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PREFACE

Intellectbase International Consortium (IIC) is a professional and academic organization dedicated to advancing and encouraging quantitative and qualitative, including hybrid and triangulation research practices. This volume contains a number of selected papers presented at the Fall 2007 Intellectbase International Consortium Conference in Atlanta, USA, October 25-27.

The conference provided an open forum for Academics, Scientists, Researchers, Engineers and Practitioners from a wide range of research disciplines. It is the first volume produced in the following peer-reviewed EBMAST [Education, Business & Management, Administration and Science &Technology] unique format.

The theme of the proceeding is related to pedagogy, research methodologies, organizational practice, ethics, Accounting, management, leadership, political issues, health engineering, social psychology, eBusiness, marketing and information science. IIC promotes broader intellectual resources and exchange of ideas among global research professionals through a collaborative process.

Intellectbase International Consortium (IIC) is responsible for publishing innovative and refereed research work on various related themes. The scope of this proceeding (IHART) includes: data collection and analysis, data evaluation and merging, research design and development, hypothesis-based creativity, reliable data interpretation, information transfer and knowledge sharing.

To accomplish this assignment, IIC will continue to publish a range of refereed academic journals, book chapters and conference proceedings, as well as sponsoring several annual academic conferences globally.

Senior, Middle and Junior level scholars are invited to participate and contribute one or several article(s) to the Intellectbase International conferences. IIC welcomes and encourages the active participation of all researchers seeking to broaden their horizons and share experiences on new research challenges, research findings and state-of-the-art solutions.

SCOPE & MISSION

- Promote the collaboration of a diverse group of intellectuals and professionals worldwide.
- Bring together researchers, practitioners, academicians, and scientists across research disciplines globally - Australia, Europe, Africa, North America, South America and Asia.
- Support governmental, organizational and professional research that will enhance the overall knowledge, innovation and creativity.
- Build and stimulate intellectual interrelationships among individuals and enterprises with an interest in the research discipline.
- Present resources and incentives to existing and new-coming scholars who are or planning to become effective researchers or experts in a global research setting.
- Promote and publish professional and scholarly journals, handbook, book chapters and other forms of refereed publications in diversified research disciplines.
- Plan, organize, promote, and present educational prospects - conferences, workshops, colloquiums, conventions — for global researchers.
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EDUCATION

FULL PAPERS
DEMOCRATIC VALUES IN AMERICAN HIGHER EDUCATION: A REVIEW OF REFORM PRACTICES BEARING ON THE CORE IDENTITY OF MODERN HIGHER EDUCATION

Robin M. Latimer
Lamar University, USA

ABSTRACT

Review and analysis of recent publications and research delineates the core identity of modern higher education and the polarized democratic practices being applied in the United States which both reinforce and challenge that identity. Neoconservative sources have focused activism on the economic dimensions of workforce readiness, accountability, and governance, compounded with a grassroots claim for in loco parentis rights at the institutional level. Neoliberal advocacy and activism have formulated a civic-based dialogical strategy that is both polemical relative to federal reform initiatives and strategic relative to democratic concepts of the traditions of liberal education. The value and/or authenticity of these democratic efforts is questioned in reference to a profile of global education reform as a means of producing self-regulation that serves the interests of a global economy. The information in this review suggests that there is a need to describe and measure the tenor and authenticity of the democratic values brought to bear on the identity of higher education in the United States by the diverse constituents of a polarized political will. Training that creates awareness of the possible co-implications of democratic practice with the core identity of higher education is recommended.

INTRODUCTION

The purpose of this research is to review and analyze current research outlining the polarized democratic practices being applied to ameliorate the crisis challenging the core identity of higher education. Lawton (2006) noted that the call for reform of American education at all levels is symptomatic not just of high tuition and low test scores, though these problems are real. Instead, Lawton suggested that this call for reform mirrors deeper issues in American culture, including growing diversity, and a values crisis in the home and in the larger society. America education is increasingly viewed as existing in a democracy “compromised by an undemocratic economy, by undemocratic communications and media industries, by undemocratic cultural institutions, as well as a form of representative government that many see as serving special interests” (Begley, 2003, p.12). Despite the clarion issues around the state of the democracy in which American education finds itself, the political terminology applied is quite often a call for reform of the institutions of education itself (Pongratz, 2006).

The present crisis has met with the response of emerging political movements, neoconservatism (Young, 1990) and neoliberalism (Kezzar, 2006). These responses may be part of what Starratt (2003b) has noted appears to be a broad-based resurgent priority in American society for democratic practices. Additionally, it appears that this crisis is creating an attraction to democratic process inside of a global context that compels attention to environmental concerns and emphasizes the pursuits of democratic process within international discourses (Begley, 2003).

REVIEW OF LITERATURE

The core identity of American higher education has not been significantly challenged until the last few decades (Altman, Berdahl, & Gumport, 2005; Young, 1990). Responses to that challenge have been highly polarized. Neoconservatism intends to redress grievances about the intrusion of a government into the everyday world (Young, 1990). Neoliberalism has shaped itself in intentional dialoguing across and among education and human services institutions (Kezzar, 2006) in what appears to be a corrective influence on Old Left liberalism. Young (1990) observed that the crisis in modern education began in the 1960’s, with the Student Movement. That crisis
resolved in ways that opened questions about the “moral foundations of education, about its relation to the freedom of the individual and the purpose of the state” (Young, 1990, p. 3). This crisis in turn owes much of its existence to the traditional identity of education, especially higher education, as it has adapted to educational problems that are part of the “crisis of modernity” (Young, 1990, p.3).

**Consistent Identity of Higher Education**

The university remains the most significant institution in the production and dissemination of knowledge, with journals, books, research centers, and databases under its command (Altbach, Berdahl & Gumport, 2005). These authors suggested that this is true even in an era when the corporate giants of technology, such as Google and Microsoft, have begun to stake a claim in the knowledge markets. Added to this stable aspect of the identity of higher education is its entrenched presence as a “center for civil society” (Altbach, Berdahl & Gumport, 2005, p.15).

Silver (2006) surveyed histories written in a 25-year period about higher education and concluded that these histories recommend that higher education had a certain ineffable ability to retain a general character or identity despite the alterations of nomenclature and the effects of historical interpretation. American higher education reform occurs inside of traditions that confer a core identity of higher education as an institution which is concerned with existing and growing bodies of learning and knowledge and which acts as a “civil center” (Altbach, Berdahl & Gumport, 2005, p.16).

Altbach and colleagues (2005) observed that this core identity includes a common heritage in a very stable and often resilient institutional model, the single model extant in the modern world, the European model of the university, originating in Italy and France in the 12th century, and still the one common academic model globally (Altbach, Berdahl, & Gumport, 2005).

Young (1990) noted that the German concept of Bildung (education) was relayed through Kant and emphasized the classical and liberal traditions’ emphases on the formation and development of the whole person. It remains deeply influential in educational thought today. Involved in that thought is an emphasis on autonomy and accountability for the taking rather than receiving of the intellectual and moral rights of adulthood (Young, 1990). Additionally, the concept of each succeeding generation transcending the previous one has its roots in the classical and liberal traditions (Young, 1990).

Altbach and colleagues (2005) included as an aspect of higher education’s consistent identity a standing tension between the autonomous character of higher education and its accountability to the communities it impacts. In recent years this tension arose in the “unwritten pact” that devises an exchange of student access for provided resources (Altbach, Berdahl & Gumport, 2005, p.16). This unwritten pact is a major object of neoliberal efforts at democratically rechartering higher education in this era of crisis (Kezzar, 2005).

**Neoconservative Democratic Response**

Neoconservatism deals with the failure of the government to deal with crime, poverty, and economic issues, and engenders a crisis of motivation (Young, 1990). This movement, emerging from what is called the New Right, has answered the crises of our time, including that of education, with focus on freeing up economic energy (Young, 1990). The resultant privatization creates a shift away from democratic processes and the development of a strong rich-poor divide in the United States and elsewhere (Young, 1990).

**The Spellings Report.**

The steps for a reform of the educational system at the federal level were outlined in September of 2006 in the report from the bipartisan Commission on the Future of Higher Education formed by Department of Education Secretary Margaret Spellings (Perley, 2006). The report recommended six steps that included an alignment of high school standards with college expectations, an expansion of the successful principles of NCLB to high schools, a redesigning of the 12th grade NAEP test to make it a predictor of college and workforce readiness, and initiatives around literacy (U.S. Department of Education, 2006). The verbiage of this action plan sidestepped concepts of direct control of higher education, but it clearly suggested pressure applied through alignment,
measurement, and reporting (Liberal Education: America’s Promise, 2005). One could conclude on the basis of the advance responses (Field, 2006) that these steps on the part of the Department of Education under Margaret Spellings were anticipated and planned for by state college and university administrations. Their probable concerns appeared concerned with protecting numerous traditions of higher education associated with non-governmental democracy agendas in the United States, including privacy and accreditation agendas (Field, 2006).

In loco parentis as a form of democratic dissent.

Historically in loco parentis practices have frequently conflicted with democratic urges for individual rights and due process (Conte, 2000), with notable exceptions. One might question whether their renewed ascendance signals a decrease in those urges. Giroux (2006) noted that this polarization is driven by “a diverse number of right-wing forces who have highjacked political power and ... waged a focused campaign to undermine...academic freedom, sacrifice critical pedagogical practice..., and dismantle the university as a bastion of autonomy, independent thought, and uncorrupted inquiry” (p. 2).

Giroux (2006) noted further that the methods of this right-wing effort are to adopt the vocabulary of individual rights and academic freedom in a deceitful practice that smears and libels professors and programs and obtains legislation that cuts already meager federal funding. One example of such a highjacking on the part of the New Right may be the ostensible federal imperatives calling for dialogue. One might note that the initial work of neoconservative Secretary Spellings and the DOE on education was performed under the rubric of “A National Dialogue”, a format that was applauded by the LEAP initiative, which simultaneously critiqued the overall plan (Liberal Education: America’s Promise, 2005).

Pongratz (2006) identified this type of political “shadowboxing” (p.473) between neoconservatives and liberals (either Old Left or neoliberal) as the masquerade of educational reform beneath which lies broad governmental strategies for control of subjects in the global market. Pongratz (2006) observed that it is significant that the German accountability test, PISA, was developed under the auspices of the Organization for Economic Cooperation and Development (OECD). Pongratz (2006) suggested that this test is part of larger neoconservative trends in Germany and Europe aimed at defining students within “technologies of the self” (p. 474) and of self-regulation that line up with government-based global economic designs.

Neoliberal Democratic Response

Young (1990) observed that the Old Left has refused to view socialized labor and the welfare state as untenable, despite the fact that the emancipatory impulse of this view of labor has ceased being functional. Neoliberalism attempts to correct this myopia with new practices in leadership ethics (Kezzar, 2006). As well, neoliberals are applying strategies for civic empowerment through democratic dialogue (Kezzar, 2005).

In loco parentis and Habermas’ lifeworld.

The shared responsibilities of parents and educators do not have to be viewed simply as a reflection of the pendulum shifts of in loco parentis (Lawrence-Lightfoot, 2003). Instead they can become a reflection of a developing quest for the dialogical qualities in which democracy has traditionally been fostered (Lawrence-Lightfoot, 2003). If one assents to the dictum of Habermas that the “life world” [daily, familial world] of humans has been increasingly colonized by the “artificial world of rational order” [public life, mass production and technologies] (Starratt, 2003a, p.72), then the school or college is one of these colonized (or as Starratt referred to it, “administered”) areas. As such, like other major objects of this colonization, the corporation, for example, the educational institution can benefit from the corrective, even transformative, aspects of advances in the very same natural, social, and human sciences that, ironically, led to its “colonized” status (Starratt, 2003a).

Rechartering through intentional dialoguing.

Kezzar (2005) noted that higher education is a social institution enacted by a social charter that needs constant renewal and has been so in the United States since Harvard opened its doors. As a social institution, higher education has a long-standing mission, values that support that mission and a historical pattern of rights and responsibilities education that are the object of the efforts of social rechartering (Kezzar, 2005). Kezzar (2005)

alluded to the creation of metamovements (alliances across organizations) as one step in the intentional dialoguing necessary for implementing the rechartering of higher education (Kezzar, 2005). Such alliances include not only educational institutions but human services organizations, such as the Alliance for Families and Children, which has just completed a set of six lengthy pilot studies in creating self-efficacy and civic engagement in those individuals who receive services (Alliance for Children & Families, 2006).

Rechartering through ethical leadership.
An early plan to begin the work of renegotiating the social charter for higher education urged a dependence on leadership rather than policy and planning because of the decentralized aspects of higher education systems (Bok, 1982). Dependence on leadership, however, assumes that leaders can maintain the public engagement needed to garner support from the public (Kezzar, 2005). This dependence assumes the public’s trust of leadership in an era notable for a dearth of research on the performance of state governing boards of public universities (Kezzar, 2006). As well, this dependence occurs in a time during which the challenges facing such boards are critical, and the public mistrust of all board-structured governance is high in the wake of the collapse of Enron, among other board-governed corporations and organizations (Kezzar, 2006). At the same time, the Association of Governing Boards of Universities and Colleges asserted that relationships between college presidents and their governing boards must improve for institutions to attract strong leaders and to be competitive in the higher-education market (Selingo, 2006).

Intentional dialoguing at the professional level.
The LEAP initiative, a reform package offered at the professional level, enjoins emergent models of democratic dialogue and civic participation, rather than federal mandate, in reference to many general concerns of the American public about higher education (Lawton, 2006). Among these concerns are the increasing costs of and the appropriateness of higher education, the relationship of the college/university experience to practical needs for job-related knowledge and skills, and significant debates about the relationship of pedagogy to ideology (AACU, Liberal Education: America’s Promise, 2005).

Outcomes flashpoints raised by the Spellings Report were addressed by Carol Schneider, President of the AACU and chief author of LEAP along with Don Harward of Bates College, in an interview in which Schneider reinforced the traditional aspects of liberal education as providing leadership knowledge. She stated this knowledge to be developing qualities of mind, and encouraging res publica, or responsibility to society. Schneider clarified that the definition of liberal education used by LEAP is not a version of a liberal arts curriculum and that it does not espouse a canon (personal communication, March 20, 2007). Instead, Schneider argued, the LEAP definition upholds these three tenets of classical liberal education. She added that LEAP’s liberal education outcomes that “pre-empt the empty category of outcomes, the vacuity of the outcomes category” (personal communication, March 20, 2007) in the Spellings Report. Schneider further noted that these same three tenets are referred to by business and government, which are clearly asking for the outcomes of liberal education in knowledge, values, and skills categories, though they balk at the actual use of the phrase or concept of liberal education (personal communication, March 20, 2007).

SUMMARY AND CONCLUSIONS
The polarization of higher education relative to parental values is well-documented (Lawrence-Lightfoot, 2003; Giroux, 2006) and played out daily in the media’s fascination with the concept of the “helicopter parent”, the less-than-flattering moniker applied to the monitoring, controlling, advocating, and activist behaviors of parents of contemporary college students. These parental behaviors are frequently viewed as interruptive of the defining construct in higher education of Bildung (Young, 1990), which enjoins a definition of education as something taken rather than received. The intensely polemical relationship of the work of the two strong political actors discussed above, the Department of Education under Secretary Margaret Spellings and the Association of American Colleges and Universities (AACC) under the presidency of Carol G. Schneider may be viewed as exemplary of the conflicting democratic values operationalized in the democracy-based agendas and processes of American higher education today. The outcomes debate, as one may term it, clarifies the neoliberal emphasis on civic outcomes and the neoconservative emphasis on economic outcomes.
This polarized emphasis of democratic ideals applied within an era of higher education crisis was reviewed in the literature in reference to leadership as well. Kezzar (2006) noted the dearth of research on the performance of the leadership of state governing boards of public universities in an era rocked by ethical scandals such as Enron (Kezzar, 2006). At the same time the AGBUC recommended that relationships between college presidents and their governing boards must improve for institutions to attract strong leaders and to be competitive in the higher-education market (Selingo, 2006). The neoliberal thrust of Kezzar's work is on the ethical aspect of boards themselves, their commitment to democratic process included. The AGBUC casts this matter in more economic terms. The literature review supported the idea that the coincidence of these debates is not likely an accident. Instead, it seems probable that the identity of higher education and democracy are co-implicated.

**IMPLICATIONS**

The information in this literature review suggests that there is a need to describe and measure the tenor and authenticity of the democratic values brought to bear on the identity of higher education in the United States by the diverse constituents of a polarized political will. Mixed-method research on new evaluative processes around the democratic behavior of academic leadership, including government-based and profession-based leadership, may be beneficial. It is important to ascertain the degree to which political will has been strategically polarized inside of broader global governance strategies as was suggested by Pongratz (2006). Educator and administrator training that enjoins significant policy awareness may be warranted.

**REFERENCES**


SYSTEMATIC APPLICATION OF SOCIAL SKILLS FOR BUILDING AN ENDURING CLASSROOM MANAGEMENT PROGRAM: EVOLUTION OF “BOSS”

Peter Ross
Mercer University, USA

Classroom management and student discipline are critically important skills in today's teaching environments. Over the past few decades, classroom management has been among the most frequently requested areas for professional training from teachers (Baker, 2005; Maag, 2001). And, because of recent changes in IDEA which advocate inclusion of special education students, classroom management is even a higher priority for teacher expertise (Meadows & Melloy, 2006). Current inclusion practices stipulate that special education students be served in regular classroom settings to the fullest possible extent. This group of students includes those diagnosed with emotional/behavior disorders (EBD) and other exceptionalities which present discipline challenges for the teacher.

Many well-intentioned teachers often employ ineffective classroom management strategies (Maag and Katsiyannis, 1999). In fact, when scrutinizing the types of strategies often implemented, most can be characterized as unsystematic, reactive practices regarding classroom management (Olive, 2004). In other words, rarely is there a systematic, theory-integrated, and enduring approach for increasing desirable classroom behaviors [especially when not relying on extrinsic reinforcers]. Instead, the typical classroom management strategy consists of repeated teacher responses to inappropriate behaviors. This type of teacher response to inappropriate behavior often is punitive, which results in temporary or negligible behavioral changes (Freiberg, 1999). Therefore, most teachers ultimately “pay attention” to instances of inappropriate behavior during the course of the day. For example, when misbehavior occurs, the teacher may reprimand the student (i.e. deliver a mild verbal punisher). In this way, the teacher focuses attention on the inappropriate behavior from the student and may neglect praising desirable behavior when it occurs. It can be seen then that weak classroom management practices often are reactive rather than proactive and offer no persistent, effective strategy for use throughout the school day.

Other problems with classroom management often are encountered by teachers. Many practices by teachers for handling discipline problems are based on punishment. Punishment is a weak motivator, offers little incentive to improve or correct behavior, and does not present a model of how to change behavior (Maag, 2001). Punishment strategies for classroom management also promote undesirable side effects among students. For example, undesirable behavioral side effects from punishment-based management strategies can include lying, stealing, anger, and retaliation toward the teacher (Hyman, 1997; Schmidt, 1982). Ironically, then, punishment-based methods for classroom management can actually increase the problems most teachers are attempting to avoid or reduce in the educational setting.

Positive reinforcement strategies typically are more effective and enduring in their results with classroom management versus punishment-based strategies (Martin and Pear, 1996). For example, verbal praise, earning privileges, and token reinforcement often have been implemented with fair success. However, some teachers resist the use of extrinsic reinforcers and related procedures (i.e. manuals, etc.). Teacher complaints with these procedures range from moral problems with overuse of extrinsic reinforcement to the wide complexities of implementing and maintaining token programs (Lepper, Iyengar, & Corpus, 2005). The use and management of token reinforcement with backup reinforcers can be cumbersome. Related responsibilities for this type of classroom management strategy include receptacles for primary tokens, expenses of backup reinforcers, accounting issues (keeping up with numbers of tokens earned per child during the course of the day/week), and storage and space issues.

Social skills often are cited as important ingredients in classroom management (Luiselli, Putnam, Handler, & Feinberg, 2005; Wentzel, 2003). It is recognized that high frequencies of pro-social student behaviors like
cooperation, courtesy, and compliant behavior are related to effective classroom management (Freiberg, 1999). However, outside of rudimentary recommendations, these behavioral components also are not commonly employed in a systematic, integrated technique. This study illustrates how an instructional model for teaching social skills while systematically integrating positive reinforcement produces a powerful classroom management program called “BOSS” (behavioral opportunities for social skills).

PROCEDURE

Implementation of this study is based on the action research model in education (i.e. conducting scholarly inquiry in a methodical manner while in the educational setting) (Cunningham, 2005). This study took place in a large Southern United States metro area public school system consisting of more than 100,000 students. One eighth grade teacher, one sixth grade teacher, and one second grade teacher volunteered to participate in this study. The teachers were asked to commit to the study for one half of a school year (i.e. beginning of school through the final day prior to the Winter Holiday break in December). The two middle school teachers worked in the same middle school student whose population was estimated to be about 3000 students (6-8). The second grade teacher worked in an elementary school with an estimated 900 total students (K-5). The investigator met with each teacher on a weekly basis to discuss the procedure and review progress. None of the teachers required large amounts of coaching from the investigator.

The teachers were given the following directions:

First week of the program:
Teacher states to the class that she/he will be watching for students' cooperative and polite (i.e. good manners) behavior during the day (or class period for middle/high school). Teacher explains, models, and gives examples of cooperative and polite (CP) behavior for the class. Teacher identifies a minimum of 6 daily instances (or per class period) of cooperative or polite behavior from the students. The teacher will verbally point out these instances to the class (e.g. "Thank you for being cooperative by promptly beginning your seatwork.")

Second week of the program:
Teacher continues above procedure and adds another component: teacher asks students at the end of the school day (or class period) to volunteer any personal instances of cooperative or polite behavior which occurred during the day. The teacher congratulates the student and asks for recognition of the behavior (teacher modeled several behaviors showing approval, like: clapping, thumbs-up, and high-five).

Third week of the program:
Teacher continues above procedures and adds another component: teacher asks students at the end of the school day (or class period) to identify instances of cooperative or polite behavior which occurred among/between fellow classmates (or with other adults in the school). The teacher responds with approval and asks for class recognition for sharing the observation. All three procedural steps continue throughout the program.

DESCRIPTION OF THE STUDENT POPULATION

Eighth grade

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Sixth grade

| Females | Males |
RESULTS AND DISCUSSION

All three teachers were asked to respond to a series of questions regarding the BOSS strategy (see appendix A). The following represents the results to each question (responses listed in the order of eighth grade teacher, sixth grade teacher, and second grade teacher).

Q: Were there any effects of the BOSS strategy on the number of your discipline referrals?

*Eighth grade teacher:* Yes, I haven't had one discipline referral which is down a great deal from last year.
*Sixth grade teacher:* I had four referrals; about half the number of other sixth grade teachers.
*Second grade teacher:* Yes, the amount of referrals decreased.

Q: Were there any effects on instructional time as a result of using the BOSS strategy?

*Eighth grade teacher:* The BOSS strategy increased my instructional time.
*Sixth grade teacher:* Definitely gained time for instruction.
*Second grade teacher:* Yes, gained instructional time. The students seemed more attentive and willing to engage each other and the teacher during instructional time.

Q: Were any student behavioral changes observed during implementation of the BOSS strategy? If so, which students, in particular, showed the greatest changes in behavior?

*Eighth grade teacher:* I noticed the change particularly in girls. I would overhear them say: “I have to go do something polite so I can tell about it in class tomorrow!” I think overall that the students had a better understanding of what behavior was expected of them.
*Sixth grade teacher:* I saw more intentional polite behavior from students as a whole. Students wanted the praise. Motivated students worked even harder to seek praise for their cooperative and polite behavior.
*Second grade teacher:* I would say that at least 50% of my students showed positive behavioral changes. There were one or two difficult students that, in particular, showed an increase in attentiveness and cooperative behavior.

Q: Did you notice any generalization effects during implementation of the BOSS strategy (i.e. did you observe improvements in behavior in other settings besides your immediate classroom environment)?
Eighth grade teacher: Yes, the students were generally more cooperative with other teachers (based on specific feedback).

Sixth grade teacher: I observed improvements in behavior outside the classroom during locker breaks. Some students waited patiently for students with lockers below them to finish before going to their lockers.

Second grade teacher: Yes, the students were generally more cooperative with other teachers (based on specific feedback).

Q: Did you observe any influences on student academic work during implementation of the BOSS strategy? If so, what did you observe?

Eighth grade teacher: Nothing out of the ordinary; I did not have time to fully assess this.

Sixth grade teacher: By focusing on being cooperative, students stayed on task during class better. This affected their classwork grades.

Second grade teacher: Yes, the students improved on reading comprehension and attention to details.

Q: Did you observe any influences on actual grades during implementation of the BOSS strategy? If so, what did you observe?

Eighth grade teacher: Same as above (Nothing out of the ordinary; I did not have time to fully assess this).

Sixth grade teacher: I would estimate about a 30% increase in grades.

Second grade teacher: Scores on quizzes and grades definitely increased.

Q: What would you add or change about the BOSS strategy?

Eighth grade teacher: Nothing, it seems fairly easy to implement and effective.

Sixth grade teacher: Nothing.

Second grade teacher: Train all the teachers in my school on using this strategy. It would cut down significantly on the negative atmosphere in the school.

Q: Please rate the overall ease of implementing the BOSS strategy as a behavior management tool.

Eighth grade teacher: Very easy.

Sixth grade teacher: Easy.

Second grade teacher: Easy.

Q: What other comments would you like to add about the BOSS strategy?

Eighth grade teacher: The teacher needs to be consistent and model the behaviors that the students are expected to model.

Sixth grade teacher: I liked that it is an effective strategy that requires little extra time or effort on the teacher’s behalf.

Second grade teacher: Great strategy. I have thoroughly enjoyed using this to develop my management skills in all of my classrooms (note: also teaches religion classes in a parochial school on weekends and used BOSS in that setting as well).

Two variables, (1) instructional time gains and (2) positive behavior changes (among students) were further subjected to analysis. Teachers were asked to provide responses to a likert scale questionnaire for these two variables (see appendix B). Results for both variables were significant ($t(12) = -26.0, p < .0001$; two-tailed).

While educators routinely teach content in a systematic manner (i.e. model task-solving, provide opportunities for drill and practice, and provide feedback), teaching social skills to create a powerful management strategy should be conducted with the same procedure. Implementing BOSS as described in this study accomplishes this goal with positive results. The results from this study showed remarkable uniformity across all variables. Teachers reduced numbers of discipline referrals while gaining instructional time. All teachers reported behavioral changes among students, observing demonstration of new social skills. A change in student’s positive language
also was observed. This finding is related to students' development of self-regulation and metacognition in the educational setting. For example, teachers observed students making self-statements like: "I have to think about being polite today." Two out of three teachers reported improvements in student achievement (one teacher had no opportunity to systematically evaluate this variable).

This study can be viewed as an important investigation into classroom management and discipline. The study integrated a number of central concepts and practices, and amalgamated them into a simple to administer, yet powerful classroom management strategy. BOSS also showed itself to be a powerful proactive system rather than the typical reactive approaches to discipline.

BOSS was effective with a variety of age and ethnic groups, suggesting that BOSS is a broad-range strategy across both of these population variables. For example, middle school students responded extremely well to BOSS. This is an important finding since few classroom management strategies specifically address middle and secondary populations. BOSS capitalized on group dynamics as well; what became referred to as the BOSS "social engine". In other words, students became critical consumers of positive social skills and learned to recognize them in each other when they occurred. Students frequently were observed offering feedback to one another about pro-social behavior. Thus, the teacher ultimately functioned as a facilitator in the BOSS process versus playing the role of a full-time disciplinarian.

The social validity of the BOSS strategy also was very positive. The BOSS strategy was easy to implement and did not require special training. Participating teachers were enthusiastic about BOSS and advocated for school-wide training. Generalization of treatment effects were observed by school personnel. For example, it was reported that instructional colleagues and administrators noted positive student behaviors across many settings (e.g. classroom, media center, halls, PE, and cafeteria). Teachers reported enduring effects of BOSS with the continued demonstration of social skills at least one month beyond the termination of the study. Finally, all teachers participating in this study received very favorable evaluations from administrators regarding their classroom management skills.

With BOSS, teachers were able to quickly gain expertise in the critical area of classroom management. This appears to be largely attributable to BOSS' design. BOSS goes beyond the typical listing of recommendations needed for effective classroom management. BOSS, with its instructional components, actually integrates those important recommendations into a powerful classroom management strategy. Finally, BOSS is easily implemented and maintained throughout the school year by teachers. Based on this pilot study, BOSS shows great promise in advancing the area of classroom management and discipline.

Future investigation should look at several additional factors. Grade level application should be investigated, especially with high school grade levels. Larger teacher sample size will help validate BOSS strategy results if similar findings are obtained. A "total school" program will be interesting to assess when the BOSS strategy is applied school-wide.

REFERENCES


APPENDIX A

BOSS Questionnaire / Feedback

Please respond to the following questions. Use back of this page or additional paper if necessary.

1. Were there any effects of the BOSS strategy on the number of your discipline referrals?
2. Were there any effects on instructional time as a result of using the BOSS strategy?
3. Were any student behavioral changes observed during implementation of the BOSS strategy? If so, which students, in particular, showed the largest changes in behavior?
4. Did you notice any generalization effects during implementation of the BOSS strategy (i.e. did you observe improvements in behavior in other settings besides your immediate classroom environment)?
5. Did you observe any influences on student academic work during implementation of the BOSS strategy? If so, what did you observe?
6. Did you observe any influences on actual grades during implementation of the BOSS strategy? If so, what did you observe?
7. What would you add or change about the BOSS strategy?
8. Please rate the overall ease of implementing the BOSS strategy as a behavior management tool (circle one).

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9. What other comments would you like to add about the BOSS strategy?

APPENDIX B

1. Effects on my instructional time prior to the BOSS strategy.

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Effects on my instructional time after using the BOSS strategy.

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2. Positive behavioral changes, on average, among my students prior to using the BOSS strategy.

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Positive behavioral changes, on average, among my students after using the BOSS strategy.

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AUTHOR’S NOTE:

Since implementing this BOSS intervention, data from 19 additional teachers became available. The results are essentially identical, or perhaps even stronger, as the findings presented in this article.
FILIPINO TEACHER’S PERCEPTIONS OF INSTRUCTIONAL NEEDS FOR TRANSITIONING TO TEACH IN U.S. SCHOOLS

Rodney Davis and Mike Rippy
Troy University, USA

ABSTRACT
Since the teacher shortage is now affecting schools throughout the nation, administrators must seek unusual methods of obtaining effective teachers. American universities are not producing enough qualified teachers to meet the demand for the present and the future needs of public and private schools. The authors have found that there are an abundance of Filipino teachers that need teaching jobs. Those teachers would like to teach to the U.S. However, before those teachers start working in American schools they should be transitioned or inducted into the American Educational system. The transitioning process will help enable those foreign teachers to better handle the demands that will be made of them. This article gives details of a transitioning program that was started at the University of St. La Salle, Negros Occidental, Philippines in the summer of 2007. It gives evidence of the perceived effectiveness of such a program by the Filipino teacher participants.

Key words: Transitioning, Diversity, Induction

INTRODUCTION:
There has been much research as to the future shortage of teachers and administrators in the U.S. (Budig, 2006) posed:

Those people who are entrusted with the economic and social future of the United States should be unnerved about what is happening—and not happening—in the essential areas of teacher preparation, recruitment, and retention. The nation’s citizens, business leaders, and politicians have been warned repeatedly about an impending disaster, “a perfect storm” that is brewing, and yet their responses have been temperate and, at times, even dismissive.

One of the solutions to the impeding teacher shortage is the recruitment of foreign teachers. This article discusses the needs that Filipino teachers perceive in their transitioning process to teach in American schools. Many American schools have been trying to fill their teaching vacancies by hiring foreign teachers. However, the authors believe that these foreign teachers should be involved in a transitioning process prior to teaching in American schools.

Public school officials in Loudoun County - the fastest growing county in Virginia- have hired fifty five teachers from fourteen countries, including Costa Rica and Mexico. In Washington County, Md. School officials plan to employ as many as ten foreign teachers next fall. Meanwhile, Fairfax County is using educators from Japan, as foreign-language and culture-immersion teachers. Prince George’s county and the district are hiring teachers from the Philippines, Spain, Nigeria, Turkey, and countries in South America to fill Shortages in various curriculums, officials said (Doolittle, 2005).

There hasn’t been much research concerning the recruitment of teachers from the Philippines. However, in the future there should be more studies undertaken due to the necessity of recruiting highly qualified effective teachers to meet N.C.L.B. regulations and because of the teacher shortage. (Coates, 2006) To help alleviate this problem (The National Education Association, 2003) reports that 7.907 visas were issued for employment in K-12 schools in 2002. Sixty-seven percent of those were recruited to teach in public schools. Planas (2005) says that Clark County schools are recruiting Filipino teachers to fill vacancies in teacher shortage areas such as math,
science, and special education. The Associated press (2001) reports that Virginia Beach, Virginia schools are recruiting teachers from the Philippines, Australia, and Great Britain.

There are pros and cons concerning the recruitment of Filipino teachers. The pros include: a pool of highly qualified teachers; the diversity dynamics of teachers to train diverse populations of students in the U.S. public schools; and the English speaking ability of Filipino teachers. (McCoubrey, 2001) The cons consist of: the retention rate of foreign teachers; the hiring of foreign teachers is a short term solution to solving the teacher shortage problem; and the cost of recruiting, retaining and training of foreign teachers.

Hutchson and Jazzar (2007) posed that since all new teachers will face induction issues, foreign teachers will face even more issues. The key to resolving these issues will be having good mentoring and transitioning programs. Mentors must be selected based on their international traveling experiences, willingness to understand other cultures, and their knowledge of how to obtain instructional resources. Those mentors must help the new foreign teachers understand the practices of the schools where they will teach. They must familiarize them with the school's structure, organization, and policies. The transitioning programs must present relevant issues to help the foreign teachers adapt to the American educational system.

FORMATION OF THE SEMINAR

During a meeting of the Educational Leadership Advisory Committee at Troy University, Dothan campus (a group of K-12 school leaders, who provide direction for the Department of Educational Administration and Leadership at the university) there was a discussion about the teacher and principal shortages that exist in our nation's schools. This discussion led to the formation of a Filipino seminar.

Ingersoll (2001) posed an organizational analysis of the teacher shortage that does exist. Since the shortage is not just perceptual, administrators must be savvy in locating qualified personnel which can be difficult in rural districts. We believe that since universities and colleges in America are not graduating enough highly qualified effective teachers or principals to fill the needed positions in American schools, innovative recruiting programs such as this one in which Filipino teachers are transitioned to teach in America are important to American students and will be provide them with the best education possible.

In the summer of 2005 Dr. Rippy visited the Philippines. While there he visited several universities and chose the University of St. La Salle in Bacolod on the island of Negros Occidental for his Filipina niece to attend. La Salle was chosen because of its academic rigor, screening process, and friendliness of the faculty.

The University of St. La Salle has a rigorous bachelor, a master degree, and doctoral degree program in education. It has a screening process which is used to interview and admit students. The students that are chosen to attend there are fluent in the English language. This Filipino university produces students that are excellent in teaching academics. The students may earn a bachelors degree in elementary education with majors in English, General Science, and Mathematics. They may also earn Bachelors degree in secondary education with majors in English, General Science, Mathematics, Social Studies, Physical Education, Health, and Music.

In addition to the strong undergraduate program, this university has a demanding Master of Arts in Teaching program with majors in Filipino; General Science; Mathematics; Music, Art, and Physical Education ( MAPE); Reading, Languages and Literature; Physical Education, Health, and Music (PHEM); Social Studies; Technology and Home Economics (THE); Values Education; and Youth Ministry. They also offer a Master of Education program with students earning a master in the following majors: Chemistry, English Literature, Marriage and Family, Mathematics, Natural Science, and Literature. Their students may earn a Masters and a Doctorate in Educational Management.

In 2006 Dr Rippy again visited the University of St. La Salle. While there he met Dr. Jochico, the coordinator of international affairs at the university. They discussed how the two universities that each represented could help each other. Dr. Jochico told Dr. Rippy that she would like for him to lecture to her education students when he returned in 2007. Dr. Rippy said that he would love to make a presentation for her students.
While flying back to the U.S. from the Philippines, Dr. Rippy thought about what Dr. Jochico had said and about how Dr. Jack Hawkins Jr., the chancellor of Troy University, had challenged his entire faculty to think globally. Dr. Rippy then started thinking how to form a seminar that would be meaningful to the students and graduates of the University of St. La Salle.

When he arrived back in the states, he discussed with Dr. Rodney Davis, head of the education administration department, the possibility of forming a seminar for Filipino teachers and administrators to be sponsored by Troy University and hosted by the University of St. La Salle in the summer of 2007. Dr. Davis was very supportive of the idea. Dr. Rippy then phoned Dr. Jochico for her approval and she not only approved but she was excited about the possibility of having the seminar on her campus. She in turn got Dr. Balor, dean of education at the University of St. La Salle, involved in formation of a proposal. The four representatives of both universities collaborated in completing the proposal for a week long seminar to be conducted at the University of St. La Salle. It was then processed through the proper channels at Troy University where it was approved at each level. It was funded through the chancellor’s funds and the seminar was borne.

**THE FORMATION OF THE SEMINAR PROPOSAL**

Dr. Rippy had seen an informational piece about Baltimore City schools recruiting Filipino teachers to help alleviate some of their teacher shortages. Dr. Rippy called Dr. Patrick Crouse, a principal at one of the Baltimore city schools, and asked him about the process and how well his recruiting went. Dr. Crouse told Dr. Rippy a lot of positive things. Dr. Rippy then asked him about what he anticipated would be some of the weaknesses of his Filipino teacher recruits. Dr. Crouse told Dr. Rippy that Filipino teachers need a transitioning process where they would be taught about teaching in America, classroom management skills, living in America, and some of the cultural differences that the Filipino teachers would face. Dr. Davis and Dr. Rippy met and discussed some of Dr. Crouse’s ideas along with the ideas of some Filipino teachers, Carla Gomez Lopez and Peter Joseph Esperanza, who were already teaching in U.S. schools. Dr. Jochico and Dr. Balor were then involved in the discussion and the components of the seminar were formed.

**COMPONENTS OF THE SEMINAR**

In May 2007 Dr. Rodney Davis, head of the department of Educational Administration; Dr. Lance Tatum, Interim dean of Troy University’s education department; Dr. Ingram, director of university college for Troy University; and Dr. Rippy, flew to the Philippines and to Bacolod to conduct the seminar which was divided into modules that had been determined by the team of educators that were involved in the formation of the seminar. The modules included Teaching in America, Brain-based learning, Living in America, Classroom Management, Student Assessment, Issues with N.C.L.B., Data-Driven decision making, Educational Leadership, Motivating students, teaching techniques, communication and problem solving.

**THE SEMINAR**

The seminar was presented in May 2007 for the purpose of establishing a positive relationship with the University of St. La Salle, to improve educational techniques in Filipino schools and to aid in the transitioning of Filipino teachers and administrators to America.
Some of the participants at the seminar
Entrance to the University of St. La Salle

Recent Teacher Education graduate from the University of St. La Salle

DESIGN

After the seminar a questionnaire was developed and administered by the teacher education staff of the University of St. La Salle in Bacolod, Philippines. The questionnaire contained eight questions that were used to evaluate the perceived appropriateness of areas taught in the seminar and the helpfulness these areas would be in transitioning the participants to teach in the U.S. A Likert scale was used in which one equals strongly disagrees, two equals disagrees, three equals agrees, and four equals strongly agrees.

FUTURE RESEARCH QUESTIONS

When Filipino teachers arrive to teach in America, a quantitative study will be conducted to determine the perceived accuracy of the Filipino teacher’s believes as to components needed in transitioning them to teach in the U.S. A study will also be conducted after they have taught in America for one year to compare perceived transitioning needs with actual needs. This study will aid the writers of this article in adapting the components of the next Filipino transitioning seminars. The next seminars will be conducted at the University of St. La Salle and Tarlac State University in July of 2008.

Questions to be evaluated:

1. Were the transitioning perceptions valid?
2. What are some additional components that should be taught in the seminar?
3. What components of the seminar were not important and should be left out?
RESULTS OF THE SURVEY CONDUCTED AT THE CONCLUSION OF THE SEMINAR

Seminar Topics presentations areas evaluated:

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<td>Effective Classroom Management</td>
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<td>Educational Leadership</td>
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<td>Living &amp; Teaching in America</td>
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<td>Communications Skills</td>
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<td>Global Education</td>
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Demographics results:

The seminar participants consisted of sixteen males and forty females for a total of fifty-six participants. Thirteen had no teaching experience, ten participants had from one to three years of teaching experience, five participants had between four and nine years teaching experience, four participants had between ten and fifteen years experience, and nine participants had more than sixteen years experience. There were eleven participants that had just graduated from the teacher education program at the University of St. La Salle. Seventeen were either elementary or secondary teachers, ten were college teachers, four were state department workers, and one was a retired administrator. Eighty-two percent of the participants strongly agreed that the seminar was helpful and seventeen percent of the participants agreed that the seminar was helpful. No participant disagreed or strongly disagreed that the seminar was helpful.

RESULTS OF THE SURVEY

- All seven sessions gained a positive score between agree and strongly agrees.
- The session “Living & Teaching in America” had the highest mean score (M= 3.818) of all sessions.
- “Effective Classroom Management” and “Educational Leadership” session’s mean scores were tied for second with an M of 3.727.
- The two session with the lowest mean scores were “Communications Skills” (M= 3.563) and Global Education (M=3.566)
- The session on Brain-based Learning gained an M=3.611 while Data-driven Decision Making’s M=3.672
CONTENT OF THE SESSIONS

Brain-based Learning
Teaching techniques based on brain-based learning was discussed.

Effective Classroom Management
This presentation gave the participants ideas concerning classroom management techniques that work with American students. The session involved the formation of classroom rules and getting those rules approved by the principal, the enforcement of rules, student rewards, forming a classroom setting that is conducive for student control, and the motivation of students.

Data-driven Decision Making
A discussion was held to show ways of obtaining and analyzing student’s data. The analysis of the data were then used to direct teaching strategies to help improve student scores.

Educational Leadership
A presentation was given concerning the different leadership styles of school administrators. This knowledge will aid Filipino teachers in dealing with their supervisors in American schools.

Living & Teaching in America
The participants were given details about teaching and living in America. The participants were told about cultural differences and how to adapt to these differences.

Communications Skills
Different communication methods that would be useful for the Filipino teachers were discussed.

Global Education
Students discussed education as a world-wide phenomenon.

FACTS ABOUT THE PHILIPPINES WHICH MAKES RECRUITING TEACHERS THERE BENEFICIAL TO AMERICAN SCHOOLS:
The Filipino people speak many dialects but their business language is English so most of their teachers are fluent in English. Some of their dialects are based on Spanish since they were under Spanish rules for many years. The Spanish base of their dialects allows them to more easily learn and understand Spanish which is the first language of the new minority in the U.S.

The Philippines has a surplus of teachers with is a great number of them being unemployed. Education is the key to the Filipinos' future and it aids them in getting out of poverty. Many teachers in the Philippines have earned advanced degrees. They normally teach in classrooms where there may be fifty to seventy-five students and yet these teachers earn a very small salary of from $100 to $300 a month.

REFERENCES
ABSTRACT

This paper presents a reflective research journey on a study based on a combination of qualitative and quantitative methods on teaching Systemic Functional Linguistics grammatical features to develop writing competence of Chinese learners of English. The task-based data of students’ writing, students’ exercises were analysed by using quantitative data and qualitative data on mutual inclusive basis. In contrast, non-tasked-based data of questionnaire survey, teachers and students’ informal interviews and classroom observation notes were analysed by employing both quantitative and qualitative data analysis methods to examine students’ general understanding of SFL, attitudes towards SFL learning, teachers’ views on teaching of writing, students’ feedback and reflection on learning of SFL grammatical features, and students’ involvement and their learning interests in the classroom activities. The discussion includes the researcher’s reflection on conducting qualitative research methodology in a Chinese education discourse, particularly how qualitative research is valued by the Chinese participants and relevant stakeholders in this study.

Key words: Qualitative Research, Chinese Education Discourse

INTRODUCTION

This research study involved developing Chinese tertiary students’ writing through teaching Systemic Functional Linguistics (SFL) grammatical features. My initial research methodologies employed in this research study were quasi-experimental research and questionnaire survey methodologies. According to quasi-experimental research method, the participants were divided into controlled and experimental group of three levels: the elementary, intermediate and advanced level. Data was collected from students’ pre-teaching and post-teaching writing. Questionnaire survey dealt with the problems of the suitability of SFL to teach writing of Chinese learners of English: students’ understanding and their views and attitudes towards the effectiveness of SFL and its four grammatical features’ application. Quantitative data statistical analysis method of SPSS which was presented as descriptive statistics was conducted to analyse the quasi-experimental and questionnaire data, comparing the statistical results of the two groups of the three levels to see the differences in students’ writing before and after the teaching of SFL grammatical feature, and to see students’ general understanding of SFL and their views on SFL learning. However, with the teaching going on, a few questions were raised. I began to doubt about the real purpose of the research and the methodologies used. The questions were:

- How do I examine students’ difficulties and problems of using the four grammatical features in the process of teaching and learning?
- What are the students’ views on learning SFL and their application?
- What are the teachers’ views on teaching writing to Chinese learners of English?
- Are students interested in SFL learning?
- What are the effectiveness and pedagogical implications of using the SFL four grammatical features in teaching writing of Chinese learners of English?
With these questions, I was clearer about my research objectives:

1. to examine the suitability of Systemic Functional Linguistics to teach writing of Chinese learners of English; Two research aspects are the focus of this objective: (1) students’ understanding and the application of SFL and its four grammatical features; (2) students’ participation in the classroom activities of SFL learning;

2. to identify the writing differences between pre-teaching and post-teaching of the four grammatical features of SFL;

3. to examine the difficulties and problems of using the four grammatical features in the process of teaching and learning;

4. to investigate students’ views on learning SFL and their application;

5. to identify the effectiveness and some pedagogical implications of using the SFL four grammatical features in teaching writing of Chinese learners of English;

6. to investigate teachers’ views on teaching writing to Chinese learners of English;

Thus, I decided to rethink and further develop my research in order to accommodate the dynamic nature of the research and my own development as a researcher.

This paper firstly intends to present that a research needs to experience a constructive process to ensure the data to be applicable in relation to the research study through the reflection on conducting qualitative research to understand the nature of the setting of a Chinese education context. Secondly, it reveals that qualitative approach should be employed to add dynamism of meaning in human behaviour and social phenomena in order to strengthen the truthfulness of the quantitative data. Thirdly, the discussion focuses on how qualitative research is valued by the Chinese participants and relevant stakeholders in this study.

**REFLECTION OF THE CONSTRUCTIVE PROCESS OF DEVELOPING SUITABLE RESEARCH METHODOLOGIES**

Research methodologies are various, but the strength of the study depends greatly on using the most appropriate methodologies. With all those questions mentioned above, I thought that the quantitative quasi-experimental research method and the standardized questionnaire used to gather data were inadequate to give the answers to those questions, so in this case, finding suitable research methods was crucial.

**Interview**

According to Denscombe (1998, p. 84), to deal adequately with the research problem, the possibility of employing more than one method stems from the fact that the various methods contain their own set of assumptions about the nature of the social world and the kind of data that can be produced to increase knowledge about the world. Interview is a qualitative research method, involving a set of assumptions and understandings about a situation, in which researchers explore informants’ experiences and interpretations through special kinds of conversations or speech events (Denscombe, 2001; Mishler, 1986). According to Moser and Kalton (1971), interviews were ‘focused’, and they consist of a series of open-ended factual and opinion questions. On the basis of the above ideas, interview was conducted to obtain information from students to know their views and attitudes towards learning SFL and their application. The interview was also undertaken to find the teachers’ views on teaching writing to Chinese learners of English. Obtaining students’ views from an individual way was helpful to have supplementary information because they were the persons who experienced the real teaching and learning of SFL. Interviewing these teachers was also important and necessary because of their teaching experience, their feelings, views, attitudes and their reflection to the real teaching situation and they knew their students very well. However, data collected by the use of interviews was limited to know students’ real learning process. It was hard to see their participation in the classroom activities, their interests in
learning SFL, their questions in relation to the understanding of the grammatical features and their reflection in class. For the purpose of obtaining this information, interviews should be used alongside with other methods as a way of supplementing their data — adding detail and depth to enhance triangulation with other methods in order to corroborate facts.

### Classroom observation and students’ exercises

Questionnaire data is distinct from that which could be obtained from interviews, observation or documents and the information from questionnaires tends to fall into two broad categories of “facts” and “opinions” (Denscombe, 1998). Michael Agar (1980) suggests, information from interviews can serve as the “methodological core” against which observational data can be used to “feed” ongoing informal interviews. Pairing observation and interviewing provides a valuable way to gather complementary data. Zelditch’s argument (1962), and Trow’s (1957) with Becker and Geer (1957; 1958) suggest that the need to interrelate data is actually inherent in field methodology, because a field study is not a single method gathering a single kind of information. One of the advantages of employing multiple research methods within a particular study is that the findings of each method can be cross validated, which in turn can be used for establishing and strengthening the validity of the research instruments and the theoretical assumptions the study is based upon (Sieber, 1982). Regarding the discussions above, classroom observation method was undertaken to see students’ involvement in SFL learning and classroom activities to add supplementary data to support quasi-experimental, questionnaire data and interview data. However, in the context of writing development of Chinese learners of English by teaching SFL grammatical features, this research study involved classroom teaching process. Research should not be based on narrow view of getting answers for the research questions to identify the classroom situations of students’ participation, the problems and difficulties of learning SFL grammatical features, their interests, feedbacks, but a process of teaching improvement.

### Action research

The formalization of the theory of constructivism (Piaget, 1950) suggested that knowledge is internalized by learners. Piaget also mentioned that through processes of accommodation and assimilation, individuals construct new knowledge from their experiences. Assimilation occurs when individuals’ experiences are aligned with their internal representation of the world. They assimilate the new experience into an already existing framework. Accommodation is the process of reframing one’s mental representation of the external world to fit new experiences. Accommodation can be understood as the mechanism by which failure leads to learning. On the basis of the theory of the constructivism, it was necessary to examine how students’ learning happened in class and whether they were using their experiences to understand a lecture and construct knowledge. Action research method was conducted to examine teaching plans, teaching processes, classroom observation, and feedback from students in class. Students’ exercises’ feedback was also a way to examine students’ application of SFL grammatical features, the effectiveness, the problems and difficulties in using these features in their writing. According to the feedback and the observation, the teacher revise teaching plan to improve future teaching.

Action research as the most applied, practical strategy has been used by researchers to explore a practical problem with the aim to find the solution to a problem and it has been used to address issues of classroom teaching for some time. Burns (2000, p. 443) defines action research as the application of fact-finding to practical problem-solving in a social situation with a view to improving the quality of action within it. Kurt Lewin (1946) described action research as a spiral of steps. Each of which is composed of a cycle of planning, acting, observing, reflecting. This cycle would then move to the next cycle of re-planning, acting, observing, reflecting and the cycle continues.

Stenhouse (1975), Ebbutt and Elliott (1985), Rudduck and Hopkins (1985), Macdonald & Walker (1974) have done much to establish action research as an educational tradition. Based on Lewin’s original concept, Kemmis has refined it considerably and together with Wilf Carr, he has applied the idea exclusively to education and has encouraged the use of the term “educational action research” (Carr & Kemmis, 1986). In Husen and Postlethwaite’s International Encyclopedia of education: Research and studies (Kemmis, 1982), Kemmis’s paper “Action research” outlined principles and practice, and ‘The action research planner’ (Kemmis & McTaggart, 1982) gave detailed advice in using an action research approach to educational practice. In the ‘planner’ the self-
reflective spiral of planning, acting, observing, reflecting, re-planning are taken as the basis for a problem-solving manoeuvre.

This research study focused on developing Chinese tertiary students’ writing proficiency by teaching students theoretical concepts of SFL. It was a classroom teaching process through which teachers and students collaborated in evaluating their teaching jointly to get feedback from students, and from students’ exercises. With teacher’s observation and teaching reflection, the teacher revised the teaching plan for the preparation for next cycle teaching. It was a cycle of having interaction, raising awareness of personal theory, developing new skills or new approaches or revised teaching plans and exercises to solve problems with direct application to the classroom teaching and learning. The cycle of these acts was repeated times until students could understand and put the SFL theoretical concepts into effective practice.

Reflection of the important role of qualitative research in this research

On the basis of the above rethinking and redesign, the methodologies included in this study were quasi-experimental research, questionnaire survey, interview, classroom observation and students’ exercises analysis. I combined both quantitative and qualitative research approaches to achieve the objectives of the study. Rossman and Wilson (1984; 1991) suggest three broad reasons of combining quantitative with qualitative research: (a) to enable confirmation or corroboration of each other via triangulation; (b) to elaborate or develop analysis, providing richer detail; and (c) to initiate new lines of thinking through attention to surprises or paradoxes, “turning ideas around,” providing fresh insight. Different methods can be used for different purposes in a study (Saunders, Lewis, & Thornhill, 1997). Using a variety of techniques may provide different perspectives on the situation, thereby increasing what is known about it (Bouma, 2000). Patton (1990, p. 187) mentioned that one important way to strengthen a study design was through triangulation, or the combination of methodologies in the study of the same phenomena or programs. Regarding the discussions above good research in my opinion should be a crystallization of collective wisdom of both quantitative and qualitative research approaches.

However, according to this particular research study, what I should stress here is that qualitative methods add dynamism of meaning in human behaviour and social phenomena to quantitative approach. Qualitative research tries to understand situations in their uniqueness as part of a particular context and the interactions there. This idea is an attempt to understand the nature of that particular setting: what it means for participants to be in that setting, what their lives are like, what’s going on for them, what their meanings are, what the world look like in that particular setting. In the analysis, a faithful communication about that should be conducted with those who are interested in that setting. Sherman & Webb (1988) mentioned that qualitative research is interested in understanding the meaning people have constructed, that is, how they make their sense of their world and the experiences they have in the world. Qualitative research “implies a direct concern with experience as it is ‘lived’ or ‘felt’ or ‘undergone’”. Eisner (1979) explains that, essentially, qualitative methods are concerned with processes rather than consequences, with organic wholeness rather than independent variables, and with meanings rather behavioural statistics. As the theorists mentioned above that qualitative methods can not only help understand the nature of the real setting but also people who are in the real setting. Qualitative research is interested in interacting with people to get the deep understanding of them, and qualitative methods stress experience rather than the result.

In this research study, apart from using the objective numeric data to illustrate the quantitative information, qualitative data was most necessary to supply information of views from teachers and students’ perspectives. This study also involved in the teaching process which was also one of the characteristics of qualitative research. Therefore choosing the approaches which are best suit to the objectives of the study is what the researchers should consider. I thought in this study, without qualitative research, the questions of examining students’ difficulties and problems of using the four grammatical features in the process of teaching and learning was impossible to find the answer. It also impossible for me to get the information of students’ views on learning SFL and their application and the teachers’ views on teaching writing to Chinese learners of English. Students’ interest in learning SFL grammatical features could not be observed. It would have no pedagogical implications of using the SFL four grammatical features in teaching writing of Chinese learners of English for future teaching, and it had no meaning for me to do the research.


Research approaches in this study

According to the research objectives of the study, the theoretical discussions and the researchers’ reflection, rethinking and redesigning, both qualitative and quantitative approaches were employed to reach the objectives of the study. I summarised research approaches as follows:

Quantitative approach

Quasi-experimental research method: to identify the writing differences between pre-teaching and post-teaching of the four grammatical features of SFL;

Questionnaire survey: to investigate the problems of the suitability of Systemic Functional Linguistics to teach writing of Chinese learners of English: students’ understanding and the application of SFL and its four grammatical features and their views and attitudes towards learning SFL and their application;

Qualitative approach

Action research, classroom observation and students’ exercises analysis methods: to find the difficulties and problems of using the four grammatical features in the process of teaching and learning, their participation in the classroom activities and their interests in learning SFL grammatical features;

Interview: to get students’ views on learning SFL and their application and the teachers’ views on teaching writing to Chinese learners of English;

According to the methods presented above, qualitative research methods of interview and action research of classroom observation and students’ exercises analysis fully embodied the importance of employing qualitative approach in this research. These were the cores which support quantitative research. The effectiveness and some pedagogical implications of using the SFL four grammatical features in teaching writing of Chinese learners of English would be concluded in the finding of the research.

Data gathered

The whole data collection process lasted for a semester (48 hours), from early September to the end of December, 2006, the first semester of the academic year of Taiyuan Teachers College, China. Each level students had 3 hours’ lessons every week. Sagor (1992, p. 45) has suggested that action researchers complete a data collection plan that identifies at least three “independent windows for collecting data on the question being investigated”. Wolcott (1988) also mentioned that the strength of qualitative research lies in its triangulation, collecting information in many ways rather than relying solely on one. In this case, single source of data was not enough to achieve the objective of the study and to satisfy triangulation. On the basis of these, the data collection in this study was conducted from various angles including task-based data and non-task-based data. The so-called task-based data referred to the data with an explicit focus on the students’ writing before and after teaching SFL grammatical features, which had special requirements such as a narrative and an expository essay, with special topics and with awareness of using grammatical features they had learnt for the purpose of writing development. Data of students’ exercises were also task-based because they were driven by a task for the purpose of improving each individual’s writing competence based on purposeful exercises related to the each grammatical features of SFL. In contrast, non-tasked-based data of questionnaire survey, teachers and students’ informal interviews and classroom observation notes were also collected. The task-based data included 720 copies of students pre-teaching and post-teaching of a narrative and an exposition essays of both experimental and controlled group of three level students’ and 360 copies of students’ SFL exercises samples. The non-task-based data included 90 copies of questionnaire survey, informal interviews including the responses from 3 teacher interviewees and 6 student interviewees and 4 typical classroom observation notes.

Data analyses

Data analyses were divided into two parts, task-based data analyses and non-tasked-based data analyses. Tasked-based data analyses included pre-teaching and post-teaching writing of both controlled and experimental group students’ of the three levels and students’ exercises data. The non-tasked-based data analyses focused
on teachers and students' informal interviews, questionnaire and classroom observation data. Data analyses in this study employed two main approaches.

**Quantitative approach**

Quantitative approach used in this research was descriptive analyses including mean scores and percentage. The mean scores referred to the mean scores of using certain grammatical features in writing and the mean scores of responses on questionnaires. The percentage referred to the percentage of students who were using the grammatical features in their writing and responses on questionnaires. Two types of data were analysed: (1) the task-based data of pre-teaching writing and post-teaching writing data to see the differences and effectiveness of students' writing between before and after SFL teaching; (2) the non-tasked-based data of questionnaire to investigate students' understanding and the application of SFL and its four grammatical features and students' views and attitudes towards learning SFL grammatical features. Quantitative data analysis methods of SPSS and EXCEL were employed to analyse the data.

**Qualitative approach**

Qualitative approach of interpretation and discussion were used to analyse three main types of data: (1) the non-tasked-based data of teachers and students' informal interviews: to examine teachers' views on teaching writing to Chinese learners of English and students' views on learning SFL and their application which were categorised into different themes; (2) the classroom observation notes data: to find students' classroom involvement and their interests in learning SFL; (3) students' exercises: to examine the difficulties and problems in the teaching and learning of the four SFL grammatical features to develop writing.

**Reliability and validity of the research**

According to Burns (2004), reliability measures the subjects' level of performance by checking that they were not hindered by various factors such as motivation and mood. Validity refers to the relevance and accuracy to what is measured (Trochim, 2000).

Reliability and validity are the goals of any scientific research, but reliability is the limiting factor in determining validity. To deal adequately with the research problem, the possibility of employing more than one method stems from the fact that the various methods contain their own set of assumptions about the nature of the social world and the kind of data that can be produced to increase knowledge about the world (Denscombe, 1998, p. 84).

A commonly used technique to improve the internal validity is triangulation. Burns (2004) defined triangulation as: “the use of two or more methods of data collection in the study of some aspect of human behaviour”. He asserted that triangulation can be achieved by checking different data sources with the same method, or when different methods are used in relation to the same object of study.

Collecting data from different sources and using different methods were crucial to corroborate the quality of a research. In this research, the combination of multi-methods, multi-person and multi-site was conducted to collect data for the purpose of ensure reliability and validity of the research. Data was collected by using multi-method, not only using research methods of quasi-experimental and questionnaire survey of quantitative approach, but also the methods of interview, classroom observation and students’ exercises data of qualitative approach. The data collection was also carried out from multi-person of teachers and students of different levels to explore information to generate ideas as an inductive reasoning to the research questions. The collection of data was also undertaken from multi-site to further strengthen validity of the research. The initial and obvious benefit of this was that it would involve more data, thus being likely to improve the quality of the research. Thus the concept “triangulation” is widely used in this research to address reliability and validity of the research.

Although the research may not be very perfect, it reflected my experience of constructing, learning and doing a research. The following are some reflections I had when I was doing my research.
RESEARCHER’S REFLECTIONS

When I was doing my research, I gradually found that doing qualitative research in China has to be with great care. Different from other countries, China is a country with big population, long history, different culture and one political party in power. It has also experienced different political movements like anti-right-deviationist, Chinese Culture Revolution and etc. Though after the “Open Door Policy”, Chinese people’s ideas and attitudes towards different things have changed a lot, Chinese culture is still strongly influenced by Confucianism. Confucianism is a complex system of moral, social, political and religious influence on the history of Chinese civilization up to the 21st century. For example, in Confucianism, the term “ritual” means politeness which colours every day life. Young people show politeness to the old and children respect to their parents. Juniors are considered to owe strong duties of reverence and service to their seniors and meanwhile seniors also have duties and benevolence and concern towards juniors. Therefore, doing qualitative research in Chinese context has to take moral, social, cultural, political, and religion into account.

Interview of students and teachers

In Chinese context, students do not want to show others their shortcoming or weaknesses as western students because they normally compete with each other especially in group interview. For example, Students seldom say that they can not do or fail to do something to disclose their weaknesses. For another example, if some students in the group have positive evaluation to the teachers, and the others never have negative opinions since they respect each others’ ideas. According to Confucianism, teachers should be respected as they are students’ seniors. Chinese students feel hesitant to speak their minds because they do not often make criticism, make comments or suggestion to teachers, since they thought this may cause teachers’ embarrassment or may not be polite enough to teachers. Thus, the interview required some adjustment of the researcher to ensure that students were at home and not responding in a way of holding back the unpleasant information. In order to protect students’ privacy, I used codes to represent each student. I also tried to maintain confidentiality especially their comments on teachers’ teaching, their personal ideas to the questions to keep their identity. I also tried to ask the interview questions by using “Could you please let us know...?” or asked question in the other way round, “If you are the teacher, how do you/what do you...?”. Students felt more comfortable to tell their ideas about the teachers’ teaching and their learning difficulties. I think qualitative research respects the ideas of each individual so that the researchers can explore what they want to know and also know unexpected things in order to use these evidences to support facts.

Teachers’ interview was also conducted in group. When I was conducting teachers’ interview, I also found that I should respect each individual because Chinese intellectuals pay great attention to their “faces”. Each teacher seemed that he/she had endless words to tell what they had experienced in the real teaching situation about students writing problems, different reasons why students making such problems. It was very hard for me to stop them without causing them to lose their “faces”. As a researcher at this situation, I had to balance the time in order to let each teacher have chance to speak, however, techniques had to be employed to try to let the first speaker stop without making his/her feel impolite. I tried to grasp the new information of the first speaker and let the second speaker give supplementary ideas and I also tried to ask each individual to express his/her ideas on the same questions.

Politeness in the interviews

In the Chinese culture, politeness is more socially important than getting the truth. China is a collective society as a whole can be seen as having more meaning or value than the separate individuals that make up that society. Collectivism stresses human interdependence and the importance of a collective, rather than the importance of separate individuals. Thus interview needs to be conducted carefully so that it is culturally appropriate and also aims for authentic information. It was a challenge for researchers. According to the research techniques, qualitative research is more open and flexible or less structured. Qualitative research helps the researcher take interactive process to find “reality” and gain an in depth understanding of the experience of particular individuals or groups. However, cultural factors should be considered. There is an old Chinese saying, “Family/Domestic shame should not be made public”. Under the traditional or social pressure, people concerned will never disclose their problems such as unmarried mother, homosexuality, crimes, family problems, suicide and etc. Traditionally, people look at these issues as a shame in a family and they are unwilling to share with others. Thus for a
researcher, I think that whether the participant is an unmarried mother or he is a criminal, respecting each individual is the most important thing. It is very offensive for the researcher to get information without cultural appropriateness. Understanding them by exchanging position will be more polite and more acceptable to them. I also think that interaction is another way to deal with the problems. For one thing, we can be familiar with each other, and for another thing, we try to understand with each other. In qualitative research, politeness is the essential ingredient for researchers.

**Politics consideration in the interviews**

Conducting qualitative research in Chinese universities needs to take the political context into consideration. It is important not to discuss sensitive topics which may offend the authority, particularly when evaluating a policy which may be seen as an attack to the executives. For many years, universities have been regarded as places which are full of intellectuals and people who have radical thoughts and political sensitivities. China’s May Fourth Movement and Tiananmen Square protests of 1989 were both led by students and intellectuals in the universities. Researchers should have political awareness to avoid asking very sensitive questions and also discussing sensitive topics such as an international dispute, attitudes towards certain parties, or political policies because these may arouse attack to the Chinese government authorities or university authorities. To be a researcher, I tried to be clear about my research questions and tried not bring my own personal ideas and attitudes towards the research questions and discussions with students and teachers.

**Attitudes of Chinese scholars towards qualitative research**

Chinese scholars are not quite comfortable with qualitative research as it is seen as “weak” and too subjective. It needs a paradigm shift for the traditional researchers and educators. Chinese people pay attention to facts and they think facts are the basis as a result people have no right to speak if they do not have facts. However, they trust scientific research results such as medical examination by using technical equipment and statistical results. Scholars in China prefer quantitative research to qualitative research, for one thing, it can show the statistical result directly and it is objective, for another thing, it is simple to conduct. Some Chinese scholars also hold the views that qualitative research is “weak” and it hardly reflects reality, and others may think that qualitative research is too subjective and cannot express the ideas in an objective way.

Generally speaking, qualitative research can help further strengthen and revise a theory which is not suitable to the facts by validating, interpreting, clarify, and illustrating quantitative findings. Qualitative research can find the truthfulness of quantitative data and makes the data more reliable because quantitative findings normally fail to tell the process or the reasons why the results come into being. However, according to the above discussions, conducting qualitative research in Chinese context has its own cultural characteristics. Regarding above points, qualitative research may lose its value in certain situations if the researcher does not take Chinese context into consideration. Therefore, conducting qualitative research can be very challenging. What qualitative researchers should consider is not only the qualitative methodological studies but social, political, cultural factors.

**CONCLUSION**

This paper involved teaching SFL grammatical features to develop writing of Chinese learners of English. The researcher took her own research as an example to present a reflective research journey based on how the qualitative and quantitative methods were combined with the research process going on. At the same time, the researcher stressed the importance of employing qualitative research to reach the objectives of the study, which ensured the truthfulness of the quantitative research. Some valuations of qualitative research from Chinese participants were presented by the researcher. In conclusion, the combination of qualitative and quantitative research can improve the quality of the researches, to realize “triangulation” and to address reliability and validity. However, researchers should look at the problems from different angles to choose suitable research methodologies to reach the objectives of the studies. In the Chinese context, the researcher presented her reflection on her experience. Apart from qualitative methodological consideration, researchers should at the same time take social, political, cultural even psychological awareness into consideration.
REFERENCES


SERENDIPITY IN ACTION RESEARCH: LEADERSHIP FOR SCHOOL IMPROVEMENT

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Jacksonville State University¹,², Pleasant Valley High School³, USA

ABSTRACT

Two College of Education professors from a regional southeastern university, in collaboration with a high school principal, investigated the reasons for his school’s outstanding improvement in student academic performance. The investigations, which began with a chance conversation, continue through an academic year as the professors completed their assigned duties as consultants, student teacher supervisors, and professional development providers to this school. Researchers gathered data from school performance statistics, from frequent personal observations, and from conversations with school stakeholders. The professors and principal concluded that pro-active communication with stakeholders, caring relationships between staff and students, and consistency of message defined this school and resulted in its success. These characteristics are congruent with decades of school improvement theory developed by Larry Lezotte and others.

INTRODUCTION

Researchers are curious people. They see the world’s anomalies and want explanations. Today’s teachers, principals, and other school leaders must become researchers. If not driven by curiosity, these practitioners are driven by the requirements of making Adequate Yearly Progress under the federal No Child Left Behind legislation. Some still complain that research, even “action” research, should remain at the university. It has no place in the practical, everyday world of the school. After all, “research can be made to support anything” (Calhoun, Allen, Halliburton, & Jones’s paper as cited in Glanz, 2003). Action research, however, is a practical way of involving teachers, administrators, and even parents, students, and community members in improving their schools. Such collaborative research creates a climate and mindset for problem-solving, promotes reflection and self-assessment, and instills a commitment to continuous improvement (Glanz, 2003).

Pleasant Valley High School, a 7-12 school of only 500 students, is just what its name implies. It is located in a rural area of Calhoun County, Alabama, and is a fifteen-minute drive to Jacksonville State University, one of the largest regional universities in the state. Professors from the university work frequently in the nearby schools such as Pleasant Valley as supervisors of student teachers, consultants, and staff development providers. Opportunities for collaborative action research abound.

In school year 2005-2006 two of the authors of this paper, one a professor in secondary education and one in educational leadership, worked on several projects at the school, each unaware of the other’s work. In this year, they were in the school on an average of once a week, affording them much time for observation, an important data-gathering strategy of action research. Purely by chance, or serendipity, they began discussing experiences at Pleasant Valley over lunch. Being in different programs within the College of Education, they rarely had reason to work on the same projects or committees within the University. They agreed that the school’s climate was extremely positive and that there was a focus on academic achievement among students, teachers, and parents. Curiosity was peaked. Theories were proposed. It was time for a long conference with the principal.

In the spring of 2006, the two professors scheduled a late afternoon appointment with the principal, who had been in his position since spring 2004. Like any good researchers, their first question to him was, “What kind of data do you have to confirm our positive impressions of the school?” He proposed drop-out data and test scores because these data are criteria for achieving Adequate Yearly Progress.
Pleasant Valley High School’s student drop-out rate plummeted from 28.4% to 17.5% in one year. Test scores on the criterion-referenced Alabama Reading and Math Test (ARMT) also showed significant improvement. Students in grades four through eight taking the ARMT are placed into four categories based upon their levels of achievement: level one—does not meet standards; level two—partially meets standards; level three—meets standards; level four—exceeds standards. ARMT results for eighth graders from the past two years show a significantly larger percentage of students earning levels 3 and 4:

**Table I: 8th Grade ARMT Scores at Pleasant Valley High School**

<table>
<thead>
<tr>
<th></th>
<th>Reading—Levels 3 &amp; 4</th>
<th>Math—Levels 3 &amp; 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2004</td>
<td>45%</td>
<td>2003-2004 (No Test)</td>
</tr>
<tr>
<td>2004-2005</td>
<td>76%</td>
<td>2004-2006 76%</td>
</tr>
<tr>
<td>2005-2006</td>
<td>84%</td>
<td>2005-2006 85%</td>
</tr>
</tbody>
</table>

At the high school level, Pleasant Valley’s students also show outstanding improvement in the percentages of students who passed the subtest of the Alabama High School Graduation Test (AHSGT):

**Table II: 11th Grade Students Passing the AHSGT at Pleasant Valley High School**

<table>
<thead>
<tr>
<th>Subject</th>
<th>2003-04</th>
<th>2004-05</th>
<th>2005-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>63</td>
<td>84</td>
<td>96</td>
</tr>
<tr>
<td>Social Studies</td>
<td>63</td>
<td>76</td>
<td>98</td>
</tr>
<tr>
<td>Mathematics</td>
<td>68</td>
<td>68</td>
<td>95</td>
</tr>
<tr>
<td>Science</td>
<td>68</td>
<td>76</td>
<td>86</td>
</tr>
<tr>
<td>Language Arts</td>
<td>75</td>
<td>78</td>
<td>88</td>
</tr>
</tbody>
</table>

From spring of 2004 to 2006, all subject areas show significant improvement. Because this test reports a percentage of students who pass, success is in terms of 15-30 “real” students who have achieved success rather than failure.

In addition to the drop-out and test performance data, Pleasant Valley High School shows significant improvement in its test score proficiency index, which is calculated by the Alabama Department of Education. Zero is the minimum standard and positive numerals show strength. Indices are shown for all students and then for sub groups. Tables two and three show a proficiency index for the special education subgroup and for the lower socio-economic groups (eligibility for free or reduced lunches) for the years 2003-2004, 2004-2005, and 2005-2006.

**Table III: Proficiency Index—Special Education Students at Pleasant Valley High School**

<table>
<thead>
<tr>
<th></th>
<th>Reading</th>
<th>Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2004</td>
<td>-52.39</td>
<td>-26.21</td>
</tr>
<tr>
<td>2004-2005</td>
<td>-32.31</td>
<td>-20.36</td>
</tr>
<tr>
<td>2005-2006</td>
<td>9.96</td>
<td>19.96</td>
</tr>
</tbody>
</table>
Table IV: Proficiency Index—Free and Reduced-Price Eligible Students at Pleasant Valley High School

<table>
<thead>
<tr>
<th>Reading</th>
<th>Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2006</td>
<td>23.51</td>
</tr>
</tbody>
</table>

The total improvement shown for the special education and low socioeconomic subgroups is respectively 30.4 and 36.35 points. Often, academic progress is hard to accomplish with the special education and low-socioeconomic groups. Armstrong (2006) believes that there is a preference in discussing academic achievement to compare schools, school districts, states, or countries rather than sub groups of students; sub group data, however, may be more meaningful indices of how much a school is improving.

Professors and practitioner agreed that the data were impressive. The next question was obvious: “To what do you credit this improvement?”

The principal credits the success of his school to frequent, pro-active, and consistent communication between students, faculty, and parents. This kind of communication results in one team’s working together. As a parent of two children attending Pleasant Valley, a senior and a current seventh grader, said, “Simply put, communication has made our school a more successful place.”

A software program, Student Information Systems “STI-Home,” was installed for parents to check on their children’s grades, attendance, and discipline records. The principal and the faculty promote the new system at every opportunity, starting with a letter home to all parents and continuing at open houses and teacher conferences during the year.

Letters go home well before a student has failed. There is a form letter that warns parents that two or more classes mean summer school. However, the principal personalizes most letters home, explaining why he believes a student is failing a class. Parents see that he cares enough about their children to know them personally.

On the first day of school, the principal and assistant principal meet with all students by grade level solely to communicate academic and behavioral expectations. Follow-up continues as the two administrators are visible daily and even hourly everywhere in the school building. At break times, either administrator chats informally with students. This time between classes presents a golden opportunity to get to know students and to reinforce expectations from earlier grade-level meetings.

At the first faculty meeting teachers are challenged to raise the bar in academic performance and are encouraged to provide students the safe and supportive environment needed for high academic achievement. Teachers also feel support and inspiration from the school’s leadership. A teacher of government and economics says, “We are appreciated. It inspires and motivates us.”

The professors confirmed the principal’s opinion. In the past year, they had observed what he described. The principal had given both professors more leadership and school improvement theory to reflect upon than effective communication, although the kind of communication among stakeholders that the principal described is a building block upon which school improvement is based. Valore-Caplan (1999) believes that “…if people within an organization cannot effectively exchange ideas, perceptions, and feelings, they cannot provide the clarity and seamlessness that distinguishes exemplary performance” (p. 123).

The principal and his staff have also separated what Lezotte and McKee (2003) identify as trailing indicators and leading indicators. The data, drop-out and test score, are the trailing indicators or the outputs of performance.
The effective communication described by the principal is a leading indicator that influences student academic performance.

To impact the trailing indicators of student performance, schools must focus on the leading indicators that cause or at least influence the trailing indicators. Through his three decades of research in school improvement, Lezotte proposes as leading indicators the time-tested Seven Correlates of Effective Schools: safe and orderly environment; climate of high expectations; instructional leadership; clear and focused mission; opportunity to learn/time on task; frequent monitoring of student progress; and positive home-school relationships (Lezotte & McKee, 2003). All correlates can be verified in an effective school, and all correlates interact.

The professors observed more than effective communication as a leading indicator at Pleasant Valley. They observed caring attitudes between adults and students during interactions. The professors’ data source on “caring” among students and adults as a leading indicator of the school’s success is admittedly comes from one kind of data: observation. However, they observed several significant instances.

Students at Pleasant Valley High School have a morning break of about 15 minutes. As mentioned before, this is prime time for communication among students, teachers, and administrators. Teachers and administrators are not found in their classrooms or offices during this time. They are outside with the students, informally chatting about sports, current events (usually sports in Alabama), what important events are happening at the school, and many other subjects of interest. Seventh and eighth graders do not huddle in groups, afraid to talk to the older students. They are included in conversations, as are visitors. The professors were included because they, too, were there. The adults care about what is happening in students’ lives, and the favor is returned.

The importance of communicating caring for all in an effective school is emphasized in the literature of effective schools and effective leadership. Hoy and Hoy (2003) see the trait as a factor in motivation for high student academic performance. Smith and Piele (1997) describe caring as the full attention to another person, and, for that reason, it is difficult to communicate when teachers and principals are expected to care for many people. The principal and teachers at Pleasant Valley make this effort.

One winter morning one of the professors was hopelessly lost in the rabbit warren of rooms and hallways on the lower floor of the school. Before she could find the classroom she sought, three students had offered to help her find the Spanish class. Students at Pleasant Valley are not afraid of being seen as helpful and caring in front of their peers. The other professor had similar experiences at the beginning of the school year.

A third factor the professors observed was the consistency of message and behavior from the principal. Expectations for excellent academic performance and caring behavior are continuously communicated to students and adults alike, beginning with the administrators’ initial meetings with faculty and students and continuing during break times and daily school interactions. This consistency can also be observed in the staff’s in person and written communication with parents. Lezotte sees this consistency as part of the three powerful Correlates of instructional leadership, clear and focused mission, and positive home-school relationships (2003).

In action research “triangulation” or multiple research approaches, multiple analytic procedures, and, above all, multiple data sources strengthen the credibility of findings (Glanz, 2003). The professors’ year-long experience at Pleasant Valley allowed for triangulation. It also began with serendipity, a chance conversation over lunch. Serendipity is an unexpected and delightful surprise of action research and pairs nicely with curiosity, the trait shared by all researchers.

The relationships among the researchers at the University and the practitioners at Pleasant Valley High School continue. There are student achievement data from 2006-2007 to be analyzed, visits to teachers’ classes to be made, student teachers to be supervised, and new school improvement projects to be initiated.

REFERENCES

APPLICATION OF QUALITATIVE RESEARCH METHODS TO ENGLISH TEACHING STUDIES IN CHINA

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ABSTRACT

In the past two decades the debate on the selection of the researching designs in the field of social sciences has been on, because quantitative design and qualitative design use the different ways to collect data and analyze data. Before 1950s, quantitative findings were believed to be more powerful and convincing than verbal accounts since it was widely assumed that without numbers, the scientific nature of a study would be called into questions. However, in the 1960s, quantitative design started to be challenged in its application to social sciences and qualitative research was noticed. In applied linguistic study, the debate exists as well. As it can be observed, English speaking countries have been taken a gradual shift of emphasis from quantitative research methods to qualitative research methods in applied linguistics, but in Chinese language teaching studies, quantitative research methods still dominate the field, for the traditional belief about the research design still influences the Chinese researchers’ decision. Therefore, on the basis of the contrast of the two types of researching designs, the paper examines the procedures and characteristics of the qualitative research methods and analyzes the significance of the qualitative research methods in English teaching studies in China. At last the paper illustrates how qualitative research methods can be applied in the studies of language teaching, and displays the value of it in the field.

Key words: Qualitative Research Methods; English Teaching Studies; Quantitative Research Methods

INTRODUCTION

In the past two decades the debate on the selection of the researching designs in the field of social sciences has been on because of their differences in the form of data. According to Punch (1998: 4), qualitative research is empirical research where the data are not in the form of numbers; while quantitative research is empirical research where the data are in the form of numbers. In fact, many researchers hold such a basic understanding about qualitative research and quantitative research and the debate arose here. However, whether qualitative research methods or quantitative research methods are more valid has to be discussed by observing their application and development. Before 1950s, quantitative research design was in a dominant position while qualitative one was peripheral (Wen, 2004). The popularity of the quantitative design was primarily due to its remarkable success in natural sciences in the 20th century. Social sciences, in order to justify their status as scientific, followed the natural sciences. They tried to quantify what they studied and establish the relation or pattern between two or more variables. Quantitative findings were believed to be more powerful and convincing than verbal accounts since it was widely assumed that without numbers, the scientific nature of a study would be called into questions.

However, in the 1960s, quantitative design started to be challenged in its application to social sciences and qualitative research was noticed. Many social scientists argued that social reality is different from natural reality and thus adopting the design for the natural sciences for social science is not appropriate. “Obviously, human beings and the societies in which they live cannot be studied in the same way as natural objects such as rocks and trees.” (Wen, 2004: 79) Furthermore, natural scientists can study physical objects in a detached way but social scientists who are a part of a society cannot be totally detached from the society even if they want to. Starting in the 1960s, the debate on the quantitative-qualitative issue became more and more intense. Supporters of the two designs were often intolerant and inflexible. Each side criticized the other harshly and
strove to argue for its own superiority. Naturally, studies conducted by the researchers from the two different sides were either quantitative or qualitative.

Since the 1980s, the mixed design notion was introduced by some social scientists, having realized that such a debate on the superiority of designs is unproductive. They have tried their best to make peace between the two opposing sides. They advocate that the world is so complex that both quantitative and qualitative designs are needed if the eventual purpose of research is to have a whole picture of the world. In their opinion, these two designs each have strengths as well as weakness. They are complementary to each other rather than in conflict.

Applied linguistics research in China has experienced the similar process of development, but much postponed in time. In China the study in a real sense on the applied linguistics and second language acquisition started in the early 1980s. At that time, a lot of Chinese researchers and teachers did not know much about research methodology. Gui & Nin (1997) made an investigation on the research fields, the researching methods and the data forms by reading and analyzing 755 papers published in the four most prestigious journals for foreign languages study from 1994 to 1997. They found that the Chinese scholars were interested in all the fields in linguistics, but they didn’t have enough researching methodology to support their study and 20 percent of the research used the descriptive methods, only 3 percent used the experimental methods, but 54 percent used the “illustative” methods, having great statistic random and being subjective. With the result of only 3 percent of the papers using experimental methods, Gui & Nin also advocate that the study on the non-native languages must rely on the numbers and statistics. Many researchers in China share the similar idea with them, advocating to utilize quantitative methods in applied linguistic studies. The editors from the journals for foreign languages studies also emphasize the imprortance of experimental methods and ask for the papers with the reseaches done in quantitative methods. So it is not difficult to understand why at present time a lot of Chinese scholars are still in favor of quantitative research methods in applied linguistics studis. However, some Chinese scholars have realized the uniqueness of social sciences including language learning and teaching studies. Pang and Wang (2001) argue that in China qualitative research methods are not given enough attention. And Gao Yihong and his partners (1999) made a similar investigation to Gui and Nin (1997) with a different purpose to draw the Chinese researchers’ attention on qualitative research methods, finding out that among all the academic papers published in the four most prestigious journals for foreign languages study from 1988 to 1997, only 2 percent of the papers adopt qualitative research methods. It seems that many Chinese researchers have a misunderstanding about qualitative research methods, and they think that qualitative research methods mean “non-quantitative,” implying the “unscientific” nature of the design. This misunderstanding may arise from the partial understanding of quativative research methods. In addition, the topic is chosen because so far in Chinese context there have been fewer discussions on the use of qualitative research methods in language teaching than in language learning. For instance, Pang & Wang (2001) and Wen (2004) all focus their attention on the research methods used in second language acquisition from the perspective of learners, not of teachers. Therefore, the paper will compare and contrast the two different methods, analyze the advantages of applying qualitative research methods to second language teaching studies, especially in China, and demonstrate the value of qualitative research methods in applied linguistic studies.

ADVANTAGES OF USING QUALITATIVE RESEARCH IN ENGLISH TEACHING STUDIES

To understand the advantages of qualitative research methods in its application to English teaching studies, we have to use some qualitative methods: contrast them with quantitative research methods and observe the characteristics and procedures of them.

Qualitative research methods vs quantitative research methods

Qualitative research methods originally developed from the methodologies of field anthropologists and sociologists concerned with studying human behavior within the context in which that behavior would occur naturally and in which the role of the researcher would not affect the normal behavior of the subjects. These methods attempted to present the data from perspective of the subjects or observed groups, so that the cultural and intellectual biases of the research did not distort the collection, interpretation, or presentation of the data. When the methods were developed, anthropologists and sociologists were concerned primarily with describing
the observable behaviors and activities within their natural context and describing these in their entirety from beginning to end. They avoided describing only certain selected aspects of behavior because the act of selection would be considered a distortion of nature (Seliger & Schohamy, 1989). Larsen-Freeman and Long (1991:11) also think that the qualitative methodology is an ethnographic study in which the researchers do not set out to test hypotheses, but rather to observe what is present with their focus, and consequently the data, free to vary during the course of the observation. Quantitative research, on the other hand, is concerned with an experiment designed to test a hypothesis through the use objective instruments and appropriate statistical analysis. McDonough and McDonough (1997: 47) use the term of "normative research" to refer to quantitative research. They list the characteristics of normative research as follows: description by number; significance in term of probability; use of experimental or quasi-experimental designs; generalization from sample to population; and the search for causes.

As matter of fact, there are more differences between qualitative and quantitative research methods. According to Malhotra (1993: 159), qualitative research and quantitative research designs are different in the objectives, questions, sample, data-collection, data-analysis, and outcomes, besides the numerical or statistical-narrative contrast.

First of all, qualitative research and quantitative research designs are used to achieve different objectives. The goal of quantitative design is to examine variables that have already been established in the literature and to see to what extent hypotheses regarding these variables can be confirmed and refuted, while the aim of qualitative design is to identify variables for further research and to formulate hypotheses for testing in the future. In other words, quantitative research is more powerful when the research is to validate the findings in previous studies; qualitative research is more useful when the research is exploratory in nature.

Secondly, questions for quantitative design are prespecified in the sense that they are constructed before empirical study. The prespecified questions help decide the procedures for subject-selection, data-collection and data-analysis in advance. The research thus has fewer uncertainties and ambiguities once the research starts. In contrast, questions for the qualitative design are rather general before data collection and will become focused gradually with the progress of the research. Consequently, it is quite common in qualitative research that the focus of data-collection shifts and the way of data-analysis changes over time.

Thirdly, quantitative research often needs a large sample to satisfy statistical requirements when it tests hypotheses. However, qualitative research usually involves a small sample because in-depth study requires enormous time and energy.

Fourthly, for data-collection, quantitative data are usually collected through more structured procedures than qualitative data. Contrarily, qualitative research procedures for data-collection are more flexible and dynamic.

Fifthly, quantiative data can only be analyzed statistically while qualitative data can be analyzed both non-statistically and statistically, though non-statistical analysis is more common for qualitative data.

Finally, the outcomes are different due to the exploratory nature of qualitative research. Qualitative research usually involves a few cases, and then the outcomes are less generalizable than the findings produced by quantitative research.

The above contrast between qualitative research and quantitative research shows that qualitative research methods and quantitative research methods are different in many ways, especially in data-collection and data-analysis. The differences show that qualitative research methods are more appropriate and easier to use in the studies of language teaching. It is known that language teaching is dynamic, and it's hard for the researcher to prespecify the questions before the research. In addition, language teaching is a natural process and the studies on it should also be done naturally without too much control. Besides the differences discussed above, Reichardt and Cook (1979: 10), in their summary of qualitative and quantitative paradigms, mention that qualitative research is process-oriented, but quantitative research is outcome-oriented; qualitative research is holistic, but quantitative research is particularistic. The process-oriented priciple is important because in order to study the teaching effects, the researcher must be able to trace teaching process diachronically. The holistic
principle attaches the importance of social and cultural background to research, and language teaching studies must consider the context in which the subjects and the researcher live and work. In terms of parameters, qualitative research is synthetic or holistic, heuristic, with little or no manipulation of the research environment, and thus data collection procedures with low explicitness. In this way qualitative research avoids the pitfalls felt to exist when language research is carried out in experimental settings.

Characteristics of qualitative research methods

According to Nunan (1992), qualitative research has six characteristics: contextual, unobtrusive, longitudinal, collaborative, interpretative, and organic. These characteristics tell people that such research is carried out in the context where the subjects normally live and work. The researcher does not attempt to control the phenomena under investigation. The research is usually long-term, taking place over several weeks, months or even years. Moreover, the research involves several participants including the researcher, the teacher, and the learners. Finally, generalizations and hypotheses emerge during the course of the data collection and interpretation, rather than being predetermined by the researcher. These characteristics correspond with the characteristics of language teaching studies. For example, language teaching studies should be carried out in the context where the subjects and researchers live and work because language teaching and learning occur in the different contexts and each context differs from the others. In Chinese context, language teaching usually takes in the big class, often with students over sixty. So the method choice and ways of managing the class will not be the same to those in small class. Also it is clear that language teaching studies should be done in a natural state, because language teaching itself is a natural phenomenon and too much control over the research will affect the outcomes of the research and will make the research hard to achieve the desirable results. Obviously, language teaching studies take time. To decide a better teaching method, for example, the researcher needs to apply different methods in the class and observe the process for at least one academic year. In addition, language teaching studies are collaborative work because language teaching behavior is a two-way activity: the teacher and the students. Sometimes, the teacher himself is the researcher, and sometimes the researcher is from a researching institution. No matter which situation the researcher is in, he/she must get the teacher and the students involved. It is hard for the researcher to do the research without the cooperation of the teachers and students. Then it is not easy for the language teaching researcher to have a generalization about the effect of certain teaching material, for example. He/she can only get the generalization or hypothesis gradually during the process of research. With these correspondences, it is clear that qualitative research methods are more applicable in language teaching studies.

The discussions done by McDonough and McDonough (1997: 69) about the features of a good research can explain certain advantages of using qualitative research methods in language teaching studies as well. After analyzing the features of a good research such as interest, originality, specificity, publication, sensitivity, objectivity, validity, reliability, falsifiability, replicability, generalizability, and ethics, they conclude that quantitative designs are good on objectivity, reliability, falsifiability and replicability, and weaker on interest, originality, context-specificity, and utility. Qualitative designs are good on interest, originality, sensitivity, context-specificity, and validity, while sometimes they are thought to be weaker on falsifiability and generalizability. For the studies of teaching English as a foreign language, it is very important to be interesting, original, sensitive, context-specific, and valid.

Procedures in the process of qualitative research

In the qualitative research, there is no set of standard designs or procedures as exist in experimental research. The procedures have been linked to a funnel or an upside-down pyramid, meaning that the investigation progresses from general to more specific. Another image to describe them is that of the spiral—while the researcher progresses from general to more specific data collection, and there is also a repetition of the cycles of observation and analysis. As the research progresses, each successive stage of analysis may lead the researcher to focus on a different aspect of the phenomenon for observation, as the picture becomes more focused. The following is the process of conducting qualitative research proposed by Seliger and Schohamy (1989: 121-124).
(1) Define the phenomenon to be described

Since qualitative research is synthetic in its approach, which means that at some stage the focus of observation will have to be narrowed down. Sometimes, in the initial stages of research, the investigator will enter the research context without a focus and try to be open to anything that is happening. At later stages, some kind of narrowing of focus is usually necessary. For example, if the research is being conducted in a language class, the researcher will want to decide how to narrow the scope of the observations to be conducted or what possible subsets of the behavioral unit of the language class to focus on.

(2) Use qualitative methods to gather data

Qualitative research uses various means to collect data. Often several different methods are used in the same study in order to compile a more complete picture of the activity or event being described. Because data are collected from different sources and with different means such as observations, tapes, questionnaires, interviews, case histories, field notes, and so on, qualitative research can provide insights not available through research methodologies depended on a single approach such as an experiment or a test. The use of a variety of methods of data also facilitates validation and triangulation.

Look for patterns in the data

Data which are gathered in qualitative research are raw data, in the sense that they have not been collected with any specific research question or hypothesis in mind nor have they undergone any initial sifting or selection. Once the data are collected, the researcher must shift through to find recurring patterns emerging from them. For example, in a study of turn-taking in the language class, the first stage might consist of video taping lessons. The tapes would then be viewed to discover only what kinds of turn-taking patterns emerged. Are certain request forms more frequent than others? Does the teacher in the language class request information in ways different from those used outside? How do learners request information or clarification? On the basis of the patterns which emerge, the researcher begins to formulate hypotheses and even develop the models to explain the findings.

Validate initial conclusions by returning to the data or collection more data

Once patterns have been identified in the data, the qualitative researcher will want to validate the findings. The use of a variety of methods to collect data allows the research to validate findings through triangulation. In triangulation, the same pattern or example of behavior is sought in different sources. Use of the process increases the reliability of the conclusions reached.

Recycle through the process or the data

After the initial stage of data analysis, it may be necessary to redefine the area of research and to narrow the focus. This process has been described above as “funnel”, in which the focus of the study becomes gradually narrowed. The researcher recycles through the data or through the data collection process as questions about the phenomenon being studied come into sharper focus.

The procedures themselves have justified the priority of qualitative research methods in second language acquisition. Furthermore, Seliger and Schoharmy’s comments (1989: 119) on the procedures and methods associated with qualitative research will show why more and more investigators in second language acquisition have selected these procedures:

First of all they think that much second language acquisition research is concerned with classroom learning, to which it is not easy to apply the controls necessary for experimental research. Initially, second language research was concerned with demonstrating the superiority of one method or approach to teaching second or foreign languages over others. They use an example to show the point. In the 1960s several studies tried to show the superiority of the audio-lingual method over the grammar-translation method. These studies, conducted within an experimental or quasi-experimental framework, were very ambitious and cumbersome and, in the final analysis, demonstrated very little about the relative efficacy of one method over another. Dissatisfaction with this kind of
methods comparison research, and the realization that perhaps more was involved in the effects of instruction than merely teaching method, led researchers to seek more effective ways to investigate language acquisition in the classroom.

Then, they notice that there has been an increased use of qualitative or ethnographic research approaches in psychology, education, communication, and discourse analysis. A growing awareness of the necessity for careful data collection and analysis in this type of research has led more sophisticated techniques. Although qualitative research methods do not control for variables, the development of rigorous methods for data collection and analysis have produced results that would not be possible through experimental designs.

Finally, they have sensed there has been a growing concern in second language research about the interactive or distorting effects of the research setting on the kind of language data collected (They quoted Tarone, 1982). Experimental settings, being controlled and artificial, may elicit data different from those produced in natural settings.

The ultimate goal of qualitative research is to discover phenomena such as patterns of second language behavior not previously described and to understand those phenomena from the perspective of participants in the activity. Therefore, qualitative research is useful wherever a researcher is concerned with discovering or describing second language acquisition in its natural state or context and where there are no assumptions about what that activity consists of or what its role is in acquisition. Researches on language teaching do have the features above.

APPLICATION OF QUALITATIVE RESEARCH METHODS IN ENGLISH TEACHING STUDIES IN CHINA

In the field of teaching English as a foreign language, there exists an opinion regarding teaching as an action and research as a way of reflection (Brumfit and Mitchell, 1989). This opinion sets teaching and researching into two opposite and unrelated activities. It seems that the teachers have nothing to do with the research. However, in China the language teachers are encouraged to be the researchers with the background of education reform. With the large population, the Chinese education system has been criticised as “examination-oriented education”, whose main function is to cultivate the “elite” for the society. Fortunately, the Chinese government has realized the potential problems caused by its education habits and called for a reform on the elementary education. Above all the reform measures, the government pays much attention to the teachers education. This education, like the trend in the world, also undergoes from training, through to education and to development, shifting from the emphasis on teaching skills to teaching theories then to developing the teachers’ ability of reflection. During the training called “teachers’ development”, English teachers are guided to learn how to pose the questions, how to collect data, how to analyze data, how to conclude and then how to improve their teaching. In fact, teachers are taught the ways to do research. Sometimes, the teachers’ reflection could be very critical and profound. For example, some teaching phenomena can not be explained by the theories only, but with the practice and the research of the teachers, the problems can be solved. Therefore, “action research” is becoming increasingly significant in language teaching studies in China, which purpose is to become the teachers to researches. Kemmis and McTaggart (1988, quoted in Nunan, 1992) give three defining characteristics of action research: it is carried out by practitioners (in languagae teaching, classroom teachers) rather than outside researchers; it is collaborative; and it is aimed at changing things. Jo McDonough and Steven McDonough (1997: 27) offer similar characteristics of action research by summarizing various definitions of action research: it is participant-driven and reflective; it is collaborative; it leads to change and the improvement of practice, not just knowledge in itself; and it is context-specific. All these characteristics try to describe the situations of teachers being researchers, the research work being done collaboratively, the research aiming to improve teaching, and the research being context-specific. Again these characteristics tally with the characteristics of qualitative research methods, implying the approriateness of using qualitative research methods in the studies of teaching English as a foreign language.

Then how qualitative research methods can be applied in English teaching studies in Chinese context? At present time, the Chinese English teachers are more concerned with such research topics as class managament, method choice, learning styles and strategies, teacher behavior, styles of language presentation,
testing and assessment, course evaluation, etc. And the key of research is to collect data. While quantitative research requires a numerical evaluation, qualitative research usually gathers data by observations, interviews, questionnaires, case studies and so on. In China, language teaching is mostly carried out in the classroom, and therefore, qualitative research methods are very useful for the teacher-researcher to discover and describe the truth about language teaching and language learning in the natural and authentic classroom.

Observations

Observation is a term which can serve varied purposes and have different interpretations. But here observations are restricted to the one carried out in the classroom. Observations are considered a major data collection tool in qualitative research. Data may be collected “by observing the target language acquisition activity or behavior and nothing only those aspects of the event which are of interest for the research.” (Seliger & Shohamy, 1989: 127). Observations can be classified into participant observation and non-participant observation. In participant observation, the researcher takes part in the activities he/she is studying. In qualitative research, the researcher does not approach the study with any specific hypotheses in mind, but takes notes on whatever he/she observes and experiences. The notes are usually recorded immediately after the activities so as to allow the researcher full participation in them. The period of this kind of observation is usually long and the number of the subjects studied is small (Larsen-Freeman & Long, 1991). For example, in an English classroom, the teacher-researcher may observe which students are often absent from the class, as is often the case for big-classroom language teaching, then analyze the possible reasons for the absence, and adjust some policies for classroom teaching management. Or the teacher-researcher may observe the frequency of the students using Chinese in English class and how this behavior helps or interrupts their English learning.

Non-participant observation means the researcher observe activities without engaging in directly. This leaves the researcher free to take notes or make tape recordings during the observation itself. For example the teacher researcher may observe the students’ pronunciation and make a recording. With the notes, the teacher-researcher can analyze the problems, may be caused by their mother tongue, or by the incomplete understanding of their vocal organs, and then find out the possible measures to improve the students’ spoken English.

Both participant and non-participant observations have many positive qualities as research methods used in language teaching studies. The researcher using the methods can provide the audience with a detailed and comprehensive description of subjects’ second language acquisition behavior and teachers’ reflection, even though the methods have some limitations of its ability to keep the research really natural and the division of the researcher’s attention in participant observation, participating and observing spontaneously.

Interviews

Interviews are also a primary research tool to collect data. The purpose of the interviews is to obtain information by actually talking to the subjects. In interviews, the interviewer asks questions and the subject responds either in a face-to-face situation or by telephone. In classroom research, Hopkins (1993: 125 and 127) lists three applications of interviews: to focus on a specific aspect of classroom life in detail; teacher-pupil discussion (diagnostic information); to improve the classroom climate. Nunan’s list (1992) covers SLA research, language testing of oral proficiency, conversational analysis, linguistic variation and so on. McDonough and McDonough (1997) suggest to add some other uses like needs analysis; program evaluation; individual case studies; and mini-surveys.

Interviews may have varied types, but in qualitative research, interviews are usually divided into structured, semi-structured (semi-open), and unstructured (open). Structured interviews are said to be close to the standard questionnaire, because the questions are prespecified for surveying relatively large populations by asking the same questions in the same order. Structured interviews have been widely used in research on language learning, for example, in data collection on attitudes or proficiency. Semi-structured interviews have a structured overall framework but allow for greater flexibility within limits, for example, in changing the order of questions. The interviewer, then remains in control of the direction of the interview but with much more flexibility. Unstructured interviews, which is also called open interviews, is mostly used in qualitative studies. Unstructured
Interviews provide the interviewee with broad freedom of expression and often resemble informal talks. They allow greater depth, and one question leads to another without pre-planning. There is usually a topic for the interview, but because the interviewee is allowed to express freely, often unexpected information emerges. This kind of information probably could not be obtained if the interview was more structured. For example, in order to prove the effect of the adopted methods in the course of Teaching Methodology, we went to the middle schools where our English majors had teaching practice. We had unstructured interviews with the teachers there and “chatted” with them about our students’ performance, their merits, and their puzzles. By the interviews like this, we got to know our students’ strong and weak points in their teaching performance after they had taken the classes of teaching methodologies, and thus find out the problems of the course.

Questionnaires

Questionnaires are printed forms for data collection, which include questions or statements for the subjects to respond, often anonymously. They are popular among educational researchers in general and language teaching research in particular, because they have a number of advantages (Seliger & Shohamy, 1989: 172):

a) They are self-administered and can be given to large groups of subjects at the same time. They are therefore less expensive to administer than other procedures such as interviews. b) Anonymity is assured, subjects tend to share information of a sensitive nature more easily. c) Since the same questionnaire is given to all subjects, the data are more uniform and standard. d) Since they are usually given to all subjects of the research at exactly the same time, the data are more accurate.

Questionnaires come in all shapes and sizes. They could be factual questions, multiple-choice, ranked questions, open-ended questions, scaled questions and so on. No matter which type is used, questionnaires, in language teaching research, can be used to survey study skills, to analyze the needs, to make assessment, for example, on certain curriculum, to investigate language skills and learning strategies of the students, and to evaluate language teaching programmes. We once used the questionnaires to investigate the channels through which our students get their teaching methods.

Diaries

Diaries are a pervasive narrative form. It is widely used in different fields like history, literature, anthropology, autobiography, sociology, health studies, clinical psychology, etc. McDonough and McDonough (1997) point out that in education and in language teaching, the diaries have become increasingly significant both as a reflective genre in itself, and as one of a battery of interpretive micro-ethnographic research techniques. And the major function that a diary fulfils is to offer what a forum for reflection. Along with the growth of interest in naturalistic modes of enquiry, the use of diaries to investigate a variety of language teaching and learning has become common and frequent.

Diaries are of different types used in language teaching and learning research, namely, language learners diaries, expert diaries, and teachers’ diaries (McDonough and McDonough, 1997). Language learners diaries are kept by the language learners. In many teaching programmes, it is now quite common practice for class teachers to ask their students to keep a journal. However, data from such conscripts is likely to be unhelpful. So the students should be given some guidelines before they start writing, and the teachers, who want to get information from the learners’ diaries, give students some detailed points to follow, such as “lessons followed,” “reactions to your teacher,” “reactions to other learners,” “comments on specific lessons,” etc. In addition, the questions like “What did you find most/least useful and enjoyable from the lesson?” or “What did you find easiest or hardest in the lesson?” are all helpful. Expert diaries refer to language learning diaries kept by language specialists who may be teachers, applied linguists, or second language researchers. They keep diaries to explore their own language-learning processes, thus revealing about language-learning strategies and processes. Teachers diaries are one of the ways for the teachers to get closest to their own work nad thus to reseach. Keeping diaries, the teacher can study the relationship between a teacher’ ideas on teaching and those of experts and theorists; teacher power; and teacher’s choice of classroom language. McDonough and McDonough (1997) think those who keep and/or work with language teaching and language learning diaries are
advocates of the genre, linking it particularly to naturalistic paradigms. They believe keeping diaries is a primary vehicle for process research.

**Case studies**

Case studies, as some researchers (McDonough and McDonough, 1997; Nunan, 1992) suggest, are not a research method itself; they employ methods and techniques in the investigation. Nunan (1992) claims case studies “hybrid” in that they generally use a range of methods for collecting and analysing data, rather than being restricted to a single procedure.

Cases are objects to be studied, so case studies are an important and convenient way for the language teachers to do research about their teaching and students’ learning. For language teachers, students are their cases. Teachers spend their working lives dealing with the students, and they need to understand those “cases”, through whom the teachers build theories, search for broader patterns, study their learners’ behaviors, learning styles, language development, successes, failures, attitudes, interests and motivations.

**CONCLUSION**

From all the discussions above, we can get two generations that in the field of teaching English as a foreign language in China, teachers are the main force of research and qualitative research methods are more appropriate methods and easier to handle for Chinese language teachers.

In Chinese education system, the main task of various research institutions is to design research and to organize teachers to do research, and teachers themselves are researchers. Research and teaching are complementary to each other as is mentioned in the discussion. In China, people have realized that research can facilitate teachers development, and in turn teachers’ involvement in research can make research more practical and problem-solving, and at the end, education quality will be improved. As McDonough and McDonough (1997: 35) point out, teacher-initiated research has important advantages: it is immediately related to classroom teachers’ problems and modes of work; it builds the bridges between theory and practice; it develops the teachers’ critical awareness; it is appropriate for subtle process lived through by the participants; and it challenges the comfortable “craft knowledge” view.

As far as research methods are concerned, qualitative research methods have priority in language teaching studies. Their features of being holistic and naturalistic, using various means to collect data, hypothesis-generating process, and being dynamic are all good for language teaching research. Data-collecting methods themselves also justify their position in research, for the forms of observations, interviews, questionnaires, diaries and case studies are all interpretive to the language teachers and teaching practice. As for a lot of English teachers in Chinese context, using numbers and understanding statistics in research are difficult for them because most of them did not have training in statistics and experiments. They can’t imagine how language teaching and language learning can be calculated as if solving math problems. Since qualitative research methods are scientific as well and can achieve the same or better goals, English teachers would like to try qualitative research methods in their research. In our university, there is a journal for the articles discussing and exploring the phenomena in middle school teaching named *Teaching and Administration*, the chief editor usually declines the papers done in quantitative research methods, for he thinks that the abstract numbers or figures are lifeless and meaningless to the middle school teachers. As Pang and Wang (2001) advocate in the research that Chinese academic field should change the situation of quantitative research dominance and take great efforts to bring qualitative research methods close to the language teachers. With more and more teachers getting familiar with the research methods and taking interested in research, English teaching itself and teaching research will make a great leap in China.

**REFERENCES**


SPREADSHEET SOFTWARE AS A TEACHING AND LEARNING TOOL:
PERSPECTIVES FROM AN UNDERGRADUATE FINANCIAL MODELLING SUBJECT

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ABSTRACT
Technology based teaching of accounting curriculum is widely researched by accounting educators. This paper reports the findings of the use of computers and Microsoft Excel spreadsheet program as a means to reflect on, and to enhance prior learning, of financial accounting, managerial accounting and finance concepts and problems, through a financial modelling subject, in an undergraduate program in an Australian regional university. Data were collected from the researched university’s formal feedback systems, Student Feedback on Subjects (SFS), and archived course materials, over a three year period (2003-2005). Using pattern matching approach (Yin, 2003), data were analyzed for making generalizations about the effectiveness of spreadsheet software usage as a pedagogical and educational tool. The study finds that spreadsheet based teaching and learning equip students with computer literacy, and spreadsheet application skills in the areas of management accounting and finance. The study also finds that the students with a few years’ of work experience outperform the students without any work experience, and appreciation of the course among the students without work experience is lower than their counterpart with a few years’ of work experience. The study has implications for accounting educators, in that difficult to learn accounting and finance concepts can be taught using a spreadsheet based modelling subject; this can provide significant insight into the relationships among numerous variables, which are difficult to manipulate and solve manually, in a traditional chalk and talk teaching environment.

Keywords: Microsoft Excel, Cognitive Thinking, Constructivism, Financial Models, Accounting Education.

INTRODUCTION

The use of computers in accounting education has been a contentious issue from the inception of the use of computers in the academic and professional environments. The accounting academics and practitioners have concurred: computers should be part of a teaching and learning tool For example, the requirement to use computers in the accounting curriculum was researched in the late 1990s (Kent & Linnegar, 1988) and the requirement is still recommended for teaching and learning purposes (Nia & Nadine, 2006; Satoshi & Gregory, 2006; Tracey & Beverley, 2006). In recent times, educators have been using different application softwares to deliver, and teach subject materials; especially spreadsheet software packages are being used to teach a diverse range of courses and to equip students with the skills and expertise to enter the workforce (Carol & Borthick, 2007; Dennis, 2004; Ian, Erwin, & Peter, 2005; Moschen, 2003; Neil, 2004; Theuri & Gunn, 1998).

Though accounting educators are using computers and software packages to deliver and teach subject materials, the effectiveness of the approach is tested from the teacher’s perspective only (except Neil, 2004). Besides, the literature on the use of computers, and spreadsheet packages is replete with issues encountered by the academics; most of these are anecdotes of the staff teaching the subject, or teachers teaching only a few topics where computers in general, and spreadsheet packages in particular, are used to solve few assessment tasks. There is a dearth in research on subject materials that are blended with related management accounting and finance topics, and the effectiveness of the subject, both from the teacher’s perspective, and the students’ perspectives, beyond a one year time period. This study is aimed to address these deficiencies by addressing the following research questions:
1. How does a teacher perceive the use of computers and a spreadsheet package to deliver and disseminate teaching materials?

2. Why does a teacher blend the subject materials with few topics from a few previously completed accounting and finance units, and design the subject materials to develop generic skills for subsequent use in the degree and for future employment?

3. How do the students enrolled in a blended subject perceive the use of computers and a spreadsheet package to learn and grasp the subject materials for their degree and for future employment?

4. Why do the students perceive the effectiveness of the blended subject materials in a certain way, either positively, or negatively?

In order to address the research questions, prior research, on the use of computers and the spreadsheet packages, is reviewed; the review however, did not seem sufficient to inform the underlying rationale behind the use of computers and spreadsheets in accounting education. So, two other theories were used to supplement the analysis: the Gestaltian cognitive psychology of learning (Borthick & Clark, 1986) and the constructivist theory of learning (Neill, 2004), both of which were studied in the context of accounting education. Using a case study approach, this research is conducted in a regional university in Australia where the subject was taught in three consecutive years, between the years 2003-2005.

The study has made a number of contributions to the growing body of the literature on the use of technology in accounting education: firstly, the teacher and the students perceived the usefulness of computers as part of a degree from two opposite perspectives, the teacher perceives that the use of the computer is beneficial, whereas the students perceived that the use of computers was minimally beneficial. Secondly, the teacher perceived that the use of a spreadsheet package is a wonderful platform to deliver and disseminate complex knowledge for lifelong learning, whereas the students missed the apparent connections among the uses of spreadsheets, the problems learned and the generic skills to be retained for other subjects, and for their future employment. Thirdly, the teacher perceived that designing and developing the subject would be useful if learning theories were consulted and aligned to subject materials, however, the students did not perceive that the deeply rooted learning theory backed curriculum mattered much in their learning of the subject materials.

The remainder of the paper is structured as follows: in section two, the relevant literature is reviewed, in section three, the theoretical framework is developed, in section four, the research method is discussed, in section five, the case is described, in section six, the findings are discussed, and in section seven, the conclusions are drawn.

COMPUTERS, SPREADSHEETS AND ACCOUNTING EDUCATION

Computers in accounting education

The computer is widely used in accounting education from the early 1990s (Borthick & Clark, 1986; Collier, Kaye, Spaul, & Williams, 1990; , 1988; Rachlin, 1981), its use has been growing to such an extent that some educational institutions are thinking of mandatory use of computers in classroom learning environment (Lawrence & Rebecca, 2003). Academics find computers as useful tools to deliver teaching materials or supplement teaching materials in a virtual learning environment; as a result students are finding the use of computers as an essential educational tool (Borthick & Clark, 1986; Hossein & Abdus, 2005; Nia & Nadine, 2006; Paul & Timothy, 2007). Computers are used in accounting education to teach advanced problems, system design issues, assess students, provide feedback and ensure better accountability (Paul & Timothy, 2007).

Accounting educators have considered computers as a reliable pedagogical tool that can enhance their teaching abilities effectively; be used to teach software and system design principles, or as an aid to impart knowledge which is impossible to disseminate in a traditional chalk and talk teaching environment. For example, accounting educators have used computers to teach the Accounting Information System (Alexander, 1996), auditing (Choi,
Students largely perceive the computer as an educational instrument that is a complement to classroom learning. Accordingly, their perceptions vary by their need to learn the concepts and practices of subject materials with computers. For example, Borthick and Clark (1986) found that students show a positive attitude towards the use of computers in the early part of a session, however, this attitude wanes with the progress of the semester. Borthick & Clark (1986) and Tracey & Beverley (2006) argued that students viewed computers as a performance enhancing instrument that can quickly provide them with insight into the complex relationships among the variables in a complex problem or case study or even give them an opportunity to receive instant feedback on attempts to solve problems. Over the years, accounting educators have placed emphasis on students’ use of computers to learn course materials through different integrative assessment tasks and encouraged students to achieve good functional knowledge of different application softwares by embedding computing skills and prior learning in other subjects. For example, Kruck and Maher (1999) and Patricia (2005) argued that computers can be used to enhance prior learning in accounting and finance subjects.

Despite the push from accounting educators, access to computers or the desire of the students to use computers in different countries revealed differing student characteristics about the use of computers in learning course materials. For example, Fink (1998) reported that Australian and New Zealand students in a computer auditing course spent less time in learning computer skills required in a computerised auditing course, than their counterpart in the US and Canadian universities. Though limited access and cost were issues for not being able to use computers in accounting education (Kent & Linnegar, 1988), the cheap availability and wider access to computers in recent times have made it possible to use computers for accounting education (Lawrence & Rebecca, 2003). More research is being carried out in different parts of the world about the educational value of computers in enhancing students’ learning from classroom teaching, integration of computers, subject materials and assessment tasks. Researchers have even gone beyond the intrinsic use of computers in enhancing students’ learning capabilities. For example, Borthick and Clark (1986) and Neil (2004) examined the impact of computer use on students’ learning from cognitive psychology and constructivist’s pedagogical theory and concluded that students’ thinking abilities are significantly enhanced by the use of computers when the computers are used for learning subject materials.

**Spreadsheet in accounting education**

The introduction of spreadsheet software has revolutionised instruction in classroom teaching and learning from the inception of computers. An spreadsheet program like Excel has been used for decades as a pedagogical aid, as a skill building tool, as a platform to build teaching materials and to learn difficult problems which are otherwise impossible to learn in a chalk and talk environment. Its popularity has been increasing exponentially. For example, Horngren, Datar & Foster’s (2006) cost accounting textbook and Ross, Westerfield & Jordan’s (2004) business finance textbook have end of chapter exercises requiring the use of a spreadsheet program.

An spreadsheet is largely used as a pedagogical tool to deliver teaching materials and equip students with the much sought after computer literacy skills. Accounting educators have used spreadsheet programs to develop students’ computing skills and spreadsheet skills. For example, the spreadsheet is used to teach spreadsheet
design skills (Alexander, 1996), teach concepts of finance (Dennis, 2004), teach general computer literacy (Mark & Clyde, 2003), and to teach skills to embed word and excel into problems solving, and interpretations (Teets & Desmond, 1995). Accounting educators have integrated different course materials and spreadsheets, embedded spreadsheet tasks with course related problems so that the students learn spreadsheet applications to real life problem contexts. In such situations, the spreadsheet is seen as an instrument through which students could grasp the course materials and visualise the link between the applied aspects of problems and the underlying concepts of the course materials. For example, students learned hands on spreadsheet design skills in an AIS course (Alexander, 1996), spreadsheet modelling in financial modelling course (Kruck & Maher, 1999), and algorithmic thinking through a modelling course (Ijini, 1983; Neil, 2004).

Some educators even think that working on problems in spreadsheets is a good brainstorming exercise which promotes enjoyment and deep learning. For example, Neil (2004) and Borthick and Clark (1986) argue that spreadsheets promote deep learning and algorithmic thinking in the students, and students enjoy working on spreadsheet models to learn course materials. Some academics even think that computer games and spreadsheet based games can foster students’ learning of spreadsheet skills and course materials. For example, Andreas, 2005 cited the use of CALVADOS game to teach opportunity costs, relevant costs and transfer pricing in a managerial accounting course, and Michelle, 2005 cited the use of Who Wants to Be (WWTB) to teach auditing course material. Both researchers reported positive learning experiences by the students when the games are used to teach subject materials. The use of the spreadsheet as a pedagogical tool goes far beyond an educator’s involvement in guiding students’ learning of detailed skills embedded through assigned course materials.

Numerous studies have reported that students learn an array of detailed spreadsheet skills through different courses. The skills are generic and can be applied to different problem contexts, and in different subjects, the educators teach these skills or the students spend time to learn these skills to use in jobs. For example, students can use spreadsheet programs to learn risk analysis skills (Dennis, 2004; Kelliher, Fogarty, & Goldwater, 1996; Togo, 1992), design and error detection skills (Alexander, 1996; Heagy & Gallun, 1994; Ian, Erwin, & Peter, 2005), develop algorithmic thinking skills (Borthick & Clark, 1986; Neil, 2004), memorisation and integrations skills (Alexander, 1996; Kruck & Maher, 1999; Teets & Desmond, 1995), and scenario analysis skills (Alexander, 1996; Dennis, 2004; Togo, 1992). In recent times, the spreadsheet is being used extensively to develop financial models that require integration of finance, cost accounting, financial accounting concepts and spreadsheet functions to build and design useful decision models (Read & Baston, 1999)(Kruck & Maher, 1999). This integration has enabled the educators to teach and expose students to advanced problem solving skills where immediate feedback on attempted problems, and error checking are possible.

THEORETICAL FRAMEWORK

Gestaltian cognitive theory of learning

Educational psychologists have proposed different psychological theories of learning. Gestaltian psychological theory of learning is one of these theories of learning (Neil, 2004). The Gestaltian approach to learning was explored in understanding the learning style of accounting students (see for example, (Borthick & Clark, 1986; Neill, 2004). In Gestaltian tradition, students learn differently by following personal learning styles. As opposed to learning problems and trying to memorise them in a rote way, students learn the underlying rules and procedures and then apply these rules and procedures to different problem scenarios: such learning is generic and can be retained longer (Borthick & Clark, 1986). Werheimer (1959) termed such learning as productive thinking and more generalizable (Borthick & Clark, 1986).

Gestaltian psychology of learning has provided insight into the approach to problem solving, and integration of theory with problems. Students following this tradition gain insight into the structure of a problem, analyse the relationships among different variables, and solve the problems by iterations. For example, in an algebraic equitation students manipulate different solutions to derive the unique solution (Neil, 2004). A student learns and solves the problem by organising the components of a problem, and derives the solution in few steps.
While the Gestaltian tradition focuses on lifelong learning of generalizable problem solving skills, it does not provide insight into alternative meanings into the solutions. In reality, students comprehend the underlying principles of solutions in different ways; as a result they solve an array of equally plausible and acceptable solution sets. Gestaltian tradition implies a unique and objective solution set for problems through different cognitive mapping processes followed by different students. In order to learn aspects of problems for lifelong use, students need to explore the literal solutions to problems, and perhaps understand the alternative meanings of problems and solutions. An alternative theory, constructivism, provides an insight into students’ approaches to problem solving and interpretation, at an individual and group level.

**Constructivist theory of learning**

Constructivist learning is a recent addition to epistemology and has different connotations. Vrasidas (2000) has summarised the major philosophical and epistemological assumptions of constructivism as follows:

- a) We can experience everything within the boundary of a real world;
- b) Structure of the world is created through interaction and interpretation;
- c) The mind creates symbols by perceiving and interpreting the world;
- d) Human thoughts are imaginative and develop out of perception, sensory experiences and social interaction; and
- e) Meaning is a function of interpretation, experience, and understanding of a knower.

These assumptions have implications for a learner, in that a learner exploring and interacting with the reality, the environment, and society will continually endeavour to search for truth or meaning. There are two different ways knowledge can be constructed: personal and social. Piaget (1970) and Von Glaserfeld (1989) argue that a personal constructivist constructs knowledge in the brain through reorganization of experiences and cognitive structures (Vrasidas, 2000). This implies that personal knowledge construction efforts and interaction with outer world shapes his/her understanding and interpretation, this process of knowledge construction is dynamic. On the other hand, the social constructivist constructs knowledge in communities of practice through social interaction (Brown, Collins & Dugavid, 1989; Khun, 1996).

**RESEARCH METHOD**

A case study approach is chosen to conduct this research. A case study approach is widely used in accounting education studies (Lawrence & Rebecca, 2003; Neil, 2004). Kaplan (1986, p. 429) argues that to capture the complexity of cost accounting and management control systems, case study research enables a researcher to capture a rich description of the context within which the complex organizational problems are located; in this study, computers and spreadsheets, as teaching and learning tools, are identified as complex phenomena to study and explore because of ongoing debates about the usefulness of computers and spreadsheets by the educators.

Any case study requires a few steps to be followed for the successful completion of a project. This study has followed a few of the steps suggested in Ryan, Scapens & Theobold (1992). Firstly, the subject was identified as a potential subject for research because it was unlike the other traditional subjects taught in the university’s accounting curriculum; it was also studied to explore the effectiveness in lifting the skills and expertise of the students and the staff members so that the insights could be transferred to the other subjects where the computer and software packages could be integrated as an educational tool.

In order to examine the research issues multiple data sources were used. Multiple sources of data improve the validity and reliability of the results obtained from a field (Patton, 2002; Yin, 2003). Two sources of data were used: the data held by the researcher/teacher between the years 2003 and 2005 - this included the subject guide, the subject resources, the software packages, personal diaries maintained throughout the semester on key teaching and learning issues, and email correspondence with the students during the semesters. The other bundle of data related to the students and were: the formal evaluation of the subject by the university (between the years 2003 and 2005), qualitative comments on 11 different aspects of the subject and the teaching, the emails from past students who completed the subject and entered the workforce, informal discussion with the
past students who completed this subject, informal discussion with the staff from local accounting firms, the tutors assigned to the workshops, and the instructor from the other campus of the university.

Analyzing evidence is a means to reach the conclusions or developing theory from a case study research (Eisenhardt, 1989; Ryan, Scapens, & Theobald, 1992). Data collected from the field needs to be analysed to make valid and reliable conclusions from a case study (Ryan, Scapens, & Theobald, 1992). Data collected from multiple sources are analysed to improve the validity and reliability of the conclusions reached in this paper. In this study, collected data is analysed by using the time series data analysis technique (Yin, 2003). Time Series Analysis is used to analyse case study evidence (Yin, 1994, pp. 113-118). In case studies, the relationships between variables, or changes in constructs or events are studied over time for building a cause and effect relationship. The data was analysed using two common qualitative data analysis techniques: coding and content analysis. In order to improve the analysis further, evidence on the same issues are corroborated using the triangulation approach to evidence assessment (Ryan, Scapens, & Theobald, 1992).

The findings from the site are generalized to the university’s formal institutional educational environment only (see for example, Patton, 2002; Yin, 2003). Mintzberg (1979 p. 585) argues that in-depth study of a small number of organisations is not a barrier to generalization. Rather, the depth of research is more important for making generalizations from data collected from the field. This study is an in-depth study of a single subject offered by one of the regional universities in Australia. The findings from this site may be useful in understanding the teaching and learning issues of other universities offering a similar subject over a similar timeframe.

FINANCIAL MODELLING IN A CURRICULUM

The subject of this research is a financial modelling subject taught over a three year time period, between 2003 to 2005, in an undergraduate program of a regional university in Australia. The student population of the university varied between the years, by gender, by work experience, and by the university entrance level scores. The subject was developed in the wake of a discussion between one of the new colleagues who joined the faculty from another university and this researcher. The staff members in the program concurred that a Business Modelling subject needed to be introduced to satisfy the professional accounting bodies, that is, the Certified Practicing Accountants of Australia (CPA) and the local accounting profession. At the time of the development of the subject, a few issues were kept in mind: the computer literacy of the students entering the degree, the skill sets constantly demanded by the employees and the profession, the abilities of the staff member to train the students in Excel and cover the subject materials, the availability of computers at the university, the completion of the pre-requisite subjects, that is, Accounting, Finance and Management Accounting. In late February 2003, the subject was adopted as a compulsory third year subject, only to be offered to the students who completed Introductory Financial Accounting, Introductory Management Accounting, and first Financial Management unit.

The syllabi

The contents of the subject were designed in a modular form so that the students could learn the contents sequentially. The subject comprised three modules: a generic spreadsheet module, a management accounting module, and a finance module.

Spreadsheet module

This module was taught to equip the student with the design issues of financial modelling. Students learned the scope of a generic financial model, the specifications of a model, the design of a financial model, actual building of a model, and finally testing and use of the model including documentation of the model for the employers. The majority of the students had essential computer literacy; however, the students did not have any knowledge about detailed design, building and documentation skills. In each of the lectures, the students were exposed to different generic ideas about model building. Illustrative methods were emphasised to teach this module (Ijiri, 1983). Diagram 1 below is an example of a generic model building exercise.
Diagram 1: A generic model design

<table>
<thead>
<tr>
<th>Ref No</th>
<th>Description</th>
<th>Ref No</th>
<th>Calculation Rule</th>
<th>Units</th>
<th>Example</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inc1</td>
<td>Selling Price</td>
<td></td>
<td></td>
<td>$14.500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inc2</td>
<td>Units Sold</td>
<td></td>
<td></td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inc3</td>
<td>Unit Manufacturing Cost</td>
<td></td>
<td></td>
<td>$86.265</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inc4</td>
<td>Selling &amp; Admin Cost as % of Selling Price</td>
<td></td>
<td></td>
<td>0.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inc5</td>
<td>General Sales Varies</td>
<td></td>
<td></td>
<td>$11,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inc10</td>
<td>Projected Hourly Cost 2</td>
<td></td>
<td></td>
<td>$10.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Management Accounting module

In this second module, the students learned about the scope of spreadsheet usage to different applied aspects of management accounting. The topics from Management Accounting were selected so that the variables can be manipulated in an input, process, and output format (Read & Baston, 1999). In this module, the students were expected to apply the skills and understanding of generic models, learned in module one. Using illustrations from each of the assorted chapters, some models were designed and built during the lectures; this was done so that the students could see the connection between modelling principles and modelling design applications, that is, the relationships between the variables and the outputs for decisions. For example, capital budgeting, cost allocations, and master budgeting are three most commonly used management accounting practices that were used in lecture sessions and for homework assignments. Homework assignments were to be done at home, either individually or in groups of two to three students to enhance firmer understanding of design, build and documentation principles of various financial models.

The finance module

In this module, some common finance topics were chosen for lecture and homework assignments. The topics were chosen to enable the students to manipulate numerical variables in Excel, and solve them. Some common financial modelling textbooks were consulted to pick and choose the topic areas. The object was to instruct the students in the chosen topics and guide them to apply these common models to real life problem situations or to similar problems they experienced in their workplace or were able to share with their peers who experience similar problems.

The problems in this module were taught to accommodate skill building, problem solving and interpreting, simultaneously. In the lectures, some examples were demonstrated to cover the financial models that embedded Excel skills, numerical solution skills, and interpretations of results from the financial models. Each problem had three distinct steps: gathering and interpreting the problem variables, applying the Excel functions through a model designed for the problem, and the interpretations of the results of the models. The in-class discussion and demonstration sessions followed homework items which were developed around similar problems. Some homework questions required the students to search the net to gather information from corporate websites, and to design models with those data.

DISCUSSION OF THE FINDINGS

The findings from the field are classified and analysed from two distinct perspectives, from the teacher’s perspective and from the students’ perspectives.
The teacher’s perspective

The discussion of the findings from the teacher’s perspective is necessary to reflect on the perceived usefulness of the subject in meeting the objectives set for the students.

Computer literacy in accounting education

The study revealed that the students had apparent lack of computer literacy, so some sort of Computer Assisted Learning (CAL) was perceived useful (Tracey & Beverley, 2006). Some of the students did not have exposure to micro computers at all while the other students were well versed in micro computers. The students appreciated the introduction of the subject because they thought that it was necessary for them to be able to use computers not only for their study of the subject but also other subjects planned for their entire university degree (Linnegar and Kent, 1988). They also needed to know computer usage for future employment as suggested by Ijiri (1983).

Spreadsheet knowledge in curriculum

The study also revealed that the students in the subject lacked sufficient functional knowledge about spreadsheet software to be able to meet the objectives and tasks set for them. The use of spreadsheet software is perceived as a necessity, especially, the design and documentation issues were perceived extremely useful for these students (Alexander, 1996; Ian, Erwin, & Peter, 2005; Kruck & Maher, 1999). Students also showed enthusiasm to use spreadsheet for managerial accounting topics (Borthick & Clark, 1986; Dennis, 2001) such as budgeting, and cash flow forecasting. Another cohort with strong finance orientation found finance topics quite beneficial to enhance their skills in finance (Dennis, 2004; Henk & Michael, 1998; Kruck & Maher, 1999; Mabey, Topham, & Kaye, 1998; Togo, 1992). The use of spreadsheets gave the students opportunities to check their answers and receive feedback on their answers (Mark & Clyde, 2003).

Group and individual problem solving

Piaget (1970) and Von Glaserfeld (1989) argue that learners can construct knowledge individually in a constructivist learning framework. The study revealed that the students needed to solve problems individually, and in groups. Because of the sheer size of the problems, that could not be done manually, due to huge involvement of time, the subject required the students to have a firmer understanding of manipulating spreadsheet designs tailored for different types of problems. This requires their cognitive thinking for optimal solutions. Most of the finance topics provided unique solutions, supporting the Gestaltian tradition of cognitive psychology of learning (Borthick & Clark, 1986; Neil, 2004).

Some of the problems, could not be done alone however, so group members needed to be working on the problems in phases, and by dividing the tasks among themselves, and later putting the solution pieces together for the problems, this group work practice supports the constructivist learning philosophy in that the members of the group had different interpretations and understanding of the meaning of the problems and analysis of the solutions. The meaning of the problems and the solutions were created subjectively by different members of the groups. This group learning process in this study has revealed that the learners constructed knowledge in a community of practice and is consistent with the social constructivists’ view of learning (Brown, Collins & Dugavid, 1989; Khun, 1996).

Prior theory and modelling

Kruck & Maher (1999), Tracey & Beverley (2006) and Patricia (2005) argue that spreadsheet models require prior learning of theories and problems in accounting and finance subjects. Consistent with this, this study has revealed that the modelling subject required prior theoretical knowledge of accounting and finance concepts and problems. The students were asked to build spreadsheet models; the models required the students to apply theoretical understanding of concepts such as effective interest rate calculation, amortization of principal balance calculation, and present value of money concepts (Kruck & Maher, 1999). The study also revealed that the students needed to know the concepts of risk for designing financial models in: capital budgeting, budgeted cash flows, and budgeted income statement (Dennis, 2004; Togo, 1992).
Spreadsheet Software as a Teaching and Learning Tool: Perspectives From an Undergraduate Financial Modelling Subject

The study also revealed that prior knowledge of cost and management accounting topics were useful to build, design and analyse the models developed in the areas of cost allocation, cost volume profit relationships, budgeting, and variance analysis. The use of spreadsheets has enabled the students to manipulate huge volumes of data and concentrate on understanding the principles. This saved them huge amount of time, which they could then spend on understanding the concepts and principles underlying the financial models. This is consistent with the earlier literature on spreadsheet modelling (Borthick & Clark, 1986; Togo & McNamee, 1995). However, there is contrary evidence that students find it difficult to manage time to learn spreadsheet skills and models simultaneously (Bagranoff, 1993). Academics also find it time consuming to learning necessary computing, spreadsheet or software skills to teach theories through different types of simulated financial games (Alexander, 1996; Andreas, 2005; Fink, 1998; Michelle, 2005; Togo & McNamee, 1995).

Modelling and lifelong learning

Spreadsheet models equip students with lifelong skills that are beneficial for their degree and for future employment; the skills are generic and transferable across an array of tasks (Alexander, 1996; Kruck & Maher, 1999; Neil, 2004; Tracey & Beverley, 2006). Consistent with these arguments, the study has identified teacher efforts to equip the students with necessary spreadsheet skills, coupled with contextual problems in finance, accounting, and management accounting, so that the students learn through the problems generalizable skills for their degrees and future employment. Borthick and Clark (1986) and Neil (2004) specifically found that accounting students solve problems following the Gestaltian cognitive psychology tradition, that is, they learn principles underlying different problems and then apply those to solve those problems. Consistent with these arguments, the students in this research learned fundamental concepts and principles and applied those to advanced problems in management accounting and finance. The learning objectives support evidence to these effects. An extract of the subject of 2005 has revealed the following course objectives set by the teacher:

1. Critically evaluate the technical and theoretical literature on spreadsheet modelling;
2. Use Microsoft Excel at an intermediate to advanced level;
3. Apply prior knowledge in finance and management accounting to develop models using MS Excel 2002/2003;
4. Analyse, explain and interpret models and make recommendations to resolve issues raised in problems/cases assigned to the students;
5. Communicate effectively in interpersonal, group and cross cultural situations;
6. Communicate information effectively in written and in oral formats; and
7. Integrate your knowledge of MS Excel (2002/2003) and the assigned readings to analyse and interpret financial models to facilitate management decision making.

The students’ perspectives

While the teacher perceived the use of computers, especially spreadsheet use, as important learning tools for advanced problems in management accounting and finance, the students’ perspectives differed significantly. The findings from the students’ perspectives are summarised below:

Computer literacy in accounting education

Two questions in the SFS evaluation questionnaire addressed this issue. The majority of the students enrolled in this subject between the years 2003 and 2005 were found to have expressed their reservations about the use of the computer as a learning tool; a small minority, however, found the use of the computer as a useful learning tool. Attendance, enthusiasm, and interaction with the peers, in the lectures and the workshops, were high - confirming the earlier findings (Borthick & Clark, 1986). Alexander (1996) and Kruck & Maher (1999) argue that the use of computers, especially spreadsheets, is much demanded for work. This study, however, found otherwise: the majority of the students responded that they did not find the use of computers useful for their future employment. This was, perhaps, attributable to their high expectations from the subject, and exposure to computer in few other subjects as a part of assessment tasks. For example, in a compulsory undergraduate communication subject, the students learned the basics of micro computer use; Excel use, and Microsoft Word use for different assessment tasks. Despite the poor perceptions about the benefits of micro computer use for learning, a few comments were encouraging.
Out of all the subjects I have completed this subject has given me the most benefit in my employment.
The subject has given me a better ability to use excel.
This subject would be beneficial in the commerce degree.

Spreadsheet knowledge in curriculum

Spreadsheet skills in curriculum are useful to learn advanced problems in context bound subjects (Alexander, 1996; Borthick & Clark, 1986; Kruck & Maher, 1999). The majority of the students expressed their unhappiness about the quality of learning, that is, the use of Microsoft Excel to learn models in management accounting and finance, refuting the earlier claims that Excel is useful for learning. The evidence suggest that the students don’t perceive Excel use in curriculum is as an enjoyable experience, contradicting Neil (2004) and partially contradicting Borthick & Clark (1986) that the students’ attitude waned with the progression of the subject.

Group and individual problem solving

The use of Excel can promote group and individual problem solving (Borthick & Clark, 1986; Neil, 2004) and reinforce learning of principles in a subject (Carol & Borthick, 2007); the study evidence (the final overall grade in the subject) confirmed these earlier findings. The involvement of the students in individual problem solving each week in the workshops, through the semester for different assessment tasks, required the students to develop and enhance cognitive thinking skills, confirming the Gestaltian approach to learning (Borthick & Clark, 1986), ‘algorithmic’ thinking skills (Ijiri, 1983), and constructivist approach to individual learning (Piaget, 1970; Von Glaserfeld, 1989). Some reflective comments of a students, who enjoyed the subject made some positive remarks:

This is a very useful subject, I enjoyed the hands on.

One of the students had some other suggestions to broaden the scope of the subject:

The primary focus of the course was the development of the financial models using [E]xcel. ...I think that there is scope to include database management software such as [A]ccess. The course could accommodate this content without distracting from the modelling focus and would prepare graduates for their employment.

The constructivist theory advocates posit that learning takes place in groups of community practices (Brown, Collins & Dugavid, 1989; Khun, 1996). The assessment tasks, especially the group problems, required the students to work in groups and submit the assessment as group assignments; students submitted their group assignments and performed better than they could had the assignments been submitted as individual work, confirming the effectiveness of the constructivist learning approach. Though the majority of the students had negative experiences about carrying disproportional workloads in group assignments, confirming the caveats in Neil (2004) about group problem solving, group assessment tasks were still an enjoyable experience to a few.

This is the most interesting subject to date.

A few could not agree on the usefulness of group and individual problem solving activities in workshop sessions, their perceptions about the subject accordingly were influenced by their frustrations about the organisation, the assessment, and the learning structure of the subject.

I felt that this subject was poorly organised
There was no structure to the subject
...
... (h)e has... to help when my group does not show up for workshops.... .... I am too scared to go to the workshops because I don’t deserve to be treated like I am nothing.
The evidence above suggests that the meaning of ‘organisation’ was different to the students, the students perceived that the subject would be organised in a traditional way: a textbook would be there, some worked out example would be used to illustrate the concepts and exercises; there would be solutions to each end of the chapter questions and so on. The findings contradict the Gestaltian tradition of learning because the students thought that the course materials and the problems needed to be structured for them in such a way that they would be able to save significant time to solve and interpret the meaning of the problems (Borthick & Clark, 1986; Carol & Borthick, 2007; Neil, 2004). There were better students in the class; one such student endorsed the existing structure of the subject.

If the students attended all lectures and workshops and listened carefully to what the lecturer was explaining you would get a very good grasp on what he wanted however if students were too lazy.

Prior knowledge and modelling

Kruck & Maher (1999), Tracey & Beverley (2006) and Patricia (2005) argue that spreadsheet models require prior learning of theories and problems in accounting and finance subjects. Partially supporting these arguments, this study finds that the students were divided: the majority of the students stated that contextual grounding of managerial and finance subject was a wastage of time, to a few, the subject was an enabling subject that was an ‘acid test’ of prior learning of management accounting and finance subjects; the students in this category had significant work experience or experience of using Excel for everyday work. Though these (positive) students were not specific about any topic or content of the subject, their endorsements about prior learning in management accounting and finance subjects were consistent with the earlier literature (Dennis, 2004; Kruck & Maher, 1999; Togo, 1992); these students had, however, a different view about the difference between work practices and principles taught in the subject.

There is a big difference between the theory and the prac.

Modelling and lifelong learning

Spreadsheet models equip students with lifelong skills that are beneficial for their degree and for future employment; the skills are generic and transferable across an array of tasks (Alexander, 1996; Kruck & Maher, 1999; Neil, 2004; Tracey & Beverley, 2006). Consistent with these arguments, the study has identified that the students had a firm grasp of modelling concepts and were able to apply the principles learned to build, design and develop the models, and analyse the outputs produced by different models, assigned in the workshops, or in group assessment. For example, the failure rate in the subject overall was significantly lower than the other compulsory third year subjects. The students, however, needed initial teacher support along the way to complete their group assignments. Diagram 2 is an extract from assignment on cost of capital, requiring the students to plot a graph to a pair of airline companies' weighted average cost of capital. The students did not have any difficulty in completing this assignment.

Diagram 2: cost of capital graph
The plotting of the graph required the Gestaltian cognitive thinking abilities of the students (Borthick & Clark, 1986; Carol & Borthick, 2007), the interpretation of the efficient portfolio part endorsed the generic individual and group learning approach of the constructivist learning theory (Piaget, 1970; Von Glaserfield, 1989), and specific attributes of accounting students’ use of the Constructivist learning approach to work individually and in groups to solve assigned problems (Borthick & Clark, 1986; Carol & Borthick, 2007; Neil, 2004). It is difficult to testify if learning outcomes claimed by the teacher/researcher (as outlined in the outline of the subject) have been achieved, a few reflective unsolicited email correspondences, however, provided support that the students were able to further their skills in their jobs.

CONCLUSIONS

This case study has explored the uses of computers in general, and spreadsheet packages in particular, in teaching and learning a third year financial modelling subject, in a regional university in Australia. The evidence is analysed from two opposing perspectives: from the teacher’s perspective, and the students’ perspectives, the findings from the teacher’s perspective confirm earlier literature; however, the findings of the students’ perspectives were mostly contrary to earlier findings.

The findings of the teacher’s perspective have made three additions to extant research. The first finding is that the teacher prefers to use computers to teach subject materials. The teacher/researcher in this study was specifically instructed to develop this subject requiring the use of computers, the professional accounting bodies and the local accounting bodies also recommended to develop a subject requiring the use of computers in teaching. The second finding is that the teacher foresees beneficial uses of spreadsheet skills to disseminate subject materials, and to equip students with an array of skills expected in employment. The subject materials covered advanced problem solving and interpretation of solutions, both were congenial to adoption of the Microsoft Excel spreadsheet package to teach subject materials that cannot be taught in a traditional chalk and talk environment, because these problems are too time consuming and almost impossible to manipulate unless Excel is used. The adoption of Microsoft Excel is also justified from the Gestaltian cognitive psychology perspective, and the constructivist philosophy of teaching, in that deductive problem solving and subjective interpretations of the meanings of problems were part of the teaching of the subject. The third finding is that multiple theoretical perspectives need to be considered to design and develop curricula for lifelong learning. This is to enable the teacher to understand the logic behind teaching subject materials that will address the students’ cognitive thinking needs, learning construction approaches, and understanding plausible meanings of ‘illustrative learning’ (Ijiri, 1983). The assignments and the other assessment tasks in this study have addressed these theoretical issues. While the teacher’s perspective is claimed to have novel objectives to foster students’ learning, the students’ perspectives have provided contrasting pictures.

The findings of the students’ perspectives have made four major contributions to the literature on the use of computers in general and spreadsheets in particular, in learning subject materials. The first finding is that the students have identified the need to use computers with mixed enthusiasm, this is contrary to the literature to date. Perhaps, the cheaper availability, and the requirement to learn computers in schools, might have waned the students’ interest in using computers to learn the subject; the ability to use computers as an essential learning skill might be the other plausible reasons as to why the students lacking enthusiasm did not rate the use of computers high as a learning tool. The second finding is that the majority of the students did not find Excel as a useful tool to learn the subject material, which is a concoction of Microsoft Excel, management accounting and finance topics; unlike conventional subjects taught in the universities, this subject was fairly open ended and unstructured, requiring the students to use their cognitive thinking skills, and algorithmic thinking skills to solve and complete assessment tasks individually, and in groups; the subject also required the students to interpret and understand the meaning of solved problems, the students needed construct knowledge in groups, and individually. The fourth finding is that the subject instilled lifelong learning into the students’ brains, through the development of transferable skills to real life problems. The group assessment tasks required the students to brainstorm on management accounting and finance related problems, and then derive solutions by applying Microsoft Excel spreadsheet skills. Microsoft spreadsheet modelling skills are demanded by employers for routine daily use, and for decision making in various spheres of organisational decision making.
The study has the inherent limitations of a case study research project. Firstly, the study is a study of a single subject offered in a single educational institution, over a three year period, between the years 2003 and 2005. The generalizations made from this study are, thus, based on one single case study unit over a number of years, and may lack wider applicability; Mintzberg (1995) however, argues that findings from a single case study site don’t pose any problems for generalization.

The findings of this study can be replicated in other institutions or other educational settings or even in other disciplines where a subject is blended with multiple topics from related or unrelated areas of a discipline. The study can also be extended to include other theoretical perspectives to understand students’ learning styles or teachers’ teaching styles, or curriculum design issues. One such theory may be hermeneutics where a researcher endeavours to understand and interpret students’ understanding of subject materials based on prior grounding of other subjects or course materials. The study may be conducted using statistical survey instruments for improved validity, and reliability.

REFERENCES


KATE CHOPIN’S AWAKENING AND THE FILM “END OF AUGUST”: REFLECTIONS ON MIDLIFE OR RESOLVING THE BILDUNG?

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ABSTRACT

Many people regard Edna Pontellier in Kate Chopin’s literary masterpiece, The Awakening (1889) as the epitome of the midlife woman, using self-assertion and the power of “awakening” to move into another stage of life. The life span then was only about age fifty—so the fact that Edna was just shy of thirty does not prevent it from being a “midlife” novel. Hollywood moguls later made Chopin’s work into a film, “The End of August.” Another popular novel/film, Robert Waller’s “Bridges of Madison County” with Robert Kincaid as Francesca’s “awakener” also presents itself as building on the legacy of Kate Chopin. But one could maintain that Chopin’s Edna’s is not the forerunner of lusty Francesca, but rather a timid ingénue struggling to master the bildung (identity-building period). She could better be compared to the heroine in Charlotte Bronte’s Jane Eyre, who comes into her own only when she settles down with Edward Rochester—marriage or no marriage. Edna’s suicide, the denouement in The End of August, is not caused by a failed love affair, which most people interpret, but her inability to become a Bronte-like figure. Arrested childhood development plays a key role.

TEXT:

There are those who maintain that the midlife passage – which occurs typically between ages 45-55 represents a second coming-of-age (Sheehy, 1992; Brehony, 1996). A woman re-examines her life with the end of menarche, discarding the girlish or ingénue role she knew as father or husband’s plaything in favor of a more independent, serious, almost androgenous persona.

Upon reading Kate Chopin’s novel, The Awakening, later made into a film, The End of August (1981), I was surprised to learn that the heroine, Edna, was approaching her twenty-ninth birthday. That seems like an odd time for midlife angst and discovery. The introspection, reflections on a life not fully lived—guided by concerns about status and social convention—as experienced by Edna seem far-fetched for a woman not-yet-thirty: these musings are more common in the “about-fifty” age cohort (Steinem, 1994; Brehony, 1996).

However, the average life expectancy when The Awakening was published was around age fifty (US Life Expectancy Tables, 2002). What we view today (age thirty) as the close of the typical bildung (building identity) period was actually close to the midpoint of adult life. One could argue that, viewed contextually, Edna expresses the spiritual, sensuous longings of the midlife woman, akin to Francesca in Waller’s (1992 ) The Bridges of Madison County. Robert Kincaid, the photographer in “Bridges”, is an “awakener” for Francesca; Robert Lebrun fulfills the same role for Chopin’s Edna. She tells Lebrun (p179):

“I love you….only you, no one but you. It was you who awoke me last summer out of a life-long stupid dream.”

She loved him because he was her awakener.

The same spiritual, metaphysical quality could be attributed to Francesca’s relationship with Kincaid. Waller writes about Kincaid (p9)

He had a sense of the tragic, combined with intense physical and intellectual power, even as a young boy growing up in a small Ohio town. When other kids were singing ‘Row, row, row your boat,’ he was learning the melody and lyrics to a French cabaret song.
In a letter to Francesca, Kincaid writes (26):

*Like two solitary birds flying the great prairies by celestial reckoning, all of these years and lifetimes we have been moving towards one another. The road is a strange place...*

Waller calls “awakener” Robert Kincaid a “magician of sorts, who lived within himself in strange, almost threatening places” (p31). He was not the ordinary man of business—an ideal characteristic for an “awakener.”

I would note that Edna’s metamorphosis through her love relationship with his literary predecessor, Robert Lebrun, does not epitomize the “midlife crisis” and consequent “awakening,” despite evidence of age thirty being life’s midpoint in that era. Rather, it is Edna’s passage to womanhood—typical *bildungsroman* material.

Edna’s love affair represents movement toward maturity much as Bronte-heroine Jane Eyre’s placing “living-in-sin” with Edward Rochester above a loveless marriage with a more distant minister.

Regarding Rochester, she laments (p512):

*I should not have left him thus....I should have told him my intention. I should have confided in him; he would never have forced me to be his mistress. Violent as he had seemed in his despair, he, in truth, loved me far too well and too tenderly to constitute himself my tyrant; he would have given me half his fortune, without demanding so much as a kiss in return, rather than I should have flung myself friendless on the wide world*

By all literary standards, Charlotte Bronte’s *Jane Eyre* is accepted as the prototypical *bildungsroman*, sharing the genre with such giants as Goethe’s *Wilhelm Meister*. When Jane Eyre returns to an estranged Edward Rochester as a grown woman, putting an unconventional relationship above a heartless marriage, she is considered to have resolved the *bildung* (Steedman, 1995). She abandons the illusions of a stary-eyed ingénue for the satisfactions of mature womanhood. Jane says (p517):

*All my heart is yours sir; it belongs to you and with you it would remain, were fate to exile the rest of me from your presence forever*

It is only then that Rochester tells her, “I want a wife.” (p518). By then, his estranged legal wife has died in a fire.

Edna is not using the sensual satisfaction brought about by lover Robert Lebrun’s role as “awakener” to reinvent herself and resolve the “midlife crisis”; rather she puts to rest the issues of delayed *bildung*. When one observes Edna’s relationship with her visiting father, it is clear that she never made the requisite break from her parents in the teenage years necessary for mature marriage. Chopin spends considerable time in the novel developing the character of “the Colonel,” Edna’s Kentucky-bred father, who visits her in New Orleans prior to Sister Janet’s wedding. Chopin makes it clear that the father treats Edna like a little girl, and, in an act of rebellion, she refuses to accompany him to Kentucky for the sister’s wedding.

She has never resolved the adolescent relationship with her father, a widower, who came to represent both mother and father to her since age six. When one observes that relationship, it is clear that she never made the “break” with her parents and carried it over into the husband-wife relationship with Leonce Pontellier.

One would expect Chopin to portray Leonce as a more negative character, with somewhat more abusive traits, to justify her attraction to the softer, more “metrosexual” Robert Lebrun (later echoed in Waller’s Robert Kincaid). In order to make Lebrun more attractive—he is a “reader—they meet and discuss literature, one would expect Chopin to portray Leonce more negatively. In order to make Lebrun sympathetic to us as “new man,” one would expect her to portray Leonce as more of a brute, non-sensitive—the “old man” in today’s society.

But this does not happen. Chopin does mention Leonce frequenting a late-night mens’ club, but she is quick to point out that he mainly plays cards and smokes with the gentlemen.
There is no evidence of philandering or love interests; again, that would make us more sympathetic to our heroine’s actions, if he were more of a “cad”—a jerk. Instead, when Leonce fears that Edna is drifting away from him, moving into more of a misty-eyed, unthinking adolescent world, he consults the family doctor Mondelet, a confidante of both parties, who tells him, essentially, to give her room to grow and develop.

Chopin fails to build our view of Robert Lebrun as “the new man” with Leonce Pontellier emerging as the “old man”—the modern “metrosexual” who has more appeal to the sensitive, midlife woman than the traditional husband. Waller accomplishes this beautifully in The Bridges of Madison County, making sensuous Francesca more noble in her attraction to photographer Robert Kincaid when faced with the option of her decent but less stylish farmer-husband. Waller notes (p122)

*She had become a woman again (after meeting Kincaid). There was room to dance again. In a slow, unremitting way, she was turning for home, toward a place she’d never been.*

We are left with the feeling that European-born Francesca, stifled on the Indiana farm, is within bounds in choosing to end the cultural claustrophobia through her love affair with the attractive photographer, but we are less clear what it is Edna sees in putting the somewhat-lazy Lebrun above gentlemanly, hard-working Leonce Pontellier.

Perhaps Edna’s attraction and move out of the house after her seemingly chaste love affair with Lebrun, what would be considered an “emotional affair” today, represents a teenage girl abandoning the strong father’s household in her compulsion to become an adult—standard *bildung* material. It is generally acknowledged (Steedman, 1995) that *bildung* ends when a woman marries, accepts motherhood and community—but Edna is suffering from problems of arrested development.

Edna, Chopin tells us, married at age twenty. By age twenty-eight, she has two children, cared for primarily by a nanny. Edna both resents and envies the “real mothers,” symbolized by her friend Madame Ratignolle, for whom matronhood came easily—naturally—and, for her, marriage and domesticity is hard. Much mention is made of the real mothers of the community (p73):

*Fluttering about with extended protecting wings when any harm, real or imaginary, threatened their precious brood. They were women who idolized their children, worshipped their husbands, and esteemed it a holy privilege to efface themselves as individuals and grow wings as ministering angels*.

At one point Ratignolle tells her (p83)

*In some way you seem to me like a child, Edna. You seem to act without a certain amount of reflection which is necessary in this life*

One could maintain that Edna could not become a “real mother” because of unresolved *bildung*. She is caught in late-adolescence because she still under the thumb of her father, creating a transference relationship with husband Leonce Pontellier. Through loving Robert, albeit a failed love affair, she casts off the shackles of premature, marriage, discovers herself as a woman, and moves into the world of adult sensuality. This represents mastering the *bildung* rather than resolving midlife matters.

Robert Waller’s Francesca comes to the novel “Bridges” as a mature woman, with a sixteen-year-old child, an Italian cosmopolite bored by Indiana farm life, the narrowness of her husband and society, but is not revisiting post-adolescent material. She left her family behind in Italy to move to America and marry, presumably as an independent adult. She is the woman in “midlife-crisis” when she has her affair with the traveling photographer and is forced to decide between a life of conventional boredom or starting over at age 47.

There is also a marked difference in the nature of the two love-affairs, Edna’s with Lebrun; Francesca’s with Kincaid. Edna and Lebrun dance around the nature of their sexuality while Francesca, the already-mature woman acts.
This leads me to maintain that Edna is more like an early version of Jane Eyre than sexually-adventurous Francesca in the throes of a midlife affair. Edna is struggling with matters of self-assertion (Vander Weele, 2004), akin to what Jane Eyre faces and surmounts. When bildungsroman-heroine Jane leaves Edward Rochester at the altar, upon learning he has a legal wife, rather than accepted mistresses, she says (p367-68):

I will not be yours…
Mr. Rochester, I no more assign this fate to you than I grasp at it for myself. We were both born to strive and endure—you as well as I; do so. You will forget me before I forget you

She travels to another part of England and is offered a marriage of convenience to Mr. St. John, which she rejects (p456)

The humanities and amenities of life had no attraction for him—its peaceful enjoyments no charm…I comprehended, all at once, that he would hardly make a good husband; that it would be a trying thing to be his wife

She returns to Edward Rochester, ready to be his life partner. Edna is more like Jane initially, afraid to experience life to its fullest, not yet come into her own. Although Edna married Leonce Pontellier at the outset, she is very much a child-bride, which is why she does not blossom into motherhood. She has still to resolve the bildung, which she attempts through loving Robert.

In the end, when he disappears, a Peter-Pan like character himself, she accedes to a physical affair with Alcee Arobin, more of a ladies' man, definitely not a “metrosexual.” If anything, Arobin is more the philanderer, trying to get what he can from the ladies, than Edna’s fairly-decent husband. And he lacks the subtle “metrosexuality” of Lebrun. Still, she falls for him in a desperate attempt to resolve the period and move on with independent life.

Amber as much the “old man”—more so than her husband. Her motives are unclear—betraying true love Robert—making a poor choice—a far cry from clear womanhood (p140)

There was a dull pang of regret because it was not the kiss of love which had inflamed her, because it was not love which had held this cup of life to her lips.

Even after Robert returns, she spends time with Arobin. Chopin writes (p173)

He had detected the latent sensuality which unfolded under his delicate sense of her nature’s requirements like a torpid, torrid sensitive blossom.

We have several pairs of lovers in juxtaposition to one another: Chopin's Edna Pontellier and Robert Lebrun; Waller’s Francesca Johnson and Robert Kincaid; Bronte’s Jane Eyre and Edward Rochester. We have already established Waller's Bridges of Madison County as a novel of “Awakening” or middle-age lust; we have established Jane Eyre as classic bildung fare, which ends when the heroine marries. In Jane’s case, she had to undergo transformation to adulthood—Edna’s psychological issue—in order to live with Edwin Rochester, without societal blessing.

Conveniently, his wife has died in a fire and Rochester is free to marry, but at this point Eyre has emerged as a mature person—Edna’s struggle which cannot circumvent.

I would maintain that, in terms of development, Edna is more like Eyre, the young ingenue, which is why she is caught in an unconsummated love affair with LeBrun and later gets done in by a rogue ‘ladies’ man.” If you want midlife angst and heartbreak revisit Francesca in Bridges of Madison County and view her with her “awakener,” 52-year-old Robert Kincaid.

Edna Pontellier is pure bildung. But why does she have to commit suicide, drowning herself Virginia Woolf-style to give us a decent ending? Surely she has other alternatives after seduction by lecherous Alcee, without potential as either mate or marriage partner. Might not husband Leonce take her back—a changed woman—having matured through her experiences? Or maybe not: perhaps it is too late and she has traveled too far down another path. Edna, herself, notices the transformation (p175)
I suppose this is what you would call unwomanly. I have got into a habit of expressing myself

Author Kate Chopin decides to kill off her heroine, because it appears that there is no place for her in early-1900s society. Robert LeBrun, her summer romance who returns mid-winter only to disappear when she is not ready on-the-spot, leaves an ambiguous note, “Good-by--because I love you.

Edna had spent the winter in New Orleans awaiting Robert’s return: a gilded cigarette lighter tips her to the existence of a rival mistress in Mexico, where he has fled to escape their relationship. He delayed seeing her when he returned, while she was awaiting their reunion with baited breath

She had pictured him seeking her at the very first hour, and he had lived under the same sky since day before yesterday, while only by accident had he stumbled upon her.

But why does Edna have to die after Robert disappears when she leaves the house to attend a friend’s childbirth, expecting him to wait? She tells him (p179)

We shall be everything to each other…
No matter how late; you will wait for me Robert?

By midwifing at her friend’s childbirth, rather than cater to the errant Robert, who senses the affair with Alcee (who momentarily appears) and wants her back, she emerges more as the serious, caring mature woman (p182)

She might even invent a pretext now for going (away) but Edna did not go. With an inward agony, with a flaming, outspoken revolt against the ways of Nature, she witnessed the scene (childbirth) torture.

Robert’s disappearance—his not waiting for her a matter of couple hours after being away all winter--sends her into a tailspin, during which she becomes the old Edna, unresolved bildung heroine.

In a momentary panic, she takes the ferry out to Grand Isle and slips away into the water (drowning), a weak heroine unable to come to terms with herself.

The situation is set up for Edna to come to terms with mature womanhood, but she has failed to grasp the reins. The time is not yet ripe for a mature heroine in 1903, yet Charlotte Bronte gave us Jane Eyre in Britain of 1848. Was New Orleans society, characteristically flamboyant and libertine, too short-sighted to accept Kate Chopin’s Edna? Or is Edna rather a mixed-up adolescent, barely the subject of an “awakening” novel?

Edna’s worst enemy is herself. She is a small-minded Kentucky girl transposed to the big city. Among the society ladies, she cannot make the grade, so she drifts off into a shadowy conclusion, drowning herself in the Gulf of Mexico. Perhaps she is not of this world—akin to both Chopin and Waller’s portrayal of their respective male Robert-characters, appropriately named for one another.

Facing an undercurrent in the Gulf—which she could not swim against-- arrested bildung-- she was pulled out into a warm, expanding sea, which represented the mother she did have. It was not a poorly-concluded “awakening” at the hands of a Peter Pan-character that sent her on a trajectory toward death. Hence, the title of The Awakening smacks of psychological fraud; perhaps the novel/film would better be known as “Loss of Innocence” or “The Ingenue.” Any suggestion of “awakening” is misleading. Chopin has given us a brilliant post coming-of-age novel, in the tradition of Charlotte Bronte, and established herself as a mistress of her trade.

REFERENCES


Vander Weele, Michael. “Jane Eyre and the tradition of self assertion: or, Bronte's socialization of Schiller's ‘play aesthetic.’” Renascence: Essays on Values in Literature, Fall 2004 v57 i1 p5(24).


SELF-CONCEPT AND SCIENCE ACHIEVEMENT OF STUDENTS IN CO-
EDUCATIONAL AND SINGLE-SEX JUNIOR SECONDARY SCHOOLS IN
OGUN STATE, NIGERIA

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Olabisi Onabanjo University, Nigeria

ABSTRACT

This study compared self-concept and science achievement of Junior Secondary school students in co-
educational and single-sex schools in Ogun State, Nigeria. Twelve secondary schools were randomly
selected from the list of secondary schools in each of the four divisions of Ogun State. A sample of
three hundred and sixty (360) students participated in the study. Three instruments were used to collect
data. There was no significant difference in self-concept (t = 1.741, p>0.05) and science achievement (t
= 1.821, p>0.05) between co-educational and single sex schools. There was significant positive
relationship between self-concept and science achievement (r = +0.298, p<0.05). Teachers need to
adapt to teaching in single-sex school to eliminate barriers associated with gender differences.

Key Words: Self-Concept, Science Achievement, Students, Co-Educational, Single-Sex-Schools,
Ogun State, Nigeria

INTRODUCTION

When schools are classified as co-educational and single-sex, the basis of classification is students' gender. A
coop-educational school has both male and female students while a co-educational school is either exclusively for
boys or for girls. Usually, teachers are not restricted on the type of school they can teach based on gender. A
male teacher (likewise a female teacher) can teach in either a single-sex or co-educational school. Teachers' factors directly and indirectly influence students' achievement. Jones (2005) noted that teachers' gender affect
how they respond to boy/girl behaviour. A male teacher for example will control his class in a gender specific
manner that could be judged different from that of a female teacher. Michayluk, and Randhawa (1990) also
reported that students' attitude towards teachers' sex and their classroom behaviour affect their achievement and
the classroom climate.

Co-educational schools seem to be more popular in some countries of the world than others. In Nigeria, most
public and private schools are co-educational. In Australia, Smith (2006) noted that the early church influence on
education and the concentration of the population in relatively few large cities allowed the development of single-
sex. During the recession of the 1980s and early 1990s in Australia, there occurred the amalgamation of many
single-sex schools, but there has simultaneously been pressure to establish single-sex classes in co-educational
schools. Some key findings by Smith are enumerated below:

1. Both boys and girls preferred co-educational schools
2. Learning environment is more competitive for girls in single-sex schools
3. Boys achieve better scores in co-educational schools with no difference for girls in either a single-
sex or co-educational school.
4. Classroom discipline problems are greater in co-educational schools for girls but not for boys.
5. Male and female students get along better in co-educational schools, at the same time, the learning
environment is more competitive for girls in a single-sex school.
6. There is higher achievement of girls but than boys in math, science and computer studies in single-
sex schools.
Sanchez and Roda (2006) defined self-concept as the set of knowledge and attribute that a person has about himself or herself; the perception an individual assigns to himself or herself and characteristic or attribute that a person uses to describe himself or herself. It is understood to be fundamentally descriptive assessment and has a cognitive implication. Many researches have reported the impact of self-concept on academic achievement (Burnette, Carven & Marsh, 1999; Lang, 2006). Self-concept influences a person’s action or reaction in virtually all facets of life (Davidoff, 1991). However, self-concept can change with experience. Any student characteristic that can change because of training and exposure to counselling can be very important in enhancing students’ academic achievement.

There has been conflicting findings on how gender influences science achievement. While some studies reported significant difference between male and female students, others have reported no significant difference. In Nigeria, Olatoye (2002) reported that males out performed females in science. In Israel, Tamir (1990) reported that boys in grades 9 and 12 were found to have more positive attitude towards science subjects than did girls, and they also scored higher. A significant difference was found between boys and girls in physics in grades 9 and 12 (boys scoring higher), whereas in biology and chemistry there was no difference in achievement. In addition, in Sweden, Engstrom and Noonam (1990) reported that boys performed better than girls in science. It is logical to think that self-concept and school classification as single-sex and co-educational can have some influence on the level of students’ achievement in science. Gender is the basis of classifying a school as single-sex or co-educational. Therefore, this study compared self-concept and science achievement of Junior Secondary school students in co-educational and single-sex schools in Ogun State, Nigeria.

RESEARCH QUESTIONS

1. Is there any significant different in self-concept of students in co-educational and single-sex schools?
2. Is there any significant different in science achievement of students in co-educational and single-sex schools?
3. What is the relationship between students’ self-concept and science achievement?
4. To what extent will students’ self-concept predict students’ science achievement?
5. Is there any significant different between male and female students’ science achievement?

METHOD

Research Design

This study adopted on expo facto research design. In such design, the independent variables have already occurred, the researcher cannot manipulate them.

Target Population and Sample

The target population for the study is all the Junior Secondary School students in Ogun State. Twelve secondary schools were randomly selected from the list of secondary schools in each of the four divisions of Ogun State. Random sampling technique was used to select three (3) secondary schools from each division in order to ensure each school had equal chance of being selected. Twelve schools selected from the four divisions in the State were used for the study. Thirty students were randomly selected from the Junior Secondary School III in each school. A sample of three hundred and sixty (360) students was used for the study.

Instrumentation

Two instruments were designed and used to collect data. They are:

1. Students’ Self-concept Questionnaire (SSCQ)
2. Students’ Science Achievement Test (SSAT)

SSCQ is a four-point Likert-type scale. Students were asked to indicate their opinion by ticking any of ‘Strongly Agree,’ ‘Agree,’ ‘Disagree’ and ‘Strongly Disagree’ in front of each statement. The SSCQ has 14 items. Students
were not asked to indicate their names on the questionnaire to make the responses anonymous. The initial version of the instrument was given to experts for suggestions and comments before coming up with the final version. The Cronbach alpha reliability coefficients of 0.701 and 0.776 were obtained for SSCQ and SSAT respectively.

SSAT is a 50-item multiple-choice objective test with four options for an item. The items cover many the topics in the Junior Secondary School Integrated Science syllabus.

**Examples of items on SSCQ:**
1. ‘I am confident to ask and answer questions in the class.’
2. ‘I feel am a brilliant student’

**Examples of items on SSAT:**
1. The transfer of trait from parents to offspring is known as A. Fertilization B. Progeny C. Heredity D. Conception.
2. Air pressure is measured with A. Thermometer B. Rainguage C. Barometer D. Sonometer
3. Echo is an example of _______ of sound A. Refraction B. Reflection C. Diffraction D. Dispersion

**Data Analysis**
Data were analyzed using t-test (Research Questions 1, 2 and 5) Pearson product-moment correlation (Research Question 3) and Regression analysis (Research Question 4).

**RESULTS**

**Research Question 1**
Is there any significant different in self-concept of students in co-educational and single-sex schools?

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</tbody>
</table>

NS = Not Significant (p>0.05), df = 358

Table 1 above shows that there is no significant difference in self-concept of students in co-educational and single sex schools. (t = -1741, p>0.05). Students from the two school types have similar level of self-concept.

**Research Question 2**
Is there any significant different in science achievement of students in co-educational and single-sex schools?

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Dev.</th>
<th>t</th>
<th>p</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-education</td>
<td>195</td>
<td>20.010</td>
<td>8.054</td>
<td>0.577</td>
<td>1.821</td>
<td>0.069</td>
<td>NS</td>
</tr>
<tr>
<td>Single-Sex</td>
<td>165</td>
<td>18.691</td>
<td>5.067</td>
<td>0.395</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS = Not Significant (p>0.05), df = 358
There is no significant difference in science achievement between students in co-educational and single-sex schools (t = 1.821, p>0.05). Students from the two school types have similar level of achievement in science.

**Research Question 3**

What is the relationship between students’ self-concept and science achievement?

**Table 3: Relationship between students’ self-concept and science achievement**

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>r</th>
<th>p</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Concept</td>
<td>360</td>
<td>29.269</td>
<td>11.120</td>
<td>+0.298</td>
<td>0.000 *</td>
<td></td>
</tr>
<tr>
<td>Science Achievement</td>
<td>360</td>
<td>19.406</td>
<td>6.871</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = Significant (p<0.05)

There is low but positive significant relationship between students’ self-concept and science achievement. (r = +0.298, p<0.05). Thus, the higher the students’ self-concept, the higher the achievement in science, likewise, the lower the self-concept, the lower the achievement in science.

**Research Question 4**

To what extent will students’ self-concept predict students’ science achievement?

**Table 4: Self-Concept as a predictor of students’ science achievement**

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.298</td>
<td>0.089</td>
<td>0.086</td>
<td>6.568</td>
</tr>
</tbody>
</table>

* Analysis of Variance

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>Df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1507.658</td>
<td>1</td>
<td>1507.658</td>
<td>34.950</td>
<td>0.000 *</td>
</tr>
<tr>
<td>Residual</td>
<td>15443.131</td>
<td>358</td>
<td>43.137</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16950.789</td>
<td>359</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant (p<0.05)

Self-concept significantly accounts for 8.9% of the total variance in science achievement ( R Square = 0.089, p<0.05). Thus, self-concept is an important predictor of science achievement. It is an important factor to consider in order to improve science achievement in school. The fact that the percentage variance is only 8.9% means that there are other independent variables (not considered in this study) that influence achievement apart from self-concept.

**Research Question 5**

Is there any significant different between male and female students’ science achievement?
<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev.</th>
<th>Std Error</th>
<th>Df</th>
<th>t</th>
<th>p</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>176</td>
<td>19.136</td>
<td>6.697</td>
<td>0.505</td>
<td>358</td>
<td>-0.726</td>
<td>0.468</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>184</td>
<td>19.663</td>
<td>7.043</td>
<td>0.519</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no significant difference between male and female students’ science achievement (t = -0.726, p>0.05). Male students perform as well as their female counterparts. It should however be noted that the achievement in science for both male and female students is below average. (Mean for males = 19.136, Mean for females = 19.663). The maximum obtainable score in the science achievement test is 50.

DISCUSSION

There is no significant relationship in science achievement between students in single-sex and co-educational schools. This is similar to the findings of Smith (2006) who also found no significant difference in achievement of students in the two school types. However, further analysis by Smith showed that boys achieved better scores in co-educational schools with no significant difference for girls either in a single-sex or co-educational school.

Self-concept has also been linked to students’ academic achievement. In this study, self-concept significantly predicts science achievement. It also has significant positive relationship with science achievement. Thus, the higher the self-concept the better the performance in science. Self-concept has to do with how an individual perceives himself or herself. The findings on self-concept in this study corroborate earlier finding which reported that self-concept has significant influence on academic achievement (Burnett, Carven & Marsh, 1999; Lang, 2006). When a student is confident and has a good assessment of himself or herself, he or she is able to face challenges of learning. A student, who is confident and regularly consults teachers, asks questions in the class and lead tutorial groups is likely to do well academically.

There is no significant difference between male and female students achievement in science. In Nigeria, Olatoye (2002) reported a significant difference in favour of male students. In United States, Praat (1999) reported that males and females scored approximately the same grades in the school certificate science while female outperformed males in the Sixth Form Certificate. In Israel, Tamir (1990) reported that boys performed than girls in grades 9 and 12 science examinations. In Sweden, Engstrom and Noonan (1990) also reported that boys performed better than girls in science. There is need to carry out more research to be able to determine the influence of gender on science achievement.

CONCLUSION AND RECOMMENDATIONS

There is no significant difference in science achievement between students in single-sex and co-educational schools. It therefore suggests that if single-sex and co-educational schools are treated equally in term of allocation and availability of resources, there will be no significant difference in science achievement. Owners of single-sex and co-educational schools should ensure that teachers are not gender biased.

In single-sex schools, male and female teachers find themselves teaching either only male or female students. There is need for adjustment and adaptation to accommodate peculiarities associated with gender difference. There is a need to eliminate barrier that may be introduced by gender difference. The school administrators need to build students’ self-concept in both single-sex and co-educational schools. This is because self-concept is a significant predictor of science achievement. Regular counselling session will boost students’ self-concept.

REFERENCES

EDUCATION

WORKSHOPS
ABSTRACT

“Virtually every major issue facing global society today has science and technology at its core” (Perkins-Gough, 2007, p.9). Early research in chemistry literacy concluded that middle school teachers do not have the content knowledge for teaching conceptual chemistry in grades 5-9. This quantitative study will examine and attempt to improve chemistry literacy in 3 rural and urban public schools in Northwest Florida. A 50 item pre-assessment will be administered to 100 middle school science teachers in Escambia, Washington, and Leon Counties, Florida. This will be followed by a 4 day training session in chemistry content taught by the researchers. A post-assessment will determine if this implemented training program can serve as a model for future training projects. Three specific areas, indicated by data to be important targets for the professional development of science teachers, are laboratory skills, methods for incorporating hands-on learning activities, and use of instructional technology. Students of teachers who received professional development in laboratory methods scored nearly one-half of a grade level above students whose teacher lacked such training. In addition, teachers who received training in engaging students in projects and activities were more likely to provide hands-on science activities on a routine basis. Students, who experienced hands-on activities once a week, were 40% of a grade level ahead of students who experienced hands-on activities only once a month. When teachers made use of technology, such as the Internet in the classroom, students performed better (Wenglinsky & Silverstein, 2007).

OVERVIEW

“Virtually every major issue facing global society today has science and technology at its core” (Perkins-Gough, 2007, p.9). Early research in chemistry literacy concluded that middle school teachers do not have the content knowledge for teaching conceptual chemistry in grades 5-9. This study will examine and attempt to improve chemistry literacy in 3 rural and urban public schools in Northwest Florida. A 50 item pre-assessment will be administered to 100 middle school science teachers in Escambia, Washington, and Leon Counties, Florida. This will be followed by a 4 day training session in chemistry content taught by the researchers. A post-assessment will determine if this implemented training program can serve as a model for future training projects. Valuable information to all schools in Florida for improving standardized test scores will be disseminated by the University of West Florida collaboration of the College of Professional Studies and the College of Arts and Sciences. A review of recent data reveals there are middle school teachers of science who are in need of a deeper knowledge of science content and greater proficiency in implementing inquiry experiences in the classroom. However, Florida does not require minimum degree/coursework in the subject area taught for a beginning teacher certificate, nor does Florida require teachers to pass written tests for beginning teacher certificates in subject specific pedagogy. It should be noted that Florida does not require passing of written tests for beginning teacher certificates at the high school level in subject knowledge. (State Education Reform 2005-2006, Table 3-2). A nation-wide study revealed that in 1999-2000, 43% of public school life science classes and 59% of physical science classes’ grades 7-12 were taught by teachers not having academic major or minor in the content area (Wenglinsky & Silverstein, 2007). In Florida, 10% of science teachers are considered to be teaching out-of-field. Data from the Bureau of School Improvement indicates this number is consistent across all geographic regions. (Florida Department of Education, Office of Math and Science, 2007). Additionally, Florida beginning teachers are not assessed in subject-specific pedagogy. The fact that 10% of Florida teachers are out-of-field, may not, at first glance, appear to represent a critical need; however, a review of the number of Florida Professional Educator Certificates issued in 2005 indicates a marked decline. In 2001, 1,271 certificates
were issued in the areas of Biology, Physics, Chemistry, and General Science for grades 6-12. In contrast, in 2005, 400 certificates were issued for Biology, grades 6-12, 59 for Physics, grades 6-12 and 290 for General Science, grades 5-9 for a total of only 874 Florida certificates in a science area (Florida Department of Education, Office of Math and Science, 2007). These data show a reduction of almost 500 certificates issues since 2001. At the State Board of Education meeting in December 2006, Middle and High School Science was approved as one of eight critical shortage areas in Florida. A February, 2007, report from the Florida Department of Education Office of Evaluating and Reporting indicated that an expected 1,014 science teaching positions will need to be filled for School Year 2007-2008. The goal of science literacy for all Americans includes more than just understanding the concepts of science. Three specific areas, indicated by data to be important targets for the professional development of science teachers, are laboratory skills, methods for incorporating hands-on learning activities, and use of instructional technology. Students of teachers who had received professional development in laboratory methods scored nearly one-half of a grade level above students whose teacher lacked such training. In addition, teachers who had received training in engaging students in projects and activities were more likely to provide hands-on science activities on a routine basis. Students, who experienced hands-on activities once a week, were 40% of a grade level ahead of students who experienced hands-on activities only once a month. When teachers made use of technology, such as the Internet in the classroom, students performed better (Wenglinsky & Silverstein, 2007). Scientific literacy also involves knowledge of the processes that create the concepts (or strict inquiry) and the organizing framework that is science (or the nature of science). An emphasis on teaching science through a mode of inquiry has been the present approach for attaining scientific literacy. Although the National Science Education Standards have been in existence since 1996, and it is well established that a hallmark of an effective science teacher is the ability to teach science content from an inquiry perspective, the number of science teachers routinely employing this approach is limited. The majority of teachers in science classrooms are not trained to teach in this manner (Cummings, 2001). The researchers' goal is to improve scientific literacy by utilizing the outcomes of the study for future training in all counties of Florida.

REFERENCES


THE EFFECTS OF CONTEXTUAL DIFFERENTIATION AND CONTENT IMAGERY ON THE SCHOOL-RELEVANT ANALOGICAL-REASONING OF AFRICAN-AMERICAN AND EURO-AMERICAN GRADE SCHOOL CHILDREN: MOVEMENT/MUSIC EXPLORATIONS.

Rodney T. Cunningham and A. Wade Boykin
North Carolina Central University and Howard University, USA

To date, African-American and minority school children continue to lag behind their Euro-American counterparts. Over the past three decades, educators and researchers have worked vigorously at discovering facilitating contexts/content that enhance cognitive school performance in African-American and minority school children. One of the most empirically verified paths that have revealed proactive outcomes is the work conducted by Boykin and associates addressing the interface of cultural factors and cognitive performance.

This study examined the effects of incorporating cultural factors into the learning presentation context and content of task materials. Sixty four low-income African-American and sixty four low-income Euro-American children listened to two short stories (prose) read under two different contextual conditions. One context provided high movement expression (HME, music and movement opportunity linked to the story presentation), while the other context afforded low movement expression (LME, no music and movement opportunity linked to story presentation). Additionally, the story content contained either high movement thematic (HMT) examples, such as dancing, running, and jumping, or low movement themes (LMT) such as walking and standing still.

Results revealed that African-American children displayed better story knowledge under the HME than the LME learning context, and with the HMT as opposed to the LMT. Interestingly, the inverse findings emerged for the Euro-American children. However, there were no significant differences between African-American HME performance and Euro-American children LME performance. This also held for African-American HMT and Euro-American LMT performance.

Highest performance was demonstrated when the HME context was coupled with HMT story content for African-American children, while the highest performance for Euro-American children emerged when the LME context was coupled with LMT content. These interactive findings were not significant. Results, including cultural and educational implications are discussed in relation to future research questions.
E-Examination

PROBLEM AND MOTIVATION:
Majority of countries and universities share one thing in common, that is examinations. Such exams are conducted simultaneously at different examination centers. These exams are quite difficult to monitor in order to prevent unauthorized entry. A major drawback with testing centers is that exam papers can be exposed to a third party and subsequently lead to cancellation of the examination.

Unlike many existing internet based examination systems in the market, this proposed project for internet based examination system will provide features and functionalities that allow privileged users to have control over their classes.

BACKGROUND AND RELATED WORK:
The proposed project will eradicate conventional flaws by providing internet-based examinations with synchronized times at all examination centers. As a result, it provides flexibilities, standards examination features and functionalities. In comparison to systems that already exist in the market, this Internet based examination has a superior performance, and eliminates common limitations.

The objective of this project is to avoid the appearance of test responses in Internet Search Engines, and retrieval of questions and answers from the HTML source code that could be illegally used.

The user-friendly interface will allow for easy access, which is essential in order for a successful project to be attained. In addition, this system will require minimum training and reduces confusion associated with novice users.

Unlike many Internet based examination systems that possess limited features and functionalities, the proposed system is flexible, allows privilege user to set, view, modify, and create questions bank. In addition, privileged users will be able to disable or enable examinees account when deemed necessary. Non-privilege user (examinees) will be allowed to view and take the examination only. This system provides the ability to conform to user needs based on examination requirements. It can be utilized in renown exams such as, the ACT, GRE, MCAT CISCO, MCSE and Java certification testing; just to mention a few.

The initial research for this project contains elements of design and analysis that was originally conducted in Malaysia. The problem was studied by conducting examinations between the University Science in Malaysia and Stamford College which uses manual examination systems. The results yielded three problems: randomization of questions and answers; grant access to the lecturer in the exchange questions bank; and minimize memory usage while generating the HTML files requested by the client.

Continuous research ameliorates the system by allowing lecturers and privileged users to create question banks. This is accomplished by loading it with the content of other files containing questions and answers and sharing of information between privileged users. The system also allows student results to be accessible by permitted third parties.

APPROACH AND UNIQUENESS:
This Internet based examination system allows users to take exams, conduct practice exams and quizzes as time schedule demands. The system is created with great flexibility for both lecturers and students. The project
implementation was extensively taken care by developing the design through UML diagrams. There are three unique features of the online examination:

- In order to register for class a user must have an ID from a privileged user.
- System will generate questions and answers randomly, minimizing cheating and maximizing accuracy of student evaluation. To increase security of the system, we can limit the access to the contents of examination at (html) source code level.
- Privileged users can share questions resulting in a more efficient system

RESULT AND CONTRIBUTION

The analysis and design of the project was completed successfully with UML diagrams. The project was demonstrated with few terminals and small database for experimental basis. Some of the demonstration results are shown in the figures below.

The figures include:

- Board Information diagram
- Take Assessment
- Create quiz/exam
- Create exam ID number
- Create questionnaire
- Update the questionnaire
- Results after the exam

If the system is created to conduct examination, the provision includes verifying results by users at any time with their exam ID number. The system also stores the detailed information of user, examination details, grades, and other private data.

If the system is created for training purposes, the data will be different. The system would store the detailed information of the user, number of attempts, failures, points each time, and many more features. The provision allows the lecturer to verify and evaluate the student and design exercises according to the requirement. The system has another provision by selecting the level of examination. Level of exam implies question difficulty ranging from easy through hard. This depends upon the training and intellectual capability the student can be trained/tested accordingly.

CONCLUSION

The proposed E-Examination system works as a multipurpose system. The system can be used for training, as well as conducting examinations. Unlike existing systems, the system gives complete control to privileged user to manage the question bank. The system also has the provision of testing the student at various levels (average, medium, and hard). Testing/training at various levels helps the organizations to select the candidates as per their ability. The system can be used to conduct the exams in parallel and confidentially. If the questions are leaked at any time the exam can be changed in a few minutes of time and will be able to conduct without any difficulty. This eliminates most of the problems currently faced by many countries.

The demonstration of this project was done at the end of spring 2007 at Department of Mathematics and Computer Science, Grambling state University. Some of the highlights of the demo are provided below:
Welcome to Regent School Of Economics for Online Exam

**Exam Information**

- By Next Week, Friday (14th Oct), All the diploma Final year students must prepare for the presentation and documentation submission for the major project to USSR supervision.
- The final exams will be scheduled on 14, 15, 16 of November 2005, please be prepared, and wish all of you good luck for your exam.

---

**Take Assessment**

- **Date Time:** Date: Wednesday, 06.12.2005 - Time: 11:10 AM
- **Mode of Assessment:** Exam
- **Total Questions:** 10
- **Exam Description:** Network Management

Click Start to start the assessment. The assessment will be calculated as the total points by the answers divided into multiple choice and also into correct answer.
ATTITUDE AND LANGUAGE LEARNING: AN ANALYSIS OF FACTORS AFFECTING THE FIRST DIALECT OF BI-DIALECTAL CHINESE IMMIGRANTS AND THE TEACHING OF CHINESE TO HERITAGE SPEAKERS

Jing Zhang
Emory University, USA

Many, perhaps most, first-generation Chinese immigrants to the United States are bi-dialectal. This presentation will first present an ethnographic study of such speakers’ attitudes toward their first dialect and examine interactions between their two Chinese dialects. The presenter will report on data collected from online questionnaires completed by first-generation Chinese immigrants in the United States. Then the presenter will present a discussion and interpretation of the data collected, involving consideration of likely explanation for the current status of the first dialect among the speakers, the varying situation involving dialect persistence or loss, and interactions between the immigrants’ two Chinese dialects (e.g. the first dialect and Standard Dialect Mandarin). Following that, the presenter will discuss how immigrants’ attitudes regarding the language education of immigrants’ children play a major role for many speakers. Finally, the presenter will illustrate ways to understand students’ attitudes towards their native language while teaching Chinese to heritage speakers. Pedagogical implications will also be addressed to teachers of Chinese heritage speakers. The presentation will end in an open discussion regarding the maintenance, loss of Chinese language and how to take students’ attitudes into consideration in a language class.
USING CREATIVE THINKING TECHNIQUES TO IMPROVE BUSINESS EDUCATION LEARNING OUTCOMES

Dale Jasinski
Quinnipiac University, USA

Creativity is increasingly being recognized as a factor in making organizations successful (Miller, 1987; Miller, 2000; Robinson & Stern, 1997) and essential for a business's long-term survival (Robinson & Stern, 1997). Consequently, organizations are striving to find employees who have creativity as one of their competencies.

As a primary provider of employees, business schools have also recognized the importance of developing this creativity competency in their students (De Souza & Fleigh, 2000; King & Mildrum, 2000). A current critique of business curricula suggests that training students for content is not sufficient, and that it is vital to develop their skills in critical thinking, evaluation, synthesis, etc. Many business schools have not only recognized the importance of creativity to their student's future careers, but have, just like business, seen that performance increases can accrue when student's use creativity thinking principles to critical thinking and problem solving. These potential benefits include:

- Better serving the business community by producing graduates with a wide range of skills (left-brain and right-brain)
- Better problem-solvers by encouraging more and better alternatives when alternatives need to be identified
- Increase higher-order thinking skills, e.g., creative minds can do a better job with tasks such as synthesizing information (even if the information is disparate or disconnected or contradictory), sifting through facts/information from multiple sources and figuring out how to evaluate what's important and make sense of it all, ability to restructure/reorganize information in a meaningful way, interpretive skills, abstracting skills, etc.

Accordingly, business educators are looking for ways to imbed creativity into their traditional subject courses. The purpose of this paper, then, is to provide a preliminary guide to a set of creativity techniques that can be utilized to improve the learning outcomes of students.

The paper creates a typology of techniques, desired learning outcome, and the time commitment desired by the faculty member teaching the course. Further research to be conducted would be to empirically test the effectiveness of the techniques in achieving the desired outcomes identified in the theory paper. Finally, the research could also result in the development of a companion workbook for leading textbooks in strategy, entrepreneurship and marketing where it could be demonstrated to the faculty adopting the material the value proposition of the exercises in enhancing their course and why its inclusion with the text book makes sense.

Creativity techniques which are examined include:

- theater-related techniques (e.g., improvisation)
- metaphor
- parables
- photoessays
- mindmaps
- simulations
- problem-solving
- brainstorming
- creative techniques
- case studies
- journal writing
Using Creative Thinking Techniques to Improve Business Education Learning Outcomes

- in-basket exercises
- debates
- role-play
- group work
- reversal
- question assumptions
- story-telling (and story-writing)
- analogies
- organizing/reorganizing/presenting information (including metaphors and visual representations)
- what if?

Desired learning outcomes include:

- Decreasing students who state “I'm not creative”
- Decreasing students who give pat and overly obvious answers
- Increase students who question assumptions
- Increase students who generate more alternatives
- Decrease in students who don’t always take risks or think outside the box; seem to think there’s one solution or a “right” solution
- Increase in students whose alternatives show a range of ideas
- Increase in students who are comfortable with ambiguity
- Increase in students who recognize need for creativity is needed for all kinds of business applications
- Increase in students who are flexible or adaptable and can see connections to other contexts

From interviewing faculty, time commitments include:

- Single class session
- Multiple class sessions
- Integrated with a specific assignment
- Integrated into group work
- Integrated into multiple assignments
- Integrated into case studies

The paper concludes by integrating techniques, learning outcomes and time constraints into a typology that business educators can utilize in their courses. Suggestions for empirical testing of the typology and its expansion to other domains are included.
BUSINESS AND MANAGEMENT

FULL PAPERS
CURRENT STATUS OF E-COMMERCE SECURITY AND ETHICS IN GLOBAL PERSPECTIVE

Nitya Karmakar
University of Western Sydney, Australia

ABSTRACT

The phenomenal increase in the Internet population along with E-commerce has given rise to security and ethical concerns globally. It is of paramount importance to keep cyberspace free from the playground of hackers, criminals and ethical misuse. The business community is facing continuous challenges to create a safe E-Commerce environment for consumers. Although we are now living in an age of superb technological excellence, it is also providing immense opportunities for law breakers. Tremendous efforts are being undertaken by entrepreneurs & technologists to manage technological innovations to improve the quality of life in both the developed and the developing world. It is hard to keep pace on how information technology is developing and changing. Issues relating to Internet security are a hot topic these days and are reviewed extensively in the media, business and information technology journals. In this age of globalisation, the stake of businesses (both national and international) are more serious than before in order to keep customer data in a rock solid state so that it will never be subjected to misuse. This paper analyses some of the most important issues associated with the Security and Ethics relating to E-Commerce in a global perspective. The author also looks into the recent developments in Australia in this regard. The article reveals that the business community needs to be continuously vigilant to face new challenges that are dependent not only on technologies, but other areas such as policies, procedures and practices.

Keyword:
Ethics, Security, Globalisation, E-Commerce, Law, Policy, Privacy

INTRODUCTION

The 21st century has provided us new challenges and opportunities due to the rapid increase of web-based applications. We are truly in the realm of a Web Revolution. But the negative impacts of this revolution are also disturbing us. The media and work places are bombarded with stories of security and ethical breaches. The perpetrators remain almost unpunished due to the boundary-less regime of the Internet. However, businesses are aggressively trading on the Web. For example, Dell and Cisco along with many other companies undertake business on the web that runs in a million dollars a day. It is also stated that Apple sold over a 100 million on iTunes during July 2003 to July 2004 (just one year of its operation). This is the world of e-Commerce and its growth has been a phenomenon over the last decade. But the secured electronic payment systems are still evolving. Ethics, privacy and trust play a major role in online business. Although technologies for protecting cyberspace are getting better day by day, Internet security for building secure E-Commerce Systems is a growing concern. A trusted e-commerce environment needs to be created in which payment and other exchanges can take place seamlessly. However, e-Commerce is the fastest growing area in the new digital economy and already proving itself to be a powerful business channel.

The main focus area of this paper is to briefly analyse some of the most important issues associated with the Security and Ethics relating to E-Commerce globally and in particular Australia. It also proposes that the
business community should not rely only on emerging technologies to control illegal activities on the cyberspace, but also on policies, procedures and practices.

E-BUSINESS & E-COMMERCE AT A GLANCE

The Internet is accelerating a paradigm shift in business. E-business is an integration of all the business processes required to buy and sell goods and services over the electronic medium known as the Web. This is not a new concept: rather it is an evolution of traditional business practices taking advantage of the new technologies of the Internet age to enhance efficiency and productivity. IBM defines e-business as “a secure, flexible and integrated approach to delivering differentiated business value by combining the systems and processes that run core business operations with the simplicity and reach made possible by Internet technology” (Alter 2002, p.6). It is vital to remember that e-Business is much more than e-Commerce which is defined as “buying and selling over digital media’ (Kalakota & Robinson, 2001, p. 4).

As an organisation becomes more smart in electronic business and as consumers become more confident in conducting electronic payment over the web, e-Commerce will continue to grow dramatically (Karmakar 2004, 2005). The management guru Peter Drucker has put forward strong observations about e-Commerce (Drucker 2002):

“The truly revolutionary impact of the Internet Revolution is just beginning to be felt. But it is not “information” that fuels this impact. It is not “artificial intelligence.” It is not the effect computers and data processing on decision making, policymaking, or strategy. It is something that practically no one foresaw or, indeed even talked about 10 or 15 years ago; e-commerce—that is, the explosive emergence of the Internet as a major, perhaps eventually the major, world-wide distribution channel for goods, for services, and surprisingly, for managerial and professional jobs. This is profoundly changing economics, markets and industry structure, products and services and their flow; consumer segmentation, consumer values and consumer behaviour; jobs and labour markets. But the impact may be even greater on societies, and politics, and above all, on the way we see the world and ourselves in it”.

The key reason for this Internet Revolution is ever-changing information technologies.

SECURITY FOR E-COMMERCE

E-Commerce is a new business model. It warrants special care to make secure and safe electronic exchanges on the Web. Although advanced network security technologies are available, they must be embedded with policies, procedures and practices to conduct successful e-Commerce. ` E-Commerce security marks a departure from traditional security because it demands new security measures in relation to access (authorisation & Authentication), confidentiality, integrity and nonrepudiation of information (Yang 2000). Panko argues that there is a strong tendency for upper management and even IT professionals to think of security in terms of firewalls, antivirus programs and other technology protections which are extremely dangerous because without excellent management, operational procedures, and implementation diligence, the best technology will bring no benefit (Panko, 2004).

So we define e-Commerce security as the policies, procedures, practices, and technology that must be in place to undertake commerce electronically via networks with a reasonable assurance of safe transmission of information. This assurance applies to all online activities, transmissions, and storage. It also applies to business partners, customers, regulators, insurers, or others who might be at risk in the event of a breach of that organisation's security. Ultimately, it may be the court that is called on to decide whether reasonable security existed at the time of the breach (Volonino & Robinson, 2004, p.1). With the advent of e-Commerce and growing use of the Web, security has been a frequent headline in the news media. Unfortunately, the Internet was not originally designed to be a highly secure system. The good news is that a number of technologies have been developed to increase the security of the Internet and Web (Van Slyke & Belanger, 2003). Although it is now a common belief that security for e-Commerce is mainly a management issue, not a technology issue.
ETHICAL AND LEGAL ISSUES IN E-COMMERCE

Ethical standards and laws normally lag technological innovation. E-commerce is taking new forms and enabling new business practices. These changes bring huge risks—particularly for individual consumers—along with their numerous benefits. Most electronic payment systems know who the buyers are; so, it is most important to protect buyers’ identities (privacy issues). Many of the ethical, privacy and legal issues related to IT in general apply to e-Commerce (Turban et al. 2008). Moore defines computer ethics as

“the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology” (Moore 2000)

The issue of privacy has become one of the hottest topics in computer security at the beginning of the twenty-first century. Many organisations are collecting, swapping, and selling personal information as a commodity, and many individuals are aware of these practices and looking to governments for protection of their privacy (Whitman & Mattord, 2003).

Ethics and morality are closely related. The term ethics is derived from the Greek ethos, and the term morality has its roots in the Latin mores. Both the Greek and the Latin terms refer to notions of custom, habit, behaviour and character (Tavani, 2007). Reynolds states five reasons for fostering good business ethics (Reynolds, 2003):

I. To defend the organisation and its employees from legal action
II. To form an organisation that operates consistently
III. To generate good business
IV. To avoid adverse publicity
V. To gain the goodwill of the community

Laws do not provide a complete guide to ethical behaviour, because of the legal limitations to handle all ethical issues. Some ethical questions are related mostly to morality. A professional code of ethics describes the principles and core values essential to the work of a particular occupational group so that an ethical work environment can be created. Association for Computer Machinery (ACM) and Computer Society of the Institute of Electrical and Electronic Engineers (IEEE-CS) have well established professional code of ethics for its members. It is also essential to establish a corporate code of conduct as a guide that highlights an organization’s key ethical issues and identifies the overarching values and principles that are important to the organisation and that can help in decision making. There are enormous benefits of a code of ethics for an organisation, which can be summarised as follows (Reynolds, 2003):

♦ Improves ethical decision-making
♦ Promotes high standards of practice and ethical behaviour
♦ Enhances trust and respect from the general public
♦ Provides an evaluation benchmark

Many organisations take ethics seriously and produce a document guiding the behaviour of its members or employees. Some corporations require new employees to read its code of ethics and sign a promise to abide by it.

Schoder and Yin believes that a lack of security along with the related legal issues and the fact that one is doing business with suppliers with whom one has no business history, are the key barriers to an enterprise moving its transactions on the web (Schoder and Yin, 2000).

The process of ensuring the proper ethical principles starts with corporate executives—setting a proper example—and can be enforced and ensured through formal and technical controls. The primary informal control is to be principles embedded with policies, procedures and practices and have an ethical protocol at the top with a focus and priority on e-commerce security—in the interest of the survival and prosperity of the corporation.
ONLINE SECURITY ISSUES: A GLOBAL OVERVIEW

As a result of the extensive growth of the Internet population across the globe, services and devices connected to the Internet have made more computer crimes and security breaches possible. The impact of the Internet has been tremendous on businesses. Andy Grove (1996), Chairman of Intel, one of the early adopters of e-Commerce, made a remarkable comment about the Internet:

"Is the Internet a typhoon force, a ten times force, or is it a bit of wind? Or is it a force that fundamentally alters our business?"

We are facing a rapid change in the business world as more and more organisations and consumers are exploiting the Web as a tool to enhance their selling or shopping experience. On the other hand, along with this paradigm shift in business, many Internet pirates, terrorists, hackers and frauds have come on this virtual world for taking advantage of the relative anonymity of committing online crimes and vulnerabilities affecting a number of businesses and consumers.

Kalakota and Whinston (2004) defines security threat as a “circumstance, condition, or event with the potential to cause economic hardship to data or network resources in the form of destruction, disclosure, modification of data, denial of service, and/or fraud, waste, and abuse”. So what is security in the context of electronic commerce? A security is defined as the “policies, practices, and technology that must be in place for an organisation to transact business electronically via networks with a reasonable assurance of safety” (Alter, 2002). Generally, security deals with controlling one’s environment for protection of data (Kalakota & Robinson, 2001). Forrester Research revealed that two-thirds of consumers are worried about protecting personal information online (Branscum, 2000). A survey of consumer attitudes toward privacy reported by the Pew Internet & American Life Project (2000) revealed that 66 percent of respondents believe that online tracking should be outlawed, and 81 percent support rules for online information gathering. A striking 86 percent believe that businesses should ask before collecting information about them.

In July 2005, the Computer Security Institute (CSI) revealed the results of the tenth annual Computer Crime and Security Survey, which was based on responses from 700 security managers from businesses, financial institutions, government agencies, medical institutions, and universities. The survey was conducted in collaboration with the Computer Intrusion Squad of the Federal Bureau of Investigation (FBI). According to this CSI/FBI 2005 report, organisations are subject to ongoing vulnerabilities as a result of computer security violations (Gordon et al. 2005). Some survey results are as follows:

- 56 percent of respondents experienced unauthorised uses of their computer systems within the past 12 months.
- 95 percent of respondents experienced web site incidents.
- Respondents reported more than $US 130 million in estimated financial losses.
- More than 80 percent reported estimated financial losses resulted from virus infection, unauthorised network access and theft of proprietary information, distributed denial of service attacks, and Web site defacement.

The average annual loss reported by U.S. companies in the 2007 CSI Computer Crime and Security Survey more than doubled, from $168,000 in last year’s report to $350,424 in this year’s survey. This ends a five-year run of lower reported losses. Key findings include:

- Financial fraud overtook virus attacks as the source of the greatest financial loss. Virus losses, which had been the leading cause of loss for seven straight years, fell to second place. Another significant cause of loss was system penetration by outsiders.

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1 2007 CSI/FBI Computer Crime and Security Survey
Almost one-fifth of those respondents who suffered one or more kinds of security incident said they'd suffered a "targeted attack," i.e. a malware attack aimed exclusively at their organization or at organizations within a small subset of the general population.

Insider abuse of network access or e-mail (such as trafficking in pornography or pirated software) edged out virus incidents as the most prevalent security problem, with 59% and 52% of respondents reporting each respectively.

When asked generally whether they'd suffered a security incident, 46% of respondents said yes, down from 53% last year and 56% the year before.

"At a period when experts throughout the industry have been discussing with concern the growing sophistication and stealth of cyber attacks, here we have a couple hundred respondents saying they lost significantly more money last year," states Robert Richardson, CSI director and author of the survey. "There's a strong suggestion in this year's results that mounting threats are beginning to materialize as mounting losses."

Around the globe, security threats and concerns are similar. For example, a survey of security directors in an Asian corporation revealed that their top security issues were similar to those of their US counterparts as given herewith in Table 1:

<table>
<thead>
<tr>
<th>Internet/intranet security</th>
<th>Business interruption/disaster recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kickbacks</td>
<td>Insurance fraud</td>
</tr>
<tr>
<td>Business espionage/trade secrets theft</td>
<td>Inadequate security guarding services</td>
</tr>
<tr>
<td>Intellectual property/piracy/counterfeiting</td>
<td>Political unrest/regional instability</td>
</tr>
<tr>
<td>Employee selection/screening concerns</td>
<td>Illegal sales commissions</td>
</tr>
<tr>
<td>General employee theft</td>
<td>Embezzlement</td>
</tr>
</tbody>
</table>

*Table 1: Key Security issues in Asian Corporations*

The IT industry could be crippled if the security breaches are not controlled properly. Some recent scenarios are provided herewith:

India's Information Technology (IT) sector which earns $US 23 billion annually will set up a self regulatory body to tighten security after incidents of data theft in 2005. Two incidents shook the industry:

1. Three employees of Bangalore outsourcing company Mphasis ($US5.2 billion call-centre industry) were arrested for allegedly stealing $US350,000 from Citibank account holders in New York in April, 2005.
2. An IT employee in Delhi was reported to have sold confidential information on 1000 banking customers just two months later.

India's IT companies already had many checks in place, but an independent regulatory body would provide an extra layer of comfort. More than 1000 companies representing 98 percent of the IT industry have agreed to be part of this independent regulatory body. There is also a nationwide register of IT employees that includes workers' photographs, fingerprints and employment histories to curb security breaches. This independent body would have the mandate to audit its members and to punish those failing to comply with regulations. It would give current and potential overseas clients confidence that compliance is not just left to the companies (Anon, 2006).

In 2000, a student in the Philippines planted the so-called "I Love You" virus that infected millions of computers across the globe. The worldwide economic loss due to this misadventure was estimated at $US10 billion.

For both individuals and organisations, credit card fraud is really scary (McNurlin & Sprague, Jr., 2006). There are, however, some threats that US corporations rarely consider as top priority, while managers in other areas of the world must take them into consideration. Political unrest and regional instability are two examples. Other

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*Source: "The Threat from the Net", Asian Business 36(11), pp. 34*
examples of unique threats include natural disasters in areas prone to those, or civil unrest in other areas, all of which can cause business interruption.

**GLOBAL TREND IN GENERAL**

Senior representatives of more than 3,600 companies in 50 countries were interviewed during ‘Global Economic Crime Survey 2003’ by the PricewaterhouseCoopers (2003). The economic crime remains a significant threat with 37% respondents reporting significant economic crimes during the previous two years and the average loss per company was US$2,199,930. The survey has identified that the gravest concerns for the future are asset misappropriation – the most visible of economic crimes and cybercrime and looking forward over the next five years, 35% of companies expect their greatest economic crime risk to be asset misappropriation and 31% cybercrime. Cybercrime is still seen as a key risk for the future in North America (38%) and Western Europe (37%).

In ‘Global e-fr@ud Survey’ (2001), KPMG Forensic & Litigation Services practices surveyed the world’s largest companies on the topics of e-fraud and security related issues in the world of e-Commerce in the following 12 countries:

<table>
<thead>
<tr>
<th>Region</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td>Australia, Hong Kong, India</td>
</tr>
<tr>
<td>Europe, Middle East</td>
<td>Belgium, Denmark, Germany, Italy, South Africa, Switzerland, United Kingdom</td>
</tr>
<tr>
<td>and Africa (EMEA)</td>
<td>**</td>
</tr>
</tbody>
</table>

In total, 1,253 completed questionnaires were included in the survey findings, although KPMG sent questionnaires on e-Commerce & e.fr@ud to more than 14,000 CEOs, CIOs, and other senior executives of the largest public and private companies of those countries. Hackers, poor implementation of security policies, and the lack of employee awareness were identified by survey participants as the greatest risk to their e-Commerce systems and the responses were consistent for all participating countries. Survey respondents from all participating countries stated that security of their e-Commerce system could be most improved by the following:

- Regular system penetration testing (authorized hacking),
- Use of software specifically designed for security issues in an e-Commerce environment,
- Increased use of encryption technology.

In response to their views on public perception about e-Commerce security, eighty-eight percent of respondents feel that the public perceives the traditional, more established “bricks and mortar” businesses as being more secure than e-Commerce based, or dot.com, companies. The participants identified concerns about the security and privacy of information and a lack of familiarity with technology as being the most important preventing the consumers from engaging in e-Commerce transactions.

**AUSTRALIAN SCENARIO**

Australian online organizations are also subjected to malicious attacks and misuse. The Computer Emergency Response Team (CERT) was established to research and give advice to organizations on computer security problems in the United States. AusCERT is the equivalent operation in Australia.

AusCERT provides a single, trusted point of contact in Australia for the Internet Community to deal with computer security incidents and their prevention. AusCERT aims to reduce the probability of successful attack, reduce the direct risk to security on organisations and lower the risk of consequential damage (Lawrence et al. 2003).

The 2004 AusCERT Survey identified that 49 per cent had experienced malicious online attacks that affected data or systems confidentiality, integrity or availability and after viruses, worms and Trojans, laptop theft and
misuse of IT resources at work are the most costly IT security problems for Australian businesses (Slay & Koronios, 2006, AusCERT 2004).

The key findings for 2006 AusCERT Survey (based on 2,024 IT managers or their equivalents from a range of Australian public and private sector organisations) are (AusCERT 2006):

- About 1 in 5 respondents experienced electronic attacks that harmed the confidentiality, integrity or availability of network data or systems in the last 12 months. This is substantially fewer than in the last three years (22% in 2006 compared to 49% and 35% in 2004 and 2005 respectively).
- Consistent with previous years’ trends, most of these attacks were again originated externally (83%) compared to internally (only 29%). Compared to previous years, this represents a small increase in external attacks and larger reduction in internal attacks (in 2005, 81% external and 37% internal; in 2004, 88% external and 36% internal).
- Infections from viruses and worms were the most common form of electronic attack reported by respondents with 45% of respondents experiencing this type of infection.
- The greatest sources of financial loss for 2006 were due to the theft or breach of proprietary or confidential information (over $2 million on average): computer facilitated financial fraud (over $100,000 on average); and telecommunications fraud (over 60,000 on average).
- Total average annual losses for electronic attack, computer crime, and computer access misuse or abuse increased by 63% to $241,150 per organisation compared to 2005.
- Of those that experienced harmful electronic attacks, more public sector organisations experienced harmful electronic attacks (59%) compared to private sector organisations.
- The need to change users’ attitudes and behaviour regarding computer security practices was again the most common challenge cited by organisations in 2006 (60% in 2006 compared to 51% in 2005 and 45% in 2004).

Hutchinson and Warren (2001) have researched the attributes of Australian Information Systems managers with regard to policies and audits. They conclude that while a majority approve of doing something, only a minority are prepared for an external attack. The need to shield a business from information is argued by Helms et al. (2000) to be best done by being pro-active and thus setting a long-term strategy in place.

**VULNERABILITIES**

The tremendous increase in online transactions has been accompanied by an equal rise in the number and type of attacks against the security of digital payment systems. Some of these attacks have utilized vulnerabilities that have been published. There are a number of reasons why security vulnerabilities arise in shopping cart and digital payment systems. The reasons are not exclusive to these systems, but their impact becomes much greater simply because of the wide exposure that an online website has, and because of the financial nature of the transactions.

The survey results relating to information vulnerabilities are provided in the Table 3:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerabilities</td>
<td>171</td>
<td>345</td>
<td>311</td>
<td>262</td>
<td>417</td>
<td>1,090</td>
<td>171</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>‘02</th>
<th>‘03</th>
<th>‘04</th>
<th>‘05</th>
<th>‘06</th>
<th>Q1-Q2, ‘07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vulnerabilities</td>
<td>345</td>
<td>311</td>
<td>262</td>
<td>417</td>
<td>8064</td>
<td>3,907</td>
</tr>
</tbody>
</table>

Total vulnerabilities during 1995-Q1-Q2, 2007: **34,687**

*Table 3: Reported vulnerabilities (1995-Q1-Q2, 2007)*

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The vulnerabilities discussed here are not necessarily exclusive to shopping carts or digital payment systems. They could easily be present in other types of web applications as well. However, in the case of e-commerce systems, the vulnerabilities acquire a graver dimension due to the financial nature of transactions. What is at stake is not only a direct loss of revenues, but companies may face a serious loss to their reputations as well. In some cases, they may be faced with legal penalties for violating customer privacy or trust, as in the case of Guess.com and PetCo.com. It is of paramount importance for designers and developers of web applications to consider security as a primary design goal and to follow secure coding guidelines in order to provide the highest possible degree of assurance to their customers (Mookhey, 2000).

An organisation must undertake a vulnerability assessment which is a methodical approach to identifying and prioritizing vulnerabilities, enabling businesses to non-intrusively test their networks from the hacker's perspective and automatically do the following:

- Identify vulnerabilities and network misconfigurations,
- Identify rogue devices, including wireless and Virtual Private Network (VPN) points,
- Detect and prioritise vulnerability exposures,
- Provide remedies for known vulnerabilities,
- Validate firewall and Intrusion Detection Systems (IDS).

SECURITY REQUIREMENTS: AN OVERVIEW

Today organisations that conduct their trade over the Web and their insecure communication networks face growing risk from network security breaches. E-Security is a crucial factor for the success of e-Commerce, especially in terms of privacy of content and electronic payment (Jelassi & Enders, 2005). Trusted communications of electronic transmission of business messages over the Internet demand essential e-security requirements. These are provided in table 2 (Greenstein & Vasarhelyi, 2002):

<table>
<thead>
<tr>
<th>Security Issue</th>
<th>Security Objective</th>
<th>Security Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication</td>
<td>Origin verification - transaction who they claim to be</td>
<td>Digital Signatures, Digital certificates, Challenge-response, Passwords, Biometric devices</td>
</tr>
<tr>
<td>Privacy &amp; Confidentially</td>
<td>Privacy of message</td>
<td>Encryption, Digital Signatures</td>
</tr>
<tr>
<td>Integrity</td>
<td>Detecting message tampering and checking that the message sent is complete</td>
<td>Digital Signatures, Cryptographic hash Sums</td>
</tr>
<tr>
<td>Non-repudiation</td>
<td>Proof of each message’s origin, recipient, and content-ensuring that sender cannot deny sending or receiving the message</td>
<td>Bidirectional hashing, Digital signatures, Transaction certificates, Time stamps, Confirmation services, Encryption(with a trusted exchange of keys)</td>
</tr>
<tr>
<td>Authorisation</td>
<td>Limiting entry to authorised users</td>
<td>Firewalls, Password, Biometric devices</td>
</tr>
</tbody>
</table>

Table 2: Requirements for secure electronic commerce

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To achieve e-security several technologies are commonly used including digital signatures, cryptography, public and private keys and e-security standards such as Secure Sockets Layer (SSL) and Secure Electronic Transmission (SET). Kesh et al. (2002) provided the security requirements for e-Commerce in more details. An increasing security concern is keeping order details and credit card information confidential during transmission.

As the technology relating to e-Commerce has become more complex and more intertwined, the opportunities for intrusion and attacked have increased (Turban et al. 2006). According to International Data Corporation (IDC), worldwide spending on corporate digital security was over $US70 billion in 2003, including the costs associated with people, products and services (Market Research Summaries, 2003). IDC estimates that the figure will reach $116 billion by 2007. In the United Sates, the coordination of cyber security effort falls to the Department of Homeland Security (DHS). Towards this end, the DHS formulated The National Strategy to Secure Cyberspace (Department of Homeland Security, 2004). The DHS strategy includes five national priorities:

1. A national cyberspace security response system,
2. A national cyberspace security threat and vulnerability reduction program,
3. A national cyberspace security awareness and training program,
4. Securing governments’ cyberspace,
5. National security and international security cooperation.

TRUST

It is difficult to establish trust in the online world. This is a critical challenge which applies whenever trading is done on the Internet and feedback mechanisms have become an important part of dealing with it. Trust applies to every element of the transaction: a buyer expects the delivery of the right products, of the right quality and at the right time, while a seller expect a payment as agreed.

As Fukuyama (1995) argues: “People who do trust one another will end up cooperating only under a system of formal rules and regulations, which have to be negotiated, agreed to, litigated and enforced, sometimes by coercive means”. Such a legal and procedural apparatus serves as a substitute for trust, but it entails making transaction costs. Absence of trust thus implies higher costs will be incurred. Online business involves essentially the same levels of trust and reliability as does trade in the physical world (Papazoglou & Ribbers, 2006).

REGULATORY ENVIRONMENT

The regulatory environment in which e-Commerce is conducted is full of unclear and conflicting laws. There are differing interpretations for the same legal issue on cyberspace even among developed countries. In many cases, government regulatory bodies have not kept up with the changing nature of technologies.

The most important legal issue hampering the growth of e-Commerce is still a lack of awareness. Legal barriers could be defined as a specific legal provision, which prevents enterprises from entering into e-Commerce (Papazoglou and Ribbers, 2006). The lack of harmonization of e-Commerce legislation, and the resulting divergences between national legislations, has contributed to this negative image (CEC 2004).

The taxation of online business is one of the toughest issues facing governments. Sales taxes are the largest single source of revenue for many governments (Napier, H.H et al., 2006). These governments fear that increased trade on the Internet will result in a serious decline in their sales tax revenues or other form of similar taxes such as Goods and Services Tax (GST) in Australia and the Value Added Tax (VAT) in the European Union (EU). The tough EU legislation can be summarised as follows (Schneider, 2007):

“The EU enacted legislation concerning the application of VAT to sales of digital goods that became effective in mid-2003. Companies based in EU countries must collect VAT on digital goods no matter where in the EU the products are sold. This legislation has attracted the attention of companies based outside of the EU that sell digital goods to consumers based in one or more EU countries. Under the law, non-EU companies that sell into the EU must now register with EU tax authorities and levy, collect, and remit VAT if their sales digital goods delivered into the EU.”
However, the international nature of e-Commerce complicates a company’s tax obligations and inconsistent legal requirements.

Another issue of legal concern is fraud on the Internet which has grown even faster than Internet itself (CyberSource Corporation, 2005). Legal bodies have found it difficult to combat many types of online crimes and control those who are advocating terrorism over the Internet. Many consumers are also reluctant to take part in e-Commerce on the ground of privacy issues. E-Commerce Web sites will remain controversial in their attempts to collect and use consumer data until the legal environment of privacy regulations become clearer across the globe.

In addition to the above concerns, new business models, such as business-to-business (B2B) online auctions may invite new legal challenges particularly in relation to fair trade.

The Australian Government is pursuing an e-security policy to increase public confidence in the security of the online environment. It has introduced the Cybercrime Bill 2001 with the aim of providing a strong deterrent to persons engaging in cybercrime activities such as hacking, computer virus propagation, and denial of service attacks, stalking and fraud. The legislation also allows for enhancement of enforcement powers relating to the search and seizure of electronically stored data. The key offences are consistent with the terms of the draft Cyber Crime Convention being developed by the Council of Europe and other countries, including the United States.

**CYBER-TERRORISM**

Cyber terrorism is the use of computers and the Internet to launch attacks and horrible acts that may directly harm or kill people (Dasgupta, 2002). Computer systems control airline traffic and transportation systems, water, oil pipelines, and energy. Therefore, disruptions in any one of these systems could cause loss of life or widespread chaos (Volonin & Robinson, 2004). The first half of 2002 saw a 28% increase in Internet attacks, and almost 200,000 of them were successful (Barbaro, 2002).

Fifty or more new computer viruses are created each week (Vise, 2001). Using evidence from sophisticated malware hacker attacks; the FBI estimated that losses by U.S businesses had exceeded US$7 billion in 2001 (Fonseca, 2001). This estimate does not include the costs of fraud or damages by disgruntled employees.

**SECURITY POLICY FOR E-COMMERCE**

It is important to have a coherent corporate security policy in place to protect its electronic commerce assets. A security policy is a written statement that takes into account the nature of the risks, which assets to protect and why they are being protected, who is responsible for the protection, and which behaviours are acceptable and which are not, the procedures, practices and technologies required to address the risk, as well as implementation and audit trails. Because a security policy is a very detailed document, its creation typically requires the involvement of key information technology personnel as well as end users and management. Finally, the organization commits resources to building or buying software, hardware, and physical barriers that implement the security policy. Public laws and active enforcement of cybercrime statutes are also required to both raise the costs of illegal behaviour on the Internet and guard against corporate abuse of information (Schneider, 2007, Laudon, 2002).

A comprehensive plan for e-Commerce security protects a system’s privacy, integrity, availability, Nonrepudiation, Identification and authenticates users. Each organization needs to develop and sustain a security culture along with the “good management practices.” The OECD formulated and adopted the following nine principles for Information Systems security culture in 2002 (Dhillon, 2007):

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1. Awareness  4. Ethics  7. Security design and Implementation

E-COMMERCE PRIVACY POLICY

It is important to develop a clear, concise, easily accessible privacy policy on an e-Commerce Web site. The laws vary significantly among countries worldwide with respect to protection of citizens privacy. This is why many consumers fear Web-based shopping. But the European Union (EC) has adopted strict privacy laws. Although these legal principles apply only in the EU, their effect is far reaching. This is because the directive also prohibits the transfer of data from the EU to countries which do not have adequate data protection laws. Conversely, the import of data from such countries may also trigger the requirement of the importer to abide by the EU directive. This is one of the factors putting pressure on countries such as Australia to improve their privacy protection laws. In terms of e-mail generally, the tragic events of 9/11 (11 September 2001) in New York have led to the government increasing their powers to monitor e-mail traffic around the world consequently diluting privacy.

CONCLUDING REMARKS

E-commerce security and ethics are becoming a global concern. There are increased problems about security risks such as hackers and on-line fraud along with the rise of the Internet population (over 1.2 billion\(^6\) in 2007) across the globe. An organisation faces escalating challenges from network security breaches as networks have grown more complex and difficult to manage. E-commerce security requires specific technical, organisational (policies, procedures & practices) and legal measures that must be fully maintained in an organisation (Karmakar, 2006).

The information exchanges over the Internet must be safe, secure, legal and ethical so that consumers can take part in e-Commerce without hesitation (Karmakar, 2003). A uniform regulatory environment across the world should also be evolved to safeguard e-commerce from possible misuse by miscreants. Security breaches may continue to remain a frightening and costly issue which should be countered by effective controls, a strong organisation culture of prevention, deterrence and assertive actions when a case arises. Although technologies such as firewalls, encryption and biometrics are undoubtedly important, it may be ineffective unless there are strong policies, procedures, practices and a security culture in an organisation. In conclusion, it is fair to say that only those organisations perceived as “safe” will be successful to conduct business over the Web.

Do not figure on opponents not attacking; worry about your own lack of preparation.
- Book of the Five Rings

REFERENCES


http://www.itworld.com/Sec/3832/itwnws010312security/


KPMG,( 2001) Global e.fr@d.survey, available at (write website).

Lawrence et al. (2003). Internet Commerce; Digital Model for Business (3rd edition), John Wiley & Sons Australia, Ltd.


PricewaterhouseCoopers, economic crime survey (2003), available at(write website).

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RISK ASSESSMENT FOR WEB-BASED INFORMATION SYSTEMS

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ABSTRACT

Web-based information system is a distributed web environment that is synthesis of the personal computing and Internet application paradigms. This paper discusses the security issues that arise in such an environment and describes the mechanisms that to address them. These mechanisms include the logical and physical separation of servers and clients, support for secure communication for the remote connection, a distributed validation service, a file protection scheme, and the use of encryption as a basic building block.

Keywords: WWW, Internet Security, Secure Communication, Web-based Information Systems.

INTRODUCTION

Web based information system model is a distributed environment that has been proposed as a model for the purpose of security analysis of Web based internet applications. Web-based system may be a large distributed system that may include a lot of computers. A consequence of its large scale is that the relative anonymity of users in a large system requires security to be maintained by enforcement rather than by the goodwill of the user community. Many algorithms for security in distributed environments have discussed the basic security problem [1]. In contrast, this paper focuses on the design and implementation aspects of building a secure distributed web application environment. It sets forth the fundamental assumptions on which security in web application is based. Examines their effect on system structure and describes associated mechanisms. Although web-based application model is an experimental system, it is far enough from maturity that many of its details are still evolving.

The paper begins with an overview of the web-based applications and an identification of its major components. Section 2 describes the basic system structure. Section 3 discusses the underlying environment assumptions and the conditions that must be met for system to be secure. Section 4 describes the domain of web-based system protection, and section 5 discusses validation and communication security.

THE BASIC STRUCTURE OF THE SYSTEM MODEL

Figure 1. Client/Work Stations and Main Server
The web-based application combines the user interface advantages of personal computing with the data sharing, simplicity of time-sharing. This synthesis is achieved by close cooperation between two kinds of components, workstation and main server as shown in Figure 1. A workstation provides the power and capability of dedicated personal computer, while main server provides support for the time sharing abstraction. Although the main server is shown as a single logical entry in Figure 1, it is actually composed of a collection of servers and a complex local areas network or Intranet. This network spans the entire local area and is composed of something like ethernet and different kind of network topology segments interconnected by cable links and active elements, for example routers.

Each workstation runs the windows or Linux operating system, with different web browser and is thus an autonomous time sharing node. Multiple users may concurrently access a workstation via the console itself, via the Intranet, or via terminals that are connected to the workstation. But the most common use of a workstation, and the usage mode most consistent with the web-based information system paradigm, is by a single user at the console. A distributed file system that spans all workstations is the primary data sharing mechanism. In a workstation, this file system appears as a single large sub-tree of the local file system. Files critical to the initialisation of a workstation and accessed directly. All other files are in the shared name space and accessed through an intermediary process (IMP) that runs on each workstation. IMP finds files on individual servers, caches them locally, and performs emulation of the file format semantics [2]. Process on two different workstations can read and write files in this sub-tree as if they were in a single time sharing system.

**ASSUMPTIONS**

In a web-based information system model, the basic classification of security violation includes:

- Unauthorised release of information
- Unauthorised modification of information
- Denial of resource usage

The security mechanism in this model primarily ensures that information is released and modified in authorised ways. The difficult issue of denial of service is a bit hard to address. The complex of this problem becomes apparent if one considers a situation where a piece of network hardware is tampered with such that it floods the network with packets [3]. A thread that never dies in a Java applet may eat up more than standard allotment of resources [4], for example:

- Completely filling a file system
- Using up all available file pointers
- Repeatedly eating the disk cache
- Allocating all of a system’s memory
- Crating thousands of windows, effectively denying access to the output screen or window event queue
- Using all of the machine’s CPU time by creating many high priority threads.
- A hostile application may even bring something evil such as monitoring your web page [5].

The resulting denial of network bandwidth to legitimate users is clearly a security violation in the strict sense of the term. Web-based information system will install the DSDetector software that may detect the denial of service attack. DSDetector continuously runs in the background, intercepting disk cache information and preventing data loss, wasted time and system crash. DSDetector helps you find the denial of service attack in the early stage and may help you to clean up your wasted disk cache. The denial of service attack, system resources usage and network bandwidth will be discussed further in a separate paper.

A fundamental assumption pertains to the question of who enforces security in web-based internet applications. Rather than trusting thousands of workstations, security in web-based information systems is predicated on the integrity of the much smaller number of servers. These servers are assumed to be located in physically secure
rooms, are accessible only to trusted operators, and run trusted software. No user software is ever run on
servers. For operational reasons, it is necessary to provide utilities that can be run on servers to directly
manipulate file system data. Only superusers can run these utilities on servers. Both access to servers and the
ability to become a superuser on them must be closely guarded privileges.

Workstations may be owned privately or located in public areas. We assume that owners may modify both the
hardware and software on their workstations in arbitrary ways. It is therefore the responsibility of users to ensure
that they are not being compromised by software on a private workstation. Consequently, the user has to trust
every individual who has the ability to become superusers on the workstation. A user who is seriously concerned
about security would ensure the physical integrity of his workstation and would deny all remote access to it via
the Internet.

In the case of a public workstation, it is assumed that there is constant surveillance by administrative personnel
to ensure the integrity of hardware and software. It is relatively simple to visually monitor and detect hardware
tapering in the public area. But it is much harder to detect a miscreant becoming superuser and installing a
Trojan horse [6]. Keeping the superuser password on a workstation a secret is not adequate because
workstations can be easily booted up standalone, with the person at the console acquiring superuser privileges.
An organisation that is serious about security would have to physically modify workstations so that only
authorised personnel can boot up public workstations standalone. It is common for some workstations to be used
by a group of users. Workstations located in shared offices or laboratories are examples of such situations. From
the point of view of security, such workstations must be controlled by security personnel to ensure the integrity of
the hardware and software on the workstations.

Software integrity on workstations pertains to local files. There are usually only a few such files, typically system
programs for initialising the workstation and for validation users to server. A lot of user files are stored in main
server and subject to the safeguards of the main server.

The network underlying web-based system model has segments everywhere. It is impossible to guarantee the
physically integrity of this network. It can be taped at any point, and private workstations with modified operating
systems can eavesdrop on network traffic. A consequence of these observations is that end-to-end mechanisms
based on encryption are the only way to ensure secure communication between server and workstations. These
mechanisms are described further in the next section. The routers are dedicated computers that run specialised
software. The integrity of these routers is not critical to web security. Because web-based information system
model uses end-to-end encryption, a compromised router cannot expose or modify information that is transmitted
through it. At worst, it can cause packets to be misrouted or modified in ways that cause the receiver to reject
them. These are essentially cases of resource denial, which does not attempt to address completely here.
Physical damage to a network segment has similar consequences.

Web-based model postulates the use of an independent, secure communication channel connecting all the main
servers. This is used for administrative functions such as system backups and distribution of the protection
database. This secure channel has to be realised either by a separate, physically secure network or by the use of
end-to-end encryption as in the case of client-server communication. The secure communication channel is the
same as the public network, and communication on it is unencrypted.

**SYSTEM ENVIRONMENT**

In web-based application model, the protection domain is composed of users or groups. A user is an entity,
usually a human that can authenticate itself to a main server, be held responsible for its own actions. A user is
the owner of the server. A group is a set of users or other groups associated with a single user. The name of the
user may be a prefix of the name of the group. It is possible to impose meaningful structure in the names of
groups, although system model ignores such structure. The server may internally identify users and groups by
unique identifiers. An id cannot be reassigned after creation. Such reassignment would require elimination of all
existing instances of the id from long-term server data structures, an operational nightmare in a large distributed
system. User and group names, on the other hand, can easily be changed.
A distinguished user named system is omnipotent; the server applies no protection checks to it. In practice, it more convenient to define the system administrator for the special group. An advantage of this approach is that the actual identity of the user exercising the privileges is available for use in audit trails. The revocation of special privileges can be done by modifying group membership rather than by changing password and communication it securely to the users who are administrators.

The protection domain includes two other special entities: the group of any users of the system, which has all authenticated users of main sever as its implicit members, and the user anonymous, corresponding to an unauthenticated server user. Neither of these special entities can be made a member of any group. A common practice in distributed systems is to create a single entry in the protection domain to stand for a collection of users. Such a collective entry, often referred to as a group account or a project account, may be used for a number of reasons. First, obtaining an individual entry for each human user may involve excessive administrative overheads. Second, the identities of all collaborating users may not be known. Third, the protection mechanisms of the system may make it simpler to specify protection policies in terms of a single pseudo user than for a number of users. Collective entries will exacerbate the already difficult problem of accountability in a large distributed system. The hierarchical organisations of the protection domain, in conjunction with the access list mechanism, make the specification of protection policies simple in this model.

**COMMUNICATION SECURITY**

Validation is the indisputable establishment of identities between two mutually suspicious parties in the face of adversaries with malicious intent. In web-based applications, the two parties are users at a client workstation and a main server, while the adversaries are eavesdroppers on the Internet, or modified Intranet hardware or software that alters the data being transmitted. The overall function of the validation mechanism includes three major components: a remote methods invocation mechanism that provides support for security; a scheme for obtaining and using validation objects (VOBs); an validation server that is a repository of password information. These components, described in detail in the following sub sections. In response to a standard login prompt at a client workstation, the user provides his user name and password. A connection key (CK) is used to establish a remote connection to the validation server. A pair of VOBs is obtained from the validation server and saved on workstation. These VOBs are used as needed to establish secure connections to file servers. The establishment of a connection is completely transparent to the user, who in particular does not have to supply the password each time a new connection is made.

**Assessment**

It became clear that the remote procedure call used between server and client workstation was a natural level of abstraction at which to provide support for secure communication. When a client wishes to communicate with a server, it executes a bind operation that sets up logical connection. Connections are relatively easy to establish and require only about a hundred bytes of storage overhead at each end. A connection can be set up at different levels as required. For example: neither validated nor encrypted; validated, but packets not encrypted; validated and remote procedure call headers, but not bodies, encrypted; validated and each procedure call packet fully encrypted, etc..

A client can specify the kind of encryption to be used when establishing a connection. The server provides a bit mask indicating the kinds of encryption it can handle, and will reject attempts by a client to use any other kind. This flexibility makes it feasible to equip servers with encryption hardware as well as a suite of software encryption algorithms of differing strength and cost. A workstation owner can make a trade-off between economy, performance, and degree of security in determining the kind of encryption to use. The preferred approach is, of course, to equip all client workstations with encryption hardware.

This model uses a two step validation scheme that is built on top of the validation mechanism. In the first step, a validation server is contacted and a pair of validation objects is obtained and saved for future use by an intermediary process (IMP). In the second step, which occurs each time IMP contacts a new file server, these VOBs are used to establish a secure RMI connection for the user.
A VOB is an object whose possession is proof of authenticity [7]. It is like a capability in that no consultation with an external agency is required when using it, but is different from a capability in that it establishes identity rather than granting rights. VOBs come in pairs. One of the components of the pair, the secret VOB, is encrypted at creation and can be sent in the clear. The other component, the clear VOB, has fields that are sensitive and should be sent only on secure connections. Both VOBs contain essentially the same information: the server’s id of the user, a connection key, a unique handle for identifying the VOB, a timestamp that indicates when the VOB becomes valid, and another timestamp that indicates when it expires. The secret VOB contains, in addition, a fixed string for self-identification. The appearance of this string when decrypting a secret VOB confirms that the right key has been used. The secret VOB also contains noise fields that are filled with new random values each time a VOB is created. This is done to prevent attempts to break the key used for encrypting VOBs. If used on Linux/Unix systems, the program for logging in on client workstations has been extensively modified, although its user interface is unaltered. Login now contacts a validation server using the remote connection mechanism described earlier. The name and password types in by the user are used as the client id and the CK respectively. The get key routine in the validation server obtains this password from an internal table. When the connection completes, a secure, authenticated connection has been established between login and the validation server. Login uses this connection to obtain a pair of VOBs for the user. The validation server generates a new CK for each pair of VOBs it creates. It encrypts the secret VOB with a key known only to itself and the file server. Login now passes the clear and secret VOB to IMP, which retains them in an internal data structure. At this point login terminates, and the user can use the client server.

The two step approach used in this model is more convenient and more robust than a single step validation scheme for the following reasons: it allows IMP to establish secure connections as it needs them, without users having to supply their password each time; it allows system programs other than IMP to perform server validation without user intervention; it avoids having to store passwords in the clear on client workstations; and it limits the time duration which lost VOB can cause damage.

Validation Server

The validation server, who runs on a trusted machine, is responsible for restricting server access and for determining whether a validation attempt by a user is valid. To perform these functions it maintains a database of password information about users. The passwords stored in the database are effectively in the clear, but are encrypted with a key known to the server so that non-malicious system personnel are prevented from accidently reading the passwords. This database is used for password lookup whenever a user logs in to a client workstation. It is updated whenever users created, deleted, or have their names or passwords changed. Users can change their own password; other operations can only be performed by system administrators. Note that it would not be adequate to store a one way transformation of the password in a publicly readable validation database, as is done in time sharing systems such as Unix. That approach assumes that terminals are connected to a mainframe by physically secure lines. The password typed in by a user is securely conveyed to the mainframe, where it is transformed and compared with the string stored in the validation database. Since the client and the server do not communicate over a secure channel in this model, the password cannot be sent in the clear. Further, the Unix approach does not provide mutual validation [8]. Although the time sharing system is assured of the user’s identity, the inverse is not true. The requirement that passwords (or keys derived from them) be stored in the clear on a server can also be explained by observing that the validation scheme is built around a shared secret. A publicly readable transformation of the password would not constitute a secret.

Server performance is considerably improved by exploiting the fact that queries are far more frequent than updates. This makes it appropriate for the server to maintain a write through cache copy of the entire database in its virtual memory. A modification to the database immediately overwrites cached information the copy on disk is not, however, overwritten. Rather, an audit trail of changes is maintained in the database by appending a time stamped entry indication the change and the identity of the user making the modification. Each server instance has a log file in which validation failures and unsuccessful attempts to update the password database are recorded.
CONCLUSION

Security is a very serious issue in a large-scale web-based information system. Although much theoretical research has been done in this area, applying those principles to real systems is difficult. The factors contributing to complexity include many levels of abstraction, and the need for compatibility that have to be correctly addressed. Web-based information system model we discussed here tries to establish a secure communication between main servers and client workstations and prevent unauthorised access to the system resources in such environment.

Access protection, file protection, RMI security, and protection domain representation of this model will be outlined in detail in a separate paper.

REFERENCES

Deb Shinder, Protect your network from rogue users, Scene of the Cybercrime (Syngress), Computer Networking Essentials (Cisco Press), December 2005.
THE THEORETICAL FRAMEWORK BEHIND INTERNET FINANCIAL REPORTING

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ABSTRACT

Financial reporting on the Internet by corporations is now a recognized and widely used phenomenon. It is different in many respects from the traditional hard copy versions of financial reports. The interface for presentation may also vary, being html or adobe acrobat format. There needs to be a regulatory framework for financial reporting on the Internet to generate better quality and uniformity of Internet based financial reporting. There are various Sociological and Accounting theories that represent this process of disclosing financial reports on websites. The fundamental theories described in this paper include: Communications theory, Entity theory, Enterprise theory, Regulatory Capture theory, the User's cognitive learning process and Human-Computer Interaction theories. These theories can be used as the basis of the development of a regulatory framework for financial reporting on the Internet.

Keywords: Internet, Financial Reporting, Theories, Framework.

INTRODUCTION

The Internet offers a new medium for presentation of financial reports by companies. New applications, new users and faster connections have spurred the Internet to become an important medium for communication, information dissemination and commerce (McKnight et al 1995).

It is different from the traditional hard copy format due to many factors. The first aspect is the form of presentation. This covers many aspects such as information being presented on a screen, compared to information being presented in the form of hard copy. Access to the information is also different with the use of companies' websites for financial reporting. There is more then one path of accessing the data such as going to the website of the company directly, using a search engine or accessing the company's website through a secondary site such as a stock exchange website. The interface itself may have different forms such as html format or adobe acrobat format. Information may be presented in different forms such as abridged information, information divided into sub categories (referred to as interactive reports) or a scanned version of the hard copy report.

INTERNET REGULATORY FRAMEWORK

According to Litan and Wilson (2000) the transition from hard copy to Internet usage for presentation of financial information requires major changes in the legal and regulatory framework in which economies function. The existing model for financial disclosure must be updated so that all assets-tangible and intangible are measured accurately (Litan & Wilson 2000). Litan and Wilson (2000) have also proposed that utilising the Internet capabilities more efficiently should generate financial reporting that is forward looking, describing not only historical cost based elements, but also providing a more accurate picture of the organisation's current and future prospects. Litan and Wilson (2000) have emphasized that the Internet regulatory framework needs to be user and market-driven rather than issuer or company driven. The implication here is that companies need to focus on the information needs of users, not just a pure cost versus benefit analysis for the company.

Companies from different regions, using one medium for presentation of financial information, the Internet, pose elements of differentiation for the user. This may occur in the context of the use of different standards, different frameworks, different languages, different stages of information (none, abridged, detailed), and different types of
The Theoretical Framework Behind Internet Financial Reporting

Information. This can be described as a spectrum of information ranging from no financial information to maximum, detailed, online reporting.

**SOCIOLGICAL AND ACCOUNTING THEORIES IN THE CONTEXT OF INTERNET FINANCIAL REPORTING**

Online financial reporting can be described in terms of sociological and accounting theories. The fundamental theories that will be used to achieve this purpose include:

- Communications theory (Shannon and Weaver 1949)
- Entity theory (Paton 1962)
- Enterprise theory (Soujanen 1954)
- Regulatory capture theory (Posner 1974)
- User's Cognitive Learning Process (Kennedy & Maines 2002)
- Human-Computer Interaction Theories: Information Foraging Theory (Pirolli 2002)

**Communications theory**

Shannon and Weaver (1949) produced a general model of communication that identified elements relating to transmission of information from one source to another. These elements have the following components:

- Information Source,
- Channel,
- Destination (Shannon and Weaver 1949).

**Information Source**

All human communication has some source (information source in Shannon and Weaver’s terminology), some person or group of persons with a given purpose, a reason for engaging in communication. In the context of the Internet this source is first of all the company itself, which is the primary source of information.

If the company does not provide information on its own website then secondary sources of company information become relevant such as databases generated by regulatory bodies, and/or private companies providing information on companies either free of charge or for a fee. The source controls the content and the quality of the message. In the context of Internet financial reporting, it’s the company that decides as to what it wants to project to the users of the information. Qualitative characteristics of financial reporting including timeliness, completeness, understandability and relevance of information therefore become the responsibility of the source, the company with the webpage.

**Channel**

The Internet itself is the channel for communicating the information to the user. Before the Internet was used as a medium of presentation of financial information, and even now, the hard copy, the paper version was the major, if not the sole means of channelling financial information to users.

The Internet poses new aspects as a medium of information presentation. The issues that relate to the Internet as a communication medium include the readability, usability and understanding of the information. These aspects relate to the nature of the information as well as the technical aspects of the medium of presentation itself. The Internet as a channel for communicating information faces aspects of quality control and security of the information presented. Security of the information is a major element in the context of Internet financial reporting. Internet is a channel that allows around the clock access to the information. It also allows information to be susceptible to manipulation and change by any party that can and has a motive to do so. It is the responsibility of the company to ensure the security of the financial information while it is presented via the channel. This is more complicated then hard copy channel because of the continuous exposure of information to unauthorized change on the Internet. This is because hard copy versions of reports could not be changed by third parties once printed.
and disseminated. Users and third parties could change them for personal use but the original version coming from the source itself could not be changed so readily.

**Destination**

The destination is the various types of users of financial reports. The user may question the nature of the information, the quality and completeness of the information and the authenticity of the information. Or the user may accept the information to be credible enough to be used for decision making. The Internet poses a major dilemma regarding this aspect of presentation of information. In order to increase user confidence companies can take measures such as providing information on security measures adopted, verification reports, such as additional assurance by auditors and statements from third parties guaranteeing the quality and content of the information so presented to be at least of the same standard as hard copy.

**Entity theory**

The entity theory emphasizes the concept of “stewardship” or “accountability” where the business is concerned about its survival and the business projects financial information to equity holders in order to meet legal requirements and to maintain a good relationship with them in case more funds are needed in the future (Paton 1962). Therefore this theory relates to the company itself, shedding light on why companies may present their financial reports on their websites.

The Entity theory may explain disclosure on the Internet in terms of the business being responsible and accountable towards its stakeholders, trying to meet the information needs of the users. For multinational and large companies this notion might even hold more strongly due to the expansive nature of the users. Regulatory frameworks have encouraged companies to reach all the users more or less simultaneously. The Internet offers this benefit, where companies can reach a wider audience at the same point in time.

The theory has mentioned companies fulfilling legal requirements in addition to meeting the information needs of their users. This notion extended to Internet financial reporting raises questions about the jurisdictions and the laws that need to be followed, considering that the Internet has no formal boundaries.

According to Lymer et al (1999) there is a range of regulatory bodies that are becoming active in the area of Internet Financial Reporting. These include The International Monetary Fund (IMF), International Accounting Standards Board (IASB), International Federation of Accountants (IFAD), Web Trust, COB (France), the Financial Accounting Standards Board (FASB, U.S.). Other bodies include the Australian Securities and Investment Commission (ASIC) and the Auditing and Assurance Standards Board, Australia, which have made pronouncements on the submission or use of electronic accounting data in various ways. The recommendations of these bodies are provided in more detail as follows:

**International Monetary Fund (IMF)**

IMF launched a Special Standard in 1996 dealing with timely release of data with equal and ready access for all users. The standard also covers other factors including integrity of data, quality of data and reconciliation and reliability of data. IMF has focused most on timeliness of financial information. According to the standards, even with optimal quality of financial information, information not released in time to users, would render the information useless and irrelevant in regards to decision making (Wallace 1996).

**International Accounting Standards Board (IASB)**

The IASB (formerly referred to as the IASC) published a detailed report, titled ‘Business Reporting on the Internet’ in 1999. This was supposed to be the first step in the process of developing standards in the context of financial reporting on the Internet. The report focused on the following aspects of online financial reporting:

- the current technologies available for electronic business reporting;
- what companies around the world are actually doing (this involved a detailed analysis of the Web sites of the 30 largest companies in each of 22 countries, 660 companies in all);
The sort of standards for electronic business reporting that are needed now, within the constraint of today's technologies; the shortcomings of business reporting on the Internet within current technologies; and the technological changes that can they improve electronic business reporting (Lymer et al. 1999)

According to the guidance issued by the IASB, the financial reports provided online should have the same scale and scope as traditional hard copy versions, otherwise any information lacking or additional information should be disclosed as such.

The guidance requirements also include the following factors.

1. Boundaries should be clearly set out between audited financial statements and related financial information,
2. Users should be notified of significant changes to website,
3. Internal link integrity should be assured at all times,
4. External link integrity should be assured to an optimal level,
5. All security provisions should be made to ensure integrity of the data,
6. Errors existing should be clearly identified (Lymer et al 1999).

In addition to these guidelines, the report also incorporated a “code of conduct” that incorporated the additional requirements to enhance online financial reporting. These recommendations focused on:

- Data quality: maintaining the same scale and scope as hard copy,
- Proper application of IASB accounting standards, with differentiation between sections following the standards and sections not abiding by the standards and or following another GAAP,
- Proper classification of data as complete or summarized,
- Provision of additional data to enhance decision making,
- Clear differentiation by the company and the auditor between audited and un-audited sections of the reports,
- Provision of reports in multiple languages and clear identification of the scope of the audit; whether the multiple language versions come under the umbrella of being audited or not,
- Authentication and verification of data provided on the webpage,
- Maintenance of internal and external integrity of data,
- Provision of additional communication means for additional information if required. (Lymer et al. 1999)

International Federation of Accountants

International Federation of Accountants (IFAC) has issued a paper prepared by the Information Technology Committee of IFAC to promote awareness among all accountants of the impact of e-business on the work of accountants and key issues which need to be addressed. IFAC (2002) has emphasized the importance of security of the accounting information.

IFAC (2002) has also emphasized that the responsibility of maintaining the integrity of accounting data rests on the management. IFAC (2002) has defined the following criteria for a reliable IT system generating reliable accounting information:

- Integrity: The first condition under this factor is for the information to be accurate and complete. The second condition is for the IT systems to be complete and relevant. The third condition is protection against unauthorized change and manipulation.
- Availability: IFAC has emphasized that the hardware, software, data and information should be available constantly, with the ability to download the data within reasonable time.
- Authenticity: This relates to the trailing of the information to its source thus generating verifiability.
IFAC (2002) has described the above criteria in the light of the qualitative characteristics of completeness, accuracy and timeliness. Therefore if a company would fulfil these criteria, it will enhance these qualitative characteristics.

**Web Trust**

The Web Trust program undertaken by the AICPA and the Canadian Institute of Chartered Accountants also incorporates security issues as the responsibility of the issuing organization. There are six standards incorporated in the program including a standard dealing with security. The Security standard assures that the website of the organization should maintain effective controls and practices to address security matters such as encryption of private and confidential customer information, protection of information once it reaches the site, protection against virus transmission, and customer approval before the site stores, alters or copies information on the customer's computer (Web Trust 2006).

**Commision des- Operations de Bourse (COB)**

The Commision des Operations de Bourse (COB) is a French public independent regulatory agency whose mission is to ensure the protection of investors whether their investments are in securities or other financial products involving public offerings, the adequacy of the information given to investors and the proper operation of the markets in financial instruments. COB issued a press release regarding the use of the Internet for distribution of financial information by listed companies, in May 1999.

Some of the recommendations are listed below.

1. The information provided by a company on its web site should be accurate, precise and sincere. Any links to additional sites should be easily identifiable. Disclaimers on the website of the company should be clearly identified with all contents of the website to which they hold.
2. If there are any errors on the web site they should be quickly identified, a warning should be issued and the mistake should be rectified.
3. Documents listed on the web site should be clarified as either complete, or as summaries or extracts. With summaries and extracts reference should be made as to where the whole document can be obtained.
4. The source of the information should be clearly identified. Outside information should not be included on the website without the author's permission. Financial research regarding the company should be carefully evaluated before being added to the website. It should be presented honestly and should not mislead the public. Extracts of the research should not be presented in such manner as to favour the company and the details of the author and the full research should be provided (Commision des Operations de Bourse 1999).

The point made by COB is very clear that the responsibility to maintain quality and accuracy of financial reporting on a company’s website, rests with the company itself and that the company needs to ensure that only reliable sources of third party information are presented on its website.

**FASB Institutional Framework (United States of America)**

Financial Accounting Standards Board (FASB) has provided a more precautionary approach to be taken by companies on their websites. According to a report published by FASB (2000, p.72):

**Companies should provide cautionary disclaimers on the web page in relation to forward-looking statements and speeches, not provide links to analysts’ websites, include full sets of statutory reports and notes, and avoid duty to update disclosures by putting disclaimers against updated information and update security measures.**
FASB’s approach is a mixture of the accountability that the company has towards its stakeholders to provide complete information and to protect the information from manipulation and at the same time an approach that would protect the company as well from potential litigation such as by providing disclaimers against information that may not be verified by a third party or that may be based on speculation such as forward looking statements. The approach taken by FASB is a conservative one, generating user confidence in past information rather than current or future based information.

**Other U.S. Regulation**

The Securities and Exchange Commission (SEC), in Securities Act Release No. 33-7233, indicates, in part, that, "The liability provisions of the federal securities laws apply equally to electronic and paper-based media." (Gray & Debreceny 2001). This suggests that companies are as responsible for maintaining the integrity and quality of online financial reporting as of hard copy financial reports.

Although in relation to auditor responsibility in respect of financial reporting on the Internet, the Securities Act has clarified that auditors are not required by Section 550 to read information contained in electronics sites, or to consider the consistency of other information in an electronic site with the original documents. This responsibility rests with the management.

The Australian Securities and Investments Commission (ASIC)

The viewpoint of ASIC (2004) on the use of the Internet as a medium of presentation of financial information has been the creation of a regulatory and business environment in which:

> Consumers of e-commerce financial products and services can be confident that their interests are properly protected, Industry participants can confidently plan and develop e-commerce initiatives, ASIC can further enhance its ability to be an effective and credible regulator in the e-commerce context.

The aim of ASIC is to protect user interest. In the context of Internet financial reporting, the major concern from ASIC’s point of view will be to ensure that financial information provided by companies is not misleading or deceptive, and that users can confidently use the information for decision making purposes.

**Auditing and Assurance Standards Board (Australia)**

The Auditing and Assurance standards and guidance statements are issued by the Auditing and Assurance Standards Board (AuASB) which is a part of the Australian Accounting Research Foundation. The standards are mandatory to be applied to all financial report audits as well as to other financial/ non financial information (The Institute of Charted Accountants in Australia 2006).

The guidance statements are there to provide detailed assistance on the implementation of the standards. The focus in the context of this research is on AGS 1050. The reason for that is that this guidance statement focuses on auditor responsibility in the context of financial reporting on the Internet.

AGS 1050 has clarified that the preparation and presentation of the financial report on the website remains the responsibility of the management but the auditor needs to face certain factors that may result in "risk of audit report being inappropriately associated with un audited information on company’s website” (The Institute of Charted Accountants in Australia 2006, p.856). This statement implies that companies may associate the audit report to un-audited information, giving the false impression that a specific set of information is audited when its not. This is a significant risk in relation to reliance on information presented on the website by a company to a degree that is associated with audited information only.

According to the guidance statement, the auditor may clarify in the engagement letter that “the examination of controls over the electronic presentation of audited financial information on an entity’s website is beyond the scope of the audit of the financial report” (The Institute of Charted Accountants in Australia 2006, p857). Here the guidance statement is referring to security of information presented online. It has clarified that this is the responsibility of the management and not of the auditor.
AGS 1050 has emphasized that the auditor may provide additional assurance in relation to online financial reporting, where management may request the auditor to provide additional assurance in respect of controls and security, and other information. This is considered a separate website assurance engagement. The auditor may provide a separate audit report for online reports which would have additional statements relating to the scope of the audit according to third AGS 1050 recommendation in 8.1.j. (The Institute of Charted Accountants in Australia 2006).

If the auditor is not satisfied that management has dealt with issues relating to financial reports and or audit reports to be presented on the company’s website, the auditor may notify the management in writing that the audit report should not be presented on the website and that the financial reports are not to be referred to as audited (The Institute of Charted Accountants in Australia 2006).

After the audited financial report is disclosed on the company’s website, the auditor has no responsibility to make any inquiries. If the auditor finds out that the audit report is being misused the auditor may ask the company to take off the audit report from the website immediately. If management would not taken appropriate action based on the auditor’s concerns, the auditor may seek legal advice and action (The Institute of Charted Accountants in Australia 2006).

In summary, AGS 1050 has shifted the responsibility on the auditor of assessing whether additional statements are required in an audit report meant specifically for online reporting and that this is considered a separate assurance engagement. The responsibility for the quality and security of information on a company’s website still rests on the shoulders of the management. The aim of this guidance statement is to make the auditor aware of any legal implications that may arise from the presentation of audited financial reports online and the measures that the auditor may take to protect against potential liability issues. Therefore the auditor only needs to ensure that any information that is to be placed on a company’s website initially is appropriately associated with the audit report and that it satisfies the auditor’s expectations. Beyond this point the auditor is relieved of additional responsibility unless it’s an additional assurance engagement.

**Summary regulatory bodies and the entity theory**

The regulatory bodies discussed have focused on rules and recommendations in relation to companies presenting financial information online. One component of the entity theory related to the point that companies present information to users in order to meet legal requirements. Considering the coverage provided by various regulatory bodies in relation to financial reporting online, covering quality and security of the information, the question still remains: Do companies follow the recommendations provided by various bodies? Do companies maintain the security, quality and integrity of the information presented on the websites?

**Enterprise Theory (Waino Soujenan 1954)**

This theory has been formulated by Waino and Soujianen (1954) which views the enterprise as a social institution where decisions are made that affect a number of interested parties: shareholders, employees, creditors, customers, various government agencies and the public.

The purpose of incorporating this theory is that when a company decides to present its financial information on its website, it has made a decision. This decision has consequences and affects. The larger the company, the greater the number of stakeholders affected.

As a result the company owes responsibility to the larger number of users to provide quality, reliable, complete financial information online. This information may have a significant impact on the decision making process of a larger pool of users compared to the number of users affected if the company would choose to use hard copy medium only to transmit financial reports.

**Regulatory Capture Theory (Posner 1974)**

The theory emphasizes the role of the manager as a major influence on the regulatory agencies and the rules that they develop and try to enforce. Capture theorists provide the views that while the purpose in fact or origin of
regulation is to protect the public interest, this process is not achieved because, in the process of regulation, the regulated comes to control or dominate the regulator (Posner 1974).

In the context of Internet reporting, there are rules and guidelines provided by regulatory agencies. So the extreme situation presented by Posner (1974) does not exist, where companies have no one to answer to or no regulations to follow at all.

The point though is as to how rigorously the rules and recommendations are actually implemented? The question implies that companies may not have a need to dominate or control the regulator if they can get away with not putting the rules and recommendations into practice. This enhances the concept that there may be a gap between de jure and de facto accounting and that regulators may not have the resources to minimize the gap. In the context of the Internet, this gap may be varied for different types of companies and or countries.

User’s Cognitive Learning Process

Hodge, Kennedy and Maines (2002) have asserted that managers lobby against certain elements being recognized in the body of the financial statements. And that users place more emphasis on the body of the financial statements rather than the notes to the financial statements due to processing costs and cognitive limitations. This characteristic is manipulated by management, who according to Hodge, Kennedy and Maines (2002) prefer and have the choice to disclose data in the notes to the financial statements rather than recognize it in the main body. This is specifically so for data that would have a negative effect on the bottom line and the investor’s perception of the firm’s performance. Many factors may hold this concept to be true and relevant such as limited time frame for the user to make a decision, lack of patience to read through every single piece of information presented in financial reports, inability to pick up important pieces of information from a vast amount of data.

Hodge, Kennedy and Maines (2002) identified most users as ‘sequential’ searchers, who look at the financial reports in the order in which they are presented, as compared to ‘directive’ searchers who go directly to the information that they need. This would further support the notion that sequential users may not be able to reach or find important information due to time and cost constraints. This might lead to inaccurate and inefficient decision making on behalf of the user.

In the context of Internet financial reporting, the capabilities of the technical language used for financial reporting would have a major bearing on how easily the format of the reports allow for direct extraction of information. If reports are presented in Acrobat format or html format, then a ‘find’ option may help the user to get to the information required. In spite of this feature there may be multiple instances of the key word or phrase within the report that the user may have to go through to get to the relevant information. Certain reporting languages have promised to alleviate this problem.

Human-Computer Interaction Theories

Human-Computer Interaction theories deal specifically with aspects, benefits, problems and issues that may arise when a user would utilize the computer to find information.

Information Foraging Theory

Information foraging theory deals with how user strategies, plans and technology utilized for information finding, assimilation and analysis are suited to the way data is presented in the computer environment (Pirolli & Card 1999). Pirolli and Card (1999) has identified two types of costs associated with extracting data on the Internet. One is the time cost that is the time it takes to find the relevant information on the website. The second is the resource cost that relates to user’s attention and effort. Pirolli and Card (1999) deduced from the research that users prefer maximum information output per unit cost. In the context of financial reporting on the Internet, this would relate to the amount of time and effort it would take to access relevant financial reports of a company on the world wide web.

Information Foraging Theory has then been linked to a concept called “Information Overload”. 
**Information Overload Theory**

Rao (2002) has described Information overload as the situation where the user is faced with large amounts of data that they have to look through to get to the specific information that the user wants.

This theory can be applied at two stages of extracting financial information from a company’s website. The first instance is typing the name of the company in a search engine such as ‘Yahoo’ to look for the company’s webpage. In many instances various pages of findings may be generated, through which the user would have to determine the primary web page of the company. The second stage of ‘information overload’ may occur at the company’s website, where once again the user may have to spend more time and effort to get to the specific piece of information desired.

Rao (2002) has described Information Scent as the user’s understanding of environmental cues in judging where information would be found and where would the user have to navigate to get to the information. Rao (2002) has used the term ‘proximal cues’ utilized by the user to navigate through the information sources. Typical examples of proximal cues are hyperlinks that are underlined and highlighted for the user to click on and follow to get to the information source. So in a way the user is “sniffing” out where the financial information may be, starting from the search engine, to the findings on the search engine, to the company’s webpage, to a hyperlink that may lead to the annual report for example, to the actual report itself.

Rao (2002) found that display of key words that best describe the information that may be accurately linked to the key word, enhanced the Information Scent theory and minimized the costs associated with the Information Foraging Theory.

From the company’s point of view, this would imply the degree of user friendliness incorporated by the company in its website. The emphasis here is more on the presentation aspect of financial reports on a company’s website. Information scent theory would be supported if companies have the correct keywords with relevant hyperlinks, leading the user to the information desired. It would also imply providing all elements that users may seek, with hyperlinks, in a sequential manner, on the company’s website. If a company was to use a PDF interface without hyperlinks to individual elements in the financial report, without providing a table of contents, with page numbers, this would lead to a user being overwhelmed with vast amount of data to search through. Combined with the cognitive limitations that the user may face, might result in the relevant information being missed altogether.

The point is that users should be helped by the company to get to the information desired in least amount of time and with minimal effort. This responsibility would probably rest on the web designer of the company, who will have to work in unison with management to achieve a more useful company website.

**Information Modelling on the Internet**

Price (2001) has shed light on the structure of the medium, which is the Internet itself as a mode of presentation. He has pointed out that with the Internet the user is working with reduced screens, slow access and limited service, while from the company’s point of view the delivery is to a much wider audience.

Price (2001) has described three characteristics of data presented on the Internet: height, width and the third element of depth, referring to the hyperlinks, which when clicked on lead to another source of data. This has not been possible with the hard copy medium.

Just like Rao (2002), Price (2001) has also emphasized the aspect of time. How much time does it take for the user to access the data required? Price (2001) has further extended on this concept by pointing out that due to extensive navigation from one page to another the formulation of a mental model of the content of each page becomes difficult.

Price (2001) has utilized the concepts of “perception” produced by Gestalt Arnheim’s concept of “visual thinking” to understand and improve what is presented in cyber space. Thus a user would apply logic and perception to
understand the information presented by a company on its website. This might be confusing for the user, if the company would provide disclaimers regarding the information presented on its website. This would raise questions regarding the reliability and verifiability of the accounting information online.

Price (2001) has pointed out that obtaining and utilizing information from the Internet, via a monitor, may not be an easy task for the user. Price (2001) has also made the point that users access company information with certain pre-conceived ideas that have been formulated based on past experience such as trusting that the information presented by a company on its website, has at least the same quality and scope as hard copy. How true can this perception be held? If companies are not taking complete responsibility to maintain the quality of information online, then this would compromise the qualitative characteristics of financial reporting online and would result in reduction of user confidence in the information, or worse, it might result in wrong decision making on behalf of the user.

Quantum Theory of Internet Value

Orłowski (2003) has pointed out the promises made when the Internet was introduced to the public in the 1990’s. Some of the promises made were: everyone having an Internet connection, and access to a wide array of knowledge.

As time has passed by the “information costs” have become obvious. So the question addressed by Orłowski (2003) is: What is the value of the Internet? According to Orłowski (2003) there must be a quantum amount of Internet utility. The value of the Internet in 1994 must be the same, not diminished now.

If management would not display all accounting information on the website of the company, than every user would not have equal access to the data. If the information is presented accurately in the main language, and is different in other languages, once again one user may be disadvantaged over another. If the information is not updated on the website, a similar problem of information asymmetry is faced.

So although the Internet may have the potential to enhance information provision to a wider audience, the element of control by humans still remains important as a factor affecting quality and quantity of information presented on the web.

The Quantum theory supports the idea that companies should follow a uniform set of procedures in regards to the presentation of information online, in order to benefit all users, regardless of the type of users.

Digital Imprimatur

Levy (2004) has described the Internet as a contradictory tool of communication. Walker (2003) developed the theory called “Digital Imprimatur”. This refers to the notion that at a future point in time nothing will be allowed on the Internet without a proper technical authorization.

Levy (2004) has described the advantages of such a system as eliminating identity theft, enabling secure transactions. Thus giving birth to a concept called “trusted computing”, where not only people but also computer programs would be stamped with identifying marks. The impact that this would have on an organization’s financial and other data is idealistic as far as tracing of data input; responsibility for data generation and sourcing of data is concerned. This would have a positive impact on verifiability and reliability of information presented on companies’ websites.

Post Modern Communication Theory

This theory deals with control and regulation in relation to the way information is presented on the Internet. It relates to the concepts of the Arbolic model and the Rhizomatic model (Massumi 1987).

The Arbolic model is State philosophy. Arbolic thought is strict and stiff. This represents uniformity, lack of flexibility in the nature of the information presented on the Internet (Massumi 1987).
On the contrary, Rhizomatic thought is non-linear, anarchic and nomadic, and it moves across borders (Deleuze and Guattari 1987). This view is exact opposite of the Arbolic model, in the respect that corporations are allowed complete flexibility in regards to the nature of financial reporting information presented on a company’s website.

Deleuze and Guattari (1987) have also formulated that the user is being transformed from “arboreal” to “rhizomatic” wandering across the globe via the Internet. This would imply choice for the user. The user, by accessing financial information on the Internet, has access to a wide range of information, from different companies. Therefore the user faces more options as a stakeholder, transcending national boundaries.

Brande (1996) has described the Internet as a new and open ended domain of production, circulation and consumption. This concept would entail the use of the Internet to reach a wider audience, globally.

The Internet: A paradigm shift for communication

Barr (2000) has described the Internet as a paradigm shift for communication. McMahon (2006) has suggested that this definition provided by Barr (2000) has come from Thomas Kuhn’s work “The structure of Scientific Revolutions” (1962). Kuhn (1962) has described paradigms as universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners. According to Kuhn, paradigms have two characteristics: The first one is that they attract people away from other competing models, and second that they are open ended to create problems for people to solve. This theory very well applies to the Internet since companies worldwide are now using the Internet as a medium of presentation and communication of financial information. It poses problems of security of data, quality of data, on time delivery of data, just to mention a few of the issues that surround Internet reporting.

McMahon (2006) has claimed the Internet to be ‘the greatest surveillance tool known’. Mc Mahon (2006) in his study has extended this concept to consider the affect of the Internet as a surveillance tool in countries like China, which are based on the Confucian system. In these countries the individual is strongly a part of the system, the family and the nation. This impacts the company as well, since these companies were owned by the government not long ago. With the privatisation process and the listing on the stock exchange locally and internationally, the reporting needs of these companies have changed as well. There are more stakeholders interested nationally and on a global scale.

Mc Mahon (2006) has pointed out that in such countries the government has maintained power by controlling what information is released to the public. But with the introduction of mediums like the Internet this control is diminishing and globalisation is coming into play in these countries as well.

According to Tomlinson (1999) globalisation is a process in which complex interconnections are rapidly developing between societies, institutions, collectives and individuals world wide. Thus the reports provided by a Chinese company can be accessed by a user in another country. Perhaps this is leading to better, more transparent reporting in order to attract capital.

Schiller (1989) has discussed the idea of information being shared across boundaries, beyond countries. This relates well to the adoption of International Accounting Standards in China and China’s ambitious efforts of “westernising” their financial reporting to attract more capital for listed companies. The amount of financial reporting that actually occurs on the companies’ websites needs to be examined.

Globalization and the Internet

Webster (2002) has mentioned the concept of “Globalisation of Communications”. He has described it as “a supportive, tense and contradictory role in the global market system, of which it is itself a major manifestation”. Webster (2002) has described the Global Communication phenomenon as supportive as well as contradictory. He has expanded on this point by mentioning that the information provided by companies via mediums such as the Internet may have a negative consequence for the company. An example can be a news release that would negatively affect the share price of the firm. At the same time, mediums like the Internet are offering exposure of the company to many more audience than was possible without the presence of the Internet.
Webster (2002) goes on to explain that Globalisation requires and at the same time enhances an “information infra-structure”. According to Webster (2002) following are the elements of this infra-structure:

- World-wide expansions of services that collect information, analyse and distribute it, and add value by analysing and collating it.
- Globalisation requires the construction and where necessary, enhancement of computer and communications technologies (Webster 2002).
- This information structure has resulted in the growth of information flows at a quite extra-ordinary rate” (Webster 2002).

The point Weber (2002) has made is that technologies such as the Internet are supporting and are being supported by the globalization process. This exposes the company to a wider range of users, thereby increasing responsibility to provide quality information to not just one, but multiple set of users.

**CONCLUSION**

Various theories were described in the context of financial reporting by companies on the Internet. They have all pointed towards the importance of quality, completeness and security of accounting information presented by companies on their websites. Internet financial reporting has extended the number and types of users of the information, beyond national boundaries. This means that companies now need to satisfy the information requirements of multiple, global users. There needs to be an Internet regulatory framework that is user driven. There are various national and international bodies that have provided guidelines that can be incorporated in a framework, relating to optimum financial reporting on the Internet. On the contrary, there is a gap between frameworks, policies and guidelines and actual reporting that deems frameworks and policies ineffective at varying levels. It is up to the companies to ensure that this gap is narrowed as much as possible to use the Internet most effectively and efficiently in order to fulfil the information needs of all stakeholders.

**REFERENCE LIST**


Rao, S. 2002, 'Application of Human- computer interaction theories to information design on Internet Portals', Virginia Polytechnic institute and State University.


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E-COMMERCE SELF-EFFICACY AND INTENTION TO SHOP ON-LINE: THE EMPOWERMENT OF INTERNET MARKETING

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ABSTRACT

E-commerce self-efficacy (ESE), or the beliefs in one’s capabilities to organize and execute courses of Internet actions required to produce given achievement, is a potentially important factor to explain the consumers’ decisions in e-commerce use, such as intention to shop online. In this study we apply the social cognitive theory on the area of E-commerce; we developed a conceptual model that can explore our understanding for consumer behaviour toward online Shopping. Subsequently this research will empower the Internet marketing.

INTRODUCTION

Internet has made the world very small. Through internet, individuals can sell their products and promote them without opening shops or recruiting sales men. This process can be done through the assistance of internet marketing i.e. Electronic Commerce. Through the www (world-wide-web), marketers can show off their products, businesses and services to very wide categories of people.

Ecommerce was defined differently by different researchers (Khosrowpour, 2005). Witeley (2000) and Sagi (2003) introduced a brief definition of Ecommerce. They defined E-commerce as: "The use of information technology in commercial transactions." Also, Moore (2004) defined ecommerce as: "commercial transactions conducted electronically on the Internet." A comprehensive definition was defined by Laudon (2003, P.10) who defined ecommerce as: "the use of internet and the web to transact business. More formally, digitally enabled commercial transactions between and among organizations and individual‖ digitally enabled transactions include all transactions mediated by digital technology. Commercial transactions involve the exchange of value (e.g., money) across organizational or individual boundaries in return for products and services. Exchange of value is important for understanding the limits of e-commerce: without an exchange of value, no commerce occurs.

SELF-EFFICACY PREFACE

Self-efficacy is the vital point of Albert Bandura’s social cognitive theory. By means of the self-system, individuals exercise control over their thoughts, feelings and actions. Among the beliefs with which an individual evaluates the control over his/her actions and environment, self-efficacy is the central determinant of human activity.

Ever since Albert Bandura achieved his top break through in psychology by the publication of his article “Self-Efficacy: Toward a Unifying Theory of Behavior Change” in 1977, the expression “self-efficacy” evolved universally in psychology and many associated domains and numerous researches accordingly followed to enlighten self-efficacy in the subfields of psychology such as personality, medical, social, production, managerial and in the associated domains of drug, communal health, nursing, and business management.

Bandura (1977) defined “self-efficacy” in his famous article as: a psychological construct refers to a belief in one’s ability to successfully perform a particular task. Later on Bandura’s observations specified that:

“Nothing is more influential in people’s everyday lives than conceptions of their personal efficacy. People

1 Albert Bandura (born December 4, 1925 in Mundare, Canada) is an Ukrainian-Canadian psychologist. Most famous for his work on Social learning theory (or social cognitive theory) and Self-efficacy (answer.com).
often do not behave optimally even though they know full well what to do. This is because self-referent thought mediates the relationship between knowledge and action" (1986, p.390)

Characteristics of self-efficacy

The concept of self-efficacy is originated from the famous social cognitive theory. This theory presents behavior, cognitions, and environment in triadic causation pattern where each element dynamically affects the others as illustrated in figure 3.2.

Figure 3.1: Triadic Reciprocal Causation Model, 1979

Self-efficacy as defined by Wood and Bandura (1989a, p. 408) is “the beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands.” Others analyzed that self-efficacy has three components at the same time as related works has pointed out three feature of the above description (Bandura, 1988a; Bandura and Wood, 1989; Wood and Bandura, 1989b).

First, self-efficacy is a broad summary or judgment of perceived capability for performing an exact task. From an organizational perspective, full estimation of capability is derived from the individual, the tasks being given to him/her and others in the work environment.

Second, concept of self-efficacy is highly dynamic. One’s estimation of efficacy varies as new information and experiences are obtained (even through performing the task itself).

Third, self-efficacy involves a mobilization component; self-efficacy reflects a more composite and generative process involving the structure and orchestration of adaptive performance to fit changing conditions (Bandura, 1989). This reveals that as people possessing same abilities possibly will perform diversely based on factors like their: consumption, arrangement and sequencing of these abilities in an developing framework.

Component of self-efficacy

Self-efficacy is divided up in to two related elements according to Rapley (2001) as:

1. Perceived self-efficacy: which stands for individual’s self-belief in his ability of keeping up a certain performance despite the existence of any circumstances or challenges (Bandura, 1982; O’Leary, 1985). Such viewpoints differ for various behaviours in relation to succeeding due to performing a certain behaviour(Rapley, 2001).
2. **Outcome expectations**: which refers to one’s conviction that a certain course of action will lead to a certain outcome (Bandura, 1977).²

**Integration Self-efficacy with E-commerce**

Bandura (1977, 1986) through researches related to cognitive theory has conceived joint relations between key cognitive elements, behaviour and environment. It is very important to obtain deep insights into these existing relations yet it is hard to draw a linear recursive model to entirely understand this conceptualization due to the richness of its contents (Compeau & Higgins, 1995).

In this study, these three elements were incorporated into the developed research model and the question of what factors to include was answered by previous IS research through investigating constructs within the structure of Social Cognitive Theory. Therefore, previous IS researches resulting discoveries will be incorporated into the model by relating key constructs within to Social Cognitive Theory construct as follows:

**THEORITICAL BACKGROUND**

Initially, this paper will provide a deeper look at the research model that is founded on the Social Cognitive Theory (Bandura, 1986), in addition to the theory that we intend to investigate in this study.

Researches have applied the Social Cognitive Theory, the self-efficacy construct particularly, in many empirical research fields like health, education, science, and for the first time on computers in 1989; however, no study has verified an existing relation between Social Cognitive Theory and the utilization of e-commerce up till now. Only one study by Kim and Kim (2005) has partially discussed the effect Self-efficacy but that research did not examine the whole of Social Cognitive theory and did not mention any factor that may affect Self-efficacy. Earlier before, self-efficacy was also presented as a construct inside the online shopping adoption model built by Chan (2001) which examines the connection between cultures of the United States and Korea on the utilization of online vendors.

**E-commerce self-efficacy Theoretical Model and Hypothesis**

Our study is the first comprehensive research explaining the Influence of cognitive factors (Social Cognitive Theory) on the adoption and the usage of e-commerce systems as there is no definite model for Social Cognitive theory built previously. Additionally, we built up a model from seven construct; General self-efficacy, E-commerce self-efficacy, System experience, Outcome expectation, Risk aversion, Consumer trust, intention to use E-commerce. The constructs are defined as follows. General self-efficacy is Individual’s acuity of their ability to achieve across a variety of different situations. E-commerce Self-efficacy reflects an individual’s beliefs about his or her capabilities to buy via E-commerce. Outcome expectations, defined as the perceived likely consequences of using E-commerce. System experience. Risk aversion is the tendency to avoid options associated with uncertain outcomes that differ in their desirability (Baron, 1994). Consumer trust is a user’s confident belief in the company’s E-commerce system (Macintosh and Lockshin, 1997).

²Both efficacy belief and outcome expectancy are important determinant of behaviour and their differential influence is explained further in chapter 3.
In our research model we have 8 hypotheses arranged as follows:

Individual's differences in motivation, attitudes, learning, and task performance can be explained significantly through GSE. For instance, it was found through Judge and Bono's (2001) meta-analysis that GSE and self-esteem are positively related to task performance. Generally, GSE summarizes individuals' over all lasting tendencies to consider oneself as capable or incapable of successfully accomplishing task demands in various situations.

As stated by (Eden, 1988; Chen et al., 2001, Shelton, 1990; Sherer et al., 1982) GSE positively impacts SSE across tasks and situations. In e-commerce as a context, individuals with higher GSE are those who:

- Express higher motivation to accomplish new tasks. Hard working and seek achievement.
- Expect to encounter less risk in e-commerce. Based on these factors, individuals capable of purchasing exactly the item that they want from Web vendors, are more likely to trust a web vendor and make purchases in the future (Kim & Kim, 2005; Chen et al., 2000). Consequently, it can be hypothesized that:

H1: There is a positive relationship between General Self-efficacy and the E-Commerce Self-efficacy. GSE will positively influence the E-commerce Self-efficacy.

Behavior has been found to be significantly influenced by previous experiences. Individuals' Intention to perform a specific behaviour is shaped by knowledge obtained from past behaviour partially because experiences allow higher accessibility to knowledge in memory (Taylor & Todd, 1995; Ajzen and Fishbein, 1980; Triandis, 1979; Reagin & Fazio, 1977).

H2: There is a positive relationship between E-commerce system Experience and the E-commerce self-efficacy. E-commerce system Experience will positively influence the E-commerce self-efficacy.

Bandura (1986) has demonstrated how special self-efficacy can be used to predict task performance outcomes mainly because the outcomes to be measured have been clearly identified. So in conclusion, we need to obtain specificity that is applied to specific performance situation in order to use SSE in predicting outcomes (Bandura, 1986, 1997; Marakas et al., 1998; Yi and Hwang, 2003). Self-efficacy judgments are perceived to shape outcome expectations since the outcome one presumes are obtained mainly from the belief of how well one can perform the specified task (Bandura, 1997, Compeau & Higgins, 1995b).

H3: There is a positive relationship between E-commerce self-efficacy and end-user's outcome expectancy. E-commerce self-efficacy will positively influence the end-user's outcome expectancy.
People described as low self-efficacious are less certain of their ability to perform the transactions of buying, selling or returning items online impeccably. So, if any of their online merchandises did not turn out satisfactorily, they will be most probably unable to take care of this problem by returning the purchased item and they will refrain from contacting web vendors to buy products.

H4: There is a negative relationship between E-commerce self-efficacy and customer's risk aversion. E-commerce self-efficacy will negatively influence the customer's risk aversion.

H5: There is a positive relationship between E-commerce self-efficacy and customer's trust. E-commerce self-efficacy will positively influence the customer's trust.

"consumers with high self-efficacy are more active, attempt to proactively manage situations, and more likely to initiate innovative decisions, as opposed to those with low self-efficacy who avoid difficult tasks and are passive" (Tabak and Barr 1999, P.252).

In 1987, Hill et al observed that the decision to use technology is considerably related to self-efficacy. Compeau and Higgins (1995b; 1999) as well revealed a direct positive connection between computer self-efficacy and computer usage.

H5: There is a positive relationship between E-commerce self-efficacy and usage of E-commerce system. E-commerce self-efficacy will positively influence the usage of E-commerce system.

Outcome expectations are demonstrated in the E-commerce context clearly through the increased utilization of this technology by consumers who expect a higher quality, lower prices, extended availability (24/7), and a wider variety of products while shopping online. The extra value individuals expect out of simple tasks they are capable of performing will create a major motivating factor for them to use the system. Therefore, we hypothesis that:

H6: There is a positive relationship between customer’s outcome expectations and usage of E-commerce system. Customer’s outcome expectations will positively influence the usage of E-commerce system.

H7: There is a negative relationship between customer’s risk aversion and usage of E-commerce system. Customer’s risk aversion will negatively influence the usage of E-commerce system.

In two separate studies both Gefen (2000); Kim and Kim (2005) demonstrated how purchase intentions are being significantly shaped by consumer’s trust in web-vendors.

H8: There is a positive relationship between customer’s system trust and usage of E-commerce system. Customer’s system trust will positively influence the usage of E-commerce system.

CONCLUSION:

This study will introduce new terms (such as E-commerce Self-Efficacy, E-commerce Anxiety and Personal Innovation in Information systems) that weren’t used before. These terms were built in view of the literature resulting of studies in related fields like Information Technology, Information Systems and another specific software researches. Constructs belonging to Social Cognitive Theory were also used in our model (such as General Self-Efficacy, E-commerce Self-Efficacy, Trait Anxiety, E-commerce Anxiety) in addition to extra two constructs that are originally used in IS (System ease of use and system experience). The developed model try to explain the consumer behaviour in the case of online shopping. Thus this model will empower the research on the Internet Marketing area.

3 To our knowledge, no study in E-commerce systems taking into accounts the Affect of consumer’s outcome expectation into the E-commerce usage.
REFERENCES


ABSTRACT

This paper reveals the experience of the Port Macquarie Base Hospital (PMBH), the first public hospital delivered under the Public Private Partnerships (PPPs) model in the State of New South Wales. This study extends the framework developed by Macário (2001) to analyse the political climate under which the first PPP experiment was conducted. The analysis covers the entire life cycle of the PPP hospital, from the initial contracting process to its eventual sale. The case study provides evidence consistent with the proposed analytical framework. As expected, the success of PPPs depends strongly on the integrity of the three-level political system. The extent to which the integrity of this political system can be ensured is dependent on the alignment of goals amongst the three different levels. This leaves scope for the State Auditor to play an instrumental role in monitoring goal alignment during the implementation process.

INTRODUCTION

The evolution of Public Private Partnerships (PPPs) has gone through two distinct but interrelated phases. Initially PPPs emerged as a procurement technique within the macroeconomic policy agenda. Subsequently they evolved into a microeconomic procurement policy. This 'macro/micro' interface is hinged through the accounting treatment of PPPs and the notions of value for money (VFM) and risk sharing (Broadbent & Laughlin, 1999: 102).

This paper investigates an early experience of PPPs in Australia. The experience demonstrates that the evolution of PPPs emanating from a macroeconomic policy agenda was initially driven by a desire to control public debt. Intrinsic to the policy package was an underlying ideology that believed market forces, as represented by private partners, could deliver the desired outcome more efficiently. Although these were seen as the main drivers for the first generation of PPPs (cf. Quiggin, 2005), to date, the macroeconomic policy agenda underpinning the pursuit of PPP schemes remains a strong force circumscribing the current evaluation process adopted by public agencies. In the Macário (2001) framework, the three levels of authority, namely the strategic, tactical and operational levels, have interrelated goals. The success of any PPP project depends on their integration. The case examined is the Port Macquarie Base Hospital (PMBH) in the State of New South Wales (NSW). Evidence in this study is based on findings from government reports, information gleaned from news releases as well as analysis from academic and professional literature. Port Macquarie represented the first PPP hospital experiment in NSW. This study shows that ideology, combined with accounting concern at the strategic level, and the conflicting goals between the three levels of authority have led to its ultimate failure.

This paper is organised as follows. The following section conceptualises PPPs. It is followed by Section Three that discusses the Macário (2001) framework and further configures it into an analytical framework that explains the application of PPPs in Australia. Section Four reviews the international proliferation of PPPs as a macroeconomic technical tool. Section Five examines the ideology underlying the pursuit of PPPs by governments. Given this groundwork, the Port Macquarie Base Hospital provides a case study that investigates the application of this macroeconomic tool at the microeconomic level. The paper concludes with its findings in Section Seven.

CONCEPTUALISATION

Public Private Partnerships are public procurement policies involving the private sector producing services that are traditionally the responsibility of the government (Broadbent & Laughlin, 2004: 4). PPPs can take different
forms. The most popular form (and the focus of this study) is the Design, Build, Finance and Operate (DBFO)1 where the private sector is contracted to supply a bundled product. This comprises two distinct elements: the creation of an asset, namely the construction of physical infrastructure. Common examples are hospitals, prisons, toll roads and schools. Once built, the ongoing management of the asset remains (WWG, 2006: 8). This can sometimes include the delivery of services associated with the asset (cf. Stanley & Hensher, 2004). The contract period usually stretches for a number of decades until the required return on initial capital outlay has been earned. The role the private sector plays in the second stage of this bundled product varies between social infrastructure projects and economic infrastructure projects. Social infrastructure projects, such as hospitals, schools and prisons, where the State retains demand risk (NSW Treasury, 2007: 1) are normally funded from State revenue (English & Guthrie, 2003: 503). The private sector’s role is limited to managing the physical facility to a specified level that is suitable for delivering the required service (Grimsey & Lewis, 2005: 346). The delivery of front-line services, such as clinical or educational services, to the public sector is not part of the DBFO contract (cf. Broadbent & Laughlin, 2004: English & Baxter, 2007). Economic infrastructure projects, such as toll roads and railways, where the private sector bears the market risk (NSW Treasury, 2007: 1) are generally funded by user charges or dedicated taxes (English & Guthrie, 2003: 503). In these projects, the private sector’s role can extended to the delivery of core services. Since the recoupment of initial capital expenditures is through third parties, most often the users, they are also known as stand-alone projects (Akbiyikli et al., 2006; WWG, 2006: 55). In return, the public sector purchaser makes regular lease payments (Broadbent & Laughlin, 2005: 75) to the private sector provider(s) for the availability of the facility (the availability charge) and the partial provision of facility-based service (the service charge) (cf. NSW AGO, 1996; Shaoul, 2005: 446).

Since DBFOs are infrastructure-based products, they require from the private partner(s) a substantial amount of financial capital at the start-up stage2. The willingness of a profit-seeking private sector provider to accept the project is, conditional on the long-term commitment on the part of the public purchaser. The length of DBFO contracts is on average 60 years long (Broadbent & Laughlin, 2005) in order to cover the life of the property. It is made up of two components: the concession and post-concession periods3. The concession period locks the public sector into a financial contractual relationship with the private party who remains the owner of the property during this fixed term. The length of the concession period is determined by the extent to which the present value of all the availability charges is sufficient to cover the capital contribution plus a required rate of return demanded by shareholders of the private party. At the conclusion of the concession period, the ownership of the property reverts back to the public sector at no charge4, and the contract is subject to renewal at the discretion of the public agency (cf. English & Baxter, 2007; Robinson et al., 2007).

Besides constructing the property, the bundled contract defining social infrastructure projects also includes the private provider supplying property management services once the facility is operational. There are separate contract conditions stipulating the required performance standards commensurate with the agreed service charges as well as the penalties that apply through abatement (NSW Treasury, 2007: 60). The nature of this contractual element resembles contracting out5. The contract term is usually subject to review on a 5-year interval (cf. English & Baxter, 2007; Robinson et al., 2007). In situations where the private provider’s performance falls short, the government has the option to put the service provision up for public tendering (NSW Treasury, 2007: 96). The public purchaser has the flexibility to terminate the management contract within the five-year

1 These are also termed Privately Financed Projects (PFPs) in the official guidelines of the state of New South Wales. The early generation of British equivalents are named Private Finance Initiatives (PFI). In this study, these terms are interchangeable, while PFI refers specifically to projects in the UK.

2 Total contract value is usually $50m or more. But the whole contract value does not entirely fall onto the private sector party. The public sector supplies physical capital like land and related capital works (WWG, 2006).

3 To date, no DBFO project has ever reached the post-concession period.

4 The zero reversion cost should not be seen as buying a property at no cost. Financial commitments from the public purchaser to the private owner during the concession period, as argued by Heald (2003: 359), were in fact paying for the post-concession life of the property.

5 This is not a separate out sourcing contract which may imply the public sector retains the ownership of the facility while contracting out the service provision. Private ownership is an indispensable feature of a whole PPP package. The NSW Government’s PPP guidelines explicitly preclude the option of contracting out (WWG, 2006: 8).
period if the performance of the private provider falls below the agreed standards (cf. English & Baxter, 2007; Robinson et al., 2007).

THE ANALYTICAL FRAMEWORK FOR PUBLIC PRIVATE PARTNERSHIPS

In studying the integrated urban transport system in Europe, Macário (2001) identified three levels of authority. At the strategic level, the political authority defines a set of overriding objectives to be followed by other authorities at lower ranks. These objectives are supposedly to satisfy the needs of citizens. At the second political level lies tactical authority. At this level, respective regulators design systems for public service delivery, defining policies and articulating the strategic goals into operational specifications. The last is the operational level where production and consumption of services occur. Decisions made at this level should be in line with strategic goals and tactical planning. The final outcome is the achievement of strategic objectives within the defined tactical system. In making decisions, authorities at different levels should take a holistic view to consider the flow-on impact on other levels. This ensures service deliveries are integrated into the whole-of-government circle. Macário warned that the absence of well developed strategic objectives and integrated tactical planning would lead to operators “seeking the maximization of their own profit, and without offering a network that effectively provides economies of scale and scope for the users, in particular, and for the local society in general.” (Macario, 2001: 6).

This three-level framework offers an analytical approach to understanding the Australian political environment within which PPPs were initiated. Figure 1 (see below) configures the Macário framework into a systematic approach to analyse the political setting of PPPs in Australia.

Australia has three levels of government: federal, state and local. Each state has its own parliament and executive government and is financially responsible for service delivery in areas such as health, schools, prisons, police and security as well as transport (English, 2003). PPPs have been implemented extensively in almost all areas (except police and security) at the state government level whereas experience at the federal level remains limited. The political framework developed in this paper applies to the political environment at the state government level.

The strategic level sets the macroeconomic policy for the state economy. The overriding strategic goals ought to be economic efficiency in consumption (allocation of resources in accordance with customer needs and preferences) and production (for each efficient allocation in consumption, find the minimum cost of production) (Macario, 2001: 7). The Treasury is responsible for overseeing policy implementation and approving projects that will fulfil these defined strategic goals.
In the area of capital works, the objective has been the supply of necessary infrastructure to deliver essential public services within the constrained budget. The Treasury was also concerned with the rising levels of public debt. The focus on public borrowing was extended to the accounting treatment of procured assets in the financial statements of the public sector. This reflected the control of public borrowing as institutionalised by the Loan Council at the federal level. Such political concern has encouraged off-balance-sheet borrowings. Thus capital works that relied on private funding source and appeared not to tap into government budgets were preferred and would be given priority.

The tactical level translates macroeconomic policies into microeconomic management. Respective ministers are in charge of planning an integrated system for public service deliveries. In the area of health for instance, the Department of Health is responsible for the planning of a state-wide public health system that facilitates the
achievement of economic efficiency. Capital works under the sovereignty of the Health Authority need to demonstrate that they are aligned with the Treasury’s funding strategy.

The operational level produces and delivers public services to constituents. The local regulator for example the local health authority, identifies the areas in need of capital works, sources the possible funding channels and submits the projects to the tactical authority who in turn seeks approval from the strategic level. In projects that include the private provision of services, a private sector operator replaces the public operator. Inherently, there exists conflict of interests because the objectives of the private sector operator and those of the public.

A functional framework should induce the operator to produce outcomes contributing towards strategic goals. Empirical studies suggested otherwise. Public agencies at the operating level are concerned only with cost savings to the responsible units (cf. Edwards & Shaoul, 2003; Shaoul, 2005). To get projects off the ground, PPPs have become a convenient approach to circumvent financial constraints. In government circles, PPPs are widely marketed as a new means of providing necessary social services and infrastructure without the burden of rising government debt. These circumvent the restriction that capital budgets impose on infrastructure provision. More widely emphasised in the broader debate are the benefits that a greater degree of efficiency derived from private sector ventures are reputed to achieve, as compared with government owned and operated enterprises.

**A TECHNIQUE IN THE MACROECONOMIC POLICY AGENDA**

Since the late 1980s, the world has experienced considerable growth of PPPs although across countries the level of development and the approach adopted vary. The degree of popularity and the desire of pursuing a PPP option are closely associated with the prevailing political will (Broadbent & Laughlin, 2004: 6-8). The political commitment to reduce visible public debt drove the first generation of PPP projects. Ceasing the delivery of public services would be an unpopular political decision although it would certainly alleviate some pressure on public spending. The following discussion examines the political agenda underpinning the evolution of PPPs in Australia, New Zealand and the UK. These three countries all use the British style of PPP-PSC (Public Sector Comparator) VFM (Value for Money) approach although they vary in practice.

PPPs first emerged in 1992 in the UK. At the global level, curbing inflation was then the paramount economic objective on the public policy agenda. Such a macroeconomic climate necessitated tight controls over public spending. In the UK, HM Treasury launched a control total in 1992 setting a fixed level for all public spending each year (Broadbent & Laughlin, 1999: 97). In Australia, state governments’ spending was capped by ‘global limits’ imposed by the Loan Council (Walker & Walker, 2000: 190). Similarly in New Zealand, the control of public sector capital expenditure was monitored through ‘the counting framework’ (abolished in 2003 with no publicly-disclosed replacement) established by the Fiscal Responsibility Act 1994 (Newberry & Pallot, 2003).

It appears that these countries were keen to reduce the level of public debt, but the attention was targeted only at debts appearing on governments’ balance sheets. A closer examination reveals that PPPs were indeed a convenient technical accounting devise for a hidden agenda that was designed to remove the visible debt off the balance sheet. In essence, PPPs establish a long term contractual agreement in which the public sector purchases a stream of services from a private provider. These delivery mechanisms are most appealing to infrastructure-based services because these projects consume significant amounts of capital before they are completed, while PPPs involve no new public sector asset appearing on the public sector balance sheet (Heald & Dowdall, 1999: 243). To deliver the related services, the profit-seeking private provider requires financial

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4 Arguably, there has been little experience of PPPs in New Zealand although the country has developed legislation (the Fiscal Responsibility Act 1994) “covertly favouring” PPPs. New Zealand’s reluctance to implement PPPs was possibly due to the public outcry over the over-extended privatisation program (Newberry & Pallot, 2003: 469).

5 Although PPPs increasingly become an international phenomenon, not all countries adopted the PPP-PSC value-for-money approach, such as the US and France. See for example Grimsey & Lewis (2005). Evidence in other countries, however, remains unexplored (Broadbent & Laughlin, 2004: 8).

6 A 1928 referendum approved constitutional amendments to empower the Commonwealth to co-ordinate borrowings by state governments. The maximum sums were established by agreements amongst the Commonwealth and State governments, and allocated by the Loan Council. The Council assigned a ‘global limit’ to each state government via a formula based on population (Walker & Walker, 2000: 191).
commitments (in some cases financial guarantees) from the responsible public sector purchaser. Thus in substance, government purchases of assets or goods and services through PPP arrangements are public debts.

PPPs are aligned with the political desire to restrain the measured level of public sector borrowings on one hand while meeting the on-going public need for infrastructure-based services on the other (Broadbent & Laughlin, 1999: 96; English & Guthrie, 2003: 494; Newberry & Pallot, 2003: 467, 481; Rutherford, 2003: 373; Quiggin, 2005: 446). This approach is not consistent with the accrual-accounting logic under which these borrowings should be accounted as liabilities. In all three countries, PPP costs were excluded from being set against the given level of public capital provision. In the UK, only the annual lease cost for operational services counts against the controlled total. The dominant financial element associated with the use of these facilities would not enter into the relevant accounts. This was justified and supported by the steering mechanism\(^9\) (Rutherford, 2003: 380) that defined the nature of such capital expenditure as being only a component of a bundled service (Broadbent & Laughlin, 1999: 98). Given this logic, all payments should be charged to the operating account and stay off government’s balance sheet (Rutherford, 2003: 379). In Australia, PPPs have since become a popular route of borrowings by state governments to escape the global limits assigned by the Loan Council (NSWPAC, 1994: 41; Walker, 2002: 5-7). Evidently, the initial motive to encourage PPPs was consistent with the desire to remove measured levels of public debt from financial accounts (English & Guthrie, 2003: 494; Quiggin, 2005: 445). Under New Zealand’s reformed financial management system, although PPPs were part of public debt, they were not counted toward the capital provision (Newberry & Pallot, 2003: 469). What was more misleading, PPPs turned capital into current spending. The full amount of financial commitments was expensed into a sequence of unnoticeable annual costs (Newberry & Pallot, 2003: 484). Such strategy potentially created an inter-generational debt to be repaid by future taxpayers and governments (Newberry & Pallot, 2003: 485).

Ostensibly, the initial engagement in PPP commitments was driven by political rhetoric aimed at removing visible public debt. Shielded by PPPs, governments effectively transferred financial burdens to taxpayers. More recent developments have been justified on the basis that PPPs allow for more efficient allocation of risk hence offer better value for money in the public interest. The argument that PPPs enhance macroeconomic benefits (meeting on-going public needs for infrastructure-based services without incurring on-balance-sheet debt) remains influential. For example in the United States, the rapid growth of PPPs at the local government level was fuelled by advocates claiming that the scheme was ideal for providing the highest quality service to an expanding population without needing to raise taxes (NCPPP, 2003).

**IDEOLOGY – THE PRIVATE SECTOR DELIVERS GREATER EFFICIENCY**

In the late 1980s, the international modernisation agenda to reform the public sector was underway. This agenda known as the New Public Management (NPM) reform had extended its influence to Australia. Microeconomic reform in Australia mirrored that of the NPM, which aimed at improving public sector by introducing private sector approaches to the public sector management. Driven by the ideological belief that, the profit-maximising private sector could deliver better outcomes, the reform intended to transform the role of state from “rowing” to “steering” and to separate the “provider” function from its “regulator” function. Worldwide, PPPs were considered as a product of the NPM. The functions of PPPs were to transform the state into:

> a declining role...in the direct and up-front financing of the infrastructure...leaves the services more vulnerable to the paucity of day to day funding as it is used more and more for 'leasing' type payments for the provision of the infrastructure, [thus] the whole nature of public provision is also vulnerable as its direct provision by the state becomes a more marginal activity (Broadbent & Laughlin, 2005: 93).

This underlying ideology, together with the public sector borrowing constraint, has facilitated the operational decision to procure needed services by way of the PPP route.

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\(^9\) Steering mechanisms are laws, regulations, and other pronouncements that define and operationalise PPPs (English & Guthrie, 2003: 494). PPPs (English & Guthrie, 2003: 494).
The UK Government pioneered such split-role (funder/provider) models in health services. In 1992, the Conservative government introduced the Private Finance Initiative (PFI) as an alternative to direct funding from central taxation for new infrastructure investment. Under the PFI, the private sector raises the finance for capital investment in return for which it receives a contract or lease to design, build, and operate services. The PFI experience in the UK suggested that "the balance of advantage is often unclear, and at the strategic level the main drivers appear still to be ideology and accounting." (Spackman 2002, p. 283).

Empirically, the PFI has been highly controversial because of its high costs and the way in which the introduction of shareholder returns and profits results in reductions in the services provided to local communities. To offset the costs of the PFI, the British Treasury allowed the National Health Service (NHS) to use the funds released from land sales to offset PFIs, rather than reinvest in direct NHS provision. The Treasury has also made special funds available to the private sector to offset the costs of the PFI, a practice known as a "smoothing mechanism". The British Department of Health has also allowed regions to divert much needed capital funding away from the NHS into the private sector. All these subsidies to the private sector came from the public purse and usually resulted in the withdrawal of funds from other NHS services. This investment in the NHS has seen a growing backlog in maintenance and repairs across the NHS (costs rose to £3.1b in 2001), and a capacity crisis (Pollock et al., 2001: 35). The high costs of the PFI drained hospital revenue budgets, leaving less for direct patient care. The first wave of PFI hospital schemes resulted in a 30% reduction in beds and a 25% reduction in clinical staff budgets (PHPU, 2003: 6). The use of the PFI has the effect of reducing both NHS services and the level of services available to patients, at the same time leading to the privatising of NHS assets.

Nevertheless, the PPP structure appears to allow for the provision of infrastructure and government services while mimicking a competitive situation. Competition is characterised by private sector technical and management skills, strong motivation for cost minimisation, and a correct assignment of risks. These features of an archetypal PPP closely correspond with the theoretical ideal of market institutions. In particular, the use of a PPP is justified on the grounds that it appears to be a satisfactory response to the crucial issue of risk assignment, by which those most able to control risks are those most contractually motivated to control it.

Improved efficiency can be brought about by market competition and flexibility. But in PPPs where projects are capital intensive, competition has little to do with efficiency since only a handful of market players exist. In the UK’s National Health Service, it is not uncommon to find that there was no competition at the final bidding stage because there was often only one bidder remaining (NAO, 1999). Further, competition loses its appeal in long-term contracts where ongoing negotiated adjustments often must occur to deal with changing conditions (Stanley & Hensher, 2004: 49).

The private sector is subject to less accountability than its public sector counterpart. It can be argued that the private sector enjoys higher efficiency as a result of its flexible decision-making. But flexibility is an impetus to increased efficiency in service delivery only when the private provider’s operation blends into the public service delivery framework. This is unlikely to be realised if the public sector does not have a set of defined goals and systematic long-term planning. Stanley and Hensher (2004) observed that at an operational level, the success of PPPs, to a large extent, relies on a sound developed framework both at the strategic and tactical level. At these levels, a well-defined whole-of-government approach is likely to reduce the room for any opportunistic behaviour by a given public agency at the expense of other government units or even that of the broader community.

It appears that the lack of long-term systematic thinking at the tactical level (Stanley & Hensher, 2004) and the driving accounting and ideology motives at the strategic level (Spackman, 2002) have resulted in a situation dominated by the absolute pursuit of private sector involvement at an operational level.

THE PMBH

In the mid-1970s, the increasing need for public health services in the Port Macquarie region demanded upgraded and better-serviced public health delivery. The old Hastings District Hospital was unable to meet the demand of the fast growing region around Port Macquarie. In 1978, the Labour Government of NSW announced that a new public hospital would be constructed on the mid-north coast to replace the old Hastings District Hospital. A series of subsequently elected governments, from both sides of politics (Labour and Coalition),
repeatedly promised a new hospital for the region. No party ever came good on their promises. The political power struggle between the strategic and tactical authorities would have continued and the hospital would still have been under proposal if the former NSW Premier Nick Greiner heading the then Coalition Government had not put forward a privatisation program for government owned facilities. The Government claimed that the private option offered the Port Macquarie community advantages in terms of certainty and timing.

In March 1988, the regional health authority produced a Master Development Control Plan for the redevelopment of the Hasting District Base Hospital. The plan suggested a new 219-bed hospital to be built on a new site. After a number of studies, the Department of Health (DoH) confirmed the recommendation. A detailed design brief was completed in November 1989. In August 1991, NSW Health Minister Hannaford nominated the PMBH to be considered for private sector infrastructure provision. The PMBH opened a landmark in health services for NSW. The government’s role changed from that of traditional health service provider to health service purchaser.

In December 1992, just prior to another change of government, the DoH entered into a 20-year, non-cancellable contract with Mayne Nickless Limited, whose subsidiary, Health Care of Australia (HCOA), subsequently formed the hospital management. The hospital was contracted to treat a mix of 80 percent public and 20 percent private patients. The DoH, in turn, promised to purchase health care services from the hospital, operated by the HCOA, for a span of 20 years.

The Port Macquarie Base Hospital (PMBH) was the first DBFO public hospital in NSW. Being the first experiment, it differed from the archetypical DBFO discussed in Section Two in many ways, for example the hospital involved the perpetual ownership of the asset by the private sector and the delivery of core services supplied by the private provider. The project constituted a contractual agreement between the Department of Health, NSW (DoH) and a private consortium. The consortium was made up of:

1. the owner, the Port Macquarie Base Hospital Pty Ltd (PMBH PL), a special purpose vehicle created by the private consortium to manage and operate the hospital;
2. the financiers, NATWEST Australia Bank Limited (NatWest);
3. the finance packagers, Hambros Nominees Australia (Hambros);
4. the builder, Fletcher Constructions;
5. the private operator, Health Care of Australia (HCOA), a subsidiary of Mayne Nickless Limited (Mayne).

The hospital was built on the site of the existing public hospital (Hastings District Hospital). PMBH PL leased the hospital building to HCOA. HCOA operated the hospital and provided public and private health services to the Port Macquarie region. Hambros arranged the financing, and also provided 49% of the funds. NatWest who contributed 51% of the total funding provided the majority of the development funds. The DoH retained its role as health services regulator, as well as adopting a new role, that of purchaser of public health services from HCOA.11

A DBFO structure was established for the whole project from design and financing to construction and operation. The terms of the project constituted two streams of payments. Through the availability charge, the private sector would recover construction costs and all other related expenses incurred in the course of building the hospital. In addition, under the 20-year service contract, the DoH would pay the service charge to the HCOA covering the operational costs of the provision of public hospital services. The hospital was built on the land owned by the public sector, the Hastings Council. At the end of the 20-year period, PMBH PL has the right to sell the hospital to any interested parties.

10 The plan was subsequently revised down to 161 beds.
11 Details of the functions of these entities can be found in Collyer (1997) and the NSW Auditor-General’s Report (1996).
In August 1993, the builder, Fletcher Constructions commenced construction, the hospital was commissioned in November 1994. In October 2003, the Mayne Group proposed selling its entire Australian Hospital business, including the PMBH, to another private consortium. In April 2004, the State Government commenced legal proceedings against the Mayne Group in relation to the novation of the PMBH contract to Affinity Health (part of the buying private consortium). On 31st January 2005, the Labour Government bought back the hospital for $35m\(^\text{12}\) (price as of 2006).

**At the operational level, a new hospital was needed to meet increasing demand**

The North Coast Region in which the Port Macquarie Base Hospital is located was the fastest growing region in New South Wales. Port Macquarie was one of Australia's largest retirement centres.

The population of the Hastings and Kempsey Local Government Areas was expected to grow by 75% between 1986 and 2006, compared to an average of 65% for the North Coast Region and 24% for NSW as a whole. In addition, the age profile of the catchment area's population was older than the regional average and for NSW. Approximately 17% were 65 years old and over, compared to 14% and 11% for the Region and NSW respectively. The region was also a major centre for tourism with figures provided by the Tourism Commission of NSW indicating that an estimated 32,000 to 34,000 tourists visit the North Coast on any day (NSW PAC, 1992: 21). The number of people in the region living on low incomes was much higher than the average for NSW. The proportion of families with children living on incomes below $15,000 per annum in 1986 (ABS Census results) was 32.5%, compared to 19.4% for NSW (NSW PAC, 1992: 21). A rapid expanding population characterised by greater ageing and lower socio-economic conditions required additional health resources to be allocated to the region.

The PMBH was designed to satisfy this rising demand in the region and to provide “an increased level of health service in terms of range and quantity of services provided compared to the previous Hastings District Base Hospital which served the region.” (NSW AGO, 1996: 395). It became one of the Mid North Coast Area Health Service facilities. This covers an area of approximately 7,000 square kilometres, with a hospital catchment population of approximately 50,000 people (NSW PAC, 1992: 19).

**Funding choice at the tactical level**

The DoH alleged that public finance was unavailable. At the time, the NSW Government had only $300 million each year for capital works projects in the health area. As a result, the NSW Government claimed that its health program was fully committed for the next three years to other projects, including Liverpool Hospital, Westmead Children’s Hospital, Nepean Hospital and a series of projects to upgrade major metropolitan hospitals. But ministers have the authority to vary budget sector project allocations. Soon after the private sector infrastructure provision was nominated for the PMBH, the Department's capital work priorities had changed allowing the construction of a public hospital in Albury. In addition, the NSW Auditor-General found that the cost of capital for the construction of the PMBH could be totally met by the State in less than the 20 annual payments of availability charges (Collyer, 1997: 31).

Nevertheless, the position held at that time insisted the only channel by which to obtain adequate funding to build a hospital in time was through private financing because the deal allowed the Government to keep these costs off the books.

In 1990, the DoH prepared an assessment of the cost of building a new public hospital for Port Macquarie, compared with the option of allowing private sector provision. The results are presented in Table 1.

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Table 1: PMBH Costs Assessment (a), (b), (c)  
Comparison of public and private options

<table>
<thead>
<tr>
<th></th>
<th>Public</th>
<th>Private</th>
<th>Savings</th>
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<tr>
<td><strong>Capital Costs</strong></td>
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<td>$15</td>
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<tr>
<td><strong>Recurrent Costs</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Year 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
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<td>$28</td>
<td>$2</td>
</tr>
<tr>
<td>Finance and Capital</td>
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<td>$4</td>
<td>$2</td>
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<tr>
<td><strong>Total</strong></td>
<td>$36</td>
<td>$32</td>
<td>$4</td>
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<tr>
<td><strong>20 year contract (NPV @7%)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Operating</td>
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<td>$306</td>
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<tr>
<td>Finance and Capital</td>
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<td>-$11</td>
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<tr>
<td><strong>Total</strong></td>
<td>$417</td>
<td>$371</td>
<td>$46</td>
</tr>
</tbody>
</table>

(a) Costs are in millions of dollars.  
(b) All costs are in 1991 prices.  
(c) Also see Footnote 23 for the reliability of these assessments.  
(d) No information is provided for this calculation.  
(e) These are costs of maintaining and running the hospital.  

Source: NSW Health Department, 1992:8, reprinted in Collyer, 1997:30

Table 1 indicates that at the operational level the private option would save $15 million in capital and $46 million in recurrent costs over the span of 20 years. However, why the initial capital outlay was $15m higher under the public option than the private option was never fully disclosed. Firstly, in the absence of information to the contrary it was possible but implausible to argue that it was based on the assumption of greater efficiency on the part of the private constructor. More plausibly, the $49m estimate for the private option was merely the figure upon which the availability charge was based and did not reflect the full cost of building and equipping the private hospital (NSW PAC, 1992: 36).

In fact, there are better grounds for believing that the publicly financed option would have been the lower cost option. In 1992, the NSW Treasury Corporation 10 year bond rate was 9.7%, which was 2.55% lower compared to the 12.25% provided by the Westpac (one of the major private financial institutions in Australia) indicator rate (Gain, 1992: 1). In other words, government bond financing would have saved the State taxpayers 2.55% in interest expenses.

The DoH also produced figures to demonstrate that at strategic and tactical levels the private option would be cheaper than the public option, as shown in Table 2.\(^{(13)}\)

Both tables were constructed to support a perception that the private sector was more cost-efficient. In other words, this cost advantage could be argued to stem from the favourable terms of the contract offered to the private contractor rather than any inherent cost advantage. Through the ‘availability charge’, the DoH contracted to compensate the private sector for all the tax expenses, a calculation based on a 45% corporate income tax rate. In this sense the $2.2m taxes (see Table 2) from the private sector are arguably not much more than window dressing to make the deal look appealing to public on-lookers.

\(^{(13)}\) Differences in the savings presented in Table 1 and Table 2 are largely due to tax effects. The strategic authority has the power to impose taxes on profits generated by the hospital.
Furthermore, the above computation did not factor in other costs, such as bargaining costs, legal costs, equipment costs, and transaction and monitoring costs. Moreover, the increased administrative costs due to the complexity of the arrangement were also excluded from the private option.

### Table 2: PMBH Comparative Costs to the Department of Health and State budgets

<table>
<thead>
<tr>
<th></th>
<th>New Public</th>
<th>New Private</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of beds</td>
<td>160</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Costs ($m p.a.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Operating Costs</td>
<td>27.8</td>
<td>27.9</td>
<td></td>
</tr>
<tr>
<td>Less State Income (Payroll tax etc)</td>
<td>-2.2(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Operating Costs to State</td>
<td>25.7</td>
<td>27.8</td>
<td>2.1</td>
</tr>
<tr>
<td>Availability Charge</td>
<td>3.8(1)</td>
<td>5.5(2)</td>
<td>1.7</td>
</tr>
<tr>
<td>Total Costs to Government</td>
<td>29.5</td>
<td>33.3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

(a) The State Government would receive $2.2m in taxes from the private sector.
(b) The reason why the availability charge under the ‘New Public’ option was higher than that under the ‘New Private’ option was not disclosed.
(c) The DoH would pay $3.8m per annum ‘availability charge’ to the private sector for the provision of public health services provided by the private hospital.


### Availability Charge

Under the terms of the contract the obligation of the DoH to pay the availability charge did not arise until the hospital had been constructed and commissioned to the satisfaction of the DoH (NSW AGO, 1996: 431). But through the ‘Availability Charge’, all the costs incurred in relation to the construction of the hospital, including the design and the development of the building, repayment of borrowings, purchases of land, payment for legal fees, finance fees, administration fees and taxation expenses, together with interest costs in all of these items, were repaid by the DoH to the Owner (PMBH PL). Expenses incurred as the result of ordinary repairs and maintenance to the hospital carried out by the Operator were factored into the availability charge. The total repayment over the term of the contract (20 years) was $143.6 million (in constant dollars).

To make the Government’s accounts look better, the DoH purchased the land from Hastings Council for $550,000 in 1989 then sold it to PMBH for $1.2m. In fact, the DoH reimbursed PMBH the price of the land through its availability charge. Effectively, the Department was borrowing $1.2m from PMBH and repaying it plus interest.

The availability charge included an allowance for the payment of PMBH’s tax liability. The calculations assume a company tax rate of 45%. In the event the tax rate fell the benefit to the Owner would increase.

To reduce the interest expenses to the DoH, the contract encouraged the early completion of the hospital. Instead of levying penalties on delays in commission, the availability charge factored into account a number of bonuses offered to the Builder and the Operator. The hospital was completed well in advance of the deadline. Thus, according to the agreements, the DoH paid a bonus of $3.2m to the Builder. The Operator commissioned the hospital 53 days earlier than it was required to and was granted a bonus of $546,000. The early completion would benefit the DoH by saving on PMBH interest expense during the construction period. However, the Auditor-General reported:

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14 The legal cost to the DoH to privatise Port Macquarie Base Hospital was $510,000 (NSW Hansard, 18/09/1997).
15 In total there were 17 contracts written to give effect to the project.
16 The company tax rate has been falling since. As of the 2004-05 fiscal year (during which the hospital was bought back), the company tax rate was 30%.
The exact amount of this benefit is difficult to quantify due to the numerous variables that determine the availability charge. However, it appears that the bonus is greater than the benefit gained by the [Health] Department (NSW AGO, 1996: 432).

A closer examination reveals that the PPP deal was in fact costly. A discount rate of 13.71% p.a. brings the present value of the total 20 payments to approximately equivalent to the value of the hospital at the date of commission. At the time the contract was signed (1992), the NSW Treasury Corporation 10 year bond rate was 9.7%. Private finance cost the residents of NSW 4.01% more in interest payments.

In the event that the PMBH failed to perform its obligations set out in the Service Agreement, a replacement operator would have to be found. However, the availability charge would remain payable to the financiers (NatWest) by the DoH, although HCOA was obliged to sell the equipment ($5m) it had provided for $1 to the successor operator (NSW AGO, 1996: 429).

Whatever the case might be, the DoH was locked into a long term commitment to guarantee the private consortium an annual risk free and tax free return of 13.71%. The NSW taxpayers would have at least gained substantial savings in interest payments if they had been calculated using variable rates in accordance with movements in the market. Moreover, after paying off the availability charge, the DoH would not own the hospital at the conclusion of the agreement unless it purchased it at market value. As noted before, it cost the State Government $35m to buy out the contract.

**Service Charge**

After the hospital was commissioned, HCOA operated the hospital and provided public services to the DoH under a 20-year contract commencing November 1994. In return, the DoH was contracted to pay a service charge each year for public patients treated in the hospital, which was equivalent to the top-cover private health insurance rebate.

The budgeted service charge was calculated on a set fee per service and the number of bed days. It would continue to escalate each year:

> The number of services is set by the [Health] Department annually, but it is not to be less than the total service charge paid in the previous year (NSW AGO, 1996: 403).

Under this condition, the DoH retained a downward demand risk. Further, the PMBH management could demand increases in its service charges. In 1997, HCOA using the threat of litigation successfully claimed an extra $3m from the DoH to cover the cost of providing for medical patients (Downey, 1997, quoted in Collyer, 1997: 35).

The service charge was made to PMBH on the basis of the DoH’s annual budget, irrespective of the actual number of services incurred during the year, and up to the budgeted amount (NSW AGO, 1996: 404). The DoH was responsible for the extra costs associated with those patients who only had basic private health insurance. Fluctuations in demand would have no net effect on the Operator’s revenues but would have an effect on the government’s expenditure, and of course they would have a flow-on effect on social welfare. This situation gave the Operator an incentive to curtail the quality and quantity of services it provided, since fixed revenue was guaranteed by the DoH each year. From this incentive arrangement, it is not surprising to discover that PMBH

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17 The constant discount rate is calculated according to the 20 annual availability charges payable by the DoH to the private consortium. The calculation is provided in Appendix 1. The calculation was based on the data provided by the Auditor-General’s 1996 report. The report revealed that the nominal value of the contract was $143.6m, equivalent to $52.3m in terms of present value. The report did not disclose how the present value was derived. According to the given data, Appendix 1 applies a 13.7% discount rate to bring the nominal value down to the $52.3m in present terms.

18 As of September 2003 (around the time the Mayne Group proposed to sell the PMBH), the 10-year NSW Treasury Bond rate was 5% p.a. Even the most recent rate was only 5.5% (Data obtained from the NSW Treasury Corporation website, www.tcorp.nsw.gov.au, accessed in September 2003 and on 23rd August 2007).
had the lowest urgent patients clearance rate, and longest surgery waiting time, amongst comparable peer hospitals (see later discussion for details).

Mayne Health did not bear any additional costs arising from the variation in the regulations. Consequently, a $1 million dollar bill was added to the service charge as the result of changes in the treatment of Department of Veteran’s Affairs (DVA) patients.

No information on the budgeted service charge was released. The secrecy provisions of the agreement even prevented the current Labour Government from revealing the true cost of the PMBH. But financial data proved that the PMBH was costly to run. In 1994-5 financial year, taxpayers paid $28 million in recurrent funding to run public hospital services at the PMBH. Compared with Albury, Coffs Harbour, Dubbo, Lismore, Orange, Tamworth and Wagga Wagga hospitals, PMBH was by far the most expensive. It required $6 million more in recurrent funding compared with the average of the other hospitals (NSW Hansard, 29/05/1996).

Given these conditions, the actual costs incurred for the project, from the construction to the operational phase, were eventually completely funded by taxpayers. Effectively, Mayne owned the hospital for nothing when the contract expired. The deal gave HCOA a free private hospital to run. Any revenue generated from the private hospital business was Mayne’s, any revenue generated from the public health business was also Mayne’s. In addition, the DoH bore all the risks and additional costs associated with changes in governmental regulation. If the Department owned the hospital, the costs and benefits would counterbalance within the public sector, rather than the current situation in which Mayne pocketed costs, financed by the general public’s taxes. In other words, these costs financed by state tax revenue would be returned to tax payers by way of hospital services.

**Performance**

Quality assurance is crucial to effective health service provision at the hospital and community levels. This fact had been recognised by the parties in defining the quality standards set out in the Services Agreement (NSW PAC, 1992: 5). The determination of the service charge was based on the quality of performance. The quality levels of service provided by the hospital were subject to the benchmark set by the DoH. The benchmark was based on the standard services provided by the old public Hospital, and was set higher than those applicable to that hospital.

Community health was the most demanded hospital service in the Hastings region. According to the statistics collected by the DoH, in the 1989-90 fiscal year, community health constituted 55% of the total services demanded (NSW PAC, 1992: 21). Being a tactical level authority, the DoH has the responsibility to ensure a regional hospital at operational level satisfies the community demand. However, the Service Agreement contained no provisions for quality assurance in the area of community-based services (NSW PAC, 1992: 6). Although the Operator was required to meet certain quality standards specified in the Service Agreement, as a private Operator, HCOA did not need to answer directly to the area health board, nor did it have to fit in with government health policy.

One of the reasons that the Greiner government was in favour of partnerships was the ideological belief that the private sector could promote competition, hence leading to better delivery of services in a more cost-effective manner. ‘Better service’ can be compared over a number of indicators between the PMBH and other base hospitals.

**1996:** several clinical indicators at the PMBH were compared to its peer hospitals. At this time all indicators favoured the PMBH. Unplanned hospital readmission within 28 days had a threshold of 5 per cent. The PMBH achieved a rate of 2.6 per cent, almost half of the State average. The average for State hospitals for unplanned return to operating theatres was 5 per cent. For the PMBH, it was 0.4 per cent. Development of post-operative pulmonary embolisms was 0.9 per cent for the PMBH. The state average was 1 per cent. The clinical indicator for contaminated wound infections, which measured the percentage of contaminated wounds that became...
infected in hospital, at the PMBH was 2.5 per cent. The State average was 5 per cent (NSW Hansard, 29/05/1996).19

1998: By this time, however, according to the DoH indicators, the PMBH had waiting times for elective patients more than double the State average and was the worst hospital performer in NSW. Comparable data is shown in Figure 2 (see below).

2003: The PMBH had the longest waiting time and largest waiting list in the State. Table 3 (see below) summarises the waiting time for elective patients in major non-metropolitan hospitals located in the Mid North Coast NSW for the period ended June 2003. The PMBH had the largest number of patients who had waiting times longer than a year. Some patients had to wait up to three years for orthopaedic surgery. Compared to the other two hospitals in the same peer group, PMBH appeared to be the most inefficient elective surgery provider.

Taxation

The DoH bore the taxation expenses. The availability charge was taxable in the hands of the PMBH but an allowance was included for the payment of the PMBH’s tax liability. The allowance for the tax liability was in itself taxable, requiring further allowance in the availability charge. In addition, the financiers were given a 6% buffer on the current tax rate to reduce their exposure to the risk of increases in the company tax rate. The Auditor-General reported that:

The financial model used to calculate the availability charge used a tax rate of 45%. The company tax rate in 1996 was 33%. The net present value of the extra cost to the [Health] Department arising from this 12% buffer at a discount rate of 12% is $546,124 (NSW AGO, 1996: 430; emphasis added).

Some caution is necessary. There was evidence of manipulation by the PMBH of key performance indicators, such as waiting lists. See footnote 20 below.

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19 Some caution is necessary. There was evidence of manipulation by the PMBH of key performance indicators, such as waiting lists. See footnote 20 below.
### Table 3

**CURRENT WAITING TIMES AND LIST BY SPECIALITIES FOR NSW MAJOR NON-METROPOLITAN HOSPITALS**

**MID NORTH COAST AREA HEALTH SERVICES - JUNE 2003, ELECTIVE PATIENTS**

<table>
<thead>
<tr>
<th>Speciality</th>
<th>Coffs Harbour</th>
<th>Manning Base</th>
<th>Port Macquarie Base</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wtg &gt; Ave Wtg</td>
<td>Wtg &gt; Ave Wtg</td>
<td>Wtg &gt; Ave Wtg</td>
</tr>
<tr>
<td>E.N.T. 02</td>
<td>4</td>
<td>7.15</td>
<td>0</td>
</tr>
<tr>
<td>General 03</td>
<td>1</td>
<td>1.42</td>
<td>0</td>
</tr>
<tr>
<td>Gynaecology 04</td>
<td>0</td>
<td>2.71</td>
<td>1</td>
</tr>
<tr>
<td>Ophthalmology 06</td>
<td>0</td>
<td>8.77</td>
<td>0</td>
</tr>
<tr>
<td>Orthopaedic 07</td>
<td>0</td>
<td>3.75</td>
<td>4</td>
</tr>
<tr>
<td>Other 14</td>
<td>0</td>
<td>0.16</td>
<td>-</td>
</tr>
<tr>
<td>Plastic 08</td>
<td>0</td>
<td>0.00</td>
<td>-</td>
</tr>
<tr>
<td>Urology 09</td>
<td>2</td>
<td>1.77</td>
<td>0</td>
</tr>
<tr>
<td>Vascular 10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7</td>
<td>3.62</td>
<td>5</td>
</tr>
</tbody>
</table>


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### Risk Allocation

PPPs offer the ideology that risk can be transferred along with ownership to the private sector, because ownership implies risk bearing.

Set out in Paragraph 7 of the Australian Accounting Standards AAS1721, risks incident to ownership of assets included: unsatisfactory performance; obsolescence; idle capacity; losses in realisable value; and uninsured damage or condemnation of the property. The Auditor-General of NSW tested the above risk components associated with the ownership of the PMBH (NSW AGO, 1996: 416-418). The results were that:

- **The [Health] Department, through the service charge, assumes the risk associated with ‘unsatisfactory performance’**.

- **The [Health] Department can be considered to bear the risk of ‘obsolescence’ as it is required to pay the availability charge as long as the hospital is made available to the Operator.**

- **The [Health] Department, directly or indirectly, has assumed a significant proportion of the risk of ‘idle capacity’. The owner of the hospital does not bear this risk as the payment of the availability charge is independent of the extent to which the hospital is used.**

- **The owner of the hospital does not bear the risk of ‘losses in realisable value’ for a similar reason – the availability charge payments are calculated independently of the realisable value of the hospital once it commences operations.**

- **The risk of ‘uninsured damage or condemnation of the property’ is shared between the owner, the [Health] Department and the Operator**. This conclusion is drawn on the identification of the benefits

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20 The DoH did not provide explanation for the measurements of “Avg Wtg Time Mths”. The measurements in this table were conservative. A NSW parliamentary inquiry in 2002 found evidence of manipulation of waiting lists at PMBH. “If patients have been on a waiting list for a long time and they’re asked if they want to go to another service, another doctor, and they say ‘yes’, they’re instantly taken off the waiting list until the new surgeon accepts them. If they say ‘no’, they’re also taken off the waiting list, although they’re still waiting for their operation, they’re not counted in the government’s official figures” (ABC News, 05/09/2002).

21 The harmonisation of Australian accounting standards with the International Financial Reporting Standards in 2005 has resulted in the replacement of AAS17 by AASB117, but the principle in accounting treatments of finance/operation leases remain the same.
associated with property ownership. The owner does not benefit from direct use of the property because its return is fixed independent of the extent the property is used by the operator. But as noted above the return to the owner is not affected by changes in the realisable value of the property, hence the owner has gains in the realisable value of the property. The operator benefits from use of the property because it is able to earn income from its activities at the hospital. The [Health] Department benefits from the use of the hospital as its objectives of ensuring the provision of quality public health services to the region are fulfilled.

Thus the report concluded:

In fact, it would appear that the majority of these risks are ultimately borne by the Department of Health (NSW AGO, 1996: 418).

In summary, through the availability charge, the DoH bore most of the financial risks associated with the entire life of the project. Costs and stamp duty related to the effectiveness of the project agreements was included in the calculation of the Availability Charge. The DoH was ultimately responsible to pay the costs arising as a consequence of variations in design and construction contracts, as they were included in the final calculation of the Availability Charge. The DoH was responsible for all risks associated with political action. In particular, political risks which may inflate prices were born by the DoH, as the contract provided for the service and availability charges to be increased in these circumstances. However, no margins for downward adjustments were apparent. The DoH carried the interest rate risk during the construction period, as the costs of hedging its risks exceeded the costs of interest movements (NSW AGO, 1996: 429).

The DoH, via the service charge, had assumed the demand risks and operational risks of the hospital. The DoH was liable for service charges to fund non-inpatient services, irrespective of demand. The payments of non-inpatient services were set on a fixed budget basis, hence risks of inefficiency in this type of service rested on the DoH. The Operator only took on the risk of insufficient demand for inpatient services, because these services were payable on a fee per service. Inflation risk was borne by the DoH, since price adjustments were built into the calculation of the Service Charge (NSW AGO, 1996: 428, 429).

In the hospital’s case, the main risks identified are those that arise from changing regulations, and unmet patient needs, risks which ultimately the local communities and patients have to bear. The $1 million addition to the service charge compensated the HCOA for the change in the treatment of Veteran’s Affairs patients. The compensation demonstrates that the DoH bore the risk arising from the variation in regulation. During the term of the Agreements, if the hospital experienced inadequacy in meeting demand, the DoH was responsible to arrange and finance an expansion of public health infrastructure in the region.

Only a small proportion of the risks in relation to the construction phase of the project were passed on to the private sector. If the PMBH failed to obtain all necessary approvals and licenses for the construction, which was beyond the Builder’s control, and hence the Agreement was terminated, the DoH had to indemnify the PMBH up to a maximum of $6m. The Builder had to indemnify PMBH for an amount in excess of $6m. Environmental risks associated with construction were passed on to the Builder, but the Department would provide indemnity to the PMBH to cover pre-existing environmental risks. During the hospital operation, the Operator was required to comply with all environmental laws. The Builder was responsible for cost overruns. If the project were not finished on time and to operational and quality standards due to building delays or default, the Builder had to indemnify the DoH via the PMBH for the liquidated damages. The Operator was liable for payment to the DoH should the hospital not be commissioned by the due date (NSW AGO, 1996: 426, 427).

Given these considerations, the real reason why the NSW Health Department would enter an arrangement with the consortium remains unclear. Moreover, the normal procedures of setting up such an arrangement were out of sequence. For example, the evaluation of the tenders was carried out after receipts of tenders, rather than at the time the tenders were received. A formal approval under the Public Authorities (Financial Arrangements) Act and the Loan Council was obtained in 1996, rather than before the execution of the agreement (the hospital was commissioned in 1994). This vital procedure would have never been finalised had not the NSW Audit Office
discovered the absence of such documentation in the course of an audit. No explanation has ever been made publicly on these non-compliance matters, and no contract summary has ever been done.

It is worth noting that such arrangements entered into by the DoH merely shifted the burden away from the State Government's capital works budget and into recurrent spending over a long period. What the Government did not pay for in capital funds it paid for through the cost of leasing beds from the private hospital and through not having a hospital when the contract lapsed.

Perhaps one can better understand the real reasons driving such a deal from a political perspective. The Greiner Government was keen to build a private-public hospital as a model for subsequent expansions of private participation in the health sector. This strategic ambition arguably overrode public interest in all respects.

Despite a Hastings Council referendum showing 61% of the community did not want it, Greiner pressed ahead in what some say was a personal campaign to show the private sector could do it better (Newcastle Herald, 08/05/2000).

The Treasury also was pushing the deal. It argued that the private sector could bring greater competition as well as cost-efficient services in the health industry.

\[A\]n idea propounded vigorously by the Hilmer committee in its report on a national competition policy.....that cost efficiency should be the aim of all state activities (Collyer et al, 2001: 172).

In the Phase II Inquiry Report of the PMBH, the Public Account Committee identified that at the tactical level, the current trend of health care system demanded:

\[m\]ore community-based health care services, greater integration of acute hospital services with other services, and greater flexibility in terms of care and treatment options (NSW PAC, 1993: 37).

In the Committee’s view, the private option was not an appropriate solution to accommodate such a development trend in NSW, given the inexperience of the private sector in the field of community-based services (NSW PAC, 1993: 37).

Nonetheless, the Treasury went ahead with the private option. It insisted that the PMBH should be modelled to achieve the role separation of the funding source from the provider in the delivery of hospital services.

Another reason that the government was more attracted to a PPP option was because such a route offered a convenient accounting device to avoid the global limits imposed by the Loan Council. Debt was a headline indicator which governments wanted to reduce. Under debt financing, the State would have created an asset and a liability at the same time. The liability entry would account for a proportion of the global borrowing limited by the Loan Council. On the other hand, to build and run the PMBH through the PPP option would avoid such entries in the State’s balance sheet since it appeared that the Government did not own and operate the facility. The liability of paying 20 annual ‘availability charges’ would have become a cash expenditure, and the expenditure would only be recorded in the operating statement of the DoH when the payment was made each year. In other words, the increased expenditure involved could be buried amongst general expenditure

In terms of budget impact, the partnership arrangement offered an advantage over other options. If the hospital were fully funded by the Government, the construction would have an impact of $64m to the DoH’s capital budget. This impact would disappear if the private option was adopted, even though effectively, under this option the DoH would pay back the construction costs plus interest over a 20-year contract. With this type of accounting technique, such borrowing would be treated as annual expenditure, instead of debt occurred at the time the contract was executed. But this accounting gimmick did not escape the State Auditor’s scrutiny:

The Department initially prepared its 1994-5 financial statements on the basis that the availability charge represented present arising obligations (a liability) and an underlying asset that should be recognised in the statements. However, the Treasury directed that the Department account for the total of the
availability charge and the service charge as an expense in its operating statement, with future commitments arising from the contracts detailed in notes to the financial statements (NSW AGO, 1996: 398).

Recurrent costs per annum to the health budget, under the public option and private option, were $28m and $32m respectively. The private option included the $4m annual availability charge, which would not occur if the public option was adopted. These impacts to the Health and the State budgets are summarised in Table 4 (see below).

The table shows that the private option offered advantages in terms of capital impact to the Health and State budgets, because the public option would result in debts of $63m to both budgets. However, in recurrent costs, in terms of the impact on the health budget, the public option had a significantly lower cost, although the difference was largely accounted for by the fact that Treasury did not charge the Health Department borrowing costs (NSW PAC, 1992: 42).

Table 4: PMBH - IMPACT ON HEALTH AND STATE BUDGETS (a)

<table>
<thead>
<tr>
<th>BUDGET IMPACT</th>
<th>PUBLIC OPTION</th>
<th>PRIVATE OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st YEAR</td>
<td>20 YEARS</td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Capital</td>
<td>63</td>
<td>63 (b)</td>
</tr>
<tr>
<td>- Recurrent</td>
<td>28</td>
<td>327 (c)</td>
</tr>
<tr>
<td>State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Capital</td>
<td>63</td>
<td>63 (b)</td>
</tr>
<tr>
<td>- Recurrent</td>
<td>36 (e)</td>
<td>431 (c)</td>
</tr>
</tbody>
</table>

(a) In millions of dollars, 1990 prices.
(b) Expenditure occurs prior to commissioning, debt servicing costs in recurrent impact.
(c) Net present values taken over 20 years.
(d) Added to the $28m is the availability charge of $4m per annum which is paid to PMBH Pty Ltd by the Health Administration Corporation (the trading arm of the Department of Health), adding up the total recurrent cost of the private option to $32m.
(e) The figure reflects a number of adjustments: overhead rates and taxes (including sales tax, rates and taxes, insurances and costs of regional administration); capital recovery (debt servicing); replacement and refurbishment (allowance over and above public hospital asset maintenance standards); working capital servicing and payroll tax paid to State Treasury by the private hospital.

Source: NSW PAC, 1992: 39, Table 10

The PMBH partnership provided the Government with the opportunity to ensure the provision of the required health services at a new and modern facility, without incurring the initial capital expenditure required for its construction. This placed the State a step closer to achieving its debt elimination objective. These capital savings were partially offset by higher recurrent costs in the payment for services and an availability charge. Thus the most appealing reason at the strategic level was that the partnership arrangement could change the form of
government payments from capital costs to recurrent spending, and a spreading of the expenditure over a much longer time frame.

As noted before, the borrowing of funds by governments is regulated by the Australian Loan Council. In an effort to reduce any crowding out of private sector investment, the Australian Loan Council (established in 1927), adopted in 1984 a global approach to restrict public sector borrowing. In the view of the Loan Council, if the private sector was used as a vehicle of public borrowing, then the amount so borrowed should be counted against a Government’s borrowing limits. To be excluded from the global borrowing limits, the Loan Council required any contracts to comprise genuine service contracts (not just the purchase of assets). The major part of risk had to be transferred to the private sector, rather than is true with an agency agreement where the major part of risk remained with the public sector.

The DBFO scheme was designed to get around the global limits to borrowing.

The private option has been constructed so as to have project excluded from the global borrowing limit of the Government (NSW PAC, 1992: 40).

The Loan Council considered, wrongly based on the assessment provided by the DoH that the project had resulted in a situation by which the private sector wore all the risks associated with the construction, operation and profit generation. Under such an agreement the NSW Government would not be required to purchase the hospital after the service contract expired. It therefore decided that the project fell outside the global limits.

Analysis

The international accounting profession treats a finance lease as being, in substance, purchases on credit or ‘borrowings’ (Walker, 2002: 5). Finance leases, due to the fact that the lessee resumes all the risks associated with the facility are considered to be equivalent to borrowing and therefore are counted as part of a government’s global borrowing limit. On the other hand, operating leases are excluded from global limits. In the opinion of NSW Audit Office, the PMBH had the characteristics of a finance lease. It constituted a liability to the Department, especially through the two committed payment streams even though the DoH did not legally “own” the hospital. Notwithstanding the disagreements from the accounting profession, the NSW Treasury instructed the DoH to use ‘operating lease’ accounting methods in dealing with this transaction. In another sense, it treated these payments as expenditure instead of debt in the accounting book. The ‘substance over form’ specified by the AAS17 and SAC 4, was overturned on the basis that the DoH did not retain the legal form of the PMBH, it only contracted out a provision of services to the private sector for a period of time. The insistence of the Treasury is not difficult to comprehend if one takes into account that the Loan Council counts all finance leases as part of a government’s global borrowing limits.

Regardless of the reliability of the assessments depicted in Table 1 and 223, in fact the ‘cost-efficiency’ of the private sector cost the government an extra $40 million to subsidise private patients who wanted to use the hospital (Collyer, 1997: 175). The conservative cost estimation excluded transaction costs that included substantial amounts of additional expenditure on hiring an independent audit team to monitor the services provided. Expenses also include the setting up of separate administrative units to deal with public and community health services in the region, such as mental health inpatients, since under the contract the hospital was precluded from providing such services. Later in June 1995, the HoD admitted “it was costing the state 30% more to run PMBH than its own hospitals in Dubbo, Lismore, Albury and Orange” (Sun Herald, 25/06/1995, requoted in Collyer et al., 2001: 178).


23 The Public Accounts Committee NSW disputed the figures produced by the HoD. Details can be found in the Phase I Report, 1992, and Collyer 2000: 30-31.
Besides the issue of hidden debt, the Treasury argued that private efficiency could bring in innovative design and techniques in constructing the hospital. However, there was no evidence as to why the public sector could not demand that its contractors use the same building standards commonly used in the private sector. The findings in the Phase I report of the Public Account Committee of NSW Parliament showed that the public sector could build a quality hospital at considerable savings (NSW PAC, 1992: iii).

In the case of PMBH “Innovative design” caused a duplication of hospital services. The contract was so constructed that two types of health facilities had to be separated under the same roof. Before the deal was made, the Coalition Government promised that once the new hospital began operation there would be sufficient capacity to satisfy the rising demand for community health in the local area. In fact, community health facilities were housed only in the former Hastings District Hospital, but not at the PMBH as assured by the Coalition Government (NSW Hansard: 29/05/1996).

Community health services could not be placed in the PMBH for two major reasons. Firstly, the space was inadequate for the services required, and secondly, every year the Government had to pay for all the floor space in the building, including space to be used for community health. Taxpayers would be responsible for extra costs incurred by the private operator if the State and Federally funded services were run from private premises.

Evidence suggests that the planning for the hospital was far from efficient. The procurement feasibility study on the future of the Hastings District Hospital site indicated that the space requirement for community health was between four and five times the area provided at the PMBH (NSW Hansard, 23/11/1995). Important community health services would have to be split if the services were located at the hospital. The previous integration of community facilities was in line with efficient health services. The split had caused service fragmentation.

How the greater efficiency of the private sector was to manifest itself in practice was never made clear. A confidentiality clause denies the community the opportunity for scrutiny. It made it difficult to judge whether the hospital was being efficient and NSW taxpayers were getting value for money. Ironically, the Mayne Healthcare Group posted a $456 million full-year loss in the 2002-03 financial year. The loss was triggered by the massive write-downs, particularly in Mayne’s ailing private hospital business. Mr Stuart James, the Mayne’s Group Managing Director and Chief Executive Officer in a media release on 27 August 2003, stated that:

"[T]he writedown reflects the fact that we did not believe this business could sustain the long term carrying value attributed to it [Maynegroup, 2003: 28]."

Neither the public subsidy provided by the PMBH contract, nor its private sector efficiency, was sufficient to protect Mayne from this drastic write-down in value. Nor were they sufficient to avoid the sale of all of Mayne’s hospital assets to a consortium including the investment arm of the Singapore Government in October 2003.

The changes to the level of service provision would have significant implications for access to care. This is particular so given that at the time of planning the hospital in question was the only regional provider (NSW PAC, 1992: 101). The move to public sector reliance on a private provider meant that, instead of a separately sited private hospital in competition with a public facility, the PMBH would become the sole provider of regional health services. The effect of the contract, rather than of fostering competition, was to establish the PMBH as a private monopoly over health services in the district, replacing the previous public monopoly. Although monopoly is a common situation for public hospitals (as frequently the sole hospital in a country town), it is uncommon for private hospitals to have a monopoly position. Such private monopoly power raised concerns before the Public Accounts Committee about equity and access to quality care (NSW PAC, 1992: 103). Furthermore, the public sector has a crucial role in ensuring equity in health care, that is ensuring access to good quality care for those in the greatest need and with the least capacity to pay. It is also crucial in ensuring geographic access. At the contract expiry, should the HCOA not wish to continue to provide service to the DoH then the Hastings Community would have been left without access to a public hospital.

A private monopolist will try to maximise realisable rents by keeping down production costs. There was an observed increase in the reliance on part-time and casual hospital staff at the PMBH (SMH, 20/05/1995). To reduce the cost of running the health service, the HCOA decided to stop rostering theatre nurses on weekends,
claiming the move was a cost-cutting exercise. The roster changes had caused delays in medical response to emergencies. The ‘put profit before human life’ action was detrimental to the quality of care. The decline of specialist medical staff and nurses certainly would achieve the cost minimisation objective but it would also lead to fewer specialists available to provide services in the public sector and thereby impact adversely on public sector waiting lists. This may explain the observed decline in key performance indicators noted above.

‘Value for money’ is assessed by: net present value of future spending; improved risk management; ownership and whole-of-life costing; asset utilisation; and whole-of-government outcomes. Based on the information provided, an assessment of the PMBH can now be made based on these indicators. In regards to the first criterion, the net present value of the sum of 20 annual payments of availability charges ($67 million)\textsuperscript{24} is 27.7% higher than the initial capital outlay ($52 million). The second element of the value for money methodology is risk transfer. This requires identification of future pattern of risks and costs over the entire life of the hospital, compared with a private sector comparator. The DoH bore all the risks associated with the ownership, the risk transferred to the private sector being negligible. The PMBH cost the State 30% more to run than its public sector comparators. Whole-of-life costing had become the responsibility of a single party, the taxpayers. The argument as to ‘private efficiency is superior to that of the public sector’ was badly shaken by the experience of the PMBH. The hospital had the longest and largest number of waiting lists in the state.

The partnership deal can be regarded as a useful political strategy to avoid accountability. The commercial-in-confidence contracts did not allow for full transparency. In the PMBH case, details of the contracts entered into were unavailable due to the commercial-in-confidence defence. Such a secrecy component not only removes genuine public accountability of economic efficiency, but also proper oversight in achieving appropriate standards of care and service for the community the hospital was intended to serve. The deal between the Liberal Health Minister and the HCOA completely ignored accountability in the expenditure of public funds. The contract was structured in a way such that any succeeding Health Minister or governments would never be able to disclose the true cost to the taxpayers.

CONCLUSION

Evidence presented in this study is consistent with the analytical framework developed in Section 3. This has led to the predicted outcome, namely a position dominated by the operator’s concern for cost savings thereby failing to realise economic efficiency at the whole-of-government level.

The PMBH experience was not motivated by a wish to provide better patient care, improved access to hospital services or a desire to obtain maximum value in the use of taxpayers’ dollars. It was an experiment to prove that the private sector could do a better job than the public sector. However, based on the evidence presented above, the experiment failed. The experience of the PMBH supports a strong case that the government’s stewardship function failed to ensure that financing was channelled through appropriate risk sharing arrangements. It failed to make the private sector accountable for the quality of care required. As Collyer has described it:

\begin{quote}
The privatisation strategy has transferred, and continues to transfer, significant public funds from the public sector into the private sector. Private hospital operators, previously relying on patient contributions and health insurance company payments, can now rely more heavily on public funds for the financing of profitable patient services (Collyer, 1997: 38).
\end{quote}

It is clear that the PMBH has failed to obtain the specified strategic goal of economic efficiency. Such an outcome was caused by the strategic authority’s ideological belief that the private sector is more efficient combined with its intention of keeping debts off the public sector’s balance sheet. Arguably, these strategic objectives have been closely complied with at all three levels. Constrained by the funding limit, the tactical authority had no option but to push ahead with the private deal in order to have an upgraded hospital for the region. It is also clear that the performance at the operational level failed drastically. The operator was only.

\textsuperscript{24} This is calculated using a discount rate equivalent to the NSW Treasury 10 year bond yield, 9.7% in 1992. Calculation is provided in Appendix 2.
concerned with cost savings at the local level thereby undermining service quality and community welfare. The profit-maximising objectives of the private operator were mutually incompatible with the public welfare imperatives inherent in any conception of the role of government. These conflicting goals between the three levels have compromised the integrity of the whole-of-government system and led to the eventual failure of the venture.

The PMBH lesson has demonstrated that the achievement of strategic goals is largely dependent on the successful alignment of goals amongst the three different levels within the political system. Given that the private sector has a completely different set of profit-seeking goals, the alignment of interest is inevitably problematic. There is significant scope for the State Auditor’s involvement in this three-level political system where the private sector plays a crucial role at the operating level. It is hoped that through its independent monitoring role, the State Auditor can facilitate the realisation of strategic goals through the implementation process. Only time can tell what value the independent monitoring role of the State Auditor can add to the system.

REFERENCES


### Appendix 1

**Annual Availability Charge Payable by the Department and the Present Value of the Total Charge at Discount Rate of 13.71%**

<table>
<thead>
<tr>
<th>Year Ended 30-Jun</th>
<th>Availability Charge $'000</th>
<th>Present Value $'000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>3,242</td>
<td>3,242</td>
</tr>
<tr>
<td>1996</td>
<td>5,753</td>
<td>5,059</td>
</tr>
<tr>
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<td>2002</td>
<td>8,161</td>
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<tr>
<td>2003</td>
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<tr>
<td>2004</td>
<td>9,169</td>
<td>2,885</td>
</tr>
<tr>
<td>2005</td>
<td>9,719</td>
<td>2,689</td>
</tr>
<tr>
<td>2006</td>
<td>10,302</td>
<td>2,507</td>
</tr>
<tr>
<td>2007</td>
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<td>2,337</td>
</tr>
<tr>
<td>2008</td>
<td>11,576</td>
<td>2,179</td>
</tr>
<tr>
<td>2009</td>
<td>12,270</td>
<td>2,031</td>
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<tr>
<td>2010</td>
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<td>1,342</td>
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<tr>
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<td>5,007</td>
<td>641</td>
</tr>
<tr>
<td>2012</td>
<td>2,720</td>
<td>306</td>
</tr>
<tr>
<td>2013</td>
<td>1,477</td>
<td>146</td>
</tr>
<tr>
<td>2014</td>
<td>803</td>
<td>70</td>
</tr>
<tr>
<td>2015</td>
<td>248</td>
<td>19</td>
</tr>
</tbody>
</table>

| Total            | 143,612                   | 52,461              |

Source: Calculated using 13.71% discount rate based on data from the Auditor-General's Report 1996, Vol. 1, Appendix 4
### Appendix 2

**Annual Availability Charge Payable by the Department and the Present Value of the Total Charge at Discount Rate of 9.7%**

<table>
<thead>
<tr>
<th>Year Ended 30-Jun</th>
<th>Availability Charge $'000</th>
<th>Present Value $'000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>3,242</td>
<td>3,242</td>
</tr>
<tr>
<td>1996</td>
<td>5,753</td>
<td>5,244</td>
</tr>
<tr>
<td>1997</td>
<td>6,098</td>
<td>5,067</td>
</tr>
<tr>
<td>1998</td>
<td>6,464</td>
<td>4,896</td>
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<tr>
<td>1999</td>
<td>6,852</td>
<td>4,731</td>
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<tr>
<td>2000</td>
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<td>4,572</td>
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<tr>
<td>2001</td>
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</tr>
<tr>
<td>2002</td>
<td>8,161</td>
<td>4,269</td>
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<tr>
<td>2003</td>
<td>8,650</td>
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<td>2004</td>
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</tr>
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<td>2005</td>
<td>9,719</td>
<td>3,851</td>
</tr>
<tr>
<td>2006</td>
<td>10,302</td>
<td>3,721</td>
</tr>
<tr>
<td>2007</td>
<td>10,921</td>
<td>3,596</td>
</tr>
<tr>
<td>2008</td>
<td>11,576</td>
<td>3,474</td>
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<tr>
<td>2009</td>
<td>12,270</td>
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<tr>
<td>2010</td>
<td>9,218</td>
<td>2,299</td>
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<tr>
<td>2011</td>
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<td>1,138</td>
</tr>
<tr>
<td>2012</td>
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<td>564</td>
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<tr>
<td>2013</td>
<td>1,477</td>
<td>279</td>
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<tr>
<td>2014</td>
<td>803</td>
<td>138</td>
</tr>
<tr>
<td>2015</td>
<td>248</td>
<td>39</td>
</tr>
</tbody>
</table>

**Grand Total**: 143,612 67,005

Source: Calculated using 9.7% discount rate based on data from the Auditor-General's Report 1996, Vol. 1, Appendix 4
ABSTRACT

The globalization and the expansion of markets, as well as the general progress in the technologies available have brought new problems to the compilation of financial reports and to the ascertainment of trading income of supranational corporations and groups in accordance with statutory regulations of countries involved. From the year 2005 should public listed companies in the Czech Republic report under IFRS framework, while the non-listed companies still report under Czech accounting principles. This duality may lead to discrepancies with respect to the identification of free cash flow, which is considered the basic information required for the income-based business valuation. The subsequent text therefore deals with the basic difference in the identification and valuation of assets and liabilities in listed companies (which report under IFRS/IAS) and nonlisted companies (which report under Czech regulations). The most significant problem of financial statements and items shown is the complete inconsistency of measurement bases and the application of the historic (acquisition) cost, fair value and the present value. At present, the principle of measurement based on the historical cost fades out as it is being gradually replaced by the IFRS trend of reporting fair values, which are, however, difficult to measure in less transparent markets.

Keywords: Financial Reporting, IFRS/IAS, Accounting, Czech Republic, Globalisation

INTRODUCTION

In the year 2002 the Council issued Regulation 1606/2002 whereby it stipulated certain duties on the part of companies listed on European stock exchanges to compile their consolidated accounting statements in accordance with IFRSS1, effective as of 2005 at the latest. Although International Financial Reporting Standards are not deemed an equal alternative to Czech laws regulating the compilation of financial reports, Act 563/1991 Sb., on accounting, nevertheless stipulated that selected accounting entities are obliged to proceed in accordance with IFRSs to compile their financial statement. This exception applies to consolidated accounting entities which have issued securities listed on the official stock exchange market in EU member states. Other accounting entities may choose whether to compile their financial statement in accordance with Czech statutory regulations or in accordance with IFRSSs.

Unlike international standards, Czech accounting regulations lack a glossary of definitions for basic elements of financial statements, which is why we shall use the definitions applied in IFRS/IAS standards, namely in the Framework. Reliable measurement is expected from all entries involved.

Asset An asset is a resource controlled by the enterprise as a result of past events and from which future economic benefits are expected to flow to the enterprise.

Liability A liability is a present obligation of the enterprise arising from past events, the settlement of which is expected to result in an outflow from the enterprise of resources embodying economic benefits.

Equity Equity is the residual interest in the assets of the enterprise after deducting all its liabilities.

Income Income is increases in economic benefits during the accounting period in the form of inflows or enhancements of assets or decreases of liabilities that result in increases in equity, other than those relating to contributions from equity participants.

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1 International Financial Reporting Standards
Expense Expenses are decreases in economic benefits during the accounting period in the form of outflows or depletions of assets or incurrences of liabilities that result in decreases in equity, other than those relating to distributions to equity participants.

Concerning the initial recognition under Czech laws, the Accounting Act (Section 24) identifies the following valuation alternatives:

- **historical costs**, i.e. the cost of acquisition of the assets concerned, including the costs related to the acquisition itself
  - the historical cost is used to place value of tangible and intangible fixed assets, inventory purchased, securities and interests, derivatives\(^2\) and liabilities procured for consideration or by deposit
- **replacement/reproduction cost**, i.e. the cost for which the assets would be obtained at the time of the accounting statement,
  - the replacement costs are used to place value on assets procured gratuitously\(^3\) and assets produced by the enterprise itself, where the enterprise cannot determine the costs required to produce the assets
- **production costs**, which include all direct costs expended on the manufacturing or other activity and that part of indirect costs, which is related to the manufacturing or other activity involved
  - own costs are used to place value on the processed production, including livestock raised, and tangible and intangible fixed assets generated by the enterprise itself
- **nominal value**, i.e. the face value
  - nominal value is used to place value on receivables, payables, cash funds and liquid valuables

As of the date of balance, the accounting entities are obliged to record their assets and liabilities as follows:

<table>
<thead>
<tr>
<th>Entry</th>
<th>Upon acquisition</th>
<th>As of the date of balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intangible fixed assets</td>
<td>historical costs/ replacement costs/ production costs</td>
<td>net book value or the lower of the following (net book value vs. market price)</td>
</tr>
<tr>
<td>Depreciated tangible fixed assets</td>
<td>historical costs / replacement costs/ production costs</td>
<td>net book value or the lower of the following (net book value vs. market price)</td>
</tr>
<tr>
<td>Non-depreciated tangible fixed assets</td>
<td>historical costs / replacement costs/ production costs</td>
<td>or the lower of the following (historical costs /replacement costs/ production costs vs. market price)</td>
</tr>
<tr>
<td>Shares and ownership interests – controlling influence</td>
<td>historical costs</td>
<td>equivalent valuation</td>
</tr>
<tr>
<td>Shares and ownership interests – substantial influence</td>
<td>historical costs</td>
<td>equivalent valuation</td>
</tr>
<tr>
<td>Realizable securities (long-term)</td>
<td>historical costs</td>
<td>fair value</td>
</tr>
<tr>
<td>Inventory purchased</td>
<td>historical costs / replacement costs</td>
<td>or the lower of the following (historical costs /replacement costs vs. market price)</td>
</tr>
<tr>
<td>Own products in inventory</td>
<td>production costs</td>
<td></td>
</tr>
<tr>
<td>Receivables</td>
<td>nominal value/ historical costs</td>
<td>or the lower of the following (nominal value/ historical costs vs. market price), or fair value (derivative contracts or receivables hedged by derivatives)</td>
</tr>
<tr>
<td>Cash</td>
<td>nominal value</td>
<td></td>
</tr>
<tr>
<td>Short-term securities</td>
<td>historical costs</td>
<td>fair value</td>
</tr>
<tr>
<td>Payables</td>
<td>nominal value</td>
<td>as entered in the inventory</td>
</tr>
</tbody>
</table>

\(^2\) However, at the time of the accounting transaction the acquisition price may be measured only for option contracts which stipulate the option bonus. Fixed term transactions as of the date of contract conclusion have zero initial measurement.

\(^3\) As an example, the acceptance of the gift of a 5-year-old motor vehicle. The replacement price is set as the market value of the identical car with the identical age, brand and quality.
International standards IFRS/IAS apply the following measurement bases for financial accounting:

- **historical cost:**
  - with respect to assets, the historical cost is recorded at the fair value of the consideration given to acquire the assets at the time of their acquisition
  - with respect to liabilities, the historical cost is recorded at the fair value of the consideration received in exchange for incurring the obligations at the time the liabilities were incurred
- **common replacement/reproduction cost (current cost):**
  - with respect to assets, replacement cost of assets is the current cost of replacing an existing asset with the same or equivalent asset
  - liability equivalent of replacement cost is the non-discounted amount that would have to be expended to settle the liability
- **net realizable value:**
  - with respect to assets, realizable value is the current selling price of assets obtained under normal market conditions
  - the liability equivalent of realizable value is the non-discounted amount that would have to be paid in the course of normal enterprising activities
- **present value:**
  - with respect to assets, present value is the current discounted value of estimated future cash income procured by future use or sale
  - the liability equivalent of present value is the current discounted value of estimated future cash expense which is estimated to be expended to settle obligations incurred in the course of normal enterprising activities.
- **fair value:**
  - or the fair value is the amount for which an asset or liability could be exchanged between knowledgeable, willing parties in an arms-length transaction.

In the Czech Republic, values are usually measured through historical prices, while donated or gratuitously procured assets are measured by reproduction acquisition price which is the approximate equivalent of the reproduction cost as defined by IFRS/IAS. Under certain circumstances, also the realizable value and the fair value also may be used as the measurement bases for financial accounting. At the same time, Czech regulations virtually ignore measurement methods based on present value (Strouhal, Židlická, 2007, p. 46).

**FINANCIAL STATEMENTS**

Under Section 18 of the Accounting Act, the financial statements comprise:

- balance sheet,
- profit and loss statement, and
- notes

At the same time, Section 18 also contains the following unfortunate sentence “the financial statements may also include a cash-flow statement and the statement of changes in equity.” This means that under Czech laws, the cash-flow statement is not an obligatory component of the financial statements, not even for the accounting entities which are liable to statutory audit4 (Strouhal, 2006, CD).

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4 The accounting entity must undergo a statutory audit of its financial statement, if it fulfills one or more of the following conditions over two successive accounting periods:

- the balance sum exceeds the amount of CZK 40 000 000,
- net sales (pursuant to Value Added Tax Act) exceeds CZK 80 000 000, and
- converted number of employees is higher than 50 persons.

Joint-stock companies must comply with one of the above conditions, and limited liability companies and cooperatives with two of the above conditions to require statutory audit.

Accounting entities which are obliged to undergo the statutory audit are also required to compile the annual report (which is also subject to statutory audit). Audited accounted entities are obliged to compile the annual statement in its full extent. If the accounting entity is not subject to statutory audit, but undergoes the audit voluntarily, it may compile its annual report in simplified form and extent.
On the other hand, international standards stipulate that the above statements be an integral part of the financial statements. The subsequent text deals mainly with the balance sheet and the profit and loss statement (income statement).

**Balance Sheet**

Pursuant to the Fourth Directive of the E.U., accounting entities should compile in the Czech Republic the balance sheet horizontally:\(^5\):

<table>
<thead>
<tr>
<th>TOTAL ASSETS</th>
<th>TOTAL EQUITY AND LIABILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Receivables from subscriptions</strong></td>
<td><strong>A. Equity</strong></td>
</tr>
<tr>
<td><strong>B. Fixed assets</strong></td>
<td></td>
</tr>
<tr>
<td>B.I. Intangible fixed assets</td>
<td>A.I. Registered capital</td>
</tr>
<tr>
<td>B.II. Tangible fixed assets</td>
<td>A.II. Capital funds</td>
</tr>
<tr>
<td>B.III. Long-term financial assets</td>
<td>A.III. Reserve funds, statutory and other funds</td>
</tr>
<tr>
<td><strong>C. Current assets</strong></td>
<td>A.IV. Profit/loss of previous years</td>
</tr>
<tr>
<td>C.I. Inventory</td>
<td>A.V. Profit/loss of current period (+/-)</td>
</tr>
<tr>
<td>C.II. Long-term receivables</td>
<td><strong>B. Liabilities</strong></td>
</tr>
<tr>
<td>C.IV. Short-term financial assets</td>
<td>B.II. Long-term liabilities</td>
</tr>
<tr>
<td><strong>D.I. Accruals</strong></td>
<td>B.III. Short-term liabilities</td>
</tr>
<tr>
<td></td>
<td>B.IV. Bank loans</td>
</tr>
<tr>
<td></td>
<td><strong>C.I. Accruals</strong></td>
</tr>
</tbody>
</table>

Unlike Czech regulations, international standards do not define accruals and deferrals as separate accounting entries, but rather integrate them among receivables (deferred revenues) and liabilities (accrued expenses).

At the same time, the Czech regulations do not require the separate reporting of discontinued operations (Dvořáková, 2006, p. 171 – 172), while IFRS/IAS stipulate that discontinued operations be disclosed and presented separately in accordance with IFRS 5. In particular, IFRS 5 stipulates that:

- the sum of the post-tax profit or loss of the discontinued operation and the post-tax gain or loss recognized on the measurement to fair value less cost to sell or fair value adjustments on the disposal of the assets (or disposal group) should be presented as a single amount on the face of the income statement
- detailed disclosure of revenue, expenses, pre-tax profit or loss, and related income taxes is required either in the notes or on the face of the income statement in a section distinct from continuing operations

**Profit and Loss Statement (Income Statement)**

Pursuant to the Fourth Directive of the E.U., accounting entities should compile the profit and loss statement vertically, allowing for the presentation of expenses either according to their nature or function. However, if the profit and loss statement is arranged with respect as to the function of entries involved, accounting entity must also include a schedule disclosing the operating costs classified with respect to their nature.

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\(^5\) viz Appendix 1 Regulation No. 500/2002 Coll.
### P/L statement (by nature)

| + | Revenues from merchandise |
| - | Costs of goods sold |
| = | Sales margin |

| + | Production |
| - | Production consumption |
| = | Value added |

| - | Personnel expenses |
| - | Taxes and fees |
| - | Depreciation of tangibles and intangibles |
| + | Revenues from disposals of fixed assets and materials |
| - | Net book value of fixed assets and materials |
| - | Change in operating provisions and adjustments |
| + | Other operating revenues |
| - | Other operating expenses |
| + | Transfer of operating revenues |
| - | Transfer of operating expenses |
| = | Operating profit/loss |

| + | Revenues from sales of securities and ownership interests |
| - | Securities and ownership interests sold |
| + | Revenues from long-term financial assets |
| + | Revenues from short-term financial assets |
| - | Expenses associated with financial investments |
| + | Revenues from revaluation of securities and derivatives |
| - | Cost of revaluation of securities and derivatives |
| - | Change in financial provisions and adjustments |
| + | Interest revenues |
| - | Interest expenses |
| + | Other financial revenues |
| - | Other financial expenses |
| + | Transfer of financial revenues |
| - | Transfer of financial expenses |
| = | Profit/loss from financial operations |

| - | Income tax on ordinary income (due, deferred) |

| + | Ordinary income |

| + | Extraordinary revenues |
| - | Extraordinary expenses |
| - | Income tax on extraordinary income (due, deferred) |
| = | Extraordinary income |

| - | Transfer of ratio in profit/loss to partners |
| = | Profit/loss of current accounting period |

### P/L statement (by function)

| + | Sales of products, goods and services |
| - | Costs of sales |
| = | Gross profit/loss |

| - | Selling expenses |
| - | Administrative overheads |
| + | Other operating revenues |
| - | Other operating expenses |
| = | Operating profit/loss |

Financial operations and Extraordinary items – viz P/L statement by nature

Under IAS 1 accounting unit should also report EPS ratio. Unlike US GAAP, international standards do not require that costs be classified as to their function in the profit and loss statement. Instead they only demand that accounting entities submit an analysis of costs classified as to their nature or function, whichever classification provide more reliable or more relevant information. However, the function-base classification allows for a amount of certain discretion with respect to the assignment of costs to individual functions.
There exist two basic differences between the profit and loss statement compiled in accordance with Czech rules and in compliance with IFRS (Dvořáková, 2006, p. 292):

- IFRSs have revoked the obligation to report extraordinary expenses and extraordinary revenues – as of 1st January 2005, accounting entities disclose extraordinary expenses and revenues under their other expenses and revenues;
- Czech regulations have included the entries re-allocation of expenses to inventory and fixed assets and change in inventory of finished goods and work in progress among the revenue entries. However, since IFRS do not recognize the above entries as revenues, they have been included among adjustments to operating expenses.

**BASIC DIFFERENCES IN FINANCIAL STATEMENTS (CZECH STANDARDS VS IFRSS)**

**Intangible fixed assets**

Intangible fixed assets are intangible assets which the accounting entity intends to keep for more than one accounting period (the Income Tax Act also specifies that the input price of intangible fixed assets must exceed the sum of CZK 60 000).

Intangible fixed assets above all include: incorporation expenses, research and development, software, valuable rights (patents, licenses and know-how), goodwill, other intangible fixed assets (such as emission permits, milk preference limits), intangible fixed assets under construction or advance payments for intangible fixed assets.

The value of intangible fixed assets is measured by historical cost (acquisition price) for assets purchased, by production costs for internally generated assets and by replacement price for assets obtained gratuitously. Intangible fixed assets are subject to amortization; the amortization period is stipulated by the Income Tax Act. The intangible fixed assets must be accounted for in compliance with the prudence principle as of the balance day, meaning that the accounting entity should disclose either the net book value of the intangible fixed assets, or the lower present market price.

*IFRS: IAS 38 – Intangible assets, IFRS 3 – Business Combinations*

Intangible assets may be measured by two basic models over the period of possession: historical costs model and the revaluation model. If the accounting entity applies the historical costs model, the assets shall be subject to continual amortization and their value shall be decreased and disclosed in compliance with IAS 36. If the accounting entity uses the revaluation model, the asset shall be regularly revaluated to its fair value and consequently depreciated. If the asset value is impaired, the accounting entity must proceed in compliance with ISA 36. The revaluation to fair value which is higher than the original value shall be accounted for in equity, while the impairment loss should be recognized in profit or loss – see IAS 36. Intangible fixed assets may be amortized only if it is possible to make a reliable estimate of its useful life. The applicable amortization methods are virtually the same as the methods applied for the depreciation of tangible assets.

Unlike under the Czech regulations, the incorporate expenses as well as research and development should be accounted for under expenses. Under certain circumstances, R&D may also be capitalized in the balance sheet.

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6 The book depreciation for intangible fixed assets is equal to tax write-off. Tax write-offs are derived from linear distribution.
7 Residual cost = input price (i.e. acquisition price, replacement price, own costs) – adjustments (i.e. accumulated depreciation)
8 In this case the accounting entity enters only a temporary adjustment entry. After the lapse of the reasons for the revaluation, the accounting entity lapse deletes the entry.
9 In the area of intangible assets, IFRS does used the term depreciation but rather the term amortization.
10 If the accounting entity creates an revaluation fund for the asset concerned, it shall account for the asset under equity at first until the fund is completely withdrawn. After that, the accounting entity should account for the reduction of the fair value of the asset under expenses.
Goodwill pursuant to IFRS 3 should be disclosed only in the event that the goodwill was generated by acquisition.

Advance payments may be offset against debts from the same title.

**Tangible fixed assets**

Tangible fixed assets include tangible assets which the accounting entity intends to keep for more than one accounting period (the Income Tax Act also specifies that the input price of the tangible fixed assets must exceed CZK 40,000).

Tangible fixed assets above all include real property (regardless of the value), plant (buildings and structures regardless of the value), machinery, equipment, vehicles, furniture and fixtures, perennial crops, breeding and drought animals, other tangible fixed assets such as works of art and artwork collections, tangible fixed assets under construction, or advance payments for tangible fixed assets.

The value of the tangible fixed assets is measured by historical costs (acquisition price) for assets purchased, by production costs for processed production and by replacement price for assets obtained gratuitously. Tangible fixed assets are subject to depreciation, the accounting books should show the so-called book depreciation. The tangible fixed assets must be accounted for in compliance with the prudence principle as of the balance day, meaning that the accounting entity should disclose either the net book value or the lower present market price of the tangible fixed assets concerned.

**IFRS: IAS 16 – Property, plant and equipment, IAS 17 – Leases, IAS 40 – Investment property, IAS 41 – Biological assets**

Tangible assets may be measured by two basic models in the course of possession: historical costs model and the revaluation model. If the accounting entity applies the historical costs model, the assets shall be subject to continual amortization and their value shall be decreased and disclosed in compliance with IAS. If the accounting entity uses the revaluation model, the asset shall be regularly revaluated to its fair value. If the asset value is impaired, the accounting entity must proceed in compliance with IAS 36. The revaluation to fair value which is higher than the original value shall be accounted for under the revaluation fund and recognized in equity, while the impairment loss should be recognized in profit or loss.

Tangible fixed assets shall be depreciated in compliance with IAS 16, while the accounting entity shall determine its useful life by itself. Unlike under Czech regulations, accounting entities are entitled to write off real property since the year 2004 provided that it would be possible to determine their useful life. It is also possible to write off a part of the property if the costs of property acquisition include also property development expenses – this part of property value may be allocated to costs at the moment when the costs expended start yielding a revenue.

Advance payments may be offset against debts from the same title.

In the event of property investments reported under IAS 40, the value is measured mainly by means of the revaluation model. At the same time, same as in IAS 16, the accounting entity is also entitled to use the

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11 With the exception of land, works of art and art collection, which are not subject to depreciation.
12 The calculation of the tax base should incorporate deduction under the Income Tax Act – i.e. the so-called tax deductions. The Income Tax Act entitles the accounting entities to use linear or accelerated depreciation. Selected accounting entities use the differences between the book net value and the tax residual value of the fixed assets to calculated deferred tax liabilities.
13 If the market price is not known, the fair value shall be determined based on replacement costs reduced by an adequate depreciation of the asset concerned.
14 As was the case with intangible fixed assets, if the accounting entity creates an revaluation fund for the asset concerned, it shall account for the asset under equity at first until the fund is completely withdrawn. After that, the accounting entity should account for the reduction of the fair value of the asset under expenses.
15 Possible depreciation methods permitted by the standard include straight-line depreciation, activity depreciation, declining-balance depreciation, DDB (Double-Declining-Balance Method) or SYD (Sum-of-the-Years-Digits) method.
alternative – historical costs model. Reporting procedures are the same as with other assets reported under IAS 16.

The rules pertaining to finance leases under international standards are completely different from Czech regulations. While in the Czech Republic, the subject of finance lease is accounted for by the lessor in his balance sheet (usually a leasing firm) and the lessor also writes it off, and the lessee is only entitled to include lease installments among his expenses and must disclose the asset under off-balance sheet records, IAS 17 applies the rule that substance takes precedence over form.

Pursuant to the above standard, at the commencement of the lease term, the lessee should record the finance leases as an asset and a liability at the lower of the fair value of the asset and the present value of the minimum lease payments. The lessee’s depreciation policy should comply with IAS 16.

Same as in the Czech Republic, assets held for operating leases should be presented in the lessor’s balance sheet.

To conclude, unlisted enterprises should use the data recorded in the schedule to annual accounts, where the accounting entity provides information about its off-balance sheet assets and liabilities and then incorporate the data in its own financial analysis to avoid any distortions of the economic results.

**Inventories**

Inventories count among current assets. Usually we distinguish between inventory purchased and processed production.

At the time of acquisition, the value of inventories is measured by the historical costs (acquisition price - for purchased inventories), replacement price (for inventories obtained gratuitously) and production costs (for processed production).

For the measurement of the value of inventory decrement, the same cost formula should be used for all inventories with similar characteristics as to their nature and use to the enterprise. For groups of inventories that have different characteristics, different cost formulas may be justified, including FIFO\(^\text{16}\), weighted average cost formula, fixed inventory price with independent disclose of variations or the actual acquisition price.

Accounting entities are entitled to choose from the continual inventory system (method A) and periodic inventory system (method B) for inventory records. In the continual inventory system, accounting entities record inventories via account groups Materials, Processed Production and Goods and allocate inventory decrement to costs (Raw Materials, Resale of raw materials, consumables and purchased finished goods) or to income adjustments (group Change in inventory (stocks)). In the periodic inventory system accounting entities record the purchased inventories in the relevant costs accounts and during the accounting period do not even use balance-sheet entries such as Inventory of Materials and Consumables or Inventory purchased for resale - In storage. Instead, as of the balance day, the accounting entity transfers the initial status of the balance-sheet entries into costs and based on the stock-taking results transfers from the costs the final status of purchased inventories into the balance sheet.

The Accounting Act stipulates that the accounting books must be complete and conclusive. The compliance with the requirements may be demonstrated in a review of assets and liabilities and the comparison of ascertained data with the information shown in the accounting books. If the actual data ascertained by the review procedure differ from the data entered in the books, the situation is described by the term inventory discrepancy. Inventory discrepancies include inventory shortages (the volumes and amounts recorded in the books exceed volumes and amounts ascertained by the review) and inventory surplus (the volumes and amounts recorded in the books are lower than the volumes and amounts ascertained by the review). There are two types of inventory shortages,

\(^{16}\) First In First Out
natural standard shrinkage (such as natural standard shrinkage of industrial spirit as a volatile substance) and above-standard shrinkage (all other shortages).

Inventories must be accounted for in compliance with the prudence principle as of the balance day, meaning that the accounting entity must record the inventories with their book value or with their lower present market price.

IFRS: IAS 2 - Inventories, IAS 41 – Biological assets

Inventories are reported in accordance with the same principles as followed by applicable Czech regulations, with the exception of Spare Parts Inventory, which is not recorded among Inventories but under IAS 16 as Property, Plant and Equipment.

It is also necessary to bear in mind that processed production in the accounts change in inventory (stocks) and re-allocation of expenses to inventory and fixed assets do not comply with the definition of revenues, which is why they are recorded as adjustments to operating expenses. The above accounts are not recorded under the function-based classification of operating expenses.

At the same time, IAS 2 stipulates much stricter terms with respect to the measurement of processed production, particularly in the following areas:

- separation of fixed production overhead and variable overhead; only that part of the fixed production overheads which is based on the normal capacity of production facilities may be allocated to the costs of conversion,
- prohibition of re-allocation of expenses not expended productively (such as scrap and waste),
- permission to allocate administration overheads only provided that the accounting entity demonstrates incontestable relation between the expended administration overhead and inventory procurement.

Same as under the Czech regulations, it is not possible to revaluate the inventories to higher value. Advance payments may be offset against debts from the same title.

Receivables, payables and credits

The short-term and long-term receivables constitute a part of current assets, while short-term and long-term are included among liabilities.

Both receivables and payables should be measured by their nominal value, unless obtained in exchange for consideration, in which case they should be measured by their acquisition price. Accounting entities must convert receivables and payables in foreign currencies as of the moment of their measurement in Czech crowns in accordance with the current exchange rate of the Czech National Bank or a fixed exchange rate. As of the balance date, the accounting entities must also convert the sum of pending receivables and payables to Czech crowns in accordance with the current exchange rate of the Czech National Bank. Foreign currency exchange losses and gains should be recognized in the income statement.

Receivables include trade receivables, receivables from employees, receivables from partners and participants in an association, tax receivables or receivables from derivatives transactions.

Payables include trade payables, payables to employees, payable due to state (taxes), health insurance companies and social security agencies, payables to partners and associations, bank loans and other financial assistance, bond emissions, deferred taxes and payables from derivatives transactions.

Accounting entities should review the actual state of their receivables and payables in the accounting documents. It is recommended that the accounting entity invites all its debtors and creditors to confirm the sum of their claims and debts, i.e. to register and acknowledge the sum of their due claims and debts with respect to the accounting entity. The accounting entity should record the possible inventory discrepancies in that accounting period for
which the book inventory has been executed. Consequently, the enterprise may create adjustments to receivables, that would be based on the data ascertained by the book inventory.

The deferred tax assets and liabilities arise from the differences between the accounting and taxation concept of selected accounting entries. The accounting for the deferred taxes is based on the assumption that the accounting entity will apply the deferred tax in a later period than the due tax. The recognition and the accounting for the deferred tax is mandatory for entities which form the consolidation units (i.e. enterprises within a group) and the accounting entities which are obliged to compile the final accounts in their full extent. Other accounting entities may account for the deferred tax at their own discretion. The accounting for the deferred tax does not affect the tax liability. At the same time, it affects the sum of disposable profit, i.e. profit intended for allocation. The calculation of the deferred tax should be based on the balance-sheet approach. Deferred tax should be recognized for all temporary differences arising from the different accounting and tax view of entries included among assets and liabilities. It is also necessary to account for differences between the tax and tax residual price of the deductible tangible and intangible fixed assets as well as for another differences such as the reserves created beyond the scope of statutory duty, recognition of adjustments to inventories or receivables etc.

Credits and financial assistance should be measured by their nominal value.


Receivables and liabilities are generally perceived as financial assets or financial liabilities to be recognized in accordance with standards applicable to financial instruments. Long-term receivables and payables should be recognized in their present value; the settlement of the difference between the present and nominal value is performed by means of an effective interest rate. Due to their time character, short-term receivables and payables are normally recognized at their nominal value and the discounting to their present value is not required.

Receivables and payables from derivatives contracts should be recognized under IFRS in the FVPL/HFT portfolio. When used as a hedging instrument, it is necessary to proceed in accordance with IAS 39. For fair value hedges the change should be recognized in profit or loss, cash-flow hedges and hedge of foreign investments in foreign operation should be recognized in equity.

As in the Czech Republic, the measurement of deferred tax liabilities under IAS 12 is performed in accordance with the liability method. This means that deferred tax assets and liabilities should be measured at the tax rates that are expected to apply to the period when the asset is realized or the liability is settled (liability method), based on tax rates/laws that have been enacted or substantively enacted by the balance sheet date. Deferred tax assets and liabilities should not be discounted under IAS 12.

**Advance payments may be offset against debts from the same title.**

**Cash**

Short-term financial assets included among the current assets of an enterprise. We distinguish between cash in hand, cash at bank and short-term securities. Cash items are measured at their nominal value, while short-term securities are measured by the historical costs (acquisition price).

Cash items are included among financial assets and should be recognized in accordance with standards dealing with the reporting of financial instruments. Short-term securities should be recognized in the portfolio of financial assets intended for trade under FVPL/HFT\(^1\), revalued to their fair value with impact on profit or loss.

**Provisions**

The Accounting Act stipulates that the only genuine profits should be accounted for in the balance sheet and that the accounting entity should take into consideration all predictable risks and possible losses affecting its assets and liabilities and known to the accounting entity at the time of balance sheet compilation, as well as should include all devaluations regardless of the fact whether the accounting entity showed profit or loss in the accounting period. The accounting entity is entitled to use provisions, adjustment entries and write-offs for that purpose. Provisions are aimed to cover future expenses or liabilities, whose purpose is known and which are expected to occur, but whose timing or amount is uncertain. However, provisions may not be used adjust the value of assets.

Provisions may be used only for the purpose for which they have been originally recognized. Logically, provision may only be used to the maximum amount in which it was created; and provision may not have a credit balance. The balance of reserves at the end of the accounting period should be transferred to the subsequent period. Accounting entities are obliged review provisions entered in the books at the end of the accounting period, and assess their tenability and amount. If it is discovered that the reason for which the provision has been created has lapsed, the provision should be dissolved in its full extent. If it is discovered that the provision is for a different sum than it is due, it should be adjusted. In the balance sheet provisions should be accounted for under liabilities.

The Accounting Act defines 5 types of reserves – provisions for risks and losses, provisions for income tax, provisions for pensions and similar obligations, provision for restructuring, technical provisions or other provisions pursuant to special legal regulations (statutory provisions).

The Provision Act stipulates three types of provisions for enterprises: provision for repairs of tangible assets, provision for cultivation of crops, other provisions (for the removal of mud from a pond, for the redevelopment of plots affected by mining, for the settlement of mine damage or provisions stipulated by special laws as costs required to achieve, ensure or maintain revenues).


In accordance with IAS 37, an enterprise may recognize a provision if, and only if a present obligation (legal or constructive) has arisen as a result of a past event; it is more likely than not that to settle such an obligation, an expenditure of profitable income is required; and the amount can be estimated reliably.

The amount recognized as a provision should be the best estimate or the most probable result. However, it may also be measured as the present value of future expenditures, in case the obligation is to be settled over the course of several future periods, or in a period which does not subsequently follow the accounting period in which the provision has been recognized; or if the amortized cash value is considered to have a major impact.

IAS 37 does not allow provisions for future operating losses, since they do not meet the requirements which constitute an obligation or the general principles for the recognition of provisions. Instead, it is necessary to consider possible asset value impairment, and apply IAS 36 – Impairment of Assets.

Furthermore, IAS 37 does not allow the recognition of a provision for the repair of tangible assets\(^1\). Since in accordance with IAS 16, assets with different useful life are depreciated separately, and expenditures for asset maintenance or replacement are activated subsequently.

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\(^{17}\) at Fair Value Through Profit and Loss / Held For Trading

\(^{18}\) IAS 37 does not allow other tax-effective provisions popular in the Czech Republic, such as the provision for the removal of mud from a pond, or the provision for reforestation, since they do not meet the prerequisites for a provision pursuant to the standard.
On the other hand, an enterprise may recognize a provision for an onerous (loss-making) contract. Provisions for restructuring may also be recognized, if all general criteria for the recognition of provisions have been met. Provision for income taxes is recognized as a tax liability, in accordance with IAS 12.

CONCLUSION

The most significant problem of financial statements and items shown is the complete inconsistency of measurement bases and the application of the historic (acquisition) cost, fair value and the present value (Buus, Strouhal, Brabenec, 2007, p. 36). At present, the principle of measurement based on the historical cost fades out as it is being gradually replaced by the IFRS trend of reporting fair values, which are, however, difficult to measure in less transparent markets. At the same time, the reporting based on fair value is includes a hidden danger of future volatility of such values and the consequent impact of the changes on financial statements.

Jindřichovská & McLeay (2005) states that “the Czech market is similar to more developed markets, at least in one respect: There is statistically significant evidence of different market effects of profits and losses, in that profits are more persistent than losses. However, contrary to the findings in more developed markets, there is no statistically significant evidence of earnings conservatism in the Czech market” (p. 635). These results are most probably due to the continuing influence of restrictive tax regulations that mitigate any tendency towards conservatism, as well as the transitional nature of the economy. In conclusion, if changes in market prices signal good news and bad news about future risky outcomes, there is no evidence of asymmetry in the Czech market in accounting for such risks.

The principal differences in reporting balance sheet entries can be summarized as follows:

1. unlike Czech regulations, the Standards allow the revaluation of an (in)tangible asset even for a higher (fair) value based on the revaluation model, reflected in the capital reserve;
2. unlike in Czech practice, intangible fixed assets do not include organization costs and research, included directly in expenses in the IFRS;
3. unlike in Czech practice, tangible fixed assets include items procured by financial leasing;
4. unlike in Czech practice, it is possible, under certain circumstances, to depreciate property;
5. according to the IFRS, tangible fixed assets also include spare parts, which the Czech Accounting Standards (CAS) recognize as inventories;
6. unlike in Czech practice, inventories do not include spare parts, which are reported as tangible fixed assets;
7. unlike in Czech practice, IFRS require a strict distinction between fixed and variable overheads, and do not allow the activation of unproductively expended costs;
8. in accordance with IFRS, long-term receivables and long-term liabilities should be valued based on their present value, not their nominal value used in Czech regulations;
9. under certain conditions, IFRS allow to report provisions at their present value

REFERENCES

Accounting Act (No. 563/1991 Coll.)
Regulation of the Ministry of Finance No. 500/2002 Coll.
Czech Accounting Standards for Entrepreneurs
Czech Accounting Standards for Financial Institutions
Income Taxes Act (No. 586/1992 Coll.)
Provision Act (No. 593/1992 Coll.)
www.iasb.org (International Accounting Standards Board)
www.iasplus.com (International Accounting Standards online)
A RE-EXAMINATION OF UK INTERBANK MARKET AND CONTAGION RISK

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ABSTRACT
While the interbank market provides a risk sharing mechanism to prevent liquidity shocks, it may cause a contagion effect in the market. The paper studies this spill-over effect in the UK interbank market and obtains a wide-scale contagion result in contrast to other literatures. The divergence is due to the difference in the assumption of the initial bank failure. Using subsidiary data rather than group data in the related literature may underestimate the severity of contagion. The paper also investigates how market structure determines the effect of contagion and finds that the increase presence of foreign counterparties concentrates the market of a complete structure and thus amplify the contagion effect; but it diversify the market of a tiered structure and hence dampen the effect.

Key words: Systemic Risk, Financial Stability, Risk Management, Interbank Market

INTRODUCTION
The benefit of interbank market gives optimal allocation of resources. Funds are distributed efficiently from banks who have comparative advantage in deposit collecting but are less informative in investing them, to banks who are experts in finding projects but are lack of funding. In addition, Freixas, Parigi and Rochet (2000) showed that when banks are faced with liquidity shock, interbank credit lines allow them to cope with the problem while reducing the cost of maintaining reserves, especially central bank deposits (low-return liquid assets, ie. dealing with short-term stochastic problems).

However, the fact that interbank exposures are usually large and make up a large proportion of banks’ balance sheets in many countries (Lublýôy 2005), often exceeding capital, it can also be an important source of contagion. This process takes two forms. The first is panic withdrawal of interbank assets as a result of insufficient aggregate liquidity following the failure of one or several banks. Since liquidating banks’ long term investment is costly (Shleifer and Vishny [1992] and Allen and Gale [2000]), banks will withdraw the interbank loan first. The fact that all other banks in the network follow this will turn the original solvent but illiquid bank into insolvency, thus the healthy banks on the node would finally find themselves on the edge of failure (Allen and Gale 2000). The second form does not involve any self-fulfilling withdrawal. Banks fail one after another purely because the amount of their default interbank assets exceed their tier-I capital. Hence, the market exposure of initial failure and its multilateral credit relations with other banks determine the severity of contagion. This implies that market structure plays a pivotal role for systemic stability.

Allen and Gale (2000) contended that a complete market structure (shown below as Figure 1) that is where every bank is symmetrically linked with all others causes less contagion. Incomplete linkages (Figure 2), where banks have connections only to a few neighbouring counterparties, tend to be more fragile. In another article, Freixas, Parigi and Rochet (2000) modelled a centralized banking system (Figure 3) where the institutions on the peripheral are linked to a money centre bank but not to each other. They argued that the failure of a bank on the periphery could not easily lead to the breakdown of the whole system which is more likely to occur if the initial failure is a money centre bank. Mistrulli (2005) emphasized the interconnectedness of market structure, another factor apart from completeness as put forward by Allen and Gale, should not be ignored. The risk of contagion is lower when the market is more segregated because the impact is limited within the particular market where the initial default occurs, see disconnected structures in (b) of Figure 2 and Figure 3.
Figure 1. Complete market structure in Allen and Gale (2000)

Figure 2. Incomplete market structure in Allen and Gale (2000)
(a) Interconnected

(b) Disconnected

Figure 3: Money centre bank market structure in Freixas, Parigi and Rochet (2000)
(a) Interconnected

(b) Disconnected

Following Wells (2004) on the UK interbank market in 1999, this paper re-examines this market aiming three objectives: 1) Assess the extent of contagion in the UK interbank market 2004 using publicly available data; 2) Investigate relationship between market structure and severity of contagion; 3) Compare results of 2004 with those of other years.

Although bilateral and multilateral credit network structure is necessary to our contagion simulation, from banks’ annual reports we only know an aggregate value of interbank assets and liabilities since counterparties that the bank is lending to or borrowing from is confidential to the public. However, the entropy optimisation method is applied to simulate the bilateral position given incomplete information. The results find a wide-scale contagion effect in UK interbank market which is inconsistent with conclusions of many studies in other European countries.
as well as UK market. This mainly results from the very nature of UK market, the majority bank assets of which are concentrated in a few bank conglomerates, which is similar to a money center market structure. The bankruptcy of one of the money center banks has a considerable impact on the whole system if loss given default rate is set at a hundred percent. Differences in the results of our paper from Wells’ in UK market are rationalized as the outcome of difference in data sources, i.e. data of bank groups in this paper vs. data of associates in Wells. In addition, three cases of relationship banking market structure are investigated. In particular we find that increase in the size of overseas counterparties has mixed effect on the extent of contagion depending on the prototype market being a complete structure or a money center structure. And this simulation results confirm our hypothesis before test, i.e. increase in foreign presence concentrates market of complete structure and thus amplify the contagion effect; but it diversify the market of a tiered structure and hence dampen the effect.

The paper is organised as follows: Section 2 gives a literature review of similar studies in a number of countries; Section 3 presents the data sources; Section 4 describes the entropy maximisation method on benchmark model, sensitivity analysis and build-up of different market structures based on the benchmark model; Section 5 presents the results as well as their comparison with other sample years; and section 6 concludes.

PREVIOUS EMPIRICAL STUDIES AND SIMULATION

Furfine (1999) first investigated the knock-on effect using data from Fedwire system. The bilateral exposures in U.S. Federal Reserve’s large-value transfer could be directly quantified. By measuring the ratio of bank’s lending exposure to its tier 1 capital, he found that smaller banks generally have larger exposures relative to their capital level. His study suggests that system-wide impact of certain failures may have been exaggerated, because even in his worst scenario, i.e. after the joint failure of 2 most significant bank at a 100% loss rate, 31 banks fail, accounting for only 4% of total commercial banking assets. If loss rates are kept to historically observed levels (5%), assets loss would never be expected to exceed 1% of total assets. However, his suggested that the result is conservative and need be cautious to interpret on it since the federal funds market accounts for only 14% of the total U.S. interbank exposures.

Sheldon and Maurer (1998)’s study covers nearly all items of interbank activities in Swiss. However the bilateral interbank exposures are unobservable and have to be estimated from the aggregate data of interbank assets and liabilities. This is solved by an entropy maximization method which trace its origin to information engineering. They indicated the average probability of at least one bank default (the initial failure) out of 576 Switzerland banks in any given year from 1987-95 is quite high. Then, they propose two most likely scenarios for the initial default: 1) One bank within a bank category receives the shock; 2) The shock is distributed evenly across all banks. He shows that no lending bank should expect to fail in 2) while nearly all banks will fail if a large bank defaults in 1). Therefore, since large banks are least likely to fail and the second scenario is more realistic, they conclude that the chances of contagion seem rather slim in Switzerland.

Both Furfine and Sheldon et al have mentioned vaguely that the nature of bank relationship will crucially influence the degree of contagion, but they failed to point out how the causality relationship works. It is not until theoretical modeling of complete/incomplete market structure by Allen and Gale (2000) and money centre structure by Freixas, Parigi and Rochet (2000) that empirical studies began to relate the market structures to their impact on contagion.

Upper and Worms (2002) followed Sheldon and Maurer’s entropy maximization based on partial information but argued that German two-tier interbank market is similar to a money centre structure. The lower tier consists of most savings banks and virtually all cooperative banks, who transact mainly with the Landesbanken (saving central bank) and cooperative central bank. The upper tier consists of the head institutions of the two giro systems, the commercial banks and other banks which comprise mainly mortgage and development banks.

---

52 For example, HBOS group chiefly is made up of Bank of Scotland and Halifax. Wells takes it as two individual banks while this paper counts only one bank.
53 Relationship banking is interpreted here as that some banks borrow from and lend to their customer banks more frequently and/or with larger size than with other banks.
Unlike Sheldon and Maurer’s, their analysis takes the initial shocks as exogenous and the bilateral position can be told from supervisory data. For comparison, they compute two matrices of interbank position, one with bilateral full information and the other estimated from aggregated data as did in Sheldon et al. The latter is denoted as a benchmark model. In consistent with the theoretical models of Allen and Gale (2000) and Freixas, Parigi and Rochet (2000), they find that contagion is less likely in the benchmark model that proxies a complete structure of claims than the full information matrix that represents a more concentrated system; Also, failures of savings banks or cooperative banks have little impact on other banks but their giro central bank do. Finally, their results suggest that domino effects are possible and multi-round contagion can occur in any case if the loss rate reaches a critical level of approximately 40%, which may explain why Furfine (1999) does not obtain severe effects.54 However, if safety mechanisms like institutional guarantees are taken into account, they suggested that the danger of contagion is significantly reduced but remains a possibility.

Wells (2004) adopts a similar approach as Upper and Worms in his analysis of UK interbank market. It has been shown that beyond 40% loss rate, there are always cases of contagion out of total 33 cases. 25.2% of the balance sheet assets are affected for the worst case at 100% loss rate level. Moreover, incorporating partial information tends to reduce risk of contagion between major UK-owned banks but it increases the potential contagion if the initial banks are foreign owned. The assumption of a money central structure indicates an even higher spillover potential with balance sheet assets affected up to 42.22% in worst scenario. Wells (2004) also considered the distribution of capital loss other than 100% in that a sufficiently large loss might cause a bank to fail in reality, even its Tier-I capital is not completely dried up.

Degryse and Nguyen (2004) extented previous literature by incorporating cross-border interbank linkage. The contagion process is triggered by the default of either a domestic bank or a foreign bank. In case the initial default is a domestic one, they found the contagion impact is limited: in the worst-case scenario, i.e. 100% loss rate, affected banks never exceed 4.4% of the total assets. If the loss rate is lowered to 40% as it is in Furfine’s, the majority of banks which account for over 90% total assets lose less than 40% of their tier-I capital. Furthermore, using time series data of 1998-2001, they discovered that the Belgian market experience the structural change from a complete market structure to a multiple money centre structure, a change that decreased the risk and impact of contagion. During the same period, the market also experienced an increase of international integration, which has lowered the risk of local contagion. However, the default of a foreign bank could lead to a sizable loss on domestic banks’ asset, although the chances for the failure of high profile foreign banks are considered to be very low. On top of that, Degryse and Nguyen (2004) conducted a sensitivity analysis that takes the too-big-to-fail or banks’ expectation into consideration. Their results implies that TBTF policy decrease appreciably the number of rounds of contagion.

Selecting 50 days in 39 banks’ interbank transaction to represent turbulent and less turbulent periods, Lubloy (2004) found the systemic risk implication of the Hungarian interbank market is also limited. In the worst case scenario out of 1950 cases (50*39), on 19th March 2003, only one banks failed accounting for merely 0.23% of the total banking assets. Concerning this fairly limited contagion, Lubloy then modified the default definition and let a bank fails if its regulatory capital is less than half of the minimum capital required. But the result does not change much in the number and percentage of default banks while the average capital losses increased from 0.53% to 0.8%. Similar to Degryse and Nguyen (2004), Lubloy considers the factor of market expectation but not in the sense of government guarantee, but that banks can limit or even partly withdraw their long-term interbank claims from the counterpart bank that is to default. Additionally, Lubloy captures the potential risk of multiple failures in a particular sector including real estate, agriculture and financial enterprises. In that case, the average capital losses of the banking sector were increased respectively to 3.03%, 3.07% and 6.02% compared to the idiosyncratic failure. Lubloy used only 100% loss ratio as contagion effect is very limited. And no entropy maximization method is needed in Lubloy’s research as all data provided by the report of banks to the central banks contain full bilateral counterpart information.

54 Furfine (1999) only test for 5% or 40% loss rate for contagion analysis. And the contagion never exceeds second round.
Mistrulli (2005) attached great importance in the bias of result caused by entropy maximization. Mistrulli (2005) argued that comparing estimated data with observed bilateral exposures is the same as comparing complete with incomplete but (partially) disconnected markets. The sign of the bias is ambiguous depending on the incompleteness and disconnectedness. If the market is not fully interconnected, it is not possible to know ex ante if the estimation methodology generally adopted in the literature overestimate or underestimate the impact of the contagion. This is illustrated by comparing Figure 3 (a) and (b). Mistrulli pointed that with two money centre connected in the market after financial consolidation, the degree of incompleteness increases. As a result, the risk of contagion tends to increase. Meanwhile, the interconnectness can also play a role of risk diversification where money center banks raise money outside the interbank market or become more internationalized. Therefore, Mistrulli inferred that the overall effect on the risk of contagion is not a priori determined.

The studies reviewed so far have implicitly assumed the shock triggering contagion is a sudden, unexpected and idiosyncratic shock. Common shock that affects the bank sector as a whole has been rarely mentioned except for Wells (2004) and Lobloy (2005). The former was inspired by Pain (2002) who suggests that a 1% rise in the real effective sterling exchange rates has typically been accompanied by a 10% rise in new provisions by UK commercial banks. Wells (2004) assumes that the provisions are taken from capital and reports the contagion for a range of assumptions about the size of the system-wide shock/capital depletion. Lubloy (2004) handles this by specifying groups of banks that are likely to fail together and follow the same procedure to analyze idiosyncratic shock.

With an alternative methodology, Elsinger, Lehar and Summer (2002 and 2006) decompose the systemic crisis into those arise directly as fundamental shock and those arise indirectly because of contagion. In the first paper, they look into Austria market and embed network clearing mechanism in a risk management model to cover common risk such as market and credit risk. By the clearing mechanism, they define the insolveny as the income received from other banks plus the income position of non-interbank activities minus the bank’s own interbank liabilities becomes negative. Then, scenarios were created from the distributions of the risk factors and computing the effect on each bank’s income. By the network model the interbank payments for each scenario are then endogenously explained by the model for any given realization of incomes. In that way they get endogenously default frequencies, recovery rates. In the second paper in UK market, they model the probability of default by individual banks with a KMV model that allows for correlated shocks.

CONTAGION ANALYSIS OF UK INTERBANK MARKET

DATA

We investigate 16 major UK-owned banks, whose interbank positions are stated in their annual reports of 2004. According to their asset size, they are categorized into large, mid-sized, and small banks. Therefore, the sample contains 6 large banks whose assets are over £100 billion, 6 mid-sized banks whose assets are less than £100 billion but higher than £10 billion and 4 small banks whose assets are below £10 billion. However, banks’ annual reports only disclose aggregate amount that a bank lends to and borrows from the whole interbank market. Bilateral information showing the specific counterparties that a bank is dealing with is not publicly available. Hence, given partial knowledge of the network structure, we use a method of entropy maximization to estimate the bilateral position between banks.

Wells (2004) pointed that UK-resident banks lend three quarters of interbank assets to non-resident banks. So it would be ideal if bilateral exposure could be estimated between UK banks and overseas counterparts. However, in practice, data are not readily available, even at the supervisory level, for banks that do not operate in the UK market directly. At the public level, annual reports for overseas banks, CityBank for example, do not reveal how much of borrowings are from UK banks. Selecting data from annual reports could therefore lead to serious bias.

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55 Estimated matrix refers to the matrix whose entries are estimated by using aggregate data through RAS algorithm.
56 Consolidated balance sheet reports interbank lending and borrowing information separately under assets and liabilities. Data are selected respectively from items of “Loans and advances to banks” and “Deposits by banks”.
in the result, as a foreign institution like CityBank may mostly transact with local US banks or other counterparts located other than in UK.

However, Bank of England releases add-up information of interbank position for all resident banks including foreign owned banks that have their branches or subsidiaries located within the United Kingdom. Specifically, other than UK owned banks, the central bank’s website aggregates transactions for banks of EU, America, Japan, Other developed and Other (the rest of the would) countries.

In sum, two sources of data have been used to capture UK interbank market exposure. One is from the central bank’s website of and the other is from banks’ annual reports, which constitutes 21 individual bank group. And the following text explores the contagion effect resulted from credit linkage of the 21 entities.

One feature of the annual reports’ data is that they are consolidated and grouped in nature. This implies that if a bank group has two subsidiaries operating banking business separately, we treat them as one entity that transacts with others in the interbank market, although intra-group activities are taken into account. The opposite to this is that subsidiary data are selected as it is in Wells (2003). One of the advantages of this former treatment are its emphasis of the default probability on bank groups rather than on its subsidiaries. It is often the case in real economy that other branches under the same brand group would fall into crisis at the same period when one branch gets into trouble. This is exemplified by 2007 Northern Rock Group Crisis. Using unconsolidated data would lessen the impact of idiosyncratic shock and therefore underestimate the contagion effect.

**METHODOLOGIES**

**Estimating the matrix of bilateral exposure**

**Basic model**

To identify contagion process, we estimate the bilateral exposure based on bank’s partial information about the interbank lend. The estimation of unobservables is formulated as an entropy maximization by Sheldon and Maurer (1998) in Swiss interbank market. Most following papers apply this method since they are faced with the same partial information problem, i.e. only sums of all claims and liabilities in the interbank market are available. The interbank position between N banks in the market can be expressed by the following matrix:

\[
X = \begin{bmatrix}
    x_{11} & \cdots & x_{1N} \\
    \vdots & \ddots & \vdots \\
    x_{N1} & \cdots & x_{NN}
\end{bmatrix}
\]

where \( x_{ij} \) represents interbank asset owned by bank \( i \) of bank \( j \). \( a_i \) and \( l_j \) are sum of each row and column (formalized in equation 1), representing the aggregate asset/liabilities owned by bank \( i \) against all other banks. Both \( a_i \) and \( l_j \) can be obtained from individual bank’s balance sheet, but \( x_{ij} \) is not observable as there are no detail information of which particular counterparty that a bank is lending to or borrowing from.

\[
\sum_{j=1}^{N} x_{ij} = a_i \quad \sum_{i=1}^{N} x_{ij} = l_j \tag{1}
\]

In order to identify \( x_{ij} \), an assumption of the distribution of the bilateral exposures needs to be made. Using entropy maximization approach in this paper is to assume that banks seek to maximize the dispersion of their interbank activity. By standardizing a’s and l’s, the solution is given by equation (2). Intuitively, it means that banks symmetrically hold claims on all other banks in the economy, on condition of the size of aggregate lending and borrowing in the interbank market.

\[\sum_{j=1}^{N} x_{ij} = a_i \quad \sum_{i=1}^{N} x_{ij} = l_j \tag{2}\]

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57 The treatment of default in this paper and other paper using entropy maximisation let one bank fail after another.
To reflect the fact that an individual bank do not lend to and borrow from itself, we impose a restriction that 10 small and mid-sized banks denoted by \(B_1 - B_{10}\) have no exposure to themselves. This yields zero on the main diagonal in the left upper submatrix of Figure 1.

However, the data contain partly the position of intra-group transaction for large banks denoted in Figure 1 by \(B_{11}\) to \(B_{16}\) and foreign owned banks from 5 regions denoted by \(R_1 - R_5\). This yields non-zero on the lower part diagonal. Hence, we shall reconstruct a structure, \(X^0\), with elements:

\[
x_{ij}^0 = \begin{cases} 
0 & \text{if } i = j \in 1, 2, \ldots, 10 \\
a_l l_j & \text{otherwise}
\end{cases}
\]

According to equation (3), the model treats entries or the transaction equally within and across groups as \(x_{ij} = a_l l_j\). As larger banks tend to have larger total interbank claims/ liabilities comparative to smaller banks, intra-group transactions as a part of the total exposure are also inclined to increase with the size of the bank group.

Figure 1: Matrix table illustrating equation (3).

<table>
<thead>
<tr>
<th>(B_1)</th>
<th>(B_2)</th>
<th>(\ldots)</th>
<th>(B_{10})</th>
<th>(B_{11})</th>
<th>(\ldots)</th>
<th>(B_{16})</th>
<th>(R_1)</th>
<th>(\ldots)</th>
<th>(R_5)</th>
<th>(\sum_{j=1}^N x_{ij})</th>
</tr>
</thead>
<tbody>
<tr>
<td>(B_1)</td>
<td>0</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(a_1)</td>
</tr>
<tr>
<td>(B_2)</td>
<td>(x_{ij})</td>
<td>0</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
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<td>(\ldots)</td>
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<tr>
<td>(B_{10})</td>
<td>(x_{ij})</td>
<td>(x_{ij})</td>
<td>0</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>(B_{11})</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(a_{11})</td>
</tr>
<tr>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
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<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>(B_{16})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>(R_1)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
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<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
</tr>
<tr>
<td>(R_5)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(x_{ij})</td>
<td>(\ldots)</td>
<td>(a_{21})</td>
</tr>
<tr>
<td>(\sum_{i=1}^N x_{ij})</td>
<td>(l_1)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(l_{11})</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(\ldots)</td>
<td>(l_{21})</td>
<td>(\ldots)</td>
</tr>
</tbody>
</table>

Notes: \(B_1\) to \(B_{10}\) represent 10 small and mid-sized banks which do not transact with themselves. Therefore 0’s are assigned on diagonal of the top left sub-matrix. \(B_{11}\) to \(B_{16}\) and \(R_1\) to \(R_5\) represent large banks and combined positions of 5 foreign banks owned by EU, America, Japan, Other developed and Other (the rest of the world) countries. Since we take account intragroup lending and borrowing, the diagonal value is non-zero.

Since the matrix is inconsistent with the adding up constraints, i.e. \(a_l\) and \(l_j\), we need to minimise the “distance” of the new matrix \(X^0\) to \(X\) but still satisfies these constraints. Cross-entropy minimisation method is again used here to solve the problem. Formally, it is expressed as follows:

\[
\min \sum_{j=1}^N \sum_{i=1}^N x_{ij}^0 \ln \left( \frac{x_{ij}^0}{x_{ij}} \right) 
\]

\(58\) See detail of mathematical prove in Wells (2004).
Subject to  \[ \sum_{j=1}^{N} x_{ij}^0 = a_i, \quad \sum_{i=1}^{N} x_{ij}^0 = l_j, \quad x_{ij}^0 \geq 0 \]

with the convention that \( x_{ij}^0 = 0 \) if, and only if, \( x_{ij} = 0 \), and \( \ln(0/0)=0 \). This problem is solved by RAS algorithm. The final matrix after the iteration process is regarded as a benchmark model to compare with the money centre model.

**Sensitivity analysis of intragroup lending**

The shortcoming for the benchmark model is that it assumes maximal dispersion of bank’s interbank activities to other banks. Transactions within/across group are treated uniformly according to size of counterparties. However, this treatment could rule out that fact that banks transact more frequently with fellow associates under the same mother group. Specifically, for example, 2 biggest banks out of the 16 are conglomerates comprising more than 3 subsidiary banks, and the intra-group activities might be more intensive. Similarly, the importance of “intra-regional” effects need to be addressed since foreign owned banks may have a larger proportion of non-sterling deposit with banks within the same region. Lending or borrowing directly from banks of the same regions shelters them from the foreign exchange and derivative risks. To test this, an sensitivity analysis that assign more weight on the intra-group transaction is necessary.

However, the contagion effect in the basic benchmark model can also be overestimated by letting the UK-resident banks owned by five other economies and regions (other EU, American, Japanese, Other developed and Other countries) having low interaction with banks from their own region. Therefore, the importance of intra-regional effects is undermined since foreign owned banks may have a larger proportion of non-sterling deposit with banks within the same region therefore they could be sheltered from the foreign exchange and derivative risks. Especially, the intra-region effect is more significant within “other EU banks” and “other developed banks”.

To see whether the result of basic model will be changed when taking into account the above issues, this paper conducts a sensitivity analysis by assigning more weights on the intra-group and intra-region activities in relation to the basic model. The following form is a variation of Wells’ (2004) to estimate a new interbank structure based on aggregate data. \( x_{ij}^* \) is defined as:

\[
(1+\delta)a_{ij} \quad \text{for } i = j \in A \\
(1+\delta)a_{ij}^0 - \delta \sum_{j=1}^{N} x_{ij}^0 \quad \text{otherwise} \\
\]

In the new structure, for banks \( i=j \) belong to A which represents groups and regions, the intra-group exposure is multiplied by \( (1+\delta) \) in regards to its original level \( a_{ij}^0 \), where \( a_{ij}^0 = a_{ij} \). The change of notation is to address that \( a_{ij}^0 \) implies the percentage of intra-group activities out of the total aggregate liability of banks to all counterparties represented by \( l_j \). When \( \delta = 0 \), the form produces the original basic model while the higher bound of \( \delta \) is determined by \( a_{ij}^0 \). This is because \( (1+\delta)a_{ij}^0 \), the new percentage, should have value between 0 and 1. The rest of the elements are respectively weighted down to scale. Note that the total stock of interbank funds remains unchanged, only the distribution of the funds changed.

---

60 See Appendix in Elsinger et al (2002) for further detail on the iteration procedure. In practical, Microsoft Excel and the VBA program set in the macro can be applied to serve a good solution to estimate the final matrix. See more in appendix.

61 There are many other sources of over-and underestimation of risk of contagion such as too big to fail, netting agreements and so on. See Lubloy (2004) for the list of the major sources.

62 Wells (2004) used data on subsidiary banks and individual foreign banks rather than aggregate group and regional aggregate. Therefore, his equation to analyze the intragroup effect is not applicable here and need to be altered.

63 The highest figure for \( \delta \) in this paper is 2.2791.
Money centre model

This model is based on the assumption that there are two hierarchies in the UK interbank market. At the bottom level, small and mid-sized banks only engage in business with large banks and no activities among themselves or with foreign banks. Only large domestically owned banks lend and borrow from each other and serve as a money centre. At the top level, large banks transact with foreign-owned banks which do have business with each other. This tied structure is illustrated in Figure 2.

Figure 2: Simulated matrix of money centre model

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>M</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: S, M, L, F denote small, mid-sized, large and foreign-owned banks respectively. “1” and “0” means transaction and no-transaction between two banks.

Technically, as shown in Figure 2 above, we take in the same elements (denoted as 1) estimated from equation (2) and construct a money centre matrix by placing extra zero into the initial matrix, $X_0$. Then the RAS algorithm is applied again to minimise the distance between initial matrix and the money centre matrix.

However, the assumption of this model may be slightly divergent from the real market. In particular, small and mid-sized banks carry on a certain amount of business with each other at least at a low percentage level relative to their activities with large banks. To image this situation, an alternative way is to perform a sensitivity test and increase gradually the importance of bank’s consolidation instead of only having the extreme scenario. Equation (5) used in the previous section could be applied again to perform the test. But one drawback that may occur is that in the sensitivity test each bank’s total borrowing and lending, i.e. $a_i$ and $l_j$, is altered although the total stock of interbank exposure remain the same. Conversely, the RAS algorithm does not have such problem and is superior when we have to compare the result of money centre model with the benchmark basic model.

Internationalization analysis on money centre model

This paper conducts another sensitivity analysis on internationalization. This is achieved by increasing the proportion of interbank exposure of domestically owned banks with foreign-owned banks. As illustrated in Figure 3 below, B1 to B17 represent UK-owned banks while F1 to F5 represent foreign owned banks and the shaded areas shows the activity between them and denoted by the letter G. Then, we could apply the formula (5) in a varied way to reshuffle the elements in the matrix adding more weight in the shaded area.

In equation (6), $\lambda$ decides how much weight is given to internalization exposure and it falls in the range between 0 and 1 which implies two extreme scenarios. When $\lambda = 0$, the matrix will mirror the basic model in which banks spread their borrowing and lending evenly among its counterparties subject to their size, i.e. $a_i$ and $l_j$. $\lambda = 1$ displays the extreme that all banks is assumed to have interaction with foreign banks.

$$
x_{ij}^* = \begin{cases} 
(1-\lambda)x_{ij}^0 + \lambda \sum_{i \in G} x_{ij}^0 / \sum_{i \in G} \sum_{j \in G} x_{ij}^0 & \text{for } x_{ij}^0 \in G \\
(1-\lambda)x_{ij}^0 & \text{otherwise}
\end{cases}$$

---

63 Wells (2004) applied this formula in intragroup analysis and this paper extends his equation in banks’ internationalization analysis.
**Figure 3: Simulated matrix table for internationalization analysis**

<table>
<thead>
<tr>
<th></th>
<th>B1</th>
<th>...</th>
<th>B16</th>
<th>R1</th>
<th>...</th>
<th>R5</th>
<th>( \sum_{j=1}^{5} x_{ij} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>B16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>( a_1 )</td>
</tr>
<tr>
<td>R1</td>
<td></td>
<td></td>
<td>G</td>
<td></td>
<td></td>
<td></td>
<td>( a_2 )</td>
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<tr>
<td>...</td>
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<td>( \ldots )</td>
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<tr>
<td>R5</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>( \ldots )</td>
</tr>
<tr>
<td>( \sum_{i=1}^{16} x_{ij} )</td>
<td>l_1</td>
<td>l_2</td>
<td>\ldots</td>
<td>\ldots</td>
<td>\ldots</td>
<td>l_{21}</td>
<td>( \sum_{i=1}^{16} l_i )</td>
</tr>
</tbody>
</table>

Note: B1…B16 denote 16 UK owned banks and R1 … R5 denote foreign owned banks which have their subsidiaries or branches in UK. The shaded parts represent that more weight is assigned to transaction with foreign banks.

**The contagion process**

The procedure of contagion in the above literature can be described in the following Figure 4. The chart indirectly tells how the author defines the round of failure which is an important measurement of severity of the contagion. If there is no bank, which fails after the initial bank failure, there will be no contagion and the iteration ends. Alternatively, if there is contagion, which means at least one new insolvent bank, as a result of the loss realized on its interbank claim, the procedure experiences the first round of contagion if there’s no further contagion.

The contagion condition is that the realized loss suffered by the bank in question must be higher than the bank’s tier 1 capital. Algebraically, it means:

\[
x_{ij} \theta \geq c_i
\]

(7)

Where \( \theta \) is the loss rate, \( x_{ij} \) denotes bank’s \( i \) exposure to bank \( j \) while \( c_i \) is bank \( i \)’s capital. For the dominos continuing to fall down in the second and third round, there could be more than one bank resulted to fail simultaneously. Therefore, there is a general condition for the iteration process which can be expressed as:

\[
\sum_{j=1}^{N} x_{ij} \phi_j \theta \geq c_i
\]

(8)

Where \( \phi_j \) is a dummy variable that equals 0 if bank \( j \) has survived and 1 if it has failed. Note that it assumes that in the event of bankruptcy, there is no netting effect.

**Figure 4: The procedure of contagion**

- **Idiosyncratic failure of a bank**
  - The failed banks do not or only partly pay back its interbank obligation. The other banks try to pay back their obligation fully.
  - No further bankruptcy occurs.
  - There is at least one new insolvent bank, as a result of the loss realized on its interbank claims


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64 The chart is modified from Lublóy’s (2004).
A number of literatures gave reasons why fixed θ’s have to be used instead of endogenized ones. Many believed it is because of the scarcity of historical bank failure and uncertainty of creditor’s expectation due to administration fee, collateral and other factors.

RESULTS

Basic Model
Table 1 displays the magnitude of interbank exposure measured by the ratio of exposure to tier 1 capital. The second and third columns report the mean and maximum value of bilateral exposures to tier-1 capital on the basis of basic model. This implies the possibility of failure of a particular bank or joint collapse of banks owned by 5 other economic regions in case one of its counterpart default at 100% loss given default rate. The fourth column, however, reports the worst-scenario/contagious exposure in case of joint default of all counterpart banks. And the last column suggests that except for 2 banks (one mid-sized and the other small bank) whose ratio less than 1, the rest entries have the potential to fail at different level where banks owned by other developed are most fragile at the ratio of 12.31. On the other hand, the magnitude of exposure without further contagion reflected in mean and max index indicates that 2/3 entries (14 entries are less than 1) would not fail. Therefore, the actual effect may depend on the level of contagion which is in turn subject to the concentration of interbank exposure or structure of the market.

Several factors could describe the level of contagion after the initial failure: case of contagion, number of failing banks at each round of contagion, total number of contagious banks and asset value of failed banks in percentage of the asset of total banking sector. In table 3, the results of the estimation of the basic model show that there is wide scale contagion for the UK interbank market for both 100% and 80% Loss Given Default rate. 4 out of 21 total scenarios will cause the spill-over effect and the initializers or the first bank that cause contagion always occur among the 2 biggest domestic bank and joint banks default owned by two particular regions --- Other EU and Other Developed. It is because they are the biggest borrower from the market.

Compared to other articles, definition and interpretation of the round of contagion might be different. Degryse and Nguyen consider that the more round the worse the effect of contagion. This is reasonable for a large sample data and the more round the more banks will fell down as a domino mechanism. However, in this paper, the total sample of network nodes is limited and all 4 scenarios end up with total failure of around 18 banks including the initial failure. It’s not better to measure the level by compare the asset volume of failed banks in percentage of the total. They have same number of 89.48% in that there are always the same 3 banks that remain safe at the last round due to good capital reserve. Therefore, the round of contagion here is interpreted as the speed of transmitting the failure—the more number of round the slower the contagious speed. It is treated as positive instead because it leaves more time for the regulator to take action against it. Moreover, if four scenario (e.g. Other EU compared with other scenarios) at 100% LGD level has the same round of failure and the total banks involved in the contagion are equalized, the worst case between them can be told from the number of failing banks at each round of the contagion. Apparently, as the case with the initializers of Other Developed runs 6 failures in relation to 1 in other, the case turn out to be the worst within 100% category. In case of joint default of banks owned by other developed country, the regulator will have the least time to take proper action. Similar explanation could be made for the comparison of worst scenario in different category of LGD 100% and 80%. Under 80% assumption, the contagion spread less fast than 100% LGD. Significant distinction happen when the LGD lower to 60%, only one case out of 21 would trigger the contagion and other indicators like total banks failure at the end and the percentage asset affected are also scaled down. There’s no contagion for the market under 40% LGD.

The result in the basic model diverges largely from most literature in this topic. One might contribute to geographic difference in research between this paper and other articles, but Wells (2004) who’s also studied UK interbank market found that only 25.20% total balance sheet assets were affected (89.48% for this paper) in the worst scenario under 100% LGD category.
This is partly due to the difference in selection of data and in assumption. First, Wells investigated the interbank market in 1999 while this paper chooses 2004 as its sample year. Table 2 demonstrated the average ratio of exposure to tier-I capital over the past four years from 2001 to 2004\(^{65}\). It shows an increasing trend in potential extent of contagion effect for either large bank, or mid-sized and small banks except for 2001 of large bank (ratio=2.71) when one of the largest bank in the category substantially aggrandize their capital size.

Second, this paper use consolidated data of banks, among which there are several giant banking groups owning a number of subsidiary banks. Therefore, the initial domino causing contagion is mostly a bank group instead of an individual subsidiary bank. This implies that higher exposure was imposed to the market. In Wells paper, he exploited lending and borrowing data from nearly every subsidiary bank. This diversifies the exposure to the whole interbank market. However, our assumption is argued to be more reasonable because a bank group would not let its subsidiaries go bankrupt without any rescue action. Moreover, banks only give out data as a group in their publicly released financial report and cause restriction of data.

In the next section, a sensitivity analysis taking account of the intra group activities is made to solve this problem. The impact of data difference is exemplified in the following two figures. The total liquidity needs and excess cash are equalized in both papers amounting to e+f+g+h+i+j+k+l+m+n+o+p. For two banks A and B within the same banking group, they are registered separately at the central bank’s “Institutions included within the United Kingdom banking sector” and are treated as two separate banks in Well’s paper illustrated in Figure 5. In that way, the estimated matrix of Well’s benchmark model is close to a complete market structure. The interbank loan and deposit in such a complete market are represented by lower-case letters, from e to p. On the other hand, this paper uses data from the financial statement of a banking group to estimate the matrix of bilateral exposure and regards A and B as one bank illustrated in Figure 6. This means the group aggregated data in this paper simulate a more concentrated market structure, although the total interbank assets remain the same on the central bank’s UK summarized balance sheet. Thus, parts\(^{66}\) (60% in this example) of intragroup activities amounting to e+f are mistreated as intergroup transactions between bank group made of A & B and bank C and D respectively.

**Figure 5: Complete market structure in Wells (2004)’s benchmark model.**

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\(^{65}\) Data for 1999 is excluded because of incomplete release of some small banks.

\(^{66}\) This paper does not place zero on the diagonal of the matrix in the basic model for large banks which means intragroup activities are taken into consideration but possibly at a lower level than reality. Even full intragroup activities are incorporated after running the RAS algorithm, the severity of contagion could be still higher than Well’s benchmark model, because n+h+n, and i+p>i. Similar problem is explained in footnote 11.
Figure 6: Concentrated and incomplete market structure in this paper’s basic model

Assume same contagion progress in equation (6) and denote the tier one capital of each individual bank as:

- Tier I of A = $\alpha$
- Tier I of B = $\beta$
- Tier I of C = $\chi$
- Tier I of D = $\delta$

In the complete structure of Well’s benchmark model:

If bank A fails, it will cause first round contagion if:

\[ f\theta > \beta \Rightarrow \text{Bank B fails} \]
\[ n\theta > \chi \Rightarrow \text{Bank C fails} \]
\[ l\theta > \delta \Rightarrow \text{Bank D fails} \]

where $\theta$ represents the level of LGD.

In the concentrated structure of this paper:

If bank A fails (i.e. bank group A & B fails), it will cause first round contagion if:

\[ (n + h + 0.3f)\theta > \chi \Rightarrow \text{Bank C fails} \]
\[ (l + p + 0.3f)\theta > \delta \Rightarrow \text{Bank D fails} \]

Hence, the concentrated structure seems to be more contagious than the close-to-complete market structure in Wells paper. However, if the contagion is measured by affected asset in percentage of total asset of all banks (excluding the initial failure), chances are that in the worst scenario when all banks are badly capitalized, the complete structure could be more contagious. However, the possibility of worst scenario is much lower if there are more banks like C and D (consider another bank E having deposit with A and B amounting to q and r respectively, or possibly more banks) involved in the market which will be added into the left hand side of the inequivalent below, but the right hand side remains unchanged:

\[ (n + h + 0.3f + q......)\theta > n\theta \]
\[ (l + p + 0.3f + r......)\theta > l\theta \]

Therefore, the more banks are connected with bank A than in the example, the high severity of contagion in the complete market structure is than the concentrated and incomplete market structure. But all possibilities depend on the adequacy of bank’s capital. In general, this problem can be summarised as follows:

---

67 The analysis is built on Degryse and Nguyen’s comparison of complete structure vs. money centre.
68 The reason for this are: \( (n + h + 0.3f)\theta > n\theta \quad (l + p + 0.3f)\theta > l\theta \)
69 If the assets for bank A, B, C, D are respectively a, b, c, and d and bank A fails initially. Affected assets of failure bank in percentage of total bank assets in the worst possible scenario is \((b+c+d)/(a+b+c+d)\) in complete market structure which is greater than \((c+d)/(a+b+c+d)\) in concentrated market structure.
(i) \( c_i < x_{iA} \) extent of contagion is same for both model
(ii) \( x_{iA} < c_i < x^*_iA \) concentrated market structure more contagious
(iii) \( c_i > x^*_iA \) no contagion in the market

where \( c_i \) denotes tier-one capital of banks other than bank A whereas \( x_{iA} \) and \( x^*_iA \) identifies bank A’s exposure to bank i in complete market structure and concentrated market structure respectively. The different result between this paper and Wells shows that capital reserve of majority banks could fall in the range displayed in (ii) above.

Sensitivity analysis of the intragroup activity

One unfavourable factor exists in Wells (2004) benchmark model: by using RAS algorism, it rules out relationship banking especially potential more activities within the same bank group. As reasoned in data and methodology sections, this would underestimate the ultimate contagion effect. However, Wells conducts a sensitivity test for the benchmark model through imposing weight on banks belong to a same group I, and the elements for the new estimated matrix are given by:

\[
x_{ij}^{\text{INTRA}} = \begin{cases} 
(1 - \delta)x^0_{ij} + \delta \sum_{j \neq i} x^0_{ij} & \text{for } j \in I \\
(1 - \delta)x^0_{ij} & \text{otherwise} 
\end{cases}
\]  

(7)

Applying the same RAS in this paper may result in the same problem as Wells’. But as intragroup lendings and borrowings are already incorporated in the basic model (not placing zero in diagonal for \( x_{ij} \) which \( i=j \)), the analysis in this section assumes that weight may not be imposed adequately. This assumption is derived from the fact that 4 cases out of 21 are 2 largest bank group and 2 regions (other EU and other developed countries) which owns most international-scale banks.

However, Wells’ equation can not be used directly in this paper because of distinctive elements \( x_{ij} \) or data origin. Hence, equation (7) is altered to apply for the group aggregate data in this paper. To recall equation (5) in the last section:

\[
x^*_i = \begin{cases} 
(1 + \delta)\theta_i & \text{for } i = j \in A \\
x^0_{ij}(1 + \delta) - \delta \sum_{j=1}^n x^0_{ij} & \text{otherwise} 
\end{cases}
\]  

(5)

In this way, this paper considers relationship banking by increasing value of one element in the matrix which represents group bank or regional bank rather than increasing the value of several elements that belong to the same group.

The results for intragroup sensitivity analysis are presented in Table 5. The first column is the delta value indicating weight assigned to intragroup activities in ascending order. For each delta, values are calculated to measure the severity of contagion in 3 aspects: case of contagion (in second column), number of failing banks at each round of contagion and their summery, and (in the third panel) the assets in scale represented by, and the number of banks of failing banks (including initial failure) and banks losing respectively between 100% to 70%, between 70% and 40% or less than 40% 70% of their tier-I capital. All results are based on the worst scenario and 80% LGD.

Table 5 shows that increasing weight on intragroup activities will lower the chance as well as speed of the contagion propagating over the banking sector. With the weight delta goes larger, the case out of 21 scenarios that will cause contagion fall from 4, which is close to the basic model, to 0, which means there is no contagion.

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70 The reason for not further categorizing banks between losing 40%-10% and less than 10% capital as in other literature is that there is no banks losing less than 10% in all situation of different value of delta.
For delta amounting to -0.5, 0.1 and 0.5 where there are all 4 cases, it shows in the next panel that either the total number of failure after all rounds decreases, or the speed of contagion slows in second round from 7 banks failure down to 5 banks. Moreover, as delta increases, the asset of banks affected in the contagion in percentage of total asset of banking system goes down, the losing percentage of which appears in majority under “banks losing 100-70% of tier-I capital” for a small δ=0.5 and δ=0.1 and then the number spread evenly under “banks losing 70-40% of tier-I capital” and “banks losing 40-10% of tier-I capital” when δ reaches 1.94. This is another aspect indicating a lower effect of contagion.

However, it is worth to note again, that this sensitivity analysis can not be compared with the result in the basic model in the way that the money centre model can in the next section. This is due to that after applying equation (5), the restriction of the matrix is changed which means the amount of aggregate interbank assets and liabilities for each bank diverge from the sample data selected from bank’s financial statement, although the total interbank exposure remain the same. However, as long as the relative scale for each restriction seems not be varied a lot, the comparison can be made with the basic model when the new matrix in the sensitivity analysis is regarded as a simulated version of market structure other than in the year of 2004.

Money centre model

Money centre model presents another type of relationship banking where there are no activities among small and mid-sized banks which only transact with large money centre banks. In theory, money centre structure is more contagious if the first domino is the money centre banks because all sub-connected banks are more likely to fail than in the basic model which relatively complete in structure. However, if the initial bank is a sub-connected bank, chances are that the complete structure in basic model is more contagious since the firstly failed bank and other sub-connected banks are disconnected with each other and therefore less likely get affected as long as the money center banks are not too badly capitalized.

Figure 9 and 10 and 11 provides a comparable result of money center model and basic model in all scenarios at various LGD level ranging from 100% to 40%. In terms of the number of total banks affected in the worst scenario, two models are equalized with the result of 17 banks for both 100% and 80% LGD, 9 banks and 0 banks respectively for 60% and 40% LGD. However, on average the money center model have a less number of total banks affected in the other-than-worst scenarios (7 banks at LGD=60%), which implies lower possibility of contagion. On the other hand, the money centre model shows a slightly higher possibility of contagion from the result that it has one more case than the basic model out of total 21 to initialize contagion. But when comparing the number of banks at each round of contagion in both models, it indicates that the money centre model is slower in the transmission speed where relative more banks fail in the 3rd round rather than in 2nd round in the basic model. This is because more than half the scenarios starts with a foreign region group (initial failure in red displayed in the table) and the small and mid-sized banks failed in the basic model in 2nd round are assumed no transaction with those banks in the money center model. Hence, only after a large money center bank fails in the 2nd round fails will there be those small and mid-sized failing following in the 3rd round. In conclusion, it is hard to say which model is more contagious from the simulation test.

Internationalization analysis

Two sensitivity tests are made on the basic model and the money center model which are illustrated in the following Figure 7 and Figure 8. For both charts which identify the weighted version of basic model and money centre model, letters “L”, “F”, “M” and “S” represent respectively domestic large banks, foreign banks, domestic mid-sized banks and domestic small banks and the blue arrows in bold represent increased exposure between UK-owned banks and foreign-owned banks. As compared with the original unweighted basic model and money center model, two hypotheses can be made before conducting the test:

The severity of contagion increases after raising banks’ internationalization level based on the basic model, because the interbank market become more consolidated on foreign banks compared to the relative complete market structure in the basic model.
The severity of contagion decreases after raising banks’ internationalization level based on the money centre model, since the exposure of the original consolidated money centre model is diversified partly from the money centre banks to foreign-owned banks.

**Figure 7: Increasing weight of banks’ internationalization based on the basic model**

![Figure 7](image)

**Figure 8: Increasing weight of banks’ internationalization based on the money center model**

![Figure 8](image)

Table 6 and Table 7 provide in turn the result of the sensitivity analysis on the original basic model and the money centre model. The worst scenarios are selected at 80% LGD level for all results. And the internationalization indicators $\lambda$ are ranged from 0 to 1 for both tables where $\lambda=0$ generates the original basic model and money center model while $\lambda=1$ represents complete internationalization for both model.

Table 6 shows that in general there is no significant change in the level of contagion with a larger $\lambda$. Total number of banks failed after the initial failure remains the same with the increasing level of internationalization. Besides, there is no change in the number of banks affected and asset affected in percentage under various cases of capital losing for all values of $\lambda$. As shown in the table, the number of banks losing 100-70% of tier I capital are 2 and their assets in percentage are 13.96% at various level of banks’ internationalization. However, except for $\lambda=0$, from $\lambda=0.2$ to $\lambda=1$, it implies that the speed of contagion turns out to be faster as increasing numbers of banks fail at the first two round.

On the other hand, Table 7 regarding the sensitivity analysis based on the money center model displays a distinctive decrease in the severity of contagion. Total number of bank failure excluding the initial one fall from 17 for $\lambda=0$ to 9 for $\lambda=1$. Also, the assets affected in percentage appears in majority under “banks losing 100-70% of tier-I capital” for a small and then the percentage spreads evenly under “banks losing 70-40% of tier-I capital” and “banks losing 40-10% of tier-I capital” when $\lambda$ increases. Moreover, when $\lambda$ reaches 1, there are 10 banks losing no tier-I capital at all. Therefore, the results in both tables largely in line with the two hypotheses stated above.

**Comparison of contagion effect of 2004 with that of 2002 and 2003**

Results of basic model in 2004 are compared to those of 2002 and 2003 using same data sources. The comparison is shown in Table 12 and Figure 13.

Among the three years from 2002 to 2004, the results for 2003 and 2004 are close and differ significantly from that of 2002. At any Loss Given Default rate (LGD), UK banking system has highest cases of contagion out of 21 in 2002 while it experiences lowest cases of contagion in 2004. It means that UK banks have higher chances to encounter contagion in 2002 while it is relatively less likely in 2004 than other two years to have it happening, assuming that the total number of banks in the system are 21. However, as long as the snowball starts to roll, the year of 2003 which has lower chances of contagion than 2002 incur the most severe consequence, 18 out of 21 banks failing infectedly in the worst scenario compared to 17 banks in 2004 and 2 banks in 2002. Counting the number of failed banks at each round of contagion, it shows that the snowball rolls faster in 2003 with the most banks failed in the 1st round and most banks failed in the end. In contrast, the contagion process stops at 1st round for any LGD rate in 2002 with only 2 banks out of 21 being finally contagious.
In Figure 13, comparison of the contagion effect between the three years has been made in terms of banks’ loss of tier-I capital under various LGD rates of worst scenario. The y-axis represents the severity of contagion measured by infected banks’ assets in percentage of total assets in banking system. Coloured portions in each histogram shows percentage level of banks’ assets under 4 categories: 1) losing less than 40% of tier-I, 2) losing 70-40% of tier-I, 3) losing 100-70% of tier-I and, 4) losing more than 100% of tier-I (or failed banks). Similarly as Table 12, the figures display major difference between 2002 and other two years in the severity of contagion. When LGD rate is above 80% (banks loss all their interbank assets in case of default of the counterpart banks) shown in graph (a) and (b), more than 90% of banks in the system are contagious or lose or lose 100-70% of their tier-I capital in 2003 and 2004. However, in 2002, although 70% of banks assets are infected under worst scenario, most banks lose less than 70% of their tier-I capital (banks are still solvent) which implies there is no systemic crisis caused. For LGD rate being 60% in graph (c), it appears similar patterns with (a) and (b) but at lower contagious level. Finally, graph (d) shows that there are no cases of contagion at all in 2003 and 2004 if LGD rate is less than the threshold of 40%. However, it is still likely that 12.57% banks’ assets are ruined following the initial bankruptcy in 2002, but other banks infected (65.08% of the total banking assets) lose less than 40% of their tier-I capital.

The results of higher contagious effects in 2003 and 2004 than in 2002 lie in the changing amount of banks’ capital and interbank asset over time. Comparative ratios of interbank exposure to Tier-I capital for all banks among the three years are given in Figure 13. Chart (i) shows the maximum value of the ratio (interbank asset divided by tier-I capital) for all of the 21 individual banks or groups which on the x-axis, have been shown their nature, i.e. 1-6 are large banks, 7-12 are mid-sized banks, 13-16 are small banks while 17-21 are regional groups. As defined early in Table 1, the maximum ratio indicates the case when a bank’s largest counterpart (in which most interbank assets are put amongst all counterparts) default while all other counterparts stay solvent. From the chart, it is apparent that banks generally have higher ratio of exposure to Tier-I capital in 2003 and 2004 with half bank’s ratio greater than 1, while the exposure risk is generally lower in 2002 having most of the ratio between 0 and 1. Chart (ii) depicts the ratio of exposure to Tier-I when a bank’s all counterparts default. As shown in the chart, ratios for the three years either overlap or display similar patterns as chart (i) with few exceptions for regional groups. This is an extreme scenario that could rarely occur, as even in the worst scenario of basic model at LGD=100%, there are 2 or 3 banks surviving the systemetic contagion. Therefore, contagion effect of 2002 to 2004 in basic model tells the midway between chart (i) and (ii). Overall, it implies that in 2003 and 2004 banking system tends to expand their lending to the interbank market relative to their own capital and evolves to be higher in credit risk than 2002.

However, though banks are generally less risky in 2002, Table 12 indicates that banks are more likely to encounter contagion in 2002 whose cases of contagion turn out to the highest among the three years. Figure 13 also shows that even at LGD=40%, there are still banks failing in 2002. This is because in 2002 two banks (or groups) are extremely vulnerable to be contagious no matter which of their counterparts fail initially. This means that banks in the system are biased in their source of interbank funding relative to their tier-I capital. The conclusion is varified in chart (iii) that display the standard deviation of ratio of interbank exposure to tier-I capital in each bank. Except for the overlap parts for some mid-sized and small banks and last two banking groups, the standard deviation in 2002 is higher than that in 2003 whose figure is higher 2004. Hence, it suggests that while smaller banks stay similar in their profile of interbank risk exposure from 2002 to 2004, banks bigger in size are inclined to converge in their credit risk of interbank market.

**CONCLUSION**

The paper has investigated the contagious effect of the failure of an individual bank or bank groups on the whole banking system through interbank credit exposure. By exploiting unique public available data from banks’ annual report and central bank’s website, the paper implied that the knock-on effect following the initial shock of bank failure is great. 89.48% of the total balance sheet assets were affected in the worst scenario under 100% LGD category compared to 25.20% in Wells (2004), although there’s no contagion at all at 40% LGD.

This divergence can be partly attributed to the difference in assumption of initial bank failure. It has been demonstrated that using independent subsidiary bank as the initial domino in related literature rather than using bank group is comparable to make the concentrated UK interbank market structure become close-to-complete
structure, thus underestimating the contagion effect. However the conclusion is subject to the adequacy of bank’s tier-I capital. The concentrated market structure is more contagious only when the average capital of the affected banks is greater than the credit exposure of the failed counterparty banks. On the other hand, the high severity of contagion derived in this paper should be interpreted with careful caveat. This is because the paper only investigates the interbank exposure and its contagion impact of UK-resident banks due to data limitation. The contagion effect may be greatly diluted if we take account the non-resident interbank lending diversification.

Based on the benchmark model, the paper has investigated various types of relationship banking and their impact on the extent of contagion. It is found that 1) if banks have more intragroup exposure relating to intergroup activities, individual failure will have lower chance to be turned into wide-scale contagion; 2) money centre structure does not change the overall result of contagion analysis in basic model; 3) Internationalization based on the “complete market” structure does not increase the severity of contagion while internationalization based on “money centre” structure decreases the severity of contagion. To summarize the result from three aspects, it implies that consolidation of the interbank market does not alter the extent of contagion but diversification can decrease the severity.

The severity of contagion in UK interbank market is changing over the time. Specifically, the results for 2003 and 2004 are close and differ significantly from that of 2002: higher contagious effects in 2003 and 2004 than in 2002. This is due to the fact that in 2003 and 2004 banking system tends to expand their exposure or lending to the interbank market relative to their owned capital that can afford the loss. Moreover, banks have higher chance to be contagious in 2002 than 2003 and 2004. Standard deviation of the ratio (interbank exposure to capital) over the three years shows that smaller banks stay similar in their profile of interbank risk exposure from 2002 to 2004, banks bigger in size are inclined to converge in their credit risk of interbank market.

Table 1: Magnitude of interbank exposure measured by the ratio of exposure to tier 1 capital

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<th>Ratio of exposure to tier-I capital</th>
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</tbody>
</table>

* The second and third columns report the mean and maximum ratio of bilateral exposures (Xij) to tier-I capital in the benchmark model. This implies the possibility of individual bankruptcy in case one of its counterparty default at 100% loss given default rate. The fourth column, however, reports the scenario of joint default of all counterparties. Entries that have value of ratio less than 1 mean survival.
Table 2: Average ratio of exposure to tier-I capital from 2001-2004

<table>
<thead>
<tr>
<th>Bank types</th>
<th>Average ratio of exposure to tier-I capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large bank &gt;£100,000m</td>
<td>2.474883</td>
</tr>
<tr>
<td>Mid-sized bank &gt;£10,000m</td>
<td>2.08737</td>
</tr>
<tr>
<td>Small bank &lt; £1,000m</td>
<td>2.078213</td>
</tr>
</tbody>
</table>

Table 3: Number of failing banks at each round of contagion (Excluding the initial failure) in the basic model

<table>
<thead>
<tr>
<th>LGD</th>
<th>Case of contagion (out of 21)</th>
<th>Initializer</th>
<th>Number of failing banks at each round of contagion (Excluding the initial failure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>4</td>
<td>L2</td>
<td>1st round  2nd round  3rd round  4th round  Total</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other EU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other Developed</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>4</td>
<td>L2</td>
<td>1st round  2nd round  3rd round  4th round  Total</td>
</tr>
<tr>
<td></td>
<td></td>
<td>L3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other EU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other Developed</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>Other EU</td>
<td>1st round  2nd round  3rd round  4th round  Total</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Contagion analysis of the basic model

<table>
<thead>
<tr>
<th>LGD</th>
<th>Banks failing</th>
<th>Banks losing 100-70% of tier-I capital</th>
<th>Banks losing 70-40% of tier-I capital</th>
<th>Banks losing less than 40% of tier-I capital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>total asset banks in % of total asset of banking system</td>
<td>Number of banks</td>
<td>total asset banks in % of total asset of banking system</td>
<td>Number of banks</td>
</tr>
<tr>
<td>100%</td>
<td>89.48%</td>
<td>18</td>
<td>10.04%</td>
<td>2</td>
</tr>
<tr>
<td>80%</td>
<td>89.48%</td>
<td>18</td>
<td>10.04%</td>
<td>2</td>
</tr>
<tr>
<td>60%</td>
<td>69.45%</td>
<td>10</td>
<td>20.43%</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 5: Increasing weight to intragroup exposure (Worst Scenario, LGD=80%)

<table>
<thead>
<tr>
<th>Δ</th>
<th>Case of contagion (out of 21 case)</th>
<th>Number of failing banks at each round of contagion (Excluding the initial failure)</th>
<th>Banks failing (Incl. initial failure)</th>
<th>Banks losing 100-70% of tier-I capital</th>
<th>Banks losing 70-40% of tier-I capital</th>
<th>Banks losing less than 40% of tier-I capital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st round</td>
<td>2nd round</td>
<td>3rd round</td>
<td>4th round</td>
<td>5th round</td>
<td>Total</td>
</tr>
<tr>
<td>0.5</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>0.5</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>1.4</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>1.7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>1.94</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
A Re-examination of UK Interbank Market and Contagion Risk

Figure 9: Comparison chart of number of failing banks at each round of contagion (Excluding the initial failure) in the basic model and money centre model (LGD=100%) — 4 cases of contagion (out of 21)

Figure 10: Comparison chart of number of failing banks at each round of contagion (Excluding the initial failure) in the basic model and money centre model (LGD=80%) — 4 cases of contagion (out of 21)

Figure 11: Comparison chart of number of failing banks at each round of contagion (Excluding the initial failure) in the basic model and money centre model (LGD=60%) — 1 cases of contagion (out of 21) for Basic and 2 cases for MC
### Table 6: Increasing weight of banks’ internationalization based on the basic model (Worst Scenario, LGD=80%)

| λ | CASE OF CONTAGION (OUT OF 21 CASE) | NUMBER OF FAILING BANKS AT EACH ROUND OF CONTAGION (EXCLUDING THE INITIAL FAILURE) | BANKS FAILING (INCL. INITIAL FAILURE) | TOTAL ASSET OF BANKS IN % OF TOTAL ASSET OF BANKING SYSTEM | NUMBER OF BANKS | BANKS LOSING 100-70% OF TIER I CAPITAL | TOTAL ASSET OF BANKS IN % OF TOTAL ASSET OF BANKING SYSTEM | NUMBER OF BANKS | BANKS LOSING 70-40% OF TIER I CAPITAL | TOTAL ASSET OF BANKS IN % OF TOTAL ASSET OF BANKING SYSTEM | NUMBER OF BANKS | BANKS LOSING LESS THAN 40% OF TIER I CAPITAL | TOTAL ASSET OF BANKS IN % OF TOTAL ASSET OF BANKING SYSTEM | NUMBER OF BANKS | BANKS LOSING NO TIER I CAPITAL | TOTAL ASSET OF BANKS IN % OF TOTAL ASSET OF BANKING SYSTEM | NUMBER OF BANKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 | 4 | 10 | 2 | 1 | 17 | 86.0345% | 2 | 13.96% | 0 | 0.00% | 1 | 0.01% |
| 0.2 | 4 | 4 | 8 | 1 | 17 | 86.0345% | 2 | 13.96% | 0 | 0.00% | 1 | 0.01% |
| 0.4 | 3 | 4 | 9 | 1 | 17 | 86.0345% | 2 | 13.96% | 0 | 0.00% | 1 | 0.01% |
| 0.6 | 3 | 8 | 4 | 0 | 17 | 86.0345% | 2 | 13.96% | 0 | 0.00% | 1 | 0.01% |
| 0.8 | 4 | 5 | 3 | 0 | 17 | 86.0345% | 2 | 13.96% | 0 | 0.00% | 1 | 0.01% |
| 1 | 4 | 11 | 4 | 2 | 0 | 17 | 86.0345% | 2 | 13.96% | 0 | 0.00% | 1 | 0.01% |

### Table 7: Increasing weight of banks’ internationalization based on the money center model (Worst Scenario, LGD=80%)

| λ | CASE OF CONTAGION (OUT OF 21 CASE) | Number of failing banks at each round of contagion (Excluding the initial failure) | Banks failing (Incl. initial failure) | Banks losing 100-70% of tier-1 capital | Banks losing 70-40% of tier-1 capital | Banks losing less than 40% of tier-1 capital | Banks losing no tier-1 capital | Total asset of banks in % of total asset of banking system | Number of banks | Total asset of banks in % of total asset of banking system | Number of banks | Total asset of banks in % of total asset of banking system | Number of banks | Total asset of banks in % of total asset of banking system | Number of banks | Total asset of banks in % of total asset of banking system | Number of banks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 | 3 | 5 | 3 | 6 | 17 | 94.9962% | 2 | 5.00% | 1 | 0.01% | 0 | 0 | 0 | 0 |
| 0.2 | 4 | 3 | 5 | 5 | 16 | 89.8773% | 2 | 9.13% | 1 | 0.99% | 1 | 0.01% | 0 | 0 |
| 0.4 | 4 | 2 | 3 | 5 | 1 | 11 | 84.9685% | 6 | 13.96% | 2 | 1.07% | 1 | 0.01% | 0 | 0 |
| 0.6 | 3 | 3 | 4 | 2 | 1 | 10 | 84.2440% | 2 | 9.77% | 6 | 4.99% | 2 | 0.99% | 0 | 0 |
| 0.8 | 4 | 4 | 5 | 0 | 0 | 9 | 84.2436% | 1 | 9.05% | 2 | 0.72% | 8 | 5.98% | 0 | 0 |
| 1 | 4 | 5 | 4 | 0 | 0 | 9 | 84.2436% | 1 | 9.05% | 0 | 0.00% | 0 | 0.00% | 10 | 6.71% |
Table 12: Comparison of contagion effect in basic model from 2002 to 2004

2002

<table>
<thead>
<tr>
<th>LGD</th>
<th>Case of contagion (out of 21)</th>
<th>Number of failed banks at each round of contagion (Worst Scenario, Excluding the initial failure)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1st round</td>
</tr>
<tr>
<td>100</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>80</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>60</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

2003

<table>
<thead>
<tr>
<th>LGD</th>
<th>Case of contagion (out of 21)</th>
<th>Number of failed banks at each round of contagion (Worst Scenario, Excluding the initial failure)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1st round</td>
</tr>
<tr>
<td>100</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>80</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>60</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

2004

<table>
<thead>
<tr>
<th>LGD</th>
<th>Case of contagion (out of 21)</th>
<th>Number of failed banks at each round of contagion (Worst Scenario, Excluding the initial failure)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1st round</td>
</tr>
<tr>
<td>100</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>80</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>60</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 13: Severity of contagion measured by loss of tier-I capital

(a) LGD=100%

(b) LGD=80%

(c) LGD=60%

(d) LGD=40%
Figure 13: Magnitude of interbank exposure measured by the ratio of exposure to tier 1 capital

(i) Maximum value

(ii) Joint default Scenario

(iii) Standard deviation of ratio of exposure to tier-I capital in each bank
REFERENCES


Mistrulli, Paolo Emilio (2005) “Interbank Lending Patterns and Financial Contagion,” Preliminary draft


ABSTRACT

Fraudulent actions in the business community have spurred researchers to investigate unethical behavior and its impact on firm performance effectiveness. Although scholars have found positive, negative and no relationships, scholarship suggests that these practices might negatively impact a firm’s ability to achieve sustained profitability. The descriptive study using moral reasoning and ethical climate types sought to calibrate the potential relationships between individual and organizational ethical behavior and firm performance effectiveness. The resultant data from both questionnaires along with financial measures (return of sales, return on equity, and return on assets) were subjected to Pearson Correlation Coefficient and one tail t-tests at the industry and total sample levels. The extensive research although finding noticeable correlations at specific industry levels, revealed that there were no relationships between perceived organizational ethical behavior and firm performance effectiveness, and no relationship between perceived individual ethical behavior and firm performance effectiveness. This study as well as a variety of works undertaken to understand the impact unethical actions might have on organizational performance, found no concrete evidence that conclusively indicates that ethical firms are more profitable than the less ethical firms. The follow-on of the study addresses several compelling questions researchers and practitioners face as well as offers five cost effective common sense principles geared to combat unrelenting unethical behavior while producing measurable organizational improvements.

UNETHICAL BEHAVIOR: THE FIRM AND PERFORMANCE EFFECTIVENESS

In recent years, increasing attention has been given to unethical behavior, especially in the business community. Wrongful and unethical behavior in the business environment is not a new phenomenon; violations can be traced back at least two centuries ago. From a historical perspective, misconduct in the business community has undergone three distinct periods of time when the public's intolerance for unethical behavior peaked. The first period, the late 1800s to World War I, corresponds to the development of the Sherman and Clayton Antitrust Acts, the Federal Reserve System, the Federal Trade Commission and regulations relative to food and drugs. The public's trust eroded again during the second period -- the depression era in the 1930s. As result of this spiking, numerous institutions were established: the Federal Deposit Insurance Corporation, the National Labor Relations Board, and others that oversaw different aspects of business operations. The third period, beginning in the 1960s and peaking between 1973 and 1980, fostered an emphasis on corporate social responsibility and protection for the consumer (Spencer, 1995). Spencer (1995) postulated that the fourth period of heightened public mistrust might be imminent because of the general public’s increasingly unhappiness over the many scandals, fraud and unethical corporate behavior.

Scholarship supports the premise that unethical business practices are on the upswing. This proliferation has resulted in scholars giving serious academic treatment to the subject at both the macro and micro levels. At the macro level, prevailing issues conceivably include bribery, environmental pollution, product quality, and price-fixing, while at the micro level; issues might include whistle blowing, and practices in which one or several employees comply with certain patterns of unethical behavior. Documented incidents at both levels, confirm the importance of ethics in the business community (Derry, 1987).

Since the 1970s, public opinion polls have communicated a steady decline in the public’s confidence in America’s business community, which has shown an infinity for breaking the rules (Gautschi & Jones, 1987;
Lipset & Schneider, 1983). Research studies suggest that ignoring rules is not uncommon in companies and the practice carries a very high cost to the public. Empirical studies, although limited because of the difficulty in gathering the appropriate and reliable information, reveal that rule breaking by employees in the form of fraud and other unethical practices cost firms more than $400 billion annually (MacLean, 2001; McKendall, 1999). Other researchers, also asserting that the cost is absorbingly high, estimate the amounts to be in the billions annually (Cochran & Nigh, 1987; Reidenbach & Robin, 1989).

Besides the financial estimation associated with wrongful acts, other costs such as the possible deterioration in societal morality has to be considered. The societal effect fosters distrust between corporations and the general public, in part due to the popular perception that the penalties for corporate wrongdoing are too lenient. This view, so widely held, potentially places the American economic system at risk (Gautschi & Jones, 1987; “Growing the Carrot,” 1996; Lipset & Schneider, 1983; McKendall & Wagner, 1997).

Huffington (2003) supporting the notion that corruption is bad for America vividly recounts in *Pigs at the Trough: How Greed and Political Corruption are Undermining America*, the many scandals that rocked the business community most recently. The author asserted that many corporate executives actively engaged in abusive and unethical behavior that lead them to falsely depict the firm's financial wellness and on a personal basis, gain substantial wealth, while the organization under their guidance performed badly. These abusive executives, aided by a cast of enablers such as investment analysts, accountants, and corporate board members, successfully hindered needed financial reform in the business sector by lobby initiatives and political maneuvering.

Practices such as embezzlement, fraudulent billing, and overstatement of financial performance have spurred researchers to investigate if there is a relationship between unethical behavior and firm performance effectiveness. Since executives, traditionally focus on firm performance from a bottom line perspective and advocate the importance of profitability and financial performance the necessity to understand this relationship—ethical behavior and profitability—is of grave value to the business community, particularly in the global environment (Carlisle & Carter, 1988; Reidenbach & Robin, 1989).

Studies investigating this potential relationship, have been numerous, notwithstanding, the results have been mixed with no conclusive evidence (Reidenbach & Robin, 1989). For example, Clinard, Yeager, Brisette, Petrakek and Harries (1979) studied 477 Fortune 500 manufacturing companies with the intent of isolating a set(s) of factors predictive of corporate illegality. The researchers’ exploration entailed questioning the relationship between 21 independent variables that included various indicators of financial and structural characteristics and company violations. These violations, ranging from ocean dumping, fraud, unfair trade, financial misdeed to product recalls, represented enforceable actions collected by 24 federal agencies. After extensive analysis, the researchers theorized that with the exception of manufacturing violations, the measures of firm and industry characteristics were not strong predictors of corporate illegality. But the study did reveal that firm size, industry means firm size and industry mean asset per employee were significant indicators of total non-minor (court proceedings) violations (cited in Cochran & Nigh, 1987).

Using Clinard's et al. (1979) study including the comprehensive database, Cochran and Nigh (1987) examined the relationship between the probability of a company being a non-minor violator and various firm characteristics. Unlike Clinard's et al. (1979) study, the scholars discovered that not only poor firm profitability, but also size, magnitude of product diversification and rapid growth were all related to an increased likelihood that a major industrial firm would engage in illegal behavior. Although a firm's propensity to engage in illegality related to its profitability, the researchers' findings did not support the notion that industry profits were significantly related to illegal corporate behavior.

Yet in another corporate illegality study, employing the same population base, that is, Fortune 500 companies, similar to Clinard et al. (1979) and Cochran and Nigh (1987) studies, Baucus and Near (1991) postulated that poor performing firms were not prone to commit wrongdoings. Additionally, the researchers, who developed an illegal corporate behavior model using event history and identifiable illegal acts that managers and the firm knew or should have known were ethically questionable acts, provided other scholarship to the topic. Namely, their findings included (a) large firms that operate in dynamic, munificent environments were the most likely to behave
illegally, (b) firms having a history of prior violations increase their probability of behaving illegally, and (c) firms belonging to certain industries increase the likelihood of engaging in illegal activities.

Despite the overwhelming evidence of corporate wrongdoing, relevant research is fragmented. Correcting this deficiency requires establishing and formulating a well-articulated body of research. Scholars, McKendall and Wagner (1997) driven by this need, examined covariates (profitability, industrial concentration, sized, structural complexity, decentralization and ethical climate) thought to be associated with corporate illegality. Departing from previously established norms, their study focused on violations of environmental regulations as opposed to antitrust violations, commonly employed in corporate illegality research. Their study disclosed that lower profitability is associated with higher frequencies of detected serious violations (court proceeding) of federal environmental laws. Size, structural complexity, decentralization and ethical climate were also associated with detected instances of serious environmental violations. In contrast, nonserious acts were not associated with any of the variables.

The full extent of business illegality is not known, but available evidence suggests that a significant number of large manufacturing firms routinely violate federal laws. Clinard, Yeager, Brisette, Petraskek and Harries (1979) reported that of the 582 largest publicly owned corporations during 1975 and 1976, manufacturing firms incurred an average of 4.8% enforcement actions during the observation phase and that 40% engaged in repeated violations (Clinard's et al. study cited in McKendall & Wagner, 1997). A similar finding was reported by Thornburg (1991); between 1970 and 1980, 20% of the sampled Fortune 500 companies had been convicted or penalized for serious violations (Thornburg's study cited in McKendall & Wagner, 1997).

Evidence from these and other studies demonstrates the idea that relationships between antecedents conditions that include financial performance, industry performance, environmental factors and market consumer relations, and illegal behavior are more complex than previous theories have suggested (Baucus & Near, 1991). The dilemma is further hampered because relevant research continues to be splintered and spans a variety of disciplines that include law and the social and behavioral sciences. Additionally, few quantitative studies are available and they pertain almost exclusively to antitrust violations (McKendall & Wagner, 1997).

Although a variety of works have been undertaken to understand the impact unethical practices might have on organizational performance effectiveness, the results continue to vary; researchers have found positive and negative relationships as well as no relationships. Consequently, there is no concrete evidence that conclusively indicates that ethical firms are more profitable than the less ethical firms. Nonetheless, scholarship suggests that unethical behavior possible might negatively impact a firm’s ability to achieve sustained profitability.

Using Cooper and Schindler's (2001) framework, the relationship between individual ethical behavior and organizational ethical behavior and organizational performance effectiveness was investigated quantitatively. The study sought to discover and explain the relationship between the two independent variables, individual ethical behavior and organization ethical behavior, and organizational performance effectiveness, dependent variable (Gaulden, 2004).

**HYPOTHESES**

1. There are no relationships between perceived organizational ethical behavior and organizational performance effectiveness according to traditional financial performance measures (Gaulden, 2004).
2. There is no relationship between perceived individual organizational ethical behavior and organizational performance effectiveness according to traditional financial performance measures (Gaulden, 2004).

To investigate the possible relationships, two highly acclaimed theories, moral reasoning, and ethical climate types were relied upon (Gaulden, 2004). Moral reasoning deals with the considerations that are contemplated when individuals are making a moral decision, which include the nature of the prioritizing and the integration of principles (Rest, 1979). James Rest's Defining Issues Test Questionnaire (DIT) assessed individual moral reasoning (individual ethical behavior).
Ethical climate type represents shared perceptions of individuals, a group of individuals, or an organization as it relates to ethically correct behavior and the methodology of resolving ethical issues (Victor and Cullen, 1987). Victor and Cullen’s Ethical Climate Questionnaire determined the organizational ethical climate type (organizational ethical behavior).

The resultant data from both questionnaires along with financial measures (return on sales, return on equity, and return on assets) were subjected to Pearson Correlation Coefficient and one tail t test at the industry (Standard Industrial Classification) and total sample levels. All analyses were performed by SAS/JMP analytical software whereas the level of significance was set at .05 (Gaulden, 2004).

The resulting analyses revealed that even with noticeable correlations at specific industry levels, no one industry segment or sample at the total sample level exhibited statistical significant correlations. Therefore, the research study found that there were no relationships between perceived organizational ethical behavior, defined by ethical climate type and organizational performance effectiveness (return on sales, return on equity, and return on assets). The study also discovered that there was no relationship between perceived individual ethical behavior, explained by ethical reasoning, and organizational performance effectiveness: return on sales, return on equity, and return on assets (Gaulden, 2004).

Gaulden’s (2004) research study in concert with others, confirms the notion that relationships between antecedent conditions such as financial performance, industry performance, environmental factors, consumer relations and unethical behavior is extremely complex. Because relevant research continues to be splintered and spans a variety of disciplines that include law, and the social and behavioral sciences, the complexity is more severe than previous theories have suggested (Baucus & Near, 1991). Nonetheless, the study employing the generic framework used by other scholars, contributes to the body of knowledge relating to business ethics and firm performance effectiveness. However the results must be cautiously interpreted because of the small sample size (Gaulden, 2004).

While the selection bias was considered a nonissue, the small sample size conceivably limits generalizability. It consisted of only 18 usable surveys, which netted a response rate of 22.5%. Although the literature is satiated with examples of rates comparable with the 22.5%, the absolute number of responses certainly is a limiting factor; it might influence correlations and the test of significance (Gaulden, 2004).

Besides the obviously low response, the actual verification of the performance information in most cases was prohibited. Participants in many instances reported their own financial performance. Thus perhaps those firms that perform poorly opted to not participate. This too, could hinder generalizability (Gaulden, 2004).

In essence, the study focused solely on determining if there were statistical significant relationships between the independent variables and the dependent variable and not understanding the causes associated with the relationships. Judgment in this study was primarily limited to the interpretation of the results (Gaulden, 2004).

Similar to Wimbush’s (1991) study in which no relationships between climate types and profitability were discovered, the study also found no statistically significant relationships. In contrast, other researchers have reported the opposite. For example, when M. Baucus and D. Baucus (1997) investigated firms that were convicted in the courts, they discovered that a relationship did exist between corporate illegality and longer-term performance. According to the researchers, these firms generated lower accounting returns (return on sales and return on assets) in the first year and the subsequent five years after the conviction. However the seriousness of violations did not relate differently to longer-term performance.

Unlike Baucus and Baucus (1997), who studied convicted firms, McKendall’s (1999) work focused on environmental violations. He discovered that lower industry profits and larger firm size were both related to serious and non-serious violations. In addition, he noted that lower firm profits and lower levels of industry concentration were significantly associated with serious environmental violations. The researcher asserted that his findings support the theories of corporate crime, which contend that motivation and opportunity combine to create situations that are conducive to illegal activities.
Aside from demonstrating different results, the aforementioned studies differed vastly in how unethical behavior was assessed. Baucus and Baucus (1997) used firms convicted by the courts, McKendall used environmental violations while the research conducted by Gaulden (2004) used ethical reasoning and ethical climate type theories; search of the literature revealed no other instances where these two constructs were used along with financial measures.

Nonetheless, in all instances, the selected mechanism measured the application of ethics in the business environment. An environment that comprehends all actions committed by an individual or groups of individuals within an organizational setting that violates an administrative, civil or criminal law and the organization is perceived as being the principal beneficiary (McKendall & Wagner, 1997). Thus the challenge for the researcher is not only seeking to succinctly define the research opportunity but also more importantly selecting the instrument(s) that will reveal interpretable and meaningful data that will subsequently add to the body of literary knowledge as it pertains to understanding the impact unethical behavior might have on firm performance effectiveness (Gaulden, 2004).

Investigating and understanding the relationship between ethics and organizational performance effectiveness, is very important, since many critics believe applying ethics to the business community generates societal benefits that penetrates the firm, its employees, and their clients (Wekesser, 1995). Presuming this to be true, then the compelling questions faced by researchers and practitioners are: (a) what motivates firms and individuals to practice unethical behavior; (b) how does this behavior impact the business community and in classrooms impact society; and, (c) how can the business community and individuals remedy this moral decay while meeting the challenges emerging in the twenty-first century (Gaulden, 2007)?

While these are perplexing questions, Gaulden (2007) in Right Makes Might: Reviving Ethics to Improve Your Business, moved away from debating and admonishing ethics, explored the impact of unethical behavior on society morally and financially, and then offered a cost effective workable remedy consisting of five common sense principles, which prompts the business community to move beyond the proverbial box, catch the glimpse of restoration by transitioning – shedding the microwave mentality with its quest for immediate gratification – donning a mindset infused with a pledge to change, persistence in the change, and perseverance during the change.

Aside from presenting not only the problem, unabated unethical behavior and a remedy, Gaulden, purported that as America moved into the twenty-first century, many left over challenges such as its troubling unethical climate will be heightened by the unprecedented acceleration in technology, competition from foreign entities desiring to be global superpowers and the widespread of uncertainty through out the world. Acknowledging that the twenty-first century brought greater-than-ever opportunities for America, it also included mounting dilemmas. What will America do, or is willing to do about the growing ethical issues? Will the ever-present pressure of stockholder’s expectations or the competitive forces steer firms to appease or act morally? Will America see more offshore activities without accountability? What about the value of life? Unfortunately with increased technology and competitive forces with varying values, unwarranted behavior has fertile soil in which to grow. The consequences are uncertain, but if America is to maintain it’s standing, economically and morally, in the global community and be that beacon then its ethical challenges must be harnessed.

According to Baker (1995),

*If America is to lead the world in a resurgence of economic growth, the business foundation upon which that future must be built is a commitment to ethical conduct …. Those responsible for our nation's business firms upon which the national economic well being depends must be dedicated to insure that their stewardship of American enterprise is based on a strong sense of ethical and moral values.* (p. 126)

**REFERENCES**


BUSINESS AND MANAGEMENT WORKSHOPS
A DESCRIPTIVE ANALYSIS OF EC COMPETITION POLICY: A DISCUSSION ON THE MEANING OF “COMPETITION” FROM THE PERSPECTIVE OF EU COMPETITION AUTHORITIES AND ITS IMPLICATIONS FOR FIRM GROWTH STRATEGY AND INNOVATION

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PURPOSE STATEMENT

Public policy toward industry is concerned with promoting industrial efficiency and protecting the economic interests of consumers. While it is widely recognized that in “enterprise” economies market forces are the basic factor shaping the development and performance of industries, in many cases the market mechanism has failed to work effectively. For this reason and despite many economists’ arguments to the contrary, governments use industrial and competition policies to correct situations of “market failure” and to assist firms and industries to adapt to changing market conditions.

The European Commission (EC) has developed and applied both of the above measures to ensure European Union (EU) competitiveness in the wake of trade liberalization. The purpose of this paper, therefore, is to determine whether the adoption of a competition policy has indeed been effective in promoting competitive behavior among firms within the EU -- and if so, to what degree and under what terms and guiding principles. This paper will also determine what impact the subsequent ‘modernization’ of EC competition law has had on further promotion of competitive behavior among firms – and if so, to what degree and under what terms and guiding principles.

METHODOLOGY USED IN EVALUATING EC COMPETITION POLICY

In order to properly evaluate the policy, it will be necessary to examine its efficacy over a period of time - that is, both prior to and after the modernization of EC competition law.

We therefore begin with an examination of EC Competition law prior to its modernization. In this paper we will:

1) Define the industrial policy of the European Union and its objectives,

2) Define EC competition policy in context with the stated objectives of EC industrial policy, noting the points of convergence/divergence between the two policies, and

3) Via case examples, evaluate the efficacy of competition policy with respect to the pattern of decisions taken by the relevant competition authorities in handling mergers and disputes between EU firms on the national and supranational levels, and to see whether the same pattern of decisions apply to mergers and disputes between EU and non-EU firms.

In the interest of providing a well-rounded perspective, comparisons are drawn between the EC competition policy and the national competition policies of two member states -- namely, Britain and France. The comparisons include analyses of specific cases where the European Commission has intervened -- or decided not to intervene -- for expediting the competitiveness of a particular industry or firm. The results of the case examples reveal the points of convergence/divergence between the supranational (i.e., the European Commission) and national policies, and hence, the overall impact that the EC competition policy has had on the market structure within these member states.

Next, this paper will examine the evolution of EC Competition policy after implementation of the Modernization Regulation in May of 2004. In this section, we will:
4) explain the recent changes made to EC competition law and its enforcement.

5) discuss the impact of the changes on the way national and supranational competition authorities apply and enforce the law.

6) via selected case examples, note the impact this new regulation has had -- and is having -- on firms with a market presence in any one of the EU member states.

7) Lastly, conclusions will be drawn about the policy -- for the period prior to the adoption of the modernizing regulation and for the period after its adoption. Implications for firms that do business in the EU, or are contemplating expanding their market into any area of the EU will be addressed in the conclusions.

In general, however, the pattern of decisions and actions taken by European competition authorities both prior to and after modernization seem to indicate that EC competition policy does tend to promote competition among firms within the EU, but only under qualifying conditions: 1) EC Competition authorities did strive to keep competition undistorted across the EU -- but only as long as the case in reference did not interact or conflict with a higher goal of the EC, namely EU industrial policy and integration. In such cases, industrial policy and integration took precedence over competition. 2) The case does not involve a sector that qualifies for a block exemption. Exempted sectors are not as heavily regulated as non-exempted industries. 3) The case does not involve a large, non-EU firm whose relevant market is of strategic importance to the EC. In this case, the competition authority tends to promote the interests of the firm’s rivals - or the EU in general. The sectors of strategic interest are: electronic communications, aerospace & aviation, computers-office machines, scientific instruments, pharmacy, and biotechnologies. 4) The EC competition authority has expanded the scope and scale of its power. The competition authorities no longer wait for a formal complaint to be filed by an aggrieved competitor before it will launch an investigation into the practices of a firm. Furthermore, the authorities will launch an investigation into any firm perceived to have the potential to abuse its market power, even in the absence of any evidence of abuse of market power. 5) The EC competition authority, through its decisions against Microsoft and other large or innovative firms, has shown it has a significantly different perspective on the meaning of competition and what competition policy is meant to accomplish for society. According to U.S. anti-trust authorities, the primary goal of competition policy is to protect the interests of consumers. According to EC competition authorities, the goal of competition policy is to lower entry barriers into an industry so that potential market entrants may enter the industry with relative ease. This definition of competition extends to industries characterized as having scale economies and innovative firms that grew large due to being the “first-to-innovate”.

The trends detected from the pattern of decisions taken by EU competition authorities have implications for firm growth strategy and innovation among large and innovative non-EU firms with a market presence in any one or more of the EU member states.
LEADERSHIP AND MANAGEMENT IN THE PUBLIC AND PRIVATE SECTORS: A COMPARATIVE ANALYSIS

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ABSTRACT

This study examines management and leadership effectiveness of managers in both public and private organizations. The research analyzed 150 responses to an online management and leadership survey, where respondents were asked to rate, both “effective” and “ineffective” managers on eight key management and leadership skills and competencies. Respondents indicated whether they worked for public or private organizations and the data were operationalized to determine the differences in responses. Given the interest in improving efficiency and effectiveness in both public and private organizations, this study can contribute to a better understanding of the key management and leadership variables that contribute to efficiency and effectiveness.

Organizational needs generally necessitate that managers be able to manage and lead. It is critically important for managers to not only manage the workload, but also to lead people in the accomplishment of the organization’s mission. Kotter (1988) noted that the need for leadership in managerial jobs and the difficulty of providing effective leadership in those jobs have grown considerably more than most people realize. However, finding managers who are competent in both managing and leading can be a challenging task, because managing the workload and leading people require different skill sets. In 1990, Kotter conducted seminal research that outlined the necessity of managers to be able to manage and lead. He also identified the key skills that are necessary for competence in both managing and leading. Managers who are effective in both managing and leading are necessary in both public and private organizations. However, there are differences between public and private organizations that can influence the effectiveness of the leader and the ability of the organization to achieve its goals. For example most public organizations are bound by a tougher set of restrictions and/or policies that are set by their local, state, and/or federal governments. This bureaucratic “red tape” is often viewed as a negative influence on organizational leadership, management, and capacity.

The study sought to answer the following research question: Are managers in public organizations less effective than managers in private organizations?

The following two hypotheses were tested:

1. Public managers are less effective than private managers.
2. Public managers are not less effective than private managers.

The data were analyzed via a cross-sectional analysis which determines bivariate relationships. In addition, chi-square was utilized to better understand the relationships among the distributions by determining their statistical significance. The results indicated that “effective” managers consistently were evaluated higher in the areas of management and leadership than the “ineffective” managers. Furthermore, there were no significant differences between “effective” or “ineffective” managers in public or private organizations. This study further validates Kotter’s theory on management and leadership, which posits that effective managers should be skilled at both managing and leading.
THE MODERATING EFFECT OF CONSUMER’S PRODUCT INVOLVEMENT AT RETRIEVAL ON INFORMATION SATISFACTION OUTCOMES

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EXTENDED ABSTRACT

Today’s consumers are faced with a great deal of information about products and services through different promotional activities such as, advertising, salesperson communications, package information, and so on. This in turn, influences consumer expectations and presents a potential for consumers satisfaction/dissatisfaction regarding information after the purchase. Considering the fact that information provides base for consumer’s expectations, information satisfaction can have a critical impact on consumer’s satisfaction with the product experience (Spreng, Mackenzie, and Olshavsky 1996). In a given scenario, if a consumer discovers the incongruence between the information received about product and the actual performance, consumer’s perception regarding the product can be radically disappointing. Conclusively, it can be said that this disconfirmation of information would affect the process of overall satisfaction.

Notably, advancements in assimilation-contrast theory suggest that consumer’s involvement with product can affect his/her satisfaction judgment process (Babin, Griffin, and Babin 1994). Also, it has been proposed that if a consumer gets involve with a product during a memory-based judgment process, it would affect the purpose of and passion for information processing (Park and Hastak 1994). The precision of this judgment would depend on motivation of uninvolved and involved consumers, because involved consumers put more cognitive efforts and deeply search for appropriate information in memory (Martin, Seta, and Crella 1990).

Extending the concept of involvement, Park and Hastak (1994) documented the difference between consumers’ involvement with the product at the time they receive information linked to product and their involvement when they make memory-based judgment. They examined the proposition that information retrieval process can be influenced by consumer’s involvement with a product at the time product information is being received as well as at the time memory-based judgment is being taken. Findings of their study documented that consumer’s involvement at the time of a memory-based judgment amplifies the intensity of search for judgment relevant information in memory.

Although Park and Hastak (1994) based their study on a context in which a consumer, after obtaining product information, takes some time to make a judgment regarding product, findings can be applied to different situations also. For example, if a consumer makes a judgment decision based on information provided at that time and later on this information is disconfirmed, in this case, the consumer will have dissatisfaction with the information used in product determination (Spreng et al. 1996). Therefore, it can be argued that consumers’ involvement would affect their satisfaction judgment because of increased search intensity for the precise information in memory.

Based on research conducted by Spreng et al. (1996), it is considered that the information satisfaction is shaped by consumer’s evaluation of the degree to which he/she perceives the product’s performance as equal or higher to his/her expectations. Notably, if there is an increase in willingness to process information, the reaction of information satisfaction would be comparatively more influential in high involvement situations than in low involvement situation. This notion is parallel with the argument of Babin et al. (1994) which suggests that the likelihood of disparity between expectations and actual outcomes rises as involvement increases and this disparity in outcomes suppose to affect satisfaction reasonably.

We believe that there is a need to advance the understanding of consumer’s information satisfaction by examining the moderating effects of involvement at retrieval on the link between information satisfaction and
overall satisfaction. In brief, the proposed theoretical framework suggests that consumers’ involvement at retrieval would moderate the reactions of consumers’ information satisfaction.

Proposition: Consumer’s information satisfaction is more (less) responsible for overall satisfaction under conditions of high (low) product involvement at information retrieval.

From a managerial standpoint, it is important to understand how the information provided by the managers to the customer can influence the customer’s overall satisfaction with the product. This research enhances the understanding of information satisfaction by incorporating the involvement at retrieval construct as a moderator. The results of this study would expect to reveal that the information satisfaction-overall satisfaction relationship is not invariant to changes in consumers’ levels of involvement at retrieval. The results of the study would expect to support the reasoning that information satisfaction corresponds to overall satisfaction more strongly as level of involvement at retrieval increases.

REFERENCES


ADMINISTRATION, SOCIAL AND POLITICAL

FULL PAPERS
AMALGAMATED RELIGIOUS-ETHNIC IDENTITIES: THE PROMISE OF AN EMERGING POSTMODERN PARADIGM

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ABSTRACT

The construct of religious-ethnic identity is beginning to receive a good deal of attention in various forums, fueled by geo-political events across the globe and a growing disenchantment with the secular values associated with modern industrialism. This article explores the interconnected processes of bifurcation and amalgamation involved in the development of emerging, contemporary religious-ethnic identities in multicultural postmodern societies in relation to transnational trends in global migration, cross-cultural contact and adaptation. Set against a backdrop of extant theory and research on social and religious-ethnic identity formation, inter-group dynamics, acculturation and adaptation, the promise and implications of an emerging new paradigm - amalgamated identities – is explored in terms of making space for and labeling the various emerging forms of religious-ethnic identities of our times.

There is sufficient empirical evidence to indicate that bifurcated or hyphenated identities tend to polarize existing ethnic-religious and national-religious affiliations and identities. This paper gives expression to a new emerging postmodern paradigm that allows for the simultaneous experience of plural identities that we naturally possess thus resolving this polarization among discerning individuals living in a globally inter-connected culture.

While the symbiotic connections between self and society have been acknowledged in the discourse on culture and identity (Schwartz, Montgomery & Briones, 2006; Stryker & Burke, 2000), the unique nature of postmodern existence has been brought to bear in an examination of bifurcated identity based on religion and ethnicity.

Over the past half-century or so, social practices submerged religious-ethnic identities into umbrella categories and, consequently, much discourse became centered on the experience of hyphenated status (e.g., on being Jewish-American or Indian-American) and consequently, the angst of being “split” two or more ways and of having to choose one and give up the other identity. However, in our postmodern times, it is more moot to see someone as exhibiting two or more of these identities simultaneously and in new creative forms, rather than singly or in a fragmented or dichotomous form. Hence, one can more readily see oneself as, and be seen as, Jewish American or Indian American (without the hyphen), acting in both roles simultaneously in conjunction with an integrated personality, rather than alternating rigidly between two conflicting and opposite cores.

Given unprecedented levels of contact among people from diverse backgrounds in postmodern multicultural societies, due to greatly increased transnational migration, exponentially greater opportunities for interaction and social exchange arise, leading also to greater self-examination and re-consideration of one’s own cultural norms in relation to in-group membership, expectations and roles. Not surprisingly, in recent decades, individual lives have become far more complex, unpredictable, varied and multi-faceted across most countries in the world. These worldwide trends have profound implications for the core sense of identity and other intimations of “self” experienced at individual and group levels, including the sense of religious-ethnic identity, across societies.

Despite long-standing and persuasive arguments of those endorsing the desirability of the assimilation model in multi-cultural societies, the idea of cultural identity itself is experiencing a “renaissance” with more people choosing actively to integrate, rather than assimilate or submerge, their original identities with identities that are normative and valorized in the societies of origin or adaptation within which their lives unfold. For instance, Zachary (2000) labels as hybrid or “mongrelized” the forms of identity arising from enduring multiple or “plural” cultural and geographical affiliations that are becoming more normative over much of the world (e.g. the European Union or Australia).
Appiah (2006) espouses the idea of “cosmopolitanism,” the evolution of the world from a society of hunter-gatherers, where humans only knew those in their intimate tribe and clan, to one in which individuals typically interface and depend on strangers with some predictable regularity. From a starting point of knowing little about other tribes, historical processes at work in the past couple of centuries have drawn much of the world into a single large web of trade and a global network of information, causing both incredible opportunity and discontinuity in the history of civilization.

There is a strongly articulated need to develop appropriate conceptual models in order to explain these new world patterns (Schmookler, 1995). Additionally, Schwartz et al. (2006) have drawn attention to the need to operationally define terms such as acculturation, identity and culture for purposes of enabling comparable empirical research to be conducted.

First, the continuing relevance and utility of some existing models are discussed, such as Tajfel’s (1981) model of social and religious-ethnic identity, Gordon’s (1971) model of assimilation and Berry’s (1997) model of cross-cultural acculturation processes. Against this background, a new model of “Amalgamated Identities” (Banerjee, 2006) is introduced as a possible way to understand the considerably more complex constellations of identities in the world today.

The word amalgamation means to combine or unite into one form (Wikipedia, 2007); accordingly, the descriptor amalgamated, as employed here, refers to two or more components combined in a form in which each retains its unique characteristics while remaining interconnected with other components. In doing so, the central question of whether these contemporary amalgamated identities actually constitute new social phenomena or have simply assumed new salience because of a paradigmatic shift needs to be addressed.

NEED FOR A NEW PARADIGM

The importance of constructing relevant and nuanced paradigms for understanding our modern-day world has long been acknowledged (Schmookler, 1995; Toffler, 1980. New conceptual models situating our present age within a historical and ecological context are already taking shape within the fields of economic and sociological inquiry (Korten, 2006). However, ideally, we need powerful multivariate and multi-disciplinary models to accommodate the full range of psychological and socio-cultural experiences that people undergo in contemporary societies.

In particular, inner individual psychological experiences of having bifurcated or hyphenated identities have yet to receive the level of attention they merit. While many studies of immigrant and diasporic experiences exist, what is noticeably missing is a common conceptual framework connecting the ideas espoused in these studies and providing seamless interlocution among the insights they uncover. In short, the full, complex and ongoing impact of these experiences on individuals and their everyday lives needs to be explored at the level of empirical inquiry, theoretical formulation as well as the systematic charting of inner private experiences.

Appiah (2006: xiv) draws attention to the Greek notion that a citizen—polites—belongs to a particular polis, a city to which s/he owes loyalty. Cosmopolitan, on the other hand, means belonging not to a city but to the cosmos—the world. A transcendent state, the construct of cosmopolitanism is therefore closely intertwined with the idea of truly amalgamated identities, involving persons belonging to a number of spheres embodying a web of overlapping hybridities or affiliations rather than to a particular place or fixed notion of society.

CONCEPTUALIZATIONS OF IDENTITY

Perhaps before exploring postmodern identities, it is important to begin with the most basic description of identity. Identity is a complex, multi-layered and inclusive categorical term that refers to how individuals perceive themselves in psychological and cultural terms, the qualities, aspects or cultural traits that define them, and the ways in which these self-perceptions and self-definitions are being continually constructed and negotiated socially (Dolby & Cornbleth, 2001; Maalouf, 2003). Within social psychology, identity is cast as “self-concept” (Fieldman, 1998; Myers, 2002) or “self-schema” (Marcus & Wurf, 1987). The structure of identity has been described as “vertical” (Graumann, 1983) or hierarchical, built on stacked clusters of attributes.
Further, as much as they represent psychological constructs, identities affect, and are shaped by, the socio-cultural context within which they take root, and so they are possibly best understood through multi-level analyses (Graumann, 1983; Hollinger, 2000). Salient throughout life and made up of both actualized and possible selves (Markus & Nurius, P., 1986), identities also reflect roles, group affiliations and solidarities that a person experiences through personal beliefs, meanings and experiences connected to these roles and categories (Hollinger, 2000).

Individuals rarely possess singular identities; at any given point, almost everyone tends to hold more than one identity associated with their changing family and social roles over time. Graumann (1983) and Tate (2004) have commented on the benefits of holding "multiple identities" although, more often than not, these are not equivalent and one identity tends to be more dominant than the other identities, in general. The position of a person’s given identity in this hierarchy can change over time in relation to shifting role-standards and functions.

Identities are also at once both personal and social. Over a century ago, William James (1890), co-founder of the discipline of psychology, concluded that one’s identity “cannot co-exist without feedback and judgment from others.” Social psychologists have noted tendencies in seeking feedback from others, as exemplified by the concepts of the looking-glass self (Cooley, 1902) and social comparison (Festinger, 1954) while Dunning and Hayes (1996) have commented on self-focused or self-referent behavior whereby we tend to judge others' behavior and compare it to our own.

Tajfel’s (1981) “social identity” theory attempts to explain the interplay between the individual and the various membership groups to which s/he belongs. These groups can be religious, political, ideological or racial, and the individual can affiliate with varying degrees of intensity; together these contribute to a sense of self-definition, place and “identity” in society.

Tajfel’s theory seeks to explain modes of self-classification, cleavage to one’s group (whether a majority or minority group) and feelings of superiority or inferiority associated with in-group membership compared to out-groups (Tajfel, 1978, 1981). At the individual level, it focuses on a person’s need to rate highly the groups to which he belongs above the other groups, reducing “cognitive dissonance,” reflecting Festinger’s (1957) theories (Tajfel, 1981:27). Social identity theory examines the make-up of society and its institutions as a totality, rather than casting blame on unique individuals and their personality structure for catastrophic world events such as the Holocaust.

“Social identity” theory reflects upon Festinger’s (1957) “social comparison” theory and unites it with work on self-categorization, comparing particular groups with other identifiable social groups (Puddifoot, 1997:2). Festinger’s position is that a positive self-concept is critical to psychological integrity. Avoiding isolation, the individual joins social groups, integrating his personal identity with that of the group (Tajfel & Turner, 1986:40). Identity ebbs and flows: at some points, the individual sees himself as unique; at other times, she sees herself as a member of a group, and both are equally valid to self-construction (Abrams & Hogg, 1990).

The central dilemma lies in deciding whose definitions of identity apply more, one’s own or others’. According to West (cited in Sardar and Van Loon, 2004), identity means different things to different people: self-definition, a longing to belong, need for security and safety, resources, something to live for and also, for some, something to die for. Another aspect affecting how identities are perceived or constructed is ethnocentrism, which is: a “point of view that makes the social group to which a person belongs the center of all things in that person’s world, and elevates that group above all other possible groups. The group in question may be race, nationality, sports team or indeed any other form of social grouping” (Psybox.com Dictionary, 2003).

The Nobel Prize winner, Amartya Sen (2006) wrote about how our “inescapably plural identities” (p. xiii) paradoxically make each of us unique, espousing a point of view very similar to that held by Amin Maalouf, a prominent Lebanese French writer. Maalouf (2003) writes about how he sees each of his perceived cultural, social and religious identities and affiliations as connecting him to people everywhere who share these attributes with him while, paradoxically, the particular combination of these also makes him completely unique and so very few people in the world actually resemble him in totality.
It is easy to deduce the close relationship between this perceived singularity of identities and expression of religious-ethnic violence both historically and in modern times (Maalouf, 2003; Sen, 2006). Sen lays the responsibility for this at the door of reductionist or politically minded individuals and groups who “construct hatred” or prejudice through deliberately and mischievously attributing or assigning singular identities to people based on single sets of descriptive categories or boxes, for example, religion or ethnic group, while ignoring other existing identities. One does not have to go far to find real-life examples to illustrate the far-reaching and often horrifying outcomes of such reductionist thinking. These instances occur all over the world, regardless of the level of economic and political stability.

Most minority groups within almost all societies struggle to maintain group identity and cohesion in the face of such perceived danger. They control their members through a shared system of inculcated beliefs originating from members’ inception into the group (Galanter, 1989: 98-99). Previously, a commonly construed and cited experience for persons from minority groups was that of veering between two extremes – that of identifying completely with the defining majority group(s) or of staying within the safe confines of their in-group.

However, according to Bromley (2000), there is a “third space” - an extension of Stuart Hall’s concept of the third scenario (‘a non-binarist space of reflection’) into the working idea of the third space. Characters with hyphenated identities pose problems in terms of classification, and therefore raise questions about notions of essential difference. Hall’s concept captures this dialectic of belonging and not belonging as “somewhere-in-between”. Maalouf sees this as an increasingly common and predominant experience in the world today.

Finally, recent re-conceptualizations of cultural theorists – Bakhtin, Lyotard, Deleuze, Guattari, Hall, Bhabha, Brah and Gilroy, among others – (Bromley, 2000) are helping to re-interpret multiple narratives grouped together in terms of geo-locations of the receiving society (the United States, Canada and Britain).

Yet another meaningful way to conceptualize the interplay between identities and the cultures they are embedded is to distinguish between independent and interdependent views of the self, known as self-construal. Independent selves are more self-contained to the extent that, if a person were to be uprooted from the place of origin and placed in a completely foreign environment, his or her identity would remain intact. On the other hand, interdependent selves are more embedded in the socio-cultural context and so the persons concerned are more likely to face substantial sense of loss of identity in the wake of a life-changing event (Markus & Kitayama, 1991; Myers, 2002).

One could speculate that individuals with an intact independent sense of self might handle trials of immigration better than those with an interdependent religious-ethnic identity. Hence, the Jewish or Indian person with an intact independent identity separate from the cultural aspect can adapt to being Jewish American or Jewish Australian, Indian American or Indian Australian more readily than someone whose identity is only intact within that community in a given country.

Berger (1966:106-107) wrote: “Society not only defines but creates psychological reality. The individual realizes himself in society — that is, he recognizes his identity in socially defined terms and these definitions become reality as he lives in society.” In other words, people will view themselves as defined by others. Suzuki (1998:158) believes that belonging to a group is largely a psychological state, distinct from that of being a separate individual, conferring on the person his or her social identity.

THE NATURE OF POSTMODERN IDENTITIES

The thread of postmodernism runs inextricably through most contemporary studies of identity. In historical terms, “postmodern” generally refers to contemporary forms of society following the age of modernity which, in turn, is associated with the industrial era - and constitutes the entire trend of thought through the late 20th century into the 21st century as well as the social and philosophical realities of this period.

Associated with factors such as the growth of the service economy, the growing salience of globally linked mass media and rise of interdependent world economies, the characteristics of postmodernism include: globalization, consumerism, the breakdown of authority and traditional social institutions, deconstructionist scrutiny and
criticism of “absolute truths” and the commoditization of knowledge. The postmodern approach is succinctly described in the global user-driven online resource, Wikipedia, as an “incredulity towards meta-narratives”, i.e., constituting implicit rejection of the grand, supposedly universal stories and paradigms from religion, conventional philosophy, economic theories, capitalism and gender that have greatly influenced both cultural and individual behavior in many societies over the last few centuries.

Maalouf (2003) holds that identities are far more complex and organic than we imagine and, therefore, they cannot be “compartmentalized”. The different facets of identity that a person selects from a veritable menu of choices flow together as many elements in a composite mixture. People have multiple allegiances and shifting affiliations, which they constantly assemble and re-arrange to their liking, mostly subconsciously. Each of the allegiances connects us to many similar people in the world, and yet at the same time we are each unique in our make-up and identity formation.

One of Maalouf’s most persuasive insights is that postmodern religious-ethnic identities are not ascribed or conferred but, rather, constructed by individuals themselves especially in postmodern societies. Globalization may actually reinforce people’s existential “need for identity” because it often brings with it the inherent threat of standardization and cultural impoverishment. This may be why, in this period of rapid globalization, sometimes the need for a “defined” identity could appear so compelling.

Our identities are our inner and personal configurations of who we are. They are not always synonymous with the roles we play or the statuses we occupy or our positions within groups or hierarchies we are affiliated with, while they may certainly derive from, or be influenced by, these. In short, we are the sole author or compiler of our identities (Bateson, 2001), and the identities we actively compile, construct, dismantle or refurbish continually are of our own making. Even two individuals who might appear to have similar backgrounds, like siblings or identical twins, are likely to have two unique and different identities because of the key role played by their personal choices and active preferences in how these identities are constructed.

Postmodern identities take shape actively through the telling and retelling of personal stories and narratives, of weaving personally meaningful experiences into numerous strands of identity. In a postmodern setting, the emphasis moves noticeably to affirming active individual constructions of identity and away from monumentalizing ascribed and static identities that are connected to social roles. Altogether, the full range of postmodern identities beginning to be manifested is far more extensive and complex than those expressed during preceding periods of history. Our recognition of these new forms that our identities are taking is blocked or limited only by the narrowness of the frameworks that we have available to express them.

Toffler (1980) referred to these “people of the future” as anticipatory citizens of the “Third Wave” civilization that is emerging through this “psycho-cultural upheaval”. He hints at how in our times there are “… powerful forces streaming together to alter social character – to elicit certain traits, to suppress others, and in the process to transform us all … (these) individuals will show … greater individuality. And they will see and project themselves in far more complex terms than any previous people. (p. 380)”

This interplay of culture, history and lifestyle enable and shape distinctive personalities and religious-ethnic identities. Varying emphasis on different combinations of dominant personality characteristics across different phases of human history have shaped human identities and tied them to specific cultural-historical periods. Every period enables the growth and proliferation of some kinds of modal identities and inhibited the budding of others. In short, our identities are closely embedded in a cultural and historical cosmos.

THEORIES AND MODELS OF IDENTITY

Theories about identity have their origin in social psychology and cognitive psychology. Social identity theory can be summarized as a web of interlocking ideas regarding “self-conception as a group member” (Abrams & Hogg, 1990:2) “Social identity” theory assigns a central role to the process of categorization which partitions the world into comprehensible units and hence contributes to an orderly understanding of self and society.
“Dissonance” theory is closely related to “social identity” theory because it strives to relate individual functioning to group functioning. In order to feel better about oneself, it is necessary to elevate the groups to which one belongs, to avoid “cognitive dissonance” (Festinger, 1957).

“Cognitive dissonance” is a theory of “attitude formation and behavior describing a motivational state that exists when an individual's cognitive elements (attitudes, perceived behaviors, etc.) are inconsistent with each other, such as the espousal of the Ten Commandments concurrent with the belief that it is all right to cheat on one's taxes; a test which indicates that persons try to achieve consistency (consonance) and avoid dissonance which, when it arises, may be coped with by changing one's attitudes, rationalizing, selective perception, and other means” (Psybox.com Dictionary, 2003).

Wanting to maintain a positive self-identity, the individual deduces, “If I think highly of myself, and I belong to a group, therefore the group must be highly-rated” (Puddifoot, 1997). Behavior comes to reflect an individual’s membership in a self-reference group and that group’s position in the panoply of other groups that interact regularly in a carefully defined social space (Tajfel, 1981). Each group strives to maintain a distinctive identity and place for itself within the social and political system of a country. Members locate themselves within the norms, boundaries, goals, purposes and social contexts of the groups to which they belong.

Fletcher and Fitness (1996) note that individuals bias both attributions and evaluations in ways that favor relationship partners or in-group members above or close to them. Indeed, a blurring of boundaries seems to occur between the self and ones with whom they most belong. The most significant in-groups and dyads become incorporated into the representation of the self.

Groups attribute different social status to one another based on their position in society. Membership in high-status groups usually contributes to a positive social identity, whereas a negative social identity is generally associated with membership in low-status groups (Rosenthal & Hrynevich, 1985:725).

A need exists to be accepted by membership and reference groups. Individuals often process information and give out social cues about themselves, so as not to face social rejection or find themselves excluded from their group (Gardner, Pickett, & Brewer, 2000:490). After reviewing the literature, it seems that while the need to be accepted in a membership group is important, some individuals may shun religious-ethnic identities in favor of another identity, such as rank in their profession.

The “social identity” construct relies on self-descriptions in terms of social category memberships, such as race, religion, class, nationality and gender (Bornman & Mynhardt, 1991). Using this construct, an individual may view himself through the lens of race (“I am black,” “I am white”) or religion (“I am Hindu,” “I am Mormon”). The salience of these traits, how important each is to the particular individual, may vary given the society he lives in and the relative importance that society places on race or religion at a given time. An identity that may seem relatively unimportant at one time in history may become crucial at another point.

Concerns about self-identity can be found simultaneously on several levels, each varying in salience at a particular point (Capozza & Brown, 2000:33). Individuals belong simultaneously to several groups: religious, professional and vocational. The strength of their identification with each will shape their actions. Or, given the situation, a particular affiliation could become dominant.

Being religious is an identity, but it is an identity that is able to shift, unlike race or gender. It is based more on inner attributes rather than fixed demographic classifications. For example, as a Protestant, one can join a particular denomination and go regularly during one life-stage or historical period; one can join another denomination or have a different service-attendance pattern under other conditions.

With regard to acculturation and adaptation to host cultures, for decades, the two-dimensional “acculturation” model (Berry, 1997) has been the explanatory model of choice in research on cross-cultural contact and adaptation. Although in a limited way, the model has been useful as in efforts to describe the interplay of narrower cultural or ethnic orientations and broader secular or national identities that are central in individuals’
lives. Four distinct types of possibilities or outcomes are envisaged and described by Berry’s model: *biculturalism/integration, assimilation, separation* and *marginalization* (see Figure 1).

[Insert Figure 1 here]

**LIMITATIONS OF EXISTING MODELS.**

By and large, theories of cross-cultural adaptation have only inadequately addressed the “richness and complexity of a culturally diverse population (Sue, Ivey and Pedersen, 1996)”. Malouf (2003) urged that a “new concept of identity” is needed “urgently”. While Berry’s two-dimensional acculturation model has long been considered adequate for describing most kinds of cross-cultural contact occurring in the 19th and 20th centuries in the U.S., it is not comprehensive in its explanatory power. It has proven to be useful, although in a limited way, in describing a range of possible outcomes in situations where the interactive influences of national and ethnic identities play out.

**THE SEARCH FOR A NEW PARADIGM**

Now that the need to construct a more appropriate theoretical framework to accommodate and situate contemporary identities has been articulated, the question arises about what kind of model would best serve this purpose.

Berry’s *acculturation* model emerged from the need to develop a perspective on assimilation that would be less unilinear than Gordon’s (1971) model of *types of assimilation*. While Berry’s two-dimensional model brings greater nuance to the psychosocial charting of the cross-cultural experience, it nevertheless lacks the breadth, complexity and flexibility to adequately describe let alone accommodate the more widespread and increasingly mainstream identities, strivings and needs of growing numbers of people around the world.

In response to the consensus that a more complex and multi-dimensional model of religious-ethnic identity is needed, the concept of *amalgamated identities* is put forward (Banerjee, 2006). Assuming this point of view necessitates a small shift in perspective that helps to extend the limits of the existing model through incorporating additional dimensions of religious-ethnic identity. The resulting model, in its ability to accommodate a fuller and more realistic range of psychological and social aspects of identity, is altogether better suited to the study of these contemporary phenomena.

**THE AMALGAMATED IDENTITIES MODEL**

In addressing the need to fully understand the new complex emerging identities in the world, a new multi-dimensional model for understanding identity in the global context was first introduced by Banerjee (2006) — the Amalgamated Identities (AI) Model. Instead of two dimensions or axes as in the Berry model, the basic structure of the Amalgamated Identities (AI) Model, characterized by greater conceptual complexity, is constructed along the intersection of three dimensions, the first two being the same as in the two-dimensional model - *cultural, group or ethnic identity* and *regional or national identity*. A third intersecting dimension involves *global identity* or the extent to which individuals define themselves in terms of their possessing more “global” or “international” affiliations (see Figure 2)

[Insert Figure 2 here]

In addition, a fourth embedded dimension is suggested – that of *individual identity*. This is the age when more so than before, we tend to see ourselves first as individuals – as persons with distinct temperaments or personalities, gender, interests and aptitudes - rather than as just members of a tribe or group or as nationalists or global citizens. These self-definitions are possibly akin to layers making up our identities or our sense of who we are. The layer of “individual” identity is at the core of this sense of self and the other layers fill out the remainder of our identity. Depending on the extent to which each of the dimensions is developed, some identities would appear as richly layered, representing all dimensions, and others less so.
POSSIBLE OUTCOMES OF AMALGAMATED IDENTITIES AND THEIR SIGNIFICANCE

In comparison to the four possibilities that have traditionally played out in Berry’s two-dimensional model described earlier, if we consider the expanded three-dimensional model of Amalgamated Identities (AI) (Banerjee, 2006), we can differentiate many more distinct possibilities or outcomes for individuals - all connected to the interplay and spontaneous combinations of individual identities across the defining intersecting dimensions of individual, group/ ethnic/ cultural identity, secular national or regional identity and global identity.

Not all these possible identities are relevant to us in this paper. A meaningful way to describe identity may be to focus on how richly layered it is. Identities that are thinly layered or one-dimensional have been labeled “singular” while those that are multi-layered have been referred to as “complex” or “plural” (Malouf, 2003; Sen 2006). This raises the possibility of construing identity in terms of whether it is “rich” or “impoverished” in relation to the scope of individual choice and outcomes of psychological wellbeing. There is a need for sustained research on both “rich” amalgamated identities, that are likely to involve multiple levels of affiliation and relationship to the world at large as well as on “impoverished identities” where there would be fewer such connections. This will enable us to focus on the relationship of the “richness” of identities with positive psychological health.

Conversely, “impoverished” identity is often correlated with the opposite, the paucity of mental health, violence, lack of opportunity and negative outcomes. For instance, Sen (2006) provides a strong argument for the close connection between impoverished identity, ethnic or cultural violence and social upheaval. Given the far-reaching effects of such interconnected processes in our times, the importance of developing suitable and meaningful research frameworks for exploring these processes cannot be over-emphasized.

An understanding of emergent identities that are already becoming noticeable in our globalizing society, and the application of their implications can unlock doors to new and transcendent insights and perspectives. The Amalgamated Identities (AI) Model has the capacity to explain the complex and nuanced aspects of the globalization experiences as well as to reinterpret the different historical phases of the human experience in a more complete way, a capability that far exceeds the current explanatory potential of Berry’s two-dimensional model.

While each of the four dimensions of individual, cultural-ethnic, national-regional and global identities really represents a continuum rather than categories, it is nevertheless useful to consider the broad categories that would emerge when the dimensions are broken down into “strong” and “weak”.

We will now describe some of the possible set of religious-ethnic identities one may expect to find within contemporary multicultural societies. The risks of stereotyping these are undoubtedly high at the outset but will hopefully lessen as each of these clusters is studied at greater depth in subsequent attempts and as empirical research mounts on these aspects. The combinations are labeled in terms of the extreme aspects they represent when they are assigned numerical, though nominal, values of S and W on each dimension where S represents “strong” and W represents “weak” or “insignificant” for the dimensions of religious/cultural-ethnic (R-C-E I), national-regional (N-R I) in that sequence (see Diagrams 3a-h).

1. Nascent or impoverished identity. [WWWW - weak - all 4 levels of identity]

This state may be a passing phase, early in the identity formation process when a defined religious-ethnic/national identity is yet to develop. None of the dimensions are pronounced in their manifestation; however, some individuals may never leave this category. This category possibly resembles most the Quadrant IV from Berry’s two-dimensional model. With low identification on both dimensions of cultural and national identities as well as the global or individual scale, people occupying this category could possibly be described variously as being oblivious to their immediate environments. They may also be considered to be free spirits on the subject of religion, celebrating their total autonomy and completely eschewing the constraints placed by group and state. These people are not particularly enamored of their cultural or even national identities but may
be, though not necessarily, more in tune with their individual or larger global identities. National or narrower
cultural, religious or ethnic concerns are likely to be relatively low on their list of priorities.

2. **Individualist - globalist identity.** [SWWS - strong - individual & global identities/ weak -
religious-ethnic & national- regional]

“The globalist with a strong and defined individual streak” would be a way to describe this category of person. 
Possibly this will become a description of a fast-growing sub-population in a world with increasingly permeable
national borders, relative loosening of narrow cultural and ethnic bonds and growing global and supra-national
affinities. The connection to the nation in which one lives or is a citizen may be less important than the larger
constellation of which the nation is a part.

3. **Insular- nationalist identity.** [WSSW - strong - religious-ethnic & national-regional
identities/ weak - individual & global]

Among this group of persons, their sense of who they are is tied strongly to both their cultural, religious-ethnic
roots as well as national identity. Global concerns are on the very distant peripheries of their lives and their day-
to-day lives are lived well within cultural and national perimeters.

4. **Groupie or tribalist identity.** [SSWW - strong - individual & religious-ethnic/ weak -
national-regional & global identities]

These persons are low on global and national identity; their sense of who they are comes primarily from their
identification with their cultural or ethnic group. Everyone and everything is viewed in terms of the group’s criteria
or standards and either found to be desirable or wanting. Their interest in other ways of living may be fleeting and
invariably reinforcing of their own familiar ways. They live lives deeply and completely embedded in their culture
or group’s way of life and are often connected to highly satisfying and mutually supportive networks of social
relationships. Little exists outside their world, which feels complete as it is, and their individual selves are
surrendered almost completely to the groups that they are part of.

These people are consumed by religious-ethnic identity, low on national concerns. Their day-to-day lives revolve
around maintaining of group traditions and rituals, socializing and communing with others in the group. National
and global concerns and affiliations are on the very periphery of their existence. An example would be new
immigrants who, while developing themselves professionally, live in cultural ghettos within the new country, both
as a phase in the process of adapting or a premature culmination of the process.

5. **Tribalist - humanist identity.** [SSWS identity: strong - individual, national- regional and
global identities/ weak - religious-ethnic]

They are high on their group’s culture or maybe even superiority, try to keep their traditions alive and describe
themselves as part of the human family at a different level, although they may downplay their new national
identity. Nationhood and national identity are important only marginally and incidentally this makes for an
interesting combination of characteristics representing the individualists and the proponents of the “human
family” spanning tribal and global cultures, where the nation state and its constellation of values is irrelevant.
However, they look for their own group wherever they go.

6. **Pragmatist neo-cosmopolitan global citizen identity.** [SWSS - strong - individual,
national- regional and global identities/ weak - religious-ethnic]

People in this group may see themselves defined more as connected to the nation and the world at large, while
their sense of allegiance to their culture is weak.. Their individual lives may be closely interconnected with the
“national culture”, its traditions and rituals, while downplaying their own groups. They believe their future is
related to adaptation to the nation. They are strong on nationhood but disinterested in their religious-ethnic
origins.
7. **Pragmatist – Neo-Cosmopolitan Identity. [WWSS - strong - national-regional & global identities/ weak - individual & religious-ethnic]**

Persons in this category believe in the importance of both their national and global identities. They are the new pragmatists who realize that their future and success lie in how well they relate to the new dynamics operating at national and global levels and are able to integrate them in life and work. Neo-Cosmopolitans are strong on national identity and look for the opportunity to represent their country abroad but are also aware of the need to work with, and become part of, the world community at large.

8. **Transcendent actualized rich identity [SSSS - strong - all 4 levels of identity]**

In this category, individuals have an equally balanced sense of their individual identities cultural and ethnic roots and their being citizens of a nation state and of an increasingly salient larger world. Individuals in this category feel a strong sense of affinity for their culture, their nation, and would be hard put to make a choice or prioritize. In these times, we tend to find many more of them possibly because, previously, a conducive environment did not exist everywhere sufficiently to sustain them and so these tendencies did not find full expression at the behavioral level. These citizens of the world are committed to religious-ethnic and national issues and feel “at home” anywhere.

This is the only category where people are equally invested in all levels of their identity – as individuals, members of an ethnic group or belonging to a certain culture, citizens of a nation-state and as a global citizen. Of all the categories, while it contains all other combinations within it, in its purest form it is transcendent and suggestive of the potential form of central identity for persons living in a interconnected nation-state.

**IMPLICATIONS OF THE NEW PARADIGM**

We still attempt to process and analyze our experiences using archaic conceptual frameworks constructed in response to different experiences under dissimilar circumstances. For instance, we assume, when we invoke Berry’s two-dimensional acculturation model, that everyone’s lives at the social level can be explained by two salient driving forces: our cultural or religious-ethnic identities and our identification with the nation state or region where we live or hark from or migrate to.

In using Berry’s four quadrants that describe our shifts along the intersecting continua of cultural or religious-ethnic identity and national identity that are assumed to contain almost all the possibilities of the paths that our identities can be expected to take, we assume that eventually, these two types of identities are what drive behaviors of people the world over.

But even though Berry’s model is perfectly adequate in explaining the experiences of most people at an earlier point in history when the main defining forces of identity were, in fact, the tribe, culture or religious-ethnic group and nationality, our tired old schema reaches the limits of its relevance and meaning when we attempt to apply it to more contemporary experiences.

The Amalgamated Identities Model introduced in this article offers a viable and compelling alternative. It is not only based on a conceptually expanded view along two additional dimensions that are completely missing in the two-dimensional model – *individual identity and global identity* - but also provides many more reference points or hooks to hang newly emergent identities on. Most of all, this multidimensional model has the capacity to situate the many layers of our human experiences across societies and historical periods within a framework that is much more open, commodious, differentiated and nuanced.

We should therefore seriously consider accepting this new guiding framework that describes faithfully, explains accurately and predicts intuitively many different outcomes of individual identity. The possible outcomes that this new expanded model provides for understanding and anchoring the specific new emerging identities of our times are far more varied than the scenarios offered by Berry’s framework.

At the same time, it should also be pointed out that these categories do not represent sealed or watertight categories. People do not necessarily remain in one category all their lives but instead may move from one
category to another depending on what kinds of considerations are uppermost in their lives. These categories merely provide us with a convenient and effective way to understand and describe how people see themselves and what constitutes their identities over their life span. The possibilities contained within each cell of the Amalgamated Identities Model suggest that the implications are likely to vary depending on the role that these dimensions of individual, cultural, national and global identity play in peoples’ lives.

Employing an evolutionary and historical perspective, we see how pre-occupations of humans moved from the individual to the group or tribal level over centuries. In more recent centuries, the nation-state evolved as an entity with which, too, we developed affinity sometimes at the expense of the tribe or the religious-ethnic group. Now, the emergence of contemporary global structures that are competing for our “share of mind” and affections mark yet another important stage in this long journey as humans on earth.

It may not be farfetched to believe that how we manage this transition will largely determine the very future of humans. The ways in which we perceive and interpret ourselves within the context of our changing world and associated actions we take will critically affect the lives and possibilities for millions of people across the world in decades to come.

CONCLUSION

In this first decade of the 21st century, we have more access to a plethora of experiences and information – real-time, simultaneous, asynchronous, virtual, imaginary, communicated, implicit, vicarious, simulated, from across the world, than ever before in history, facilitated by revolutions in informational and communications technologies. However, in contrast to these outer changes that have taken place so swiftly within the space of a generation or less, our guiding paradigms have changed but slightly.

The construct of Amalgamated Identities moves us towards a more authentic representation of the world and ourselves and offers a far more nuanced framework for labeling, understanding and explaining contemporary patterns of lives and identities than earlier models. Phenomena that lack a label or a category may as well not exist, hence the importance of having a framework that can apprehend and label these more contemporary identities and assign them meaning.

The very idea of amalgamated identities is be immensely empowering because it more accurately represents and allows fuller aspects of our identity to be expressed and therefore validated. However, useful as the concept may be, often the very notion of relatively more differentiated identities could possibly seem disturbing to those with narrower regional, national or ethnic affiliations.

Unlike earlier periods in history, the focus is less on how we are seen by others and more and more on how we perceive and define ourselves, which is how we should ideally be seen. Willis (1991) refers to this as the “emergence of authentic self-expression “. Compiling our identities in the early 21st century is more about consciously constructing desired identities or making meaning of inherited constellations of identities than about accepting and subscribing to an ascribed identity within an established social structure (Bateson, 2001).

Compiling this kind of “cafeteria-style identity” comes closest to “authentic self-expression”. With more opportunities than before for discovering more sides to one’s core self, and provided that a more-or-less conducive context for expressing those “sides” exists, it can be argued that contemporary identities are likely to be “richer” than those in times past.

However, here may lie one of the barriers that we have to break through, yet. “Plural” identities have always existed; however, it has been the narrowness of prevailing paradigms that has often limited our perception and validation of the “many sides” of humans, compelling us to focus instead on selective and biased “singular” identities, sometimes with horrifying calamitous outcomes for both individuals and societies, such as religious wars, “ethnic cleansings” and death camps. It is not difficult to see that these kinds of situations can have a severely limiting and impoverishing impact on both individuals and societies in both the short and long term.
At the very least, individuals in such situations would understandably hold themselves back from investing themselves fully in the societies that they find themselves in. Tolerance, at the very minimum, and acceptance of “different strokes” are key to building successful and psychologically healthy societies. As Maalouf (2003) wrote, “the more an immigrant feels that his own culture is respected, the more open he will be to the culture of the host country”. Through different historical periods, we are both recipients of, and contributors to, these evolving social realities.

The inward-looking centrifugal forces of “nationalism”, like those of “tribalism” or “cultural affinities”, tend to counterbalance the trend towards globalization even as more enlightened outward-looking tendencies attempt to break through this deadlock. Steinbeck (1993) described nationalism as a positive or negative force instrumental in the “inclusion or exclusion of peoples”.

Empirical study of the issues discussed in this article is needed on a number of levels, not only to validate the constructs referred to here but also to explore the processes involved in the formation of multiple identities across different levels of group affinities and their implications. Schwartz et al (2006) call for interdisciplinary exploration of the processes of acculturation and identity in immigrant populations, including “both global and socio-structural determinants” as well as “precise and situation-specific aspects”.

Finally, in addressing the central guiding question in this paper about whether amalgamated global identities constitute a completely new phenomenon or whether they emerge due to the assumption of a new paradigm, it would seem that it involves both - not one or the other - new phenomena as well as a new paradigm. The identities that are described in this paper are paradoxically emerging even as the supporting paradigm is evolving. Each therefore needs the other to be true.

Ultimately, though, even as that question is answered, many new questions arise: What are these “new” types of religious-ethnic identities telling us? What does our amalgamated identities paradigm tell us? What can we do with this new knowledge? How do we apply it to the contexts of our lives? And in what ways will it be different from before? It is hoped that this article takes a significant step in the direction of clarifying the main issues.

REFERENCES


RELATIONSHIP BETWEEN SENSE OF RELIGIOUS-ETHNIC IDENTITY AND DEGREE OF ACCULTURATION

(based on Berry’s model of acculturation)

**Acculturation (National/Regional Identity)**

<table>
<thead>
<tr>
<th>Strong</th>
<th>Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong</td>
<td>Quadrant One</td>
</tr>
<tr>
<td>Strong</td>
<td>Bicultural individuals – equal levels of identification with religious-ethnic identity and macro-culture</td>
</tr>
<tr>
<td>Weak</td>
<td>Quadrant Three</td>
</tr>
<tr>
<td>Weak</td>
<td>Individuals marginal to religious-ethnic group and high on macro-culture identification</td>
</tr>
</tbody>
</table>

*Figure 1*
THE AMALGAMATED IDENTITIES*(AI) MODEL
[Banerjee, © 2006]

* Individual Identity embedded as a hidden dimension

KEY:
II – Individual Identity
R-EI – Religious-Ethnic Identity
N-RI – National-Regional Identity
GI- Global Identity
S = Strong
W = Weak

Figure 2
**Graphical Depiction of Identities** (Width of circles represents strength; color=type of identity)

- **Nascent or Impoverished Identity**
  - The **WWW identity**: weak - all 4 levels of identity

- **Transcendent Enriched Robust Identity**
  - The **GSSS identity**: strong - all 4 levels of identity

- **Neo-Cosmopolitan Global Citizen Identity**
  - The **SWSS identity**: strong - individual, national, regional and global identities; weak - religious-ethnic

- **Tribalist - Humanist Identity**
  - The **SSWS identity**: strong - individual, religious-ethnic and global identities; weak - national-regional

**Figure 3a-d**
Amalgamated Religious-Ethnic Identities: The Promise of an Emerging Postmodern Paradigm

Figure 3e-h
THE “SPECTRE” OF TERRORISM IN THE COLD WAR AND POST-COLD WAR WORLD

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ABSTRACT:
In recent years, it has become fashionable in the media to describe the presence of terrorism as if it began on 9/11, assuming it was nonexistent in times such as the Cold War. Such an explanation assumes that while the Cold War dealt with superpower confrontation, the post-Cold War era replaced USA-USSR struggles with terrorism. However, it is just as likely that great power confrontation left fewer resources to manage terrorism. A careful analysis of a chronology of terror attacks in the United States or its interests abroad reveals that terrorism was actually more widespread during the last 12 years of the Cold War than in the same time frame after the fall of the Soviet Union. Yet the post-Cold War era attacks against the USA were more deadly, even when controlling for the tragic events of 9/11. Such findings are important, especially if superpower confrontation (USA-Russia, USA-China) returns.

Keywords: Terrorism, Cold War, America, Statistics

“TERRORISM NEVER DIES”

In the 2006 James Bond movie “Casino Royale,” the British superspy is reintroduced into a post 9/11 world of great uncertainty, where friends and foes seem equally murky. Bond’s spymaster “M” (played by Judi Dench) quips “Christ, I miss the Cold War.” Though Dench’s words from “M” are for fiction, they closely resemble the comments of President Clinton’s neorealist Central Intelligence Agency Director R. James Woolsey, who was quoted as likening the end of the Cold War to the slaying of a dragon. “However, in the aftermath of such a victory, there emerged a ‘bewildering variety of poisonous snakes that have been let loose in a dark jungle; it may have been easier to watch the dragon.”

One would get the impression from M’s quote and Woolsey’s observation that the modern-day world that the new Bond (played by Daniel Craig) must operate in is somehow more dangerous, a fresh breeding ground for the evils of terrorism. But this ignores the fact that in many of the earlier “Cold War” James Bond films, Ian Fleming’s character rarely had to face a Soviet foe (his KGB rival General Anatol Gogol even takes his side sometimes). Instead, his enemies were part of a third organization seeking world domination at the expense of the two superpowers. In fact, the most famous of such fictional organizations, SPECTRE, did contain the term “terror” in its full name (SPecial Executive for Counter-intelligence, Terrorism, Revenge and Extortion).

So which “real world” has been shown to be safer for America and its citizens? Is it today’s shadowy post-Cold War era where a lack of information and the resulting uncertainty allows nefarious non-state actors to fester? Or was it worse during the Cold War, when America, distracted by the superpower nuclear standoff, found itself to be a terror target?

Rather than idly speculate on such a question, this paper actually gathers evidence to evaluate such an argument from Kushner’s Encyclopedia of Terrorism. This data is evaluated using a variable I have

constructed which differentiates those cases that are Cold War terrorism events from those that emerged after the Cold War was concluded. In addition to the number of cases, I also evaluate how deadly the terrorist attacks were, counting deaths from both eras to determine the level of danger from terrorism.

**ONE THEORY IS NOT ENOUGH**

It has become quite fashionable these days to examine the similarities between what has been considered the “beginning” of the “War on Terrorism” to the origins of the Cold War. Both are linked as struggles against an ideology, as opposed to a particular state. The primacy of a competing idea, liberty, is pitted against such rival tactics. But given not only these striking similarities, but also the fact that terrorism predates 9/11, there is a greater need for a coherent analysis of theory, as opposed to a quick substitution of one concept for another.

**COMPETING CONCEPTIONS OF POLARITY AND CONFLICT**

Whether speaking of a Cold War or post-Cold War era, scholars refer to these international time periods as systems. A global political system is defined as “the properties that describe the characteristic ways in which actors most often behave in the global arena of any historical period.” The next step is to determine the defining qualities of an international system in order to assess which one had the effect of enhancing or reducing terrorism. For many academics, the key factor is the distribution of power in the international system.

Such power is reflected in the number of countries determined to be great powers or even superpowers. When a single country acts as the hegemon, dominating international politics, it is labeled a unipolar system. When the international system reflects a pair of powers acting as gravitational poles for ideological differences, we think of a bipolar world. And when power is dispersed among several countries, with no clear dominant player, it is deemed to be a multipolar system.

When it comes to assessing the relative safety of an international system, few scholarly debates top the arguments between neorealist Kenneth Waltz and his critics Karl Deutsch and J. David Singer. Ironically, these scholars all reach a similar conclusion about multipolar worlds: they are systems where information is more

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75 Deb Reichman (“Bush Likens War on Terrorism to Cold War,” ABC News, May 27, 2006) quotes President George W. Bush in a speech to the U.S. Military Academy graduates, linking the Cold War to the War on Terrorism. “As President Truman put it towards the end of his presidency, ‘When history says that my term of office saw the beginning of the Cold War, it will also say that in those eight years we set the course that can win it.’ His leadership paved the way for subsequent presidents from both political parties men like Eisenhower, Kennedy and Reagan to confront and eventually defeat the Soviet threat. Today, at the start of a new century, we are again engaged in a war unlike any our nation has fought before, and like Americans in Truman's day, we are laying the foundations for victory.”

76 U.S. Secretary of State Colin Powell, in praising George Kennan at a Princeton University speech, also drew an analogy between Kennan’s Cold War theoretical contributions and the contemporary conflict involving terrorism (Eric Quinones, “Powell: Kennan’s Cold War Legacy Delivers Hope In War On Terrorism,” Speech delivered to Princeton University, March 1, 2004).

77 In his critique of the “War on Terrorism,” William Greidler (“Under the Banner of the ‘War’ on Terror,” The Nation, June 21, 2004) states “Fanatical Muslims replaced Soviet Communists and, like the reds, these enemies could be anywhere, including in our midst (they may not even be Muslims, but kindred agents who likewise ‘hate’ us and oppose our values). Like the Cold War’s, the logic of this new organizing framework can be awesomely compelling to the popular imagination because it runs on fear--the public's expanding fear of potential dangers.”


79 Ibid., 530.


dubious. That is a result of the need for more information in the world of international politics. To represent information availability, I have devised the following formula for international systems.

\[ Y = \frac{1}{X} \]

**Information Availability Equation:** Let \( Y \) represent information available on a given country and \( X \) represent the number of great powers in the international system.

Let's say that in 1984, the United States is locked in a bipolar struggle for world supremacy with the Soviet Union. In this case, the USA has to watch only one world power: the USSR. But ten years later, let us assume that in a more multipolar world, the United States must watch the European Union, the People’s Republic of China, Russia, Japan and possibly India. This means that in 1984, America’s information costs were \( \frac{1}{1} = 1 \), while in 1994, the average amount of information available for a given country was \( \frac{1}{5} \). So, with the United States having only 20% of its information assets available to watch a given country, a dearth of intelligence is likely to generate a greater degree of uncertainty. Having greater certainty during the Cold War enhanced prospects for understanding between contestants, where standard theories of deterrence and superpower management of smaller crises to limit potential nuclear confrontation preserved the peace.82

According to Waltz, this heightened level of uncertainty meant an increased amount of insecurity for a country like the United States. And rather than be taken advantage of, an insecure country is more likely to “lash out,” enhancing the prospects for conflict. Therefore, Waltz’s theory can be written as: multipolar worlds tend to be more conflict prone, with the type of system being the independent variable and the level of conflict acting as the dependent variable. The relationship is a positive one, with the chances of conflict increasing as a new great power joins the international system.

But Deutsch and Singer take the opposite approach. True, they accept the greater degree of multipolar uncertainty advanced by Waltz. But unlike their neorealist counterpart, the authors contend that insecurity breeds caution, not conflict. Nations are less likely to go to a risky event such as war with so many unknown factors to consider. If one is so uncertain of another’s intentions, how can he or she be certain of the conflict outcome? Only when the intentions seem clear and the chances for victory seem easier to calculate is a country more likely to pursue the war option. Their argument can be summed up as:

- Uncertainty \( \rightarrow \) More Caution \( \rightarrow \) Less Conflict
- Certainty \( \rightarrow \) Less Caution \( \rightarrow \) More Conflict

Therefore, Deutsch and Singer come to the theoretical conclusion that bipolar worlds tend to be more conflict prone. Like Waltz, the type of system is the independent variable while the level of conflict serves as the

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82 Walter Laqueur (“After the Cold War,” eJournal USA, April, 2006) observes “When the Cold War came to an end in 1989 with the dismantling of the Berlin Wall, when the countries of Eastern Europe regained independence, and when finally the Soviet Union disintegrated, there was widespread feeling throughout the world that at long last universal peace had descended on Earth. The fear of a war in which weapons of mass destruction would be used had vanished. Skeptics (which included this writer) feared that there was plenty of conflict left in the world, which had, however, been overshadowed or suppressed by the Cold War. In other words, as long as the confrontation between the two camps continued, all kinds of other conflicts, which seemed minor at the time, would not come into the open. On the contrary, the Cold War had in a perverse way been responsible for the preservation of some order in the world; it had been a stabilizing factor. And it was also true that the danger of a new, horrible world war had probably been exaggerated. For there existed a balance of terror; there was mutual deterrence—precisely because there was a big arsenal of devastating weapons. And since both sides in the conflict were acting rationally, because they knew what the consequences of such a war would be, peace was preserved.”
dependent variable. Unlike Waltz, the relationship is a negative one, with the chances of conflict decreasing as a new great power joins the international system.

TYING THEORIES TO TERRORISM

Yet the theories of Waltz, Deutsch and Singer were developed for great power conflict. What might account for terrorism or acts frequently perpetrated by nonstate actors in ways which might fall beyond the laws of conventional warfare? Here, I make the assumption that a relationship exists between the polarity theories of conflict and hypotheses related to terrorism. The notions of information costs and uncertainty generally apply (with one exception).

Neorealists like Waltz might well note that with less information available to spread around to “spy” on other great powers in the multipolar era that followed the Cold War, a country like the United States might drain valuable resources from antiterrorism efforts to compensate for such shortcomings in watching seemingly bigger threats (other great powers). Less intelligence assets devoted to monitoring terrorism could breed an increase in attacks, domestic or foreign. Therefore, the hypothesis to be tested is this: more terrorism attacks in and against the United States are likely in the post-Cold War system. Here, the era (whether the country is in the Cold War or not) is the independent variable while the number of terrorism attacks is the dependent variable. The relationship is positive: as the United States moves from the Cold War to the post-Cold War era, the number of terrorism attacks in and against America should increase.

Scholars like Deutsch and Singer, of a slightly more idealist persuasion, are less likely to view the post-Cold War era with the same level of trepidation. Consider the five countries or entities in the hypothetical multipolar world of 1994. Unlike those skeptical neorealists, who would view entities like the European Union, Japan and India as viable threats, the idealist realizes that such intelligence assets are not needed for spying on “friends.” Therefore, the only great power country that demands watching is the People’s Republic of China, with maybe the need to keep an eye on the more moderate regime of Boris Yeltsin. Given the “Information Availability” equation outlined earlier in the discussion about Waltz, the United States only needs to devote no more than half of its information-gathering techniques to possible rival great powers. That frees up the more than 50% of its spy budget for counterterrorism. Such a feature was not possible during the Cold War, where the United States had to devote nearly its entire monitoring apparatus to the Soviet threat, where a single mistake could be far costlier than almost any terrorism scenario. Therefore, a slight revision of Deutsch and Singer’s theory to the terrorism context might read like this: more terrorism attacks in and against the United States are likely in the Cold War system. Here, the time frame (whether the country is in the Cold War or not) is the independent variable while the number of terrorism attacks is the dependent variable. This would involve a negative relationship; as the United States moves from the Cold War to the post-Cold War era, the number of terrorism attacks against America should decline.

83 Melton (Op. Cit.) quotes General Yuri Kobaladze of the SVR, the Russian Foreign Intelligence Service and successor to the KGB as saying “there are friendly nations, but there are no friendly intelligence services.”
84 Rajesh Kumar Mishra (“Nuclear Terrorism: Potential Threats in the Post Cold War World,” South Asia Analysis Group, Paper No. 354, November 5, 2001) observes that during the Cold War, many low-level actions were permitted, so long as they did not escalate into something that would ignite a full-scale superpower attack. “Events, adjunct to cold—war preparations, though noticed, but were ignored of actions or overlooked completely by then superpowers for the reasons best known to them. Low intensity conflict, proxy war or the abetment to extremist activities by states or sub-national groups were well undertaken to keep the chances of high levels of confrontation to a tolerable low.”
85 Melton (Op. Cit.) quotes former CIA agent Sherman Kent who noted long ago that 90 percent of everything spies needed to know is available openly. With the increase in information and communications technology, this increases access to such necessary information today that was unavailable during the Cold War.
86 As Melton (Op. Cit.) points out, convicted KGB spy John Walker claimed that America’s intelligence services were so busy guarding against external threats that they ignored internal threats from spies.
RESEARCH DESIGN

In order to resolve the debate between these competing hypotheses, a competitive test should be constructed. This would involve a count of all cases of terrorism from both eras. Such data has been collected by sifting through the cases of Harvey W. Kushner’s *Encyclopedia of Terrorism* which documents all cases occurring within the United States and against American citizens abroad. Kushner uses the James K. Kallstrom’s FBI definition of terrorism, which is “the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.” This test will be assessing whether or not America can protect itself and its interests abroad in eras of adequate or limited intelligence capabilities, not considering whether an obscure attack against non-USA assets in Ecuador could be forestalled by America’s security apparatus.

Most readers of this article will come to the conclusion that counting the number of attacks is not enough to determine how safe an international system. After all, one era can consist of many small attacks with few or no casualties, while others can have much higher body counts, calling into question the security of a given international system. Therefore, an additional assessment will determine which era contained more deaths resulting from terrorist acts.

This additional analysis will include a count of acts, as well the study the assessment the relationship between a given system and deaths that occur. In this second study, the variable for a Cold War terrorism case is given a score of zero. Cases occurring after the end of the Cold War (in 1992, after the dismemberment of the Soviet Union) receive a score of one for being post-Cold War cases. As for deaths, the continuous number of fatalities will be recorded (an embassy blast killing ten people will receive a score of ten for the variable).

RESULTS: FOR YOUR EYES ONLY

In this section, I test the hypotheses that connect system polarity to terrorism. I examine not only the distribution of terrorism cases across the Cold War and post-Cold War era, but also how deadly the attacks were in both systems.

<table>
<thead>
<tr>
<th>Table 1: Distribution Of Terror Attacks: Cold War vs. Post-Cold War</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0 = Cold War, 1 = Post Cold War</strong></td>
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<tr>
<td><strong>Valid</strong></td>
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<tr>
<td>Cold War</td>
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<tr>
<td>Post Cold War</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

As Table 1 shows, there were 336 terrorist cases that occurred during the Cold War, as opposed to 214 cases that emerged after the Cold War. This means that there was nearly a 2:1 distribution of Cold War cases as compared to non-Cold War cases. Given that the number of years (1979-1991 and 1992-2003) for each value of the system variable is relatively equal, there is strong support for the hypothesis that contends a bipolar world provided a more fertile ground for the emergence of terrorism. It seemed that the United States, caught up in keeping an eye on its Russian rival, was less prepared to stop terrorist attacks at home and abroad on its interests.

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Kushner (Op. Cit.). I thank research assistants Mark Belcher, Raven Bowen, Joey Browning, Jack Cox, Shane Currie, Rachel Deloach, Alexander Elorriaga, Doug Girard, Ryan Howard, Casey Ishman, Preston King, Cory Matticola, Shawnine Muller, John Newman, Shaun O’Hara, Luke Riley, Sarah Spavone, Julie Thompson, Vince Thompson, Bo Tiller, Jorge Uribe and Joey Wowk for their work on this project.

Kallstrom is the Former Assistant Director of the New York Office of the FBI (Kushner, Op. Cit., xx).

There were 13 years of Cold War cases, but given that the dataset began with the taking of the hostages at the U.S. Embassy in Tehran, the subsequent 12 years (1992-2003) are controlled for in the analysis.
But which system was “more dangerous” in terms of how deadly such attacks were? After all, many terror attacks can be symbolic, not showing intent to kill, leaving the United States intelligence agencies to devote fewer assets to such problems. Table 2 shows the number of casualties generated by terror attacks during the Cold War (1979-1991). These 336 cases generated 871 deaths. Of these deaths, 559 were American citizens. This means that terror attacks during the Cold War averaged 2.59 deaths per attack, or 1.66 American deaths per attack.

Table 2: Deaths From Terror Attacks
(In America Or Against American Interests Abroad) In The Cold War Era

<table>
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<th>Statistics</th>
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</thead>
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<td>Sum</td>
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<td>559.00</td>
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An examination of the frequency distribution in Table 3 shows that in 80.1 percent of Cold War cases, no deaths occurred in the attack. Only 2.4 percent of cases (between 1979 and 1991) involved ten or more deaths and only 0.6 percent of cases involved more than 100 deaths. Table 4 shows that among Cold War terror attacks, only 16.7 percent involved killing an American. Of all cases, only 1.2 percent involved more than ten US deaths and only two cases (0.6 percent) generated more than 100 American deaths.

Table 3: Frequency Of Cases Of Deaths From Terror Attacks
(In America Or Against American Interests Abroad) In The Cold War Era

<table>
<thead>
<tr>
<th>dead</th>
<th>Frequency</th>
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<th>Valid Percent</th>
<th>Cumulative Percent</th>
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</thead>
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</tbody>
</table>

Table 4: Frequency Of Cases Of American Deaths From Terror Attacks
(In America Or Against American Interests Abroad) In The Cold War Era
On the other hand, the post-Cold War era was shown to generate a very significant numbers of deaths in attacks within America and against Americans abroad. Table 5 illustrates how the 214 attacks between 1992 and 2003 generated 4,920 deaths, or 22.99 deaths per attack. These 214 terrorism cases also generated 3,409 American deaths, or 15.93 US citizens killed per terror attack after the Cold War.

**Table 5: Deaths From Terror Attacks**
(In America Or Against American Interests Abroad) In The Post-Cold War Era

<table>
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<th>Statistics</th>
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<th>usdead</th>
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</thead>
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<tr>
<td>Sum</td>
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</table>

As Table 6 shows, a majority of cases (51.4) involved at least one death in an attack, with 12.1 percent involving ten or more deaths and 2.2 percent generating more than 100 killed in the event.
Table 6: Frequency Of Cases Of Deaths From Terror Attacks
(In America Or Against American Interests Abroad) In The Post-Cold War Era

<table>
<thead>
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<th>Frequency</th>
<th>Percent</th>
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<td>Total</td>
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</tbody>
</table>

An examination of Table 7 shows that of the 214 cases, 32.2% involved at least one American death. Overall, 3.3% of all cases involved more than 10 American deaths, and one percent of all cases involved more than 100 American deaths (the Oklahoma City bombing and the 9/11 attacks).
Table 7: Frequency Of Cases Of American Deaths From Terror Attacks
(In America Or Against American Interests Abroad) In The Post-Cold War Era

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
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<td>Total</td>
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CONCLUSION: FOR SPECIAL SERVICES

In this paper, two theories have been analyzed that highlight the differences between a pair of systems: a bipolar Cold War and a multipolar world that followed the Cold War. Each claims that a lack of information available about great powers generates fewer resources to monitor groups capable of undertaking terror attacks. When hypotheses about the likelihood of a terror attack against America or its interests abroad are examined, it is discovered that many more terror attacks occurred during the last 12 years of the Cold War than the first dozen years after the Cold War.

However, one would be too hasty in concluding that “M’s” line about missing the Cold War in the film “Casino Royale” was completely in error. Evidence shows that when comparing deaths from terror attacks, many more killings from such events occurred after the Cold War was concluded. Furthermore, for those who dismiss such findings concerning casualties as the work of a tiny handful of horrible cases (the Alfred P. Murrah Building or the Twin Towers/Pentagon/Flight 93 attack), it is worth noting that there were more than 2.5 times more terror attacks with at least one casualty after the Cold War than during the Cold War cases from 1979-1991. Furthermore, the number of cases with American deaths was nearly two times greater in the years following the dissolution of the Soviet Union than during the last years of the Cold War.

In conclusion, there is some mixed news concerning the number of terror attacks. These have declined since the end of superpower conflict. But unfortunately, the world has not become safer with the sharp drop in terror attacks, owing to the increased lethality of such events since the conclusion of the Cold War. Simply looking at the decline of terror attacks might lead one to conclude that there is less work for a modern-day James Bond in stopping terrorism, but the increased number of killings from those terror events that are occurring will provide plenty of reason to keep a 007 agent out of retirement.

REFERENCES

5. Deb Reichman (“Bush Likens War on Terrorism to Cold War,” *ABC News*, May 27, 2006) quotes President George W. Bush in a speech to the U.S. Military Academy graduates, linking the Cold War to the War on Terrorism. “As President Truman put it towards the end of his presidency, ‘When history says that my term of office saw the beginning of the Cold War, it will also say that in those eight years we set the course that can win it.’ His leadership paved the way for subsequent presidents from both political parties men like Eisenhower, Kennedy and Reagan to confront and eventually defeat the Soviet threat. Today, at the start of a new century, we are again engaged in a war unlike any our nation has fought before, and like Americans in Truman’s day, we are laying the foundations for victory.”
6. U.S. Secretary of State Colin Powell, in praising George Kennan at a Princeton University speech, also drew an analogy between Kennan’s Cold War theoretical contributions and the contemporary conflict involving terrorism (Eric Quinones, “Powell: Kennan’s Cold War Legacy Delivers Hope In War On Terrorism,” Speech delivered to Princeton University, March 1, 2004).
7. In his critique of the “War on Terrorism,” William Greidler (“Under the Banner of the ‘War’ on Terror,” *The Nation*, June 21, 2004) states “Fanatical Muslims replaced Soviet Communists and, like the reds, these enemies could be anywhere, including in our midst (they may not even be Muslims, but kindred agents who likewise “hate” us and oppose our values). Like the Cold War’s, the logic of this new organizing framework can be awesomely compelling to the popular imagination because it runs on fear—the public’s expanding fear of potential dangers.”
12. Walter Laqueur (“After the Cold War,” *eJournal USA*, April, 2006) observes “When the Cold War came to an end in 1989 with the dismantling of the Berlin Wall, when the countries of Eastern Europe regained independence, and when finally the Soviet Union disintegrated, there was widespread feeling throughout the world that at long last last universal peace had descended on Earth. The fear of a war in which weapons of mass destruction would be used had vanished. Skeptics (which included this writer) feared that there was plenty of conflict left in the world, which had, however, been overshadowed or suppressed by the Cold War. In other words, as long as the confrontation between the two camps continued, all kinds of other conflicts, which seemed minor at the time, would not come into the open. On the contrary, the Cold War had in a perverse way been responsible for the preservation of some order in the world; it had been a stabilizing factor. And it was also true that the danger of a new, horrible world war had probably been exaggerated. For there existed a balance of terror; there was mutual deterrence—precisely because there was a big arsenal of devastating weapons. And since both sides in the conflict were acting rationally, because they knew what the consequences of such a war would be, peace was preserved.”
13. Melton (Op. Cit.) quotes General Yuri Kobaladze of the SVR, the Russian Foreign Intelligence Service and successor to the KGB as saying “there are friendly nations, but there are no friendly intelligence services.”
14. Rajesh Kumar Mishra (“Nuclear Terrorism: Potential Threats in the Post Cold War World,” South Asia Analysis Group, Paper No. 354, November 5, 2001) observes that during the Cold War, many low-level actions were permitted, so long as they did not escalate into something that would ignite a full-scale superpower attack. “Events, adjunct to cold—war preparations, though noticed, but were ignored of actions or overlooked completely by then superpowers for the reasons best known to them. Low intensity conflict, proxy war or the abetment to extremist activities by states or sub-national groups were well undertaken to keep the chances of high levels of confrontation to a tolerable low.”
15. Melton (Op. Cit.) quotes former CIA agent Sherman Kent who noted long ago that 90 percent of everything spies needed to know is available openly. With the increase in information and communications technology, this increases access to such necessary information today that was unavailable during the Cold War.
16. As Melton (Op. Cit.) points out, convicted KGB spy John Walker claimed that America’s intelligence services were so busy guarding against external threats that they ignored internal threats from spies.


19. There were 13 years of Cold War cases, but given that the dataset began with the taking of the hostages at the U.S. Embassy in Tehran, the subsequent 12 years (1992-2003) are controlled for in the analysis.
MINORITY RELIGIOUS GROUPS VERSUS THE MAJORITY: IS NEWSPAPER USE DIFFERENT?*

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INTRODUCTION

The many subcultures (i.e. blacks, Asian-American), sects (i.e. Mormons, Bahai) and closed societies (i.e. Hasidic Jews, Amish) within the broader United States culture have distinctive media consumption patterns. Even before World War II, comparisons of individuals’ media behavior revealed that audience members within distinctive social categories selected different content from the media and interpreted the same message in different ways (DeFleur and Rokeach, 1989).

A scientific study of contemporary media patterns could be undertaken based upon race social class, gender, age and a multitude of variables, producing many interesting results. This study, however, does focus on religious behavior and belief as factors predicting newspaper consumption.

By studying two minority religions (Mormons on the east coast and Orthodox Jewish), and comparing them with a majority Americans, represented by Methodists, it is possible to understand how membership in minority religious communities alters the perceptual framework and habits surrounding media use.

Mass media exposes an individual to broader societal trends which may influence him to develop attitudes apart from group norms (Harris, 1994). A socializing effect takes place due to media exposure, and immigrant groups have often found mass media to be primary abettors of assimilation among young people. Wanting to curb assimilation and promote in-group ties, these groups often see the media as an outside catalyst of change, whose influence must be controlled by clergy and family members. Opinion leaders within certain religious subgroups (i.e. Christian fundamentalists) deliberately curb media use to keep the flock apart from catalysts of change.

Strong ingroup ties and identification create powerful interpersonal networks which influence how media messages are mediated and sometimes distorted. Consumption of media is selective to be compatible with social networks’ demands (Ball-Rokeach, 1998). Religious minority communities, with their more insular, highly developed social networks, often dictate acceptable gratifications from media exposure and community inside sources that make recreational media exposure less attractive.

This research draws heavily from Uses and Gratification theory, which states that the individual has certain needs that are satisfied by media and nonmedia sources. They are categorized as: (1) Cognition (information-gathering); (2) Diversion (stimulation, avoiding boredom); (3) Social utility (contact with community); and (4) Respite (withdrawal, escapist) (Dominick, 1990).

This study aims to explore the life of two insular, minority religious communities with a high degree of ritualized observance and rules, with a need for self-segregation to ensure conformity to practices, particularly Orthodox Jewish (the most observant branch) and Mormon (apart from Utah, the “headquarters” state), not investigated that thoroughly in past studies. It does not examine the viewpoints of the more populous but less observant branches of Judaism known as Conservative, Reform and Reconstructionist.

* This paper is based on Dr. German’s dissertation at the University of South Africa (2004). Dr. Du Plessis was dissertation supervisor.
EXAMINATION OF RELIGION IN PAST STUDIES

“Community ties” research studies have found that communities are composed of “joiners” and “isolates” (Merton, 1950; Rogers). The same people participate heavily in their house of worship, join community boards and civic associations, and subscribe to the newspaper (Stamm & Weis, 1986).

In a several studies, Buddenbaum (1999) found that groups of Christian fundamentalists often attended services several times a week, qualifying as actively involved in house of worship, yet did not confirm the supporting linkages with heavy civic-participation and newspaper use.

This led the author to believe there might be other religious subcultures, also seeking insularity, that provide further exceptions to the established linkage triad: heavy church attendance-high civic participation-strong newspaper use. Moreover, if Christian fundamentalists might withdraw from newspaper use to preserve separate ideas and identity, might not other religious minority groups, such as Orthodox Jews and Mormons, with the need for a community-based lifestyle and ingroup identification, also withdraw?

This article does not delve into theological orientation nor claim to review the numerous studies indicating media use patterns based on church theology. Rather, it is more the social aspect of withdrawal and the insularity of religious communities that is the focal point.

Creating New Linkages based on Past Literature

Tables 1 and 2 indicate the linkages that emerged in past research. The goal of this research is to investigate whether, although concomitant fundamentalism is not implied, Orthodox Jews and Mormons, as minority groups with the need for self-segregation and withdrawal, mirror the fundamentalists, with their need for self-segregation, as illustrated in Table 2. If the hypotheses are supported, Methodists (as a majority group) could be expected to conform to the paradigm in Table 1.

**Table 1: Established Paradigm**
Source: Stout & Buddenbaum (1996:15)

| Heavy Service-Attendance | → | High Civic Participation Rate | → | High Newspaper Usage Rates |

If this study’s hypotheses are supported, the two extreme religious minorities, replete with rules and the need for higher ingroup identification and self-segregation to observe these rules, would resemble the fundamentalist pattern Buddenbaum (1999) observed, as shown in Table 2.

**Table 2: Alternative Concept Linkage**
Source: Buddenbaum (1999)

| Heavy Service-Attendance | → | Low Civic Participation Rate | → | Low Newspaper Usage Rates |

**Link with Past Uses & Gratifications Work**

The “uses and gratifications” paradigm is a complex web of interwoven social psychological and media theories. Rather than address the media as a unified channel with a distinct message grasped by all consumers in similar fashion, focus shifts to the individual.

Lin (1993:224) summarizes the basic assumptions of “uses and gratifications” theory as follows:
The Uses and Gratifications perspective... assumes that media use behaviors are motivated by certain internal needs and specific gratification-seeking motives. With such self-fashioned intentions, audiences are able to dictate their content selection and use patterns for the purposes of fulfilling their gratification expectations.

While "uses and gratifications" theory focuses on the individual, it addresses social networks through Berelson's (1949) view of the newspaper as a socialization tool whereby individuals connect to others through media. Missing the newspaper means that an individual temporarily feels disconnected from society.

Members of closed communities perhaps feel less "disconnected" in day-to-day life, since religious observance creates much face-contact at services and meetings. Thus, they are apt to be more satisfied with the interpersonal nature of their lives than non-religious individuals and may need the media less for connectivity purposes. They might, for example, also need the Internet less as a connective tissue, since they belong to a face-community with great contact.

**METHODOLOGY**

**The Sample**

Orthodox Jews—10% of a group that is only 2-3% of the USA population-- and Mormons—rare in the eastern United States-- were selected as minority group representatives and Methodists as majority group surrogates.

Many rules exist within Orthodox Judaism, which serve to enforce a separate identity, including certain dietary restrictions (Rushkoff, 2003). In the nineteenth-century, Mormons stressed religious separatism and were persecuted on that account. Non-Mormons, disbelievers in the prophecy of Joseph Smith and the Book of Mormon, were viewed as "gentiles," "other," or "stranger" (Ostling, 1999).

Even though there may be no de jure prohibition against interacting with other faiths, de facto conditions of daily living promote insularity of both minority faiths in the locations surveyed. The study assumes that Methodists, part of the 70% Protestant majority in the USA, are less insular. It assumes no difference in insularity between the two minority groups.

In 2002-2003, the author visited various houses of worship in the northern New York City suburbs and administered 210 surveys to 70 congregants of each faith, following worship services or cultural events. The 81-question document was then coded and analyzed using Principal Components Factor Analysis techniques.

**Research Problem**

The study was designed to delve into how religious minorities view media use, particularly the newspaper. The goal was to ascertain whether religious minority status is a predictor of more or less newspaper purchase. It has the following other objectives:

- To determine whether members of minority religious groups approach the newspaper differently from majority group members.
- To explore whether religion and ingroup identification are, indeed, critical distinguishing features in understanding secular newspaper consumption patterns.

This research was undertaken with a heuristic emphasis (Kerlinger, 1986:8), seeking to discover new interpretations and shed new light on an existent web of theories. As a heuristic rather than predictive study, it seeks to uncover linkages that could be tested in the future under more stringent conditions, perhaps with a larger number of respondent groups.

No claim is being made of generalizability to an entire denomination. Rather, a "snapshot" is being taken of members of three religious groups at a particular place and time.
Research Subproblems
Each subproblem is represented by a set of hypotheses.

Participation in Political/Civic Affairs by the Majority Group Compared to the Minority
These hypotheses examine the linkage between religion (type) and political participation.

H1a: If individuals belong to the majority, mainstream Protestant group, they will participate more in political/civic affairs.

H1b: If individuals belong to the minority groups, they will participate less in political/civic affairs.

Service-Attendance and Political Participation
These hypotheses examine the relationship between house of worship attendance in the majority group and political participation, compared to the minority group linkage with political participation.

H2a: If individuals attend services more in the majority group they will also participate more in the community.

H2b: If individuals attend services more in the minority groups, they will participate less in the community.

Use of the Newspaper by the Majority Versus the Minority Group
These hypotheses examine the linkage between religion (type) and how the newspaper is used.

H3a: If individuals belong to the majority group, they will use the newspaper more than the majority for all four uses of the newspaper.

H3b: If individuals belong to the minority group, they will use the newspaper more or equally for information but less for the three other categories.

Definition of Major Variables

Religion
Religion is an independent variable seen as influencing the behavior under observation: newspaper readership. It has two subcomponents: (a) Type of religion and (b) Degree of religiosity.

In Funk & Wagnall’s New International Dictionary of the English Language (1987:1064), religion is defined as: “A belief binding the spiritual nature of man to a supernatural being, as involving a feeling of dependence and responsibility, together with the feelings and practices which naturally flow from such a belief; any system of faith and worship, the Christian religion; an essential part of the practical test of the spiritual life.”

Type of Religion
Religious preference is an independent variable in that subjects enter the study in an “untreated” state. They have either consciously chosen or been born into a particular denomination. They belong and pay membership dues (or each denomination’s equivalent) to a particular house of worship, and that categorizes them as a Mormon, Orthodox Jew or Methodist. It is the act of belonging to the denomination and official membership in a house of worship that constitutes religious preference.

Degree of Religiosity
Within each house of worship, varying degrees of religiosity exist at the attitudinal and behavioral levels. At the attitudinal level, the construct of high religiosity includes strong belief in God as a supernatural being, which is probed through Likert-scale statements such as a negative reaction to “I doubt the existence of God.” A highly religious person would “strongly disagree” with such a sentiment in a rating scale.
At the behavioral level, the construct of high religiosity is defined by high frequencies in service-attendance per week, reading Scriptures on one’s own and participating in religious education activities.

**Newspaper Consumption**

This is the major dependent variable in the study.

“Newspaper” can be defined (Funk & Wagnall’s, 1987:854) as “a publication issued for general circulation at frequent intervals: a public print that circulates news.”

“Consumption” is defined as “the use and consequent destruction of goods in the satisfying of people’s needs” (Funk & Wagnall’s, 1987:281). At the operational level, it has two subcomponents: (a) reading a newspaper and its associated frequencies, measured in times per week; and (b) purchasing a newspaper, as measured through “subscription” or “non-subscription” on a regular basis.

**Table 3: Relationship Between Independent and Dependent Variable Constructs**

- **Definition of Motivation for Religiosity Subcomponents**

  **Religion as Spiritual Quest**

  Buddenbaum (1994:3) defines a “questor” as “having a religiously inspired world view and desire for belief-confirming information regardless of religious beliefs. In other words, the “questor” is interested in the religious experience per se and may even try to be impartial to the “brand” of religiosity, selecting what suits his needs without a firm or exclusive orientation. To that extent, the “questor” is religiously tolerant of other groups.

  “Questors” are pro-religious and encompass all denominations. They tend to focus more on spiritual needs and derive satisfaction more related to inner psychological needs than social networking. This group is less likely to
participate in temporal affairs and more in spiritual matters, using the house of worship as a base for this orientation.

**Religion as Comfort/Security**

The “religion as comfort” orientation taps an intrinsic or God-centered approach to religion (Buddenbaum, 1994). It is similar to the “questor” mentality in that it is inner-oriented rather than societally-oriented. Both groups possess characteristics which differentiate them from the more social mentality which in the past has driven an understanding of church attendance and community participation.

The difference between the questor-oriented and the comfort-oriented religious individual is that the questor is open to investigating many different religions and is more of a seeker. The “religion as comfort” mentality revolves around satisfaction within one’s faith, viewing it as the religious home, and this person is more of a “finder” than a “seeker.”

**Religion as Leisure-Time Socialization**

A congregant who attends the house of worship for social reasons is apt to be involved politically in the community, vote regularly and support public institutions such as the newspaper or library. Buddenbaum (1993:2) notes that individuals who attend to news are more active in the political process. This argument is well-taken, in that if one is well informed through the newspaper, one is most apt to participate in the community (Berelson, 1949; Lynd, 1929).

In the past, going to church or synagogue, constituted a major time-commitment and was often tied to the need to see friends and neighbors. It was akin to being involved in a social club or community activity (Armfield, 2003:13). This group’s motivation is more external and need not reflect the need for questing or comfort/security, although there could be some overlap.

When the term “socialization” is used in this research, it does not reflect the degree to which an individual is “socialized” to church teachings; rather it is that person’s use for religion.

**Definition of Uses & Gratifications Variable Subcomponents**

Berelson (1949) conducted a study in New York City during a newspaper strike that became a widely-cited model toward understanding what the newspaper means to different people. In this study, his approach was followed closely, and every attempt was made to use the same categories. Many of his questions were used in developing the constructs. Berelson described five ways people used the newspaper:

- For “respite” or recreation, (using the newspaper to unwind from stress, a tension-reliever) measured by responses on questions such as “I relax when I read the newspaper”;
- For “public affairs,” (using the newspaper to develop opinions),” measured by high ratings on statements such as “I read the editorial page of the newspaper”;
- For “information,” (using the newspaper to be knowledgeable about what is going on in the community), measured by response to statements such as “I read the newspaper to be informed about political issues”;
- For “entertainment,” (using the newspaper either for pleasure or to find out about pleasurable activities), measured by response to statements such as “I find out about what is at the movies by reading the newspaper”;
- For “socialization,” (using the newspaper to feel joined to others beyond the family or block in the broader community), measured by response to statements such as “I feel connected to important people through the newspaper.”

Two of the categories – public affairs and information were combined in the current study, but otherwise the author has maintained Berelson’s (1949) classifications.
The difference between religion and religiosity as constructs

Religiosity
Religiosity as a construct needs to be distinguished from religion (type): Mormon, Methodist or Jew. Religiosity refers to degree of observance or intensity of belief.

Primary indicators of degree of religiosity are attending services, praying privately or reading Scriptures on one’s own. An individual who scores high on the religiosity scale is apt to attend services several times a week and engage in religious activities independently. An individual who scores low on the religiosity scale may attend services only several times a year and may not structure leisure-time around religious activities, whether in private or with a group.

Some examples of Likert-scale statements probing religiosity were “The religious quest is an essential part of my life,” “The principles of my religious faith serve as guidelines for my actions,” or a negative response to “I doubt the existence of God.”

Political/Civic Participation
The construct of political/civic participation is used in this research to refer to joining community boards, going to hearings, participating in organizations and activities. An individual who scores high in political/civic participation joins many organizations in the community and is apt to devote much leisure-time to neighborhood organizations; an individual low in political/civic participation is apt to decline from group activities and spend more leisure time on alone or with family.

Some statements which gauged political/civic participation were “(I) go to meetings about civic issues,” “(I) contribute money or time to political parties,” or “(I) attend political events.”

FACTOR ANALYSIS AND IDENTIFICATION OF FINAL CONSTRUCTS
Factor analysis was used to create scales of religiosity, ingroup identification, newspaper use and political outlook, with each scale having several sub-scales. By combining questions to create scales with close correlations, having a Cronbach’s alpha of at least 0.7, condensation occurs into solitary constructs called “factors” (Dillon & Goldstein, 1984). While it may be possible to analyze individual questions, the richness that results by combining questions under expressive semantic labels makes it possible for both the researcher and her audience to decipher complex data.

This research involved conducting two rounds of factor analysis. The purpose of the first round was to group together questions with similar responses that loaded together to create scales. By creating scales, the vast amount of data generated from 81 questions was reduced to a workable number of constructs.

Important Statistical Findings

The Overall Group as Readers and Media Users
Approximately 61% of the respondents read The New York Times, the major newspaper of the metropolitan area; 45% read The Journal News, the local paper for Westchester County; 24% read The Wall Street Journal, the principal business newspaper of the country. Many respondents read several newspapers daily. 57% subscribe to a newspaper delivered at home or work, making it the most common means of obtaining it.

It is a highly literate, well-educated group with high incomes. 49% have attended or graduated college. A very large group, 41%, has postgraduate degrees. 27% have household incomes over $150,000.

TABLE 4 GOES HERE (all longer tables now at end)

Table 4 gives the overall statistics on religion (type) and the newspaper use factors (These will explored more in the review of initial hypotheses.) Note that, in descending order, the highest overall mean is for “public affairs”,

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followed by “entertainment”, “respite” and “socialization”. Even though Methodists (the majority group) score highest on “Newspaper use: socialization”, across all three groups this factor has the lowest mean score.

Jews have the highest mean on the “public affairs” factor, followed by Methodists and Mormon members. There is no distinction based on minority/majority status.

For the means on “entertainment”, Jews and Methodists are closely allied: there is no difference based on majority/minority status.

On the “respite” factor, Jews have the highest mean score, followed again by Methodist and Mormon Church members.

The most important difference is in the means, supporting the initial, launching perspective on the study, is on the “socialization” factor: Methodists have the highest means on socialization – using the newspaper as a tool to feel connected to others, since they are apt to feel the most involved in social affairs of the community, as the majority group. They have the closest “fit” with the broader community, since they do not take on the psychological outlook of a minority. However, it is important to realize that “socialization” had the weakest mean score (2.14) and very few respondents view “socialization” as an important use of the newspaper.

**Critical Points that Emerged from Examination of Original Hypotheses**

In terms of the original hypotheses as a conceptual framework, the following critical results surfaced:

**Participation in Political/Civic Affairs by the Majority Group Compared to the Minority**

H1a: If individuals belong to the majority, mainstream Protestant group, they will participate more in political/civic affairs.

H1b: If individuals belong to the minority groups, they will participate less in political/civic affairs.

These hypotheses were intended to test whether the majority group (represented by Methodists) participated more in political/civic affairs), compared to the two minority groups, Mormons and Orthodox Jews.

**TABLE 5 GOES HERE**

The Jewish group participates the most actively in political/civic affairs, closely followed by Methodists. The largest schism was between these two groups and the Mormons. This indicates rejection of the hypothesis: majority and minority group status was not responsible for the difference in the means.

The greatest difference was between the Mormon group and the other two faiths, with the Mormon mean significantly lower. The Mormon group is a minority in Westchester County, but minority status is not the leading contributor to the difference in the means, since Jews are also a minority.

RESULT: HYPOTHESES REJECTED. Membership in majority versus minority groups does not impact political/civic participation.

**Use of the Newspaper by the Majority Versus the Minority Group**

H2a: If individuals belong to the majority group, they will use the newspaper more for “public affairs”

H2b: If individuals belong to the minority group, they will use the newspaper less for “public affairs”

The theory was that the majority group participates more in political/civic affairs, because their religion (type) puts them in the mainstream. The same people who participate heavily both in their church and in the community were thought to be avid newspaper readers (Table 1). One would think that they need the newspaper to be
knowledgeable about public affairs. The overlap between church, community and political life would lead them to read more to be knowledgeable and participate.

The ANOVA test examines the three religions (type), the difference in the mean scores on “newspaper use: public affairs”.

TABLE 6 GOES HERE

Following the same progression, the Jewish group used the newspaper most for public affairs, followed by the Methodist group, with the greatest distinction with the Mormon group, which tended to participate less in political/civic life and hence read less for public affairs purposes.

The majority/minority distinction did not hold, since Mormons are a minority group, but so are Orthodox Jews, who are a minority even within their own broader Jewish group.

RESULT: HYPOTHESES REJECTED. Minority group status was not a determinant of reading the newspaper less for “public affairs.”

Service-Attendance and Political Participation

H3a: If individuals attend services more in the majority group they will also participate more in the community.

H3b: If individuals attend services more in the minority groups, they will participate less in the community.

This can be examined through examining the relationship between answers on Question #1, “Attending religious services regularly is important” and the mean on the continuously-scored factor on “political/civic participation”.

TABLE 7 GOES HERE

The majority/minority group distinction does not hold. Methodists and Mormons believe that going to services regularly is important, giving it the highest means, compared to Jews. However, they do not have the highest political/civic participation scores: Jews do. This defeats the hypothesis, which predicted that the minority groups (Jews and Mormons) would shy away from community events as their religious service participation increases, making the house of worship the center of their community lives, since they are minorities and would presumably “fit in” less.

Mormon members attend services the most, but church-going does not lead them to participate more in the general community; in fact, they participate less. This goes against the prevailing literature that individuals who go to services most will also be most active in the community (Tables 1 and 2). That literature made a presumption that church-going was for social reasons and society was separated into those who were socially involved and those who were not (Lynd, 1929). If these people are attending church for spiritual reasons, it could even lead to a form of withdrawal (Lenski, 1963) and they would be less likely to participate in the broader community.

RESULT: HYPOTHESES REJECTED. No relationship exists between church-going among majority group members leading to increased participation in political/civic affairs. Minority group status, coupled with high church-going behavior, does not predict less political/civic participation.

THE QUESTOR MENTALITY: THE UNEXPECTED HEART OF THE STUDY

Questor versus Non-Questor Behavior Overshadows Minority-Majority Distinctions

The study was undertaken to uncover differences between how minority religious group members view the media, particularly the newspaper, compared to majority group members. However, with so many hypotheses denied, it could no longer be posited that there are remarkable differences between how minority religious
members, such as Orthodox Jews and Mormons, view the newspaper compared to mainstream Protestants, the largest religious group in the USA population.

That, being said, major distinctions did result from this data and administration of the questionnaire regarding newspaper use and purchase behavior: Questors, those individuals who scored high on religion-as-spiritual quest, have very different newspaper perspectives from non-questors, those who scored low on scales of religion-as-spiritual quest. Regardless of denomination, their behavior was remarkably similar.

**Questors Use Newspapers and Radio Less than Non-Questors**

In newspaper and radio use, frequent users have a lower mean on “religion as spiritual quest”. Those involved in the spiritual quest find it a center of their lives and rely less on newspapers and radio, rich conveyers of information.

The “spiritual quest” is the center of their lives. Examining heavy readers of newspapers, “every day or most days” compared to “occasional to never” readers, a remarkable difference in the means occurs: The mean on questing for regular newspaper readers is 4.14; for non-readers, the mean on questing jumps to 4.42. A regular newspaper reader is less focused on the spiritual quest and more on the practical affairs of everyday life, which newspapers and radio report.

**Questors Read the Business Newspaper Less**

At issue is how a questor views the world through the prism of spirituality, how a questor might use media – especially the newspaper – differently from a non-questor. The more information-packed the newspaper (such as The Wall Street Journal, the staple of the business community), the less appeal it would have to someone who defines himself primarily as a spiritual seeker, unless he needs the information for his job. This generalization, by examining the financial newspaper separately, portends the nexus of high questor-lower reader, low questor-higher reader that underlies this research. A key characteristic of heavy questors is attending services at least once, and typically more than once, times a week.

**Heavy Service-Attenders Read All Newspapers Less**

This table illustrates the decline in newspaper readership as service-attendance increases. It is a dramatic progression, although not so sharp a falloff in comparison with the statistics for the information-packed financial publication.

Those individuals who “never or only occasionally” attend services are regular newspaper readers, by a 87.2% to 12.8% margin. When services are attended more than once a week, respondents are readers versus non-
readers by a 52.4% to 47.6% margin. As an approximation, if a person never or rarely attends services, he is apt to read the newspaper regularly, by a 9:1 margin. Once he spends time attending services more than once a week, the chances of his reading a newspaper regularly are only about 50/50.

Accordingly, it is possible to construct the following profiles, based on high-low services attendance and “questor” versus “non-questor” status.

**TABLE 11 GOES HERE**

In the past, it was thought that people who attended church regularly would be more involved in the community and read the newspaper more (Buddenbaum, 1994; Stamm & Weis, 1986). But with people attending church for spiritual, more inward-directed reasons, the converse finding has crystallized. Those preoccupied with matters of faith at an inner level may use their non-work time for spiritual activities and fellowship with others of similar spiritual outlooks.

**Mean Scores Differ between Newspaper Readers and Non-Readers on Two out of Three Religiosity Factors**

**TABLE 12 GOES HERE**

While “Religion as Comfort/Security” factors and “religion-as-spiritual quest factors correlate heavily (and inversely) with newspaper reading activity, readership is not affected either way if participation in the house of worship is more for social than for spiritual reasons. The mean for religion as a time-commitment, as a use of leisure-time socialization, across the three faiths, is 3.60, lower than the 4.45 score for religion as a spiritual quest. This indicates that time committed to religion in Westchester County is less for social reasons than for “quest” reasons.

The results of the current study represent a dilution of past findings: those heavily involved in the “religion as a social time-commitment” factor-correlation did not vary significantly in their newspaper use. In other words, the traditional dichotomy between heavy churchgoers = heavy newspaper users and low churchgoers = low-newspaper users (as reported in the past, when churchgoing was believed to correlate strongly with community social involvement) has weakened.

This change in orientation toward attending church, with the social-time commitment motivation becoming less important dilutes the traditional notion of heavy churchgoing-heavy socializing-heavy community involvement and newspaper purchase. With house of worship attendance up for spiritual reasons (Stern, 2003:A1), many of the traditionally associated findings – which reflect religion as a social time commitment – are diminishing in importance.

**SUMMARY**

The object of the research study at the outset was to solve a problem: Does membership in a minority religious group compared to the majority group lead to different newspaper use behavior?

In order to do this, the researcher selected two minority groups in the New York area and set out to study the problem through a literature review and empirical survey. The results of the hypothesis-testing showed little distinction between minority and majority group members, in terms of newspaper behavior. However, a careful examination of exploratory findings identified a group of religious people—questors—with remarkable similarity across denominational lines.

Future research could focus on “questors” as a group and determine their newspaper reading traits, demographic and psychographic characteristics, in more detail. What started out as a study of religion (type), ingroup identification and newspaper use emerged as an exploration of religiosity and its effect on newspaper reading behavior.
There were few differences between the faiths individually; religious people of all faiths were remarkably similar in their worldview, when compared to those with less faith. A type of “I’m OK, you’re OK” religious relativism surfaced, without any emphasis on the superiority of individual denominations.

Services-going is related inversely to newspaper reading/subscription. Those who go regularly to their house of worship are less apt to spend large amounts of time with the newspaper. Face-contact in the social setting fulfills many of the functions of the media: respite, entertainment, socialization. The need to be informed about the world is not altered by service-attendance and people of high religiosity give more credence to this function of the media.

For a complete copy of the questionnaire, write to Myna German at mgerman@desu.edu

REFERENCES
Funk & Wagnall's New International Dictionary of the English Language. 1987. New York:
Westchester County Planning Department, White Plains, NY. Phone interview, 1/5/2003.
Table 4: Comparison of Newspaper Use Categorizations by Denomination

<table>
<thead>
<tr>
<th></th>
<th>Newspaper Use- Public Affairs</th>
<th>Newspaper Use- Entertainment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>N</td>
</tr>
<tr>
<td>Jewish</td>
<td>3.63</td>
<td>66</td>
</tr>
<tr>
<td>Methodist</td>
<td>3.20</td>
<td>65</td>
</tr>
<tr>
<td>Mormon</td>
<td>2.69</td>
<td>62</td>
</tr>
<tr>
<td>Overall</td>
<td>3.19</td>
<td>201</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Newspaper Use- Respite</th>
<th>Newspaper Use – Socialization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>N</td>
</tr>
<tr>
<td>Jewish</td>
<td>2.93</td>
<td>69</td>
</tr>
<tr>
<td>Methodist</td>
<td>2.37</td>
<td>65</td>
</tr>
<tr>
<td>Mormon</td>
<td>2.16</td>
<td>63</td>
</tr>
<tr>
<td>Overall</td>
<td>2.50</td>
<td>197</td>
</tr>
</tbody>
</table>

Table 5: Results of ANOVA Test for Differences in the Mean Between the Three Groups on the Political/Civic Participation Factor

<table>
<thead>
<tr>
<th>Faith</th>
<th>N</th>
<th>Means</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jewish</td>
<td>68</td>
<td>2.56</td>
<td>1.01</td>
</tr>
<tr>
<td>Methodist</td>
<td>68</td>
<td>2.43</td>
<td>1.04</td>
</tr>
<tr>
<td>Mormon</td>
<td>65</td>
<td>1.92</td>
<td>0.96</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faith</th>
<th>Mean Difference</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jewish Methodist</td>
<td>.13</td>
<td>.745</td>
</tr>
<tr>
<td>Jewish Mormon</td>
<td>.64</td>
<td>.002</td>
</tr>
<tr>
<td>Methodist Jewish</td>
<td>-.13</td>
<td>.745</td>
</tr>
<tr>
<td>Methodist Mormon</td>
<td>-.64</td>
<td>.017</td>
</tr>
<tr>
<td>Mormon Jewish</td>
<td>-.64</td>
<td>.002</td>
</tr>
<tr>
<td>Mormon Methodist</td>
<td>-.50</td>
<td>.017</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>7.357</td>
<td>.001</td>
</tr>
<tr>
<td>Within Groups</td>
<td>198</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6: Results of ANOVA Test for Differences in the Mean Between the Three Groups on the Newspaper Use – Public Affairs Factor.

<table>
<thead>
<tr>
<th>Faith</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jewish</td>
<td>66</td>
<td>3.63</td>
<td>0.72</td>
</tr>
<tr>
<td>Methodist</td>
<td>65</td>
<td>3.20</td>
<td>0.77</td>
</tr>
<tr>
<td>Mormon</td>
<td>62</td>
<td>2.69</td>
<td>0.78</td>
</tr>
<tr>
<td>Total</td>
<td>193</td>
<td>3.19</td>
<td>0.85</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faith</th>
<th>Mean Difference</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jewish Methodist</td>
<td>.44</td>
<td>.005</td>
</tr>
<tr>
<td>Mormon</td>
<td>.94</td>
<td>.000</td>
</tr>
<tr>
<td>Methodist Jewish</td>
<td>-.13</td>
<td>.005</td>
</tr>
<tr>
<td>Mormon</td>
<td>-.13</td>
<td>.001</td>
</tr>
<tr>
<td>Mormon Methodist</td>
<td>-.94</td>
<td>.000</td>
</tr>
<tr>
<td>Mormon Methodist</td>
<td>-.51</td>
<td>.001</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Df</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>24.817</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>190</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Means on Service-Attendance and Political Activity for Each Faith

<table>
<thead>
<tr>
<th>Faith</th>
<th>Service-Attendance Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Political/Civic Participation Mean</th>
<th>N</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jewish</td>
<td>4.24</td>
<td>70</td>
<td>0.82</td>
<td>2.56</td>
<td>68</td>
<td>1.01</td>
</tr>
<tr>
<td>Methodist</td>
<td>4.56</td>
<td>70</td>
<td>0.67</td>
<td>2.43</td>
<td>68</td>
<td>1.04</td>
</tr>
<tr>
<td>Mormon</td>
<td>4.88</td>
<td>70</td>
<td>0.60</td>
<td>1.92</td>
<td>65</td>
<td>0.96</td>
</tr>
<tr>
<td>Composite</td>
<td>4.57</td>
<td>210</td>
<td>0.70</td>
<td>2.31</td>
<td>201</td>
<td>1.04</td>
</tr>
</tbody>
</table>

Table 8: Relationship between Mean Score on the Spiritual Quest (Factor #8) and Media Use

<table>
<thead>
<tr>
<th>Newspaper Readership</th>
<th>N</th>
<th>Spiritual Quest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Most days or every day</td>
<td>134</td>
<td>4.13</td>
</tr>
<tr>
<td>Occasionally or never</td>
<td>55</td>
<td>4.35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Radio Listening Weekdays</th>
<th>N</th>
<th>Spiritual Quest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>More than 2 hours</td>
<td>46</td>
<td>3.97</td>
</tr>
<tr>
<td>Less than 2 hours</td>
<td>125</td>
<td>4.35</td>
</tr>
</tbody>
</table>
### Table 9: Cross-Tabulation: Service-Attendance and Wall Street Journal Readership

<table>
<thead>
<tr>
<th>WSJ Readership</th>
<th>% within attendance at services</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never to Occasionally (n)</td>
<td>Once a Week (n)</td>
</tr>
<tr>
<td>Regular reader</td>
<td>31.3% (15)</td>
<td>23.8% (15)</td>
</tr>
<tr>
<td>Non-reader</td>
<td>68.8% (33)</td>
<td>76.2% (48)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0% (48)</td>
<td>100.0% (63)</td>
</tr>
</tbody>
</table>

### Table 10: Cross-Tabulation: Service-Attendance and Newspaper Reading

<table>
<thead>
<tr>
<th>% Within Attendance at Services</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never to Occasionally (n)</td>
</tr>
<tr>
<td>Regular newspaper reader</td>
<td>87.2% (41)</td>
</tr>
<tr>
<td>Non-reader</td>
<td>12.8% (6)</td>
</tr>
<tr>
<td>Total</td>
<td>100.0% (47)</td>
</tr>
</tbody>
</table>

### Table 11: Polarization of Spiritual and Secular Individuals

<table>
<thead>
<tr>
<th></th>
<th>Spiritual</th>
<th>Secular</th>
</tr>
</thead>
<tbody>
<tr>
<td>High services-attendance pattern</td>
<td>Low services-attendance pattern</td>
<td></td>
</tr>
<tr>
<td>High on religion as quest</td>
<td>Low on religion as quest</td>
<td></td>
</tr>
<tr>
<td>Very low business newspaper readership</td>
<td>Very high business newspaper readership</td>
<td></td>
</tr>
<tr>
<td>Low overall newspaper readership</td>
<td>High overall newspaper readership</td>
<td></td>
</tr>
<tr>
<td>Low radio use</td>
<td>Higher radio use</td>
<td></td>
</tr>
</tbody>
</table>
Table 12: Mean Score of Regular versus Non-Regular Newspaper Readers on the Three Religiosity Factors

<table>
<thead>
<tr>
<th>Religion Factor</th>
<th>Mean Score</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Mean Score</th>
<th>N</th>
<th>Std Dev.</th>
<th>t-test</th>
<th>df</th>
<th>Sig (2-tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort/Security</td>
<td>4.35</td>
<td>51</td>
<td>0.59</td>
<td>4.04</td>
<td>128</td>
<td>0.90</td>
<td>2.73</td>
<td>138</td>
<td>.007</td>
</tr>
<tr>
<td>Time-Commitment</td>
<td>3.60</td>
<td>55</td>
<td>0.90</td>
<td>4.13</td>
<td>134</td>
<td>0.75</td>
<td>.058</td>
<td>91</td>
<td>.954</td>
</tr>
<tr>
<td>Spiritual quest</td>
<td>4.45</td>
<td>55</td>
<td>0.67</td>
<td>4.13</td>
<td>134</td>
<td>0.75</td>
<td>2.82</td>
<td>187</td>
<td>.005</td>
</tr>
</tbody>
</table>
SPIRITUALITY IN THE WORKPLACE AS IT RELATES TO JOB SATISFACTION AMONG AFRICAN-AMERICAN MALES.

Michael A. Alexander Sr.
University of Arkansas at Monticello, USA

ABSTRACT

Spirituality is gaining more recognition in the workplace. This paper will examine research on spirituality in the workplace as it relates to job satisfaction among African-American males.

INTRODUCTION

Marques (2005) found that the application of spirituality in the workplace is in line with the newly emerging perspectives on good HR management practices and that it begin with the hiring the right people for the right job. Jean-Claude and Garcia-Zamor (2003) found empirical evidence that spirituality in the workplace creates a new organizational culture in which employees feel happier and perform better. Also that employees also may feel that belonging to a work community, which is an important aspect of spirituality, will help them when things get rough in the future. This paper will explore the relationship of spirituality in the workplace on job satisfaction among African-American males in an organizational environment.

SPIRITUALITY

Spirituality is very broadly and the diversification of it's meaning in pervasive. Spirituality is interpreted as a set of practices or life experiences that align a person with a sanctity of all being (Lerner, 2002). Thompson (2001), for instance, asserts that it is something we all possess. Mitroff and Denton (1999), in turn, explain their view on spirituality as informal and personal, that is, pertaining mainly to individuals. It is also viewed as "universal, non-denominational, broadly inclusive, and tolerant, and as the basic feeling of being connected with one's complete self, others, and the entire universe" (Mitroff and Denton, p. xvi).

Lewis and Geroy (2000), finally, present Clark's 1958 definition of spirituality as follows: Spirituality is the inner experience of the individual when he or she senses a beyond, especially as evidenced by the effect of this experience on his or her behavior when he or she actively attempts to harmonize his or her life with the beyond (p. 683). It is important to emphasize that there is a significant difference between spirituality and religion, although some people do not recognize that. The perceptual difference between spirituality and religion as follows: Many business professionals want to talk about spirituality, but not necessarily religion. Also every organization has a spirituality, whether it realizes it or not however spirituality is often expressed in the broadest sense as organizational and personal aspirations and goals, values and ethics; and comments about how the organization should treat people, the environment and the community. Hodge and Williams, (2002) developed the spiritual ecomaps for assessing African-American spirituality. This author will use this model to explain spirituality as being more than what we know or what we can do, and coming into play when we decide to do what is right.

The study outlined the spiritual ecomap for African-American males (see Figure 1).

The following is a review of each variable in the spiritual ecomap for African-American males:

God. God is understood as transcendent, imminent, triune Creator. The Triune consisting of three in the Godhead: God the Father, Jesus Christ, Lord and Savior and the Holy Spirit or Holy Ghost. A relationship with God is an accepted means of defeating a feeling of moral worthlessness and instilling a sense of worth and value, giving way to a sense of mission and purpose for African-Americans (Hodge & Williams, 2002; Ellison, 1993).

Church. Church is a congregation of baptized believers in Jesus Christ. These congregations of believers that engage in worship services, gospel meetings, and bible studies are referred to as faith-based communities. Ellison, (1993) linked the church to a number of self-worth and value characteristics among African-Americans.

Rituals. Rituals refer to spiritual practices performed individually or as a group in adoration to God. Smith, Fabricatore, and Peyrot’s (1999) study indicated African-American males seek the church as a haven for cultural support and church involvement buffers the negative effect of physical unattractiveness.

Transpersonal beings. Transpersonal being refers to angels, demons and other spiritual entities. Some may have entertained these beings unaware and encounters with these beings may be life changing.

Other. Other, refer to those spiritual systems which are profitable to African-Americans. These may include pastor, preachers, elders, parents and grandparents to name a few. The main focus is to decide which other spiritual system is meaningful in the eyes of the person, especially those systems that add strength (Hodge & Williams, 2002).

JOB SATISFACTION AMONG AFRICAN-AMERICAN MALES

Smith, Fabricatore, and Peyrot, (1999) studied the religious levels of African-American men in comparison to other race/gender groups. The findings indicated a significant difference in levels of religiosity between African-American males and other groups. Results also indicated White Catholics attend more services than African-American Catholics and subjectively, African-Americans responded higher on worship experience and feelings of community than White males and females. The research suggested that African-Americans seek the church as a haven for cultural support more than White Americans. Later Kernahan, Bettencourt, and Dorr, (2000) studied the relationship between allocentrism and subjective well-being among African-Americans and European
Spirituality in the Workplace as it Relates to Job Satisfaction Among African-American Males.

Americans. The results indicated a higher level of allocentrism and subjective well-being among African-Americans than for European Americans. This indicated that African-American value group membership and European Americans value individualism and independence.

Oberholster, Wesley, and Cruise, (2000) studied spiritual well-being, faith maturity and organizational commitment. Organizational commitment was measured using the OCQ developed by Mowday, Porter, and Steers, (1982). The findings indicated spirituality was significantly and positively correlated to organizational commitment, with the highest case in the area of faith maturity. The idea of faith maturity, defined as the length and development of spirituality is related to the findings of Sheldon, (1971) that investments produce commitment to the organization regardless of other relational features for professionals with long lengths of service in the organization. Also, faith maturity (investments) producing commitment relates to Becker’s (1960) idea of side-bets as a base for organizational commitment.

CONCLUSION

The exploration of the spirituality in the workplace has received little empirical research relating to African-American males. Staples, (1986) study revealed African-American males are the least studied of all sex-race groups in the United States. In today’s global marketing environment, where opportunities are vast and evolving, it is of great importance to understand the dimensions of satisfaction and commitment among African-American males. This review of the literature will hopefully, spark more quantitative and qualitative studies on spirituality as it relates to African-American males.

REFERENCES

A DESCRIPTIVE CASE ANALYSIS OF HOW THE PRINT AND BROADCAST MEDIA USED U. S. VICK ET AL AND HUMANE SLAUGHTER LAWS (HMSLA) TO PREVENT ABUSE AND INHUMANE TREATMENT OF ANIMALS. CAN WE APPLY THE SAME STANDARDS TO CORPORATE MEAT SLAUGHTERHOUSES (PART 1)

WITH A COMMENT

BY

Johnny L. Wilson

Clark Atlanta University, USA

INTRODUCTION AND STATEMENT OF RESEARCH PROBLEM

The General Context

The following observation was made by Davis A. Graber, Sandra Rokeach and Melvin DeFleur on the nature and the role that mass media plays in shaping our perception and controlling what we think about domestic and international public policy. They argue that:

In many instances the media manipulate the political scene by creating a climate for political action. This makes them major contributors to agenda building, the process whereby news stories influence how people perceive and evaluate issues and policies. Agenda building goes beyond agenda setting. The media set the public agenda when news stories rivet attention on a problem and make it seem important to many people. Media build the public agenda when they create a political climate that determines the likely thrust of public opinions1. It is through this creation that media brings forth attitude formation and an impact on agenda setting. Since...people rely on it for information determining their decisions, it clearly can help individuals develop certain attitudes regarding given subjects. In addition, it encourages them to converse about certain things. The affective nature of the media is quite distinctive. It can create many different feelings such as fear, anxiety, and happiness. The media also can promote behavior changes. This can result in an audience member doing something that they would not ordinarily do. The mass media possess these three abilities and because of that, society has become dependent on the media for virtually all it’s outside resources in order to make decisions2.

The above statement by Davis A. Graber, Sandra Rokeach and Melvin DeFleur in effect conceptualizes how political action or interest groups in the United States and global community utilize the media (newspapers, television, radio, magazine, books, journals and internet sources) in their relentless struggle to acquire access to the policy and decision making process. The quest by members of People for the Ethical Treatment of Animals, Doris Day Animal League, American Humane Association, Physicians Committee for Responsible Medicine, American Anti-Vivisection Society, Laboratory Primate Advocacy Group, National Anti-Vivisection Society and the New England Anti-Vivisection Society to utilize the media and the political process to acquire fundamental rights and protection for animals as written in national, state and local laws, decrees, ordinances, resolutions, case and statutory laws and the Constitution of the United States, has taken place within the confines of the two major political parties. Access to the media and political process to,* disagree with the narrowly anthropocentric

and utilitarian world view of industrial society and liberal morality by demanding an end to abuse and inhumane treatment of animals, signaled the beginning movement on the part of these animal rights organizations to build alliance and cooperation at the district, ward and precinct levels to improve the quality of care, to "promote the common good and goal of the organization and to work in the political arena with their supporters to oppose what government does". According to the utilitarian ethics of Jeremy Bentham and John Stuart Mill, for example, a society ought to act in such a way as to insure the greatest good for the greatest number of people. The social good should be maximized, social evil minimized. For both Bentham and Mill, the utilitarian ethic has its origins in human sentience. Feelings of pleasure are good; those of pain are evil and are to be avoided. Because people have the capacity for suffering, society has an obligation to reduce suffering through policies that maximize social justice for all. According to the utilitarian ethics and views held by Jeremy Bentham:

> nature has placed mankind under the governance of two sovereign masters, pain and pleasure. It is for them alone to point out what we ought to do, as well as to determine what we shall do. On the one hand the standard of right and wrong, on the other the chain of causes and effects, are fastened to their throne. They govern us in all we do, in all we say, in all we think: every effort we can make to throw off our subjection, will serve but to demonstrate and confirm it. In words a man may pretend to abjure their empire: but in reality he will remain subject to it all the while. The interest of the community is one of the most general expressions that can occur in the phraseology of morals: no wonder that the meaning of it is often lost. When it has a meaning, it is this. The community is a fictitious body, composed of the individual persons who are considered as constituting as it were its members. The interest of the community then is, what?—the sum of the interests of the several members who compose it. It is in vain to talk of the interest of the community, without understanding what is the interest of the individual...A thing is said to promote the interest, or to be for the interest, of an individual, when it tends to add to the sum total of his pleasures: or, what comes to the same thing, to diminish the sum total of his pains An action then may be said to be conformable to the principle of utility, or, for shortness sake, to utility, (meaning with respect to the community at large) when the tendency it has to augment the happiness of the community is greater than any it has to diminish it. measure of government (which is but a particular kind of action, performed by a particular person or persons) may be said to be conformable to or dictated by the principle of utility, when in like manner the tendency which it has to augment the happiness of the community is greater than any which it has to diminish it. When an action, or in particular a measure of government, is supposed by a man to be conformable to the principle of utility, it may be convenient, for the purposes of discourse, to imagine a kind of law or dictate, called a law or dictate of utility: and to speak of the action in question, as being conformable to such law or dictate.

The Humane Slaughter Act of 1958 was introduced in the United States Congress in 1958 by Senator Hubert H. Humphrey and signed into law by President Eisenhower to promote happiness of the community; to improve the welfare of food animals; to provide calf shelters, loading bays, poultry pens and water troughs; to slaughter animals as close to the point of production as possible and to protect the welfare of animals at slaughter. Moreover, the Act provided the opportunity for citizens and supporters of animal rights organizations to participate in the political system as decision-makers and demand that animals are treated humanely when they are killed in federally protected slaughterhouses. For example,

> “animals should be stunned into unconsciousness prior to their slaughter to ensure a quick, relatively painless death. The most common methods are electrocution or a metal bolt to the head. Frequent on-site monitoring is necessary, as is the employment of skilled and well-trained personnel. An animal is considered properly stunned when there is no “righting reflex”; that is, the animal must not try to stand up and right itself. Only then can it be considered fully unconscious. It can then proceed down the line, where slaughterhouse workers commence in cutting up its body.”

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To further our examination of abuse, care, service and treatment of animals, this research study will attempt to describe and examine the effect animal protection organization had in tackling cruelties of national scope, seeking to resolve animals welfare problems by applying strategies, resources, and solutions beyond the ability and capacity of local government and organizations9. The most important characteristic of the study is that the struggle by the various animal rights and protection organizations, associations, individuals and Humane Farming Association (HFA) to gain access to the print and broadcast media in the United States and the global community is based on the general premise that animals can only be protected from abuse, violence and death caused by human activities if animal rights and protection organizations fail in their demur to work together and develop close relationships with the bureaucracy, congressional subcommittees and the judiciary10. They must also work together to develop a new social change agent paradigm11 aimed at developing a frame of reference that would allow us to become literate and educated about the animal world and from this viewpoint and perspective we will be able to foster a critique how approved USDA methods are employed to treat and stun or kill a dog, sheep, bird, calve, goat, swine, horse, mule or equine.

As in the case of United States and the global community, this movement for social, economic and political change was very instrumental in the development of the campaign by Humane Farming Association (HFA) to get elected officeholders to enact a law, policy or regulation to stop the use of chemical (Carbon Dioxide-CO2), mechanical(Captive Bolt),mechanical (Gunshot) and electrical (Electrical Current) methods to stun or kill animals. These approved methods for stunning and killing of animals had the following impact, namely;(a) Carbon dioxide gas(CO2) is approved for rendering swine, sheep, and calves unconscious. The gas must be administered in a way that produces surgical anesthesia quickly and calmly, with a minimum of excitement and discomfort to the animals. A carbon dioxide gas chamber is designed on the principle that carbon dioxide is heavier than normal atmospheric air. The chamber is open at both ends for the entry and exit of the animals to anesthetizing CO2 concentrations. Once anesthesia has occurred, the animals are removed from the chamber and are ready to be shackled, hoisted, or placed on a table for bleeding;(b)There are two types of mechanical captive bolt stunners that may be used to produce immediate unconsciousness in cattle, sheep, goats, swine, horses, mules, and other equines. Both types have gun-type mechanism that fire a bolt or shaft out of a muzzle. The bolt is discharged or propelled by a measured charge of gunpowder(a blank cartridge) or by accurately controlled compressed air. Both types must be able to accurately and consistently position the stunning devices so that the bolt hits the skull at the right location to produce immediate unconsciousness. The employee must be able to adjust the air pressure or detonation charge when the sex, the breed, or the size of the animal changes;(c) many plants will utilize the non-penetration type captive bolt in-order to avoid the time-consuming task of physically removing large blood clots, hair, bone, splinters, and debris from the brain. The non-penetration(concussion) bolt is similar to the penetrating bolt except that it has a bolt with a flattened circular head(mushroom head).When fired, the mushroom head meets the skull, but does not penetrate. The animal becomes insensible from the impact or concussion; and (d) captive bolts powered by compressed air must have accurate, constantly operating air pressure gauges. The gauges must be easily read and conveniently located for inspection by FSIS. When fired, the bolt in the penetrating type of captive bolt stunner penetrates the skull and enters the brain. Unconsciousness is caused by physical brain damage, sudden changes in intracranial pressure, and concussion. The brain from animals stunned with penetration captive bolts may be saved for edible purposes provided the establishment removes the large blood clots, bone splinters, and debris from the brain12.

Even though within the past ten years a variety of research studies have been written detailing the use of USDA approved slaughter inspection training methods to stun and kill animals throughout the United States, there is very little information about the history, development and definition of abuse, cruelty and inhumane treatment of animals applied equally to employees and non-employees at federally inspected corporate slaughterhouses. The absence of such scholarly research about animal abuse, rights and protection is due in part to the lack of a valid, uniform and verifiable legal, political, policy, regulatory definition, meaning and understanding. This study is intended to fill the void in the hope that such research can be further stimulated.

9 Humane Society of the United States (http://en.wikipedia.org/wiki/Humane_Society_of_the_United_States)
11 Margaret Myers,“Qualitative Research and the Generalizability Quest:Standing Firm with Proteus,” (http://www.nova.edu/ssss/QR/QR4-3/myers.html)
12 USDA Food Safety and Inspection Service, Humane Slaughter (http://www.fsis.usda.gov/FSIS_Employees/Slaughter_Inspection_Training/Index.asp)
In order to examine and describe abuse and inhumane treatment of animals and employ an investigation of human activities and the failure of public laws, rules, oversight and regulatory procedure to include and protect all animals, this writer has decided to conduct research on the selective use and application of national, state and local laws designed to prevent abuse and inhumane treatment of animals. It was chosen because of the advocacy, lobbying and influence use by animal rights and protection organization to get federal and state prosecutors to indict 27 year old Atlanta Falcon quarterback Michael Vick and his co-defendants and also because of its failure to establish the view that a relationship between the language of the indictment and the suffering and mistreatment of animals under the care and custody of employees in federal sponsored corporate slaughterhouses, does in fact, exist. In the past, such causal relationships have been measured and examined in order to show the criminal charges listed in the indictment should be applied universally to corporate factory farms. The Court of Appeals of Indiana has suggested in their ruling in Elisea v. State of Indiana that when an action of an individual meets the statutory definition of cruelty to an animal, such actions does meet the statutory definition of "knowing or intentionally torturing, beating, or mutilating a vertebrate animal resulting in serious injury or death to the animal". A subsequent review of the literature in the field of political science has also shown that the attitudes held by animal rights and protection organizations toward participating in the political system to enact resolutions, case and statutory laws to prevent animal abuse are invariably affected by and linked to their desire and intentions to work together with groups, individuals, organizations and associations to change policy, procedure and regulations. According to Ira Dreyfuss, activism on the part of these coalitions led to the Food and Drug Administration in the wake of the first U.S. case of mad cows disease to tell cosmetics makers that they can:

No longer use brain and spinal cord tissue from older cattle in lipstick, hairsprays and other products...The new Food and Drug Administration regulations...are aimed at preventing the disease from reaching people, where it can cause a rare but similar fatal condition variant Creutz Feldttabob disease.

The above statement illustrate that during the past ten years or so a plethora of rules, unifying principles, sanctions and themes have been developed to address the aforementioned concern, however, the "body of rules seem to have no ultimate unifying principle, the principles themselves are not logically related to one another (the omission of one or the addition of another in no way affects the group as whole), they are not organized in any meaningful hierarchy... and there are innumerable cases which can be brought forward with regard to each of them in which following the proper rule leads to disaster in a board (or, analogously, in a real life) situation." In most instances, the main epistemological problem with "this information or testimony is that an enormous number of our beliefs originate in the assertions or testimony of speakers, but our accepting or believing those assertions mere on the body of rules or the word of the speaker does not seem sufficient for those beliefs to be justified, warranted, or knowledge." Assuming that we accept the body of rules, words and testimony originated in the assertions being made by the media, how do we account or allow the media to determine the image, decide upon which views and behaviors are acceptable, determine which view will become praiseworthy in a given society and determine which views are unacceptable or outside the mainstream. These created images define the message and present information to us that reflect their beliefs, opinions, values, ethics, mores and norms and most importantly, what we want the audience to believe. This theory commonly described by some as the Dependency theory:

Is in essence an extension or addition to the Uses and Gratifications Approach brought about a few years earlier. The theory is in essence an explanation of the correlating relationship between the media content, the nature of society, and the behavior of the audiences. It states that people in an urban society have become dependent on mass communication to assist them in receiving the information that they need, in


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order to make a variety of decisions concerning their everyday lives. The cognitive changes that the Dependency Theory bring forth are multifold. The media brings forth attitude formation and an impact on agenda setting. Since the theory complies with the idea that people rely on it for information determining their decisions, it clearly can help individuals develop certain attitudes regarding given subjects. In addition, it encourages them to converse about certain things. The affective nature of the media is quite distinctive. It can create many different feelings such as fear, anxiety, and happiness. The media also can promote behavior changes. This can result in an audience member doing something that they would not ordinarily do. The mass media possess these three abilities and because of that, society has become dependent on the media for virtually all it's outside resources in order to make decisions.

While media participation has been defined by both black and white scholars as using the dependent theory to bring order and meaning to politics, maintaining a moral commitment to telling the truth about the political world and telling society it does not want to hear, in recent times, the focus has been on control, command, manage and direct communication, gate-keeping of political knowledge and attitudes and spotlighting on issues that influence audience use of the media, particularly the need for orientation and participation. The quest by the print and broadcast media industry to utilize the theory to direct or divert attention toward or away from problems, solutions, individuals, and groups has several delimitations. These policy delimitations, regardless of whether such knowledge is scientific or not, has been very useful in helping to orientate policy and decision makers about animal rights, abuse and prosecution of individuals and organizations responsible for cruelty to animals. The neo-liberal dependency model has also contributed to the enactment of Section 3.1-796.116 of the Virginia Consolidated Dog Laws to refrain individuals from training attack dogs and owning, and buying animals, pets or fowls. Moreover, the law authorized prosecutors to use the full text, force and intent of the law to prevent dog and animal abuse. The law stipulates that:

\[
\text{It shall be the duty of any animal control officer or other officer who may find a dog in the act or killing livestock or poultry to kill such dog forthwith whether such dog bears a tag or not. Any person finding committing any of the deprivations mentioned in this section shall have the right to kill such a dog.}
\]

Animal rights organizations seeking compliance with the law, including the People for the Ethical Treatment of Animals, Doris Day Animal League, American Humane Association, Physicians Committee for Responsible Medicine, American Anti-Vivisection Society, Laboratory Primate Advocacy Group, National Anti-Vivisection Society and the New England Anti-Vivisection Society, share information and work with the print and broadcast media, policy and decision to enact a policy, law or rule to protect the quality of life of animals. These organizations worked together and developed into an alliance seeking to:

\[
\text{...play an active entrepreneurial role in the formation of a network of communication of ideas and in the linkage of the public in such a way that power is generated, mobilized and directed.}
\]

This kind of organizational alliance is intended to gain support of business, elected officials, civic leaders, and private foundations as a way of demonstrating their willingness to work on a viable solution to violence against animals. By doing so this, the organization is in essence organizing a broad base of resources and political contacts as a means of developing some form of political power. Whether one agrees or disagrees with this...
approach, there seems to be no question that the various animal rights and protection organizations performed two very important roles. First, they performed the role of facilitator; in this sense, they established goals in accordance with the wishes of the larger society. Secondly, by including citizens within the legal, policy, media and decision-making process, the organization provided a channel through which the interests of middle and upper class elites could be represented on a larger scale within the political system. The political system became more responsive when large-scale and consistent political participation by business, elected officials, civic leaders, citizens and private foundations in Atlanta, Georgia and throughout the United States, under the direction of the alliance, created concern about the nature of care, abuse and treatment of animals.

In this sense, these animal right organizations can be conceptualized as a grass-root political organization whose desires and values have been channeled into the political process of voting to help articulate their political opinions. These opinions have focused on issues, candidates, and other matters that members of the alliance consider to be of vital concern to the safety and protection of animals. The issues of the day and how strongly the alliance feels about them influence whether national, state or local laws and regulations are written and enacted to protect the life and rights of animals. Direct involvement by these organizations in the development of animal protection laws can best be described as "all behavior through which people directly express their political opinions." Many of the opinions become political, "only when they acquire relevance for government." If public opinion is used to mean the expression of attitudes on a social issue, then political opinion refer to the expression of attitudes on a political issue. The issue may concern individuals, organizations, candidates or policies. These attitudes or opinions contribute to the lifelong process of political socialization and learning. The mass media for the mainstream of the common symbolic environment that cultivates facts and values that become standards by which we judge. Doris A. Graber and Lawrence W. Martin suggest that these opinions may also spring from:

Their own process of facts supplied by the media from attitudes, opinions, and feelings explicitly expressed by the media in news or entertainment programming or from a combination of the two. Rarely, do they have enough information and understanding to form their own views about national and international issues that confront them in bewilding succession. This puts people at the mercy of the media, not only for information, but also for interpretation. Education of the wider public in questions of fundamental strategy seems particularly desirable, not only on grounds of democratic theory during an age when technology increasingly demands delegation of fateful decisions, but also because so many of the government's problems revolve around the question of what the public can be induced to support...Though there must be decision, it should be decision tempered by the freest possible flow of thought in the widest market compatible with national security; a limit likely to be generous on the more fundamental questions of strategy.

The review of the literature in the field of political science also suggest that there is a close relationship that exist between framing abstract ideas, thinking, reasoning and having simple ideas and impressions about how human behavior impact policy and decision making in the world in which they live. While normative thinking, reasoning and political opinions have been used by policy and decision makers to formulate and answer political questions in recent times, the print and broadcast media have begun to utilize them to socialize the American public into thinking that actions taken by organizations to procure the protection of rights for animal and prevent inhumane treatment of animals can in all honestly be considered by their nature to be, "political acts". These political acts are subject to approval and disapproval to choice and rejection on the issues involving our

31 Lester Milbrath, Political Participation (Skokie, Illinois: Rand McNally, 1970), p. 45
33 Ibid., p. 96
34 Ibid., p. 96
37 Ibid
knowledge of the nature of animal rights and treatment but to raise a claim to men’s obedience, allegiance, decisions, or judgment. One does not take seriously their explicit or implicit claim to be judged in terms of goodness or badness, justice or injustice, e.g. if one does not measure them by some standard of goodness or justice. To allow animal protection organizations to use national, state and local animal abuse and cruelty laws to judge soundly, the guilt or innocence of an individual or organization or group, one must know the origin, location to which the standard bearer of truth is being adjudicated\textsuperscript{40} and why have these individuals, groups or associations been anointed to stand tall and guard and prevent allege suffering, mistreatment or abuse of animals.

As these organizations draw support from civic, business, financial, trading, shipping, merchant, banking, legal, religious and political groups to aid and albeit them in their cause, they will suddenly discover that they will need this support as they become involved in raising public concern about the failure of national, state and local authorities to apply on an equal footing, federal laws and regulations to prosecute individuals engage in the abuse of animals in federally protected slaughterhouses throughout the U.S. As groups draw support from civic, business, financial, trading, shipping, merchant, banking, legal, religious and political groups to aid and albeit them in their cause, they will suddenly discover the degree and extent to which the inhumane treatment of animals take place. For example, in these slaughterhouses:

\begin{quote}
 Animals are routinely dragged, trampled, skinned, dismembered, and scalded while alive and fully conscious. In slaughterhouses that petitioners have investigated, as many as 20 percent of all slaughter animals are conscious-exhibiting righting reflexes, kicking, blinking, looking around, and vocalizing-when their skin is removed. Many animals also remain conscious as they are immersed in scalding tanks or as plant employees remove their legs, tails, and other body parts.\textsuperscript{29} These practices are objectionable because they are illegal and because they inflict intense and needless suffering upon animals. In addition, such practices also subject slaughterhouse workers to grave risks of injury. Further, when meat is produced in this manner, the end product is more likely to become contaminated with fecal matter, filth, and other adulterants. The evidence that follows demonstrates that these disturbing, dangerous, and illegal practices are not only common, but also long-standing\textsuperscript{41}.
\end{quote}

Moreover, studies have also been conducted that examine the “abusive treatment of disabled animals, including dragging of conscious animals causing limb fractures, wounds, and strangulation, trampling and beating to death of disabled animals; smashing of non-ambulatory animals into concrete barriers to force them into front end loaders; and the routine use of chains to rip live, frozen animals from metal walls of transport vehicles in winter months”\textsuperscript{42}. The role played by animal protection organizations is of particular interest to the general public because of their concern about “ensuring that food is safe”\textsuperscript{43} and that “animal flesh wrapped in plastic packages that the American public buys bare little or no resemble to the sentient creatures that are killed for the dinner table”\textsuperscript{44}. Moreover, the task is to also ensure these animals are safe from unwanted physical abuse by factory farming workers that “open the hide on the legs, the stomach, the neck and they cut off the feet while the cow is breathing”\textsuperscript{45}. Plato and others have written quite extensively about “abusive treatment of animals” because of their love for animals and because of their belief that a group or circle of elected officeholders, legal, civic and business, community activist, religious and political and organizations at the national, state and local levels of government have the capacity and responsibility to enforce provisions of U.S. Code and Constitution of the United States to prevent the inhumane treatment of animals. Social science researchers have also begun to examine the impact of human activity on agriculture, food security, animal as well as its effects on how the print and broadcast media presents the case via the news on the care, abuse and cruelty toward animals (Tom Regan, 1985); Environmental Ethics 1980; Ethics and Animals 1984; Blackstone 1974; Doris A Graber 1989;

\textsuperscript{40} Eugene J. Meehan, Contemporary Political Thought: A Critical Study (Homewood, Illinois: The Dorsey Press, 1967), p. 68
\textsuperscript{41} The Humane Farming Association, Stop Slaughterhouse Abuse. HFA’s Campaign to Enforce Humane Slaughter Laws (July 3,2007) (\texttt{Http://www.hfa.org/hot_topic/slaughterhouse.html})
\textsuperscript{42} Ibid
\textsuperscript{44} Ibid
\textsuperscript{45} Ibid
A Descriptive Case Analysis of How the Print and Broadcast Media Used U.S. Vick Et Al and Humane Slaughter Laws (HMSLA) to Prevent Abuse and Inhumane Treatment of Animals. Can We Apply the Same Standards to Corporate Meat Slaughterhouses (Part 1)

Burn 2007; Barber A. Bardes, Mack C. Sheley and Steffan W. Schmidt 2004; Krimsky 1991 and Bruce L. R. Smith 1990). Still others have examined how science, research and policy have been used to communicate to members of the business, civic, legal, religious and political arena about the need to work together to protect animals and the environment46. Descriptive and empirical analysis about animal rights, protection and abuse has been skewed toward the prism of using human experience and perception to track, document and evaluate how domesticated animals have played a prominent and largely beneficial role in the human economy for thousands of years, providing fuel, fertilizer, transport, clothing and food (See Table I on page 16). But in this century, the numbers and impacts of livestock have swelled apace with human population and affluence. Since mid-century, human numbers have doubled to 5.4 billion, while the numbers of cattle, pigs, sheep, goats, horses, buffalo and camels have grown from 23 billion to 4 billion. At the same time, the fowl population multiplied from about 3 billion to nearly 11 billion47.

Table 1: Dogs And Animals As Food

<table>
<thead>
<tr>
<th>Animals as Food</th>
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<tbody>
<tr>
<td>Asian Pet Shops</td>
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<tr>
<td>Bear Bile Farming</td>
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<tr>
<td>Civet Farming</td>
</tr>
<tr>
<td>Companion Animals</td>
</tr>
<tr>
<td>Fur Farming</td>
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<tr>
<td>Fur Trapping</td>
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<tr>
<td>Horse Abuse</td>
</tr>
<tr>
<td>Misc. Commodities</td>
</tr>
<tr>
<td>Poaching</td>
</tr>
<tr>
<td>Persian Lamb Farming</td>
</tr>
<tr>
<td>PMU Farming (Pregnant Mare Urine)</td>
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<tr>
<td>Product Testing</td>
</tr>
<tr>
<td>Puppy Mills</td>
</tr>
<tr>
<td>Sealing</td>
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<tr>
<td>Whaling</td>
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</tbody>
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Table 2: The Humane Farming Association (HFA) Photo/Video Gallery

<table>
<thead>
<tr>
<th>Cattle Slaughterhouses</th>
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<tbody>
<tr>
<td>Hog Slaughterhouses</td>
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<tr>
<td>Egg Factories</td>
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<tr>
<td>Hog Factories</td>
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<tr>
<td>Veal Factories</td>
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<tr>
<td>Horse Auctions</td>
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<tr>
<td>Dead Factory Farmed Pigs</td>
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<tr>
<td>Ritual Slaughter</td>
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</tbody>
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Much research have been done on how regulatory policies, procedures, case and statutory laws, consent decrees and resolutions are enacted to govern and restrict use abuse of animals. The empirical and normative

research investigation conducted by the Humane Farming Association (HFA) and listed in Table II on page 11, has allowed us to become literate and educated during the 20th and 21st centuries about breeding of a horse, cow, hog, egg, veal, dog, cat, lamb, seal, puppy, whale for sport, food and entertainment.

The research study proposed here is to explore the extent to which differences in the use, definition, administration, enforcement and application of national, state and local animal prevention and control laws do, in fact, influence the role that federal and state prosecutors, animal right organization and the print and broadcast media politics plays in the prosecution and public humiliation of Michael Vick and his codefendants. Specifically, the following hypotheses will be tested:

**Hypothesis One**
Michael Vick and his codefendants would no more than likely to be prosecuted for violating federal and state animal protection laws if the law, code and statues were applied fairly, equally and uniformly to the treatment and care of all animals held in the custody of corporate slaughterhouses.

**Hypothesis Two**
Michael Vick and his codefendants would no more than likely to be prosecuted, convicted, judged, sentenced and forced to lose their life, liberty and property if people are followers of the print and broadcast media industry and fail to develop an independent analysis as to whether the law, code and statues is applied fairly, equally and uniformly.

**Hypothesis Three**
Michael Vick and his codefendants would more than likely to be prosecuted and convicted for violating federal and state animal abuse and cruelty laws if the general public accepts as pure fact the analyst or testimony originating from the radio, television and newspaper that they are guilty.

**METHODOLOGY**
The aforementioned hypotheses will be tested by collecting data from a variety of legal citations, farming, agriculture, animal rights and protection websites, books, articles, journals and newspapers.

**Dependent Variable**
The dependant variable in this research is the extent to which Michael Vick and his codefendants are being perceived by members of the print and broadcast media industry, federal and state prosecutors, animal rights and protection organizations and the general public as being guilty of violating United States Code, Title 18, Section 371. The statute provide the opportunity for a wide divers body of individuals, organizations and groups to participate in the legal and policy arena as decision makers and regulators. In essence, the statute reads that if:

> Two or more persons conspire either to commit any offense against the United States, or to defraud the United States, or any agency thereof in any manner or for any purpose, and one or more of such persons do any act to effect the object of the conspiracy, each shall be fined under this title or imprisoned not more than five years, or both. If, however, the offense, the commission of which is the object of the conspiracy, is a misdemeanor only, the punishment for such conspiracy shall not exceed the maximum punishment provided for such misdemeanor.

The enactment of national, state and local animal protection laws, rules, regulations, policies and procedures by neo-liberal individuals and organizations to protect the quality and life of animals have become secondary due to the problem in which some quasi theory about abuse explain perfectly well but they cannot predict inhumane
treatment.” Some predict but have no explanatory capacity. Some are highly suggestive, though they neither explain nor predict. The point is that discussion of the question “Is that really a theory?” is rather fruitless. To take the instrumentalist point of view, if we get the results we need, then the conceptual structure is useful whether or not it is a deductively related system⁴⁹. Moreover, when some theories become retrofitted and put into place to define all things to all given situations, what must be kept in context is that the terminology of the theory may be weak, suffer from standardization and can be assumed to be not trustworthy if it can not be applied to discover in general terms, the corpus of information that it was designed to discern⁵⁰. Some may even say that the theory is subject bias and dangerous to use. The danger, of course, is that the facts may be forced into a pattern, or that the observer will forget that he is working with a weak analogy and begin treating his research results as though he possessed a powerful theory⁵¹.

Research in the field of political science and public policy have examined how efforts by animal rights and protection organization to reshape public discourse and dialogue about animal abuse have contributed to news reports, revelations about animal abuse by slaughterhouse employees and USDA inspection program personnel and the staff of the Humane Farming Association (HFA). Much of this analysis seemed to focus on the orientation, assertion and testimony about the lack of a uniform focus on abuse less attention to the illegal slaughterhouse practices common in the USDA-inspected facilities. In most instances this attention fails to facilitate a focus on the role that technology has played in abusing and killing animals. In the last fifteen years, more than 2,000 small to mid-sized slaughterhouses—one-third of the nation’s packing houses-have been displaced by a small number of large, high-speed facilities, each with the capacity to kill several million animals a year. In 1998, more than half of the nation’s cattle were slaughtered in 14 plants and more than half the nation’s hogs were slaughtered in only 10 plants. With fewer slaughterhouses killing a growing number of animals, slaughterhouses have instituted dramatic increases in their production “line speeds.” In these high-speed operations, a minute of “down time” can spell a loss of hundreds of dollars. Individual line workers, struggling to kill as many as 1,100 animals per hour or one animal every three seconds know that they will be disciplined or fired for implementing production. In order to keep their jobs, they often resort to brutality to keep the production line running uninterrupted⁵². In many of the plants where cattle and hogs were handled and killed:

Animals are unloaded from transport vehicles, driven through a series of driveways, and penned. Animals that are suspected of being unhealthy are segregated in “suspect” pens…When the time comes for slaughter, cattle are driven from holding pens into either a “knocking box” or up to a “conveyor/restrainer” which transports them to the “stun operator.” The stun operator or “knocker” shoots each animal in the forehead with an air-or cartridge-activated device that drives a steel bolt into the animal’s skull⁵³.

Second, almost all of the ideas, opinions and data being employed and collected by HFA is designed to examine the normative and empirical assumptions by which the theory of animal rights, abuse and inhumane treatment of animals are based and the process by which a community of scholars, legal jurist, animal rights and protectorate organizations utilize these assumptions to formulate and implement laws, policies and procedures to arrest, detain, hold, prosecute, sentence and convict American citizens. Thirdly, definitions that originate from the U.S Code and various state and local code of statues seem to use the angle of prosecuting only the profiled reported individual whose name, rank and serial number are printed, reported or televised.

The print and broadcast media continue to serve a vital role in helping the public become literate and educated about the health, care, safety, endangerment and inhumane treatment of animals. Much of what the average persons learns about modern democratic government and its ability to address the safety, protection, care, endangerment, inhumane treatment of animals depends on the processing of facts and inducing the general public to support this endeavor. Much of this analysis is also skewed toward the prism of using a vast and

⁵⁰ Ibid. p.25
⁵¹ Ibid. p.26
enormous body of literature to view how regulatory policies detect and measure the risks that night arise when new technologies, substances or materials are introduced into the workforce or the environment that may cause harm to humans or animals. Moreover, such attention is also paid to how case and statutory laws can be used to examine whether animal abuse is actually being committed as a continuous course of conduct and when so committed requires no unanimity instruction; whether a unanimity instruction was required with respect to the count alleging cruelty to dogs in view of evidence of separate incidents, each of which established the offense.

For the majority of individuals and organizations involved in the movement to serve, defend and protect the rights of animals against inhumane care, service, abuse and treatment of animals, they envisioned a someday in which the movement would be quiet successful if the focus of their energy was aimed at developing a comprehensive strategy that would not only launch an attack upon policies, procedures and regulatory authority but set upon a comprehensive strategy in which supporters and the alliance of organizations would set upon to attack the Free Exercise Clause of the First Amendment in the United States Constitution. The Free Exercise Clause listed in the First Amendment, "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievance." A close analysis of their action, behavior and disenchantment with the First Amendment would reveal their pernicious, putative and inappropriate assumptions upon which they feel that they are the chosen ones that are responsible for interpreting, explaining, applying or give meaning to any and all policy, legal and regulatory discussions that give meaning to and definitions of what constitutes from a configuration of meaning, what is meant to be defined as abuse and inhumane treatment of animals? The Supreme Court holding involving the Free Exercise Clause of the United States Constitution in the Church of the Lukumi Babalu Aye v. City of Hialeah in 1993 and the Employment Division, Department of Human Resources of Oregon v. Smith caused animal right supporters to express outrage and wonderment at the language used to parlay their decision. In the case, the Court held that:

Petitioner church and its congregants practice the Santeria religion, which employs animal sacrifice as one of its principal forms of devotion. The animals are killed by cutting their carotid arteries and are cooked and eaten following all Santeria rituals except healing and death rites. After the church leased land in respondent city and announced plans to establish a house of worship and other facilities there, the city council held an emergency public session and passed, among other enactments, Resolution 87, 66, which noted city residents "concern over religious practices inconsistent with public morals, peace, or safety, and declared the city's "commitment" to prohibiting such practices: Ordinance 8740, which incorporates the Florida animal cruelty laws and broadly punishes "whenever...unnecessarily or cruelly...kills any animal, "and has been interpreted to reach killings for religious reasons; Ordinance 8752, which defines "sacrifice" as "to unnecessarily kill...an animal in a...ritual...not for the primary purpose of food consumption," and prohibits the "possession, sacrifice, or slaughter" of an animal it is killed in "any type of ritual" and there is an intent to use it for food, but exempts "any licensed [food] establishment" if the killing is otherwise permitted by law: Ordinance 8772, which prohibits the sacrifice of animals and defines "sacrifice" in the same manner as Ordinance 87 52; and Ordinance 87 72, which defines "slaughter" as "the killing of animals for food" and prohibits slaughter outside of areas zoned for slaughterhouses, but includes an exemption for "small numbers of hogs and/or cattle" when exempted by state law. Petitioners filed this suit under 42 U.S.C.S1983 alleging violations of their rights under, inter alia, the Free Exercise Clause of First Amendment. Although acknowledging that the foregoing ordinances are not religiously neutral, the District Court ruled for the city, concluding, among other things, that compelling governmental interests in preventing public health risks and cruelty to animals fully justified the absolute prohibition on ritual sacrifice accomplished by the ordinances, and that an exception to that prohibition for religious conduct would unduly interfere with fulfillment of the governmental interest because any more narrow restrictions would be unenforceable as a result of the Santeria religion's secret

55 Elisea v. State of Indiana 777 N.E2d 46 Court of Appeals of Indiana,2002
56 Amendment One, U.S.Constitution
57 Church of the Lukumi Babalu Aye v. City of Hialeah in 1993
58 Employment Division, Department of Human Resources of Oregon v. Smith 494 U.S. 872(1990)
A Descriptive Case Analysis of How the Print and Broadcast Media Used U.S. Vick Et Al and Humane Slaughter Laws (HMSLA) to Prevent Abuse and Inhumane Treatment of Animals. Can We Apply the Same Standards to Corporate Meat Slaughterhouses (Part 1)

nature. The Court of Appeals affirmed. Held: The judgment is reversed\(^{59}\).

The decision seems to be consistent with previous legal theory anticipated and proffered by members of the bar of justice in their relentless effort to try and address questions raised by the general public about abuse and inhumane treatment and the questions being raised by blacks and other populations regarding the thematic and heuristic value of this education and knowledge to define, charge and convict an individual, group or organization for “misconduct” and violating the life, liberty and pursuit of happiness for animals. The decision was further enhanced and made plain when the 3rd District of California Court of Appeals decided in People v. Sanchez in 2000. It suggested that a consensus must be reached as to what do we mean when we allege “animal abuse” and arrest someone based on this allegation. The Court held in August of 1997 in Sanchez that:

Sanchez’s neighbors went to his property because a calf had been bawling loudly for 2 or 3 days and could be heard by neighbors a mile away. The neighbors found animals living in hideous conditions. The calf was tied to a post, unable to get any food or water. Eight rabbits were caged without food or water, 4 were dead and 4 were dying. The bodies of several dead ducks, chickens and geese were scattered about. A corpse was being eaten by a dog. In June of 1998, an animal control officer went to Sanchez’s property and found several severely malnourished geese. He opined that they may have been without food or water for up to a month. Other neighbors testified that an unspecified times, they saw a chicken tied around a dog’s neck, they saw Sanchez firmly kick dogs with steel-toed boots for no apparent reason, they found a burn pit at the back of the property containing dead and dying calves and chickens, and saw dead cows, starving dogs and dead rabbits. In 1999, a police officer went to the property where he found a dead peacock in a pit and a pig’s head attached to a tree. In June of 1999, the same officer found a puppy with one dead eye and a deeply infected hole between its eyes, which was full of live maggots that were moving and eating inside the wound. The puppy was impounded and euthanized. Sanchez was arrested and charged and convicted of multiple counts of animal cruelty. He appealed 7 of the counts. At issue was the requirement of a unanimity instruction. A unanimity instruction is used when the State charges one crime but relies on multiple acts to support that one crime. When multiple acts are alleged the jury must be unanimous as to which act or incident constitutes the crime.

Issues:

Whether animal abuse may be committed as a continuous course of conduct, and when so committed requires no unanimity; whether a unanimity instruction was required with respect to the count alleging cruelty to dogs in view of evidence of 2 separate incidents each of which established the offense; whether unanimity instruction were required as to counts alleging that defendants had abused rabbits, ducks, chickens, and geese, as each was based on a continuous course of conduct; whether a unanimity instruction was required with regard to the count alleging defendant’s failure to provide any medical treatment for the severely wounded puppy.

Holdings:

(1) a unanimity instruction must be given where the evidence shows that more than one criminal act was committed which could constitute the charged offense, and the prosecution does not rely on any single act.(2) A unanimity instruction is not required where the criminal acts are so closely connected as to form a single transaction or where the offense itself consists of a continuous course of conduct.(3) An offense is of a continuing nature when it may be committed by a series of acts, which if individually considered, might not amount to a crime, but the cumulative effect is criminal.(4) When the language of the statue focuses on the goal or effect of the offense, the offense is a continuing offense.(5) Animal abuse may be committed as a continuous course of conduct, and when so committed requires no unanimity instruction(6) unanimity instruction was required with respect to count alleging cruelty to dogs in view of evidence of 2 separate incidents each of which established the offense(7) Unanimity instructions were not required as to counts alleging that the defendant had abused rabbits, ducks, chickens, and geese by failing to provide adequate food and water on ongoing basis, as

each count was based on a continuous course of conduct and(8) No unanimity instruction was required with regard to counts alleging failure to provide any medical treatment for severely wounded puppy60

MICHAEL VICK, CODEFENDANTS AND ALLEGATIONS OF ANIMAL ABUSE AND CONSPIRACY

In recent days, we read from a litany of daily, weekly and monthly newspaper stories published on the internet and listen quietly patiently to the myriad of assertions, suppositions, assumptions and explanations upon which testimony is given on the radio to clarify the rationale by which U. S. Code. Title 18:Section 371 is being used to bring an indictment against 27-year-old Atlanta Falcons quarterback, Michael Vick. Much of this discussion focused, pro or con, good or bad, right or wrong, on the alleged inhumane abuse, treatment, and mistreatment of animals by the Atlanta Falcons quarterback and his co-defendants by woefully participating in, “competitive dog-fighting, getting and training pit bulls for fighting and conducting the enterprise across state lines”. The document filed in the U.S. District Court by federal prosecutors is designed to present data and research to support an indictment for conspiring to commit several illegal acts. These claims, for example, has allowed us to look at how symbolic language, definitions, theorems or postulates are being used by individuals, organizations, actors and decision makers to shape and influence our ideas and beliefs about how human activities of man and whether or not these behaviors cause abuse and inhumane treatment of animals. In most instances, the caricature, depictions, likenesses, frames, description and image of the defendants illustrated and articulated in the 18 page indictment have been most useful in helping us to become literate about them and how prosecutors have reordered and classified data as evidence and summary facts to prosecute the defendants with animal abuse61. Eugene J. Meehan and others have asserted that these kinds of isolated facts:

have no meaning. That is why strict empiricism is impossible. Facts must be related systematically before they acquire significance and usefulness for man. The process by which facts are related we call explanation. It is probably the most important kind of intellectual activity in which human beings engage. When we say that we have knowledge, what we mean, usually, is that we are able to explain things. That is, we can say “why” or “how” things occur62

The review of the literature in political science and public policy suggest that there is a close relationship between facts that systematically reordered and programmed to fit a specific scenario and the evidence. While facts are conceptualized by some to be the defining variable upon which rest judgment, explanation and supposition, it has led some to see it as being dubious and selectively applied to achieve prosecution. For example, some in the movement claim or allege that animal suffering, mistreatment or abuse linked to the patenting of animals, food security, production and development will never be adjudicated. The claim, pro or con, is based on the argument that patenting will foster more radical forms of genetic engineering, and that some of these forms will involve the creation of animal hybrids or chimeras in which the novel strains will suffer increased stress, physical pain, and hardship. The creation of transgenic animals might result in transmogrified, cripples.” These animals whose organs and limbs do not contribute to an integrated morphology. Consider the case where an animal is genetically engineered with a re-proportioned body (i.e. a pig with shorter legs, chickens with larger breasts, a cow with a larger udder). Such examples of:

“designer animals” have begun to appear. Scientist at Beltsville, Maryland, created a boar by injecting cattle genes into fertilized embryos of a pig and implanting the embryos in the womb of a surrogate sow. One journalist gave the following description of the animal. "It' legs are thick and stubby with arthritis. Its head is overly broad. It is highly susceptible to disease, its hair sparse and its brow over grown. Researchers thought they could make a leaner pig. Instead they ended up with an arthritic, lethargic

60 Http://www.animallaw.com/abuseandcrueltycases.htm
A Descriptive Case Analysis of How the Print and Broadcast Media Used U.S. Vick Et Al and Humane Slaughter Laws (HMSLA) to Prevent Abuse and Inhumane Treatment of Animals. Can We Apply the Same Standards to Corporate Meat Slaughtehouses (Part I)

beast with an overgrown skull and crossed eyes

These facts in Lukumi Babalu Aye v. City of Hialeah in 1993 and the Employment Division, Department of Human Resources of Oregon v. Smith in 1990 relate systematically to the indictment against 27-year-old Atlanta Falcons quarterback, Michael Vick. insomuch, as the facts focus on problem identification, classification and application. Many of these problems have relevance and focus on animals being “routinely abused in the slaughterhouses when they experience dragging, trampling, skinning, dismemberment and scalding while they are alive, conscious and being held in the custody and breast of federally inspected slaughterhouses throughout the United States. Imagine being hit on the head and finding yourself dazed but still fully conscious. A chain is attached to one of your legs and you’re hoisted upside down onto an assembly line. Gigantic clippers are used to snip off the lower parts of your arms and legs. Completely helpless, you feel workers cutting you’re your thighs, belly, and sides as they strip your skin from your legs to your neck.”

The average citizen comes to learn about the indictment against 27-year-old Atlanta Falcons quarterback, Michael Vick and his codefendants and the definition of human risk, mistreatment and abuse of animals exclusively from educated people that graduate from institutions of higher learning with BA’s, BS’s, MA’s, MS’s, MSW’s, MPH’s, LLB’s, JD’s and PhD’s. Unfortunately, the main epistemological problem with the testimony that emanate from their wisdom and education is that an enormous number of our beliefs originate in the assertions, opinions and views originating in the assertions or testimony being given by these educators. However, our accepting or believing these opinions, views or assertions merely on the word of the educators does not seem sufficient for those beliefs to be justified, warranted or knowledge. Sometimes, the realities of the educator’s opinion and knowledge can get passed on to us, thus coloring our understanding. The problem is diminished but not eliminated if it is assumed, as is standard, that these educators are justified or warranted in the beliefs that their assertions express, and even if they know them. For example, opinion and knowledge, presented by these educated folk devoted by aim and purpose to the cause celebration of animal rights and protection can lead to recruiting of new members and develop new alliances and coalitions. The difference between opinion and knowledge being expressed by these educated folks about animal rights is that the, “man who has knowledge has knowledge of something, that is to say, of something that exists, for what does not exist is nothing. Thus knowledge is-infallible, since it is logically impossible for it to be mistaken. But opinion can be mistaken. How can this be? Opinion cannot be of what is not, for that is impossible, nor of what is, for then it would be knowledge. Therefore opinion must be of what is and is not.” The opinions of these educated folks about the defendant’s role in the abuse and mistreatment of animals stem from their own processing of related facts supplied by the print and broadcast media.

The epistemological problem enters our analysis, interpretation, beliefs and knowledge about the indictment against 27-year-old Atlanta Falcons quarterback, Michael Vick and his codefendants, “because we seem to have no ground for coming to these beliefs beyond the word of the media and those educators.” In recent years, these attitudes, opinions, and feelings lock us into an analysis or interpretation whereby only the word or testimony has a disproportionate view on this subject matter. Thus, much of this analysis and testimony has tended to pay too much attention to the 27-year-old Atlanta Falcons quarterback, Michael Vick and his codefendants and less attention to the failure of policy makers to obtain an indictment against others for violating the Federal Meat Inspection Acts (FMIA). The Act was enacted by U. S. Congress from 1905 to 2007. Policy

63 The Humane Farming Association, Stop Slaughterhouse Abuse. HFA’s Campaign to Enforce Humane Slaughter Laws (July 3,2007) (<http://www.hfa.org/hot_topic/usa The Humane)
67 Employment Division, Department of Human Resources of Oregon v. Smith 494 U.S. 872(1990)
69 Epistemological Problems of Testimony (http://plato.stanford.edu/entries/testimony-episprob/)
70 Ben Chambers and Zeb Dahl, The Four Idols of Sir Francis Bacon (http://www.sirbacon.org/zeb-ben.htm)
71 Epistemological Problems of Testimony (http://plato.stanford.edu/entries/testimony-episprob/)
72 Bertrand Russell, Theory of Ideas, “in Russell, A History of Western Philosophy(New York: Simon and Schuster),p. 120.
73 Ibid
debates and discussions held during this tenure about FMIA tend to focus on the ability of federal inspectors to track, forecast and inform the general consumer about the nature of the incident to which the abuse of an animal has taken place, the neighborhood, community, site area, location, individual or corporation involved. Researchers have also accumulated a plethora of data and examined the impact of human activity on animals held in federal inspected slaughter houses (Sheldon Krimsky, 1991; Animal Welfare Institute Quarterly, 2007; Humane Farming Association, 2007; Peter Singer 1975; Jeremy Bentham (1832); John Stuart Mill (1873); Tom Regan (1985); Ruth Harrison (1964) and M.Tooley (1972). Moreover, other studies have also begun to examine and list the nature of the abuse caused by the lack of non-enforcement of the Humane Methods of Slaughter Act of 1958. The Act requires that:

"Animals should be stunned into unconsciousness prior to their slaughter to ensure a quick relatively painless death. The most common method are electrocution or a metal bolt to the head. Frequent on-site monitoring is necessary, as is the employment of skilled and well-trained personnel. An animal is considered properly stunned when there is no “righting reflex”; that is, the animal must not try to stand up and right itself. Only then can it be considered fully unconscious. It can then proceed down the line, where slaughterhouse workers begin in cutting up its body (10) The Act made the proper treatment and humane handling of all food animals slaughtered in USDA inspected, slaughter plants mandatory. This includes cattle, calves, horses, mules, sheep, goats, swine, and other livestock. Once again, it required that livestock are rendered insensible to pain before being shackled, hoisted, cast, or cut. It also mandated several additional specific requirements to the humane handling of animals in meat packing plants in the United States. These include: “downers” cannot be dragged while conscious, workers are not allowed to retaliate physically against animals, water must be provided to animals always, and cattle prods connected to AC house current must be reduced by a transformer to the lowest effective voltage not to exceed 50 volts"74

The law has played a major role in the 21st century in the helping use to become literate and educated about definitions of abuse and the salient reasons that cause human to harm, abuse, mistreat or death to animals. It must be a definition in which can be applied informally. Mark improvements in our understanding of such events depend critically on more self consciousness about what observers bring to the analysis. What analyst sees and judges to be important is a function not only of the evidence about75 the law, how it allows animals to be stunned into consciousness before their slaughter to “ensure the quick relatively painless death” but also of the “conceptual lenses” through which the law is used to allow for the use of electrocution or a metal bolt as the most common method to slaughter animals. At times, the “conceptual lenses” may suffer from an identity crisis because very little scholars have oriented their research efforts toward a search for variables that assesses and compare76 penalties and allows imposed on an individual for engaging in the drowning, hanging, shooting and electrocution of animals and not apply the same definition uniformly, toward corporate slaughter plants. These corporate slaughter plants have, “lines that move with such rapidity that every animal cannot be stunned properly and rendered unconscious before being hoisted by a hind leg, violently skinned and brutally dismembered77. As the photograph listed below demonstrate, cattle and other animals are routinely restrained for slaughter and yet, we fail to eyewitness individuals or organizational standing on the side of highways, making appearance at sports events to protest this treatment.

75 Humane Slaughter Act (Http://en.wikipedia.org/wiki/Humane_Slaughter_Act)
77 Humane Slaughter Act (Http://en.wikipedia.org/wiki/Humane_Slaughter_Act)
Proper Cattle Restraint for Stunning

*Cartridge fired captive bolt gun*

If a stunning box is used, it should be narrow enough to prevent the animal from turning around. The floor should be non-slip so the animal can stand without loosing its footing. It is much easier to stun an animal that is standing quietly. Only one animal should be placed in each stunning box compartment to prevent animals from trampling on one another.

*Stationary slanted shelf in the front of the stun box keeps the animal's head raised*

If either electric stunning or mushroom head (non-penetrating) captive bolt stunning is used a head holder like the one in this picture or similar to the head holders used for religious slaughter should be used. When non-penetrating captive bolt is used the aim must be exact. This requires holding the animal’s head still. When penetrating captive bolt is used a good stunner operator may not need a head holder or one of the simpler shelf systems can be used.
In this head holder, a neck stanchion closes around the neck and a shelf is raised under the animal's chin.

*Pneumatic captive bolt gun*
Most large plants restrain cattle in a conveyor restrainer system. There are two types of conveyor restraints, the V restrainer and the new center track system. In a V restrainer system, the cattle are held between two, angled conveyors. In the center track system the cattle ride astride a moving conveyor.

A very humane position for cattle. Cattle are restrained in a comfortable, upright position.
The center track system provides the advantages of easier stunning and improved ergonomics because the stunner operator can stand closer to the animal. Either type of restrainer system is much safer for workers than a stunning box. Restrainer conveyors are recommended for all plants which slaughter over 100 head per hour. Stunning boxes are difficult and dangerous to operate at higher speeds. In a plant which slaughtered 160 cattle per hour, replacement of multiple stunning boxes with a conveyor restrainer eliminated at least one serious accident, each year.

Center track double rail restrainer. This system is available for both sheep and cattle.

Lighting in the restrainer room over the top of the conveyor will help induce cattle to raise their heads for the stunner. Cattle should not be able to see light coming up from under the restrainer because it may cause balking at the entrance. Restrainer systems should be equipped with a long, solid hold-down rack to prevent rearing. The hold-down should be long enough so that the animal is fully settled down onto the conveyor before it emerges from under it.

If an animal is walking into the restrainer by itself, do not poke it with an electric prod. Center rack systems require less prodding to induce cattle to enter it. Workers need to break the "automatic prod reflex" habit.

Animal entering the center track double rail restrainer.

Click here to return to the Homepage for more information on animal behavior, welfare, and care <http://www.grandin.com/index.html>.

However, in theory, both the 1958 and 1978 Humane Slaughter Acts required meat packers and corporate slaughter plant operators to:

1. Ensure that livestock be rendered insensible to pain by a blow, gunshot, or electrical or chemical means that is rapid and effective before shacking, hoisting, casting, or cutting.
2. Ensure that plant facilities and the activities of plant personnel were monitored in order to assure compliance with the law.
3. Utilize the non-penetration type captive bolt in order to avoid the time-consuming task of physically removing large blood clots, hair, bone, splinters, and debris from the brain. The non-penetration (conclusion) bolt is similar to the penetrating bolt except that it has a bolt with a flattened circular head.
(mushroom head). When fired, the mushroom head meets the skull, but does not penetrate. The animal becomes insensible from the impact or conclusion.

4. The law requires that livestock are rendered insensible to pain before being shackled, hoisted, cast, or cut. It also mandated several additional specific requirements to the humane handling of animals in meat packing plants in the U.S. These include:

"downers" cannot be dragged while conscious, workers are not allowed to physically retaliate against animals, water must be provided to animals at all times, and cattle prods connected to AC house current must be reduced by a transformer to the lowest effective voltage not to exceed 50 volts.

Moreover, despite the passage of the 1958 and 1978 Humane Slaughter Acts that allows corporate slaughterhouses to use, "cattle prods connected to 50 volts of AC house current" to stun or electrocute animals, we find it quiet puzzling to see that the Act did not exempt defendants from being charged with an offense in which a loosing dog that participated in a dog fight allegedly held by defendants either died in the pit or were electrocuted, drowned or shot. The indictment said purses climbed as high as $29,000 for fights. At the start, authorities seized 66 dogs, including 55 pit bulls, and equipment commonly used in dog fighting. About half the dogs were tethered to car axles with heavy chains that allowed the dogs to get close to each other, but not to have contact _ an arrangement typical for fighting dogs, according to the search warrant affidavit. Before fights, participating dogs of the same sex would be weighed and bathed, according to the filings. Opposing dogs would be washed to remove any poison or narcotic placed on the dog's coat that could affect the other dog's performance. Sometimes, dogs weren't fed to "make it more hungry for the other dog." Fights would end when one dog died or with the surrender of the loosing dog, which was sometimes put to death by drowning, strangulation, hanging, gunshot, electrocution or some other method, according to the search warrant affidavit.

Secondly, the data and the research collected to foster the indictment to address care, service, treatment and abuse of animals seems to fall preying to the myriad accepted, allowed and conditioned standards that are truly fashioned and apart of traditional communities and neighborhoods in the American psychic and culture. Using a Narcissus point of view to stare at these salient events would also bring discomfort, annoyance, dismay and disgust to the observer. For example, we could eyewitness from an ordinary community perspective how parents of the 1950's to 2007 brought before our eyes the time honored tradition of showing us how to prepare a chicken by taking chicken feed, throwing it on the ground and once the chicken comes to feed, reach out and grab the chicken and cut or ring the necks of a chicken and suddenly, you find yourself engaged in an atmosphere in which you, thereby, watch the body of the chicken begin to run absenting of the head on the ground at your foot steps. The theatre continues until the body just suddenly falls on the ground. Should we now accuse our parents of cruelty, abuse and inhumane treatment of the chicken? Did the chicken get a fair trial? Was the feed judge bias toward the plate eaters? Was the media involved that led the chicken to be lured to the chicken feed that ultimately caused his death? Can we charge conspiracy for each of the children that waited patiently with their plate to receive the cook remains with “conspiracy”? Can we accuse the litany of retail grocery store operators that receive animal products from the various federally inspected slaughter houses that use Chemical (Carbon Dioxide-CO2); Mechanical (Captive Bolt), Mechanical (Gunshot) and Electrical (Electrical Current) to produce immediate unconscious in cattle, sheep, goats, swine, horses, mules and other equines, with conspiracy and the failure to inform consumers that purchased their products?

Local news stations in Atlanta and their national affiliates have arrogated upon themselves in their vanguard custodial role to “provide” a specificity of daily news accounts about the indictment. Experts and academic scholars from the People for the Ethical Treatment of Animals, universities, institutes, public and private organizations and the general public have telephoned radio and television shows and held poster board signs on the sidewalks and highways with the words "Sack Vick!" "Kick Vick," and "Tackle Cruelty.", as a way to express their views on the subject matter. Many of these protesters have begun to travel around the United States and

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79 USDA Food Safety and Inspection Service, Humane Slaughter (http://www.fsis.usda.gov/FSIS_Employees/Slaughter_Inspection_Training/Index.asp)
line up at the "speaker's podium" and appear on varied and sundry news and sport entertainment organs to
display their body of scholarship and knowledge and to use this information as a mechanism to tell us and the
world all that there is to know about the salient reasons contributing to why these defendants participated in a
scheme to kill, harm and mistreat animals. Much of this discussion seems to willow around the myriad use of
subjective superlatives, suppositions, assumptions, assertions, words, testimonies, explanations and
imaginations being employed by the general public, members of the print and broadcast media
industry along with the various governing custodians and guardians of the keeper of the faith to now, henceforth
and forever, to take the lead and run around like chicken little and proclaim that these defendants are guilty and
we should not waste our time chatting about such things as the right to face your accuser, to put forth a defense,
to be guarantee rights, liberty and property as guaranteed by the Declaration of Independence, Constitution of
the United States and State of Georgia. Moreover, Political consultants from a variety of organizations and
throughout the academic community have utilized their regalia as a pristine device to interpret and explaining the
indictment and its affect on the life, liberty and pursuit of happiness for each of the defendants.

There are basically two problems with accepting as pure fact, the testimony, assertion, judgment, explanation or
assumption that flow from these news organs about the alleged incident of animal abuse. First, the news story is
written in such a way as to rank and differentiate the traditional core values, customs, beliefs, norms and ethical
mores of Michael Vick and their treatment and characterization of him as trouble, disturbed. The task of such an
exercise is to proffer a point of view in which a juxtaposition is employed to proffer an explanation to suggest how
to contextualized the action of the defendant and his codefendants as lying outside the scope and mainstream of
the norms and values of those that attend or watch Atlanta Falcons Football. It is also presumed that our
traditional core values, mores, beliefs that we have accumulated over time, resonate from the very assertions,
testimonies, opinions, words, language that comes from the various parade marchers, custodians or guardians of
the keepers of animal quality of life to now and henceforth, search out and destroy the image of Michael Vick
and his co-defendants.

Acceptance of the views, assertions, assumptions and opinion held by these individuals from different
organizations, universities and "think tanks" and the concomitant public acceptance of their ultimate claim to
selectively "know the truth" about approved methods for stunning animals as identified by the Humane Slaughter
Act and fail to apply this truth to the defendants is done so without ever raising the important questions to which
the system bias of media coverage is being done, viz, why is there a lack of a uniform application of the charges
levied against the defendants levied against corporate plants and slaughter houses when they use "electrical
current to stun animals to produce immediate unconsciousness? Why are African Americans only being told that
electrocution, drowning, hanging or shooting of animals warrant an indictment against Michael Vick and his co-
defendants and not the assorted members and organizations involved in agricultural meat industry? Does the
absence of a verified and accurate discussion about the Humane Slaughter Act enacted by the United States
Congress in 1958 to ensure "the animals will be stunned into unconsciousness prior to their slaughter to ensure a
quick, relatively pointless death" constitute system bias in the way that some or indicted and others are not?

Escalations of physical, emotional, psychological tensions between the guardians, custodians and protectorates
of animals and supporters of the defendants have begun to increase as they begin to entrench their will,
advertisement and heightened visibility to checkmate the movement, strategy and tactics of the defendants to
fight the legal contest and the public relation nightmare. Such a legal dispute pitting the indicted defendants
should have also included members of the restaurant and retail food industry in which we would have a thorough
discussion about animals, food, safety and security. This dispute has caused the guardians and protectorates of
animals to engage in a series of political maneuvers aimed at arousing the public to support its intentions. Their
maneuvers have caused the public to park their cars, stand on sidewalks and waive poster boards and signs
along interstate highways in route to the headquarters of the National Football League and Atlanta Falcons. By
the same token, this political passion has also aroused pan-Vick nationalism and refocused once again public
attention on the case law and statutory law that guarantee defendant with the right to a speedy trial, due process,
presumption of innocence and rights guaranteed by the Constitution of State of Georgia and United States.
DOES THE SARBANES-OXLEY ACT PROMOTE ETHICS IN CORPORATE GOVERNANCE?

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INTRODUCTION

Ethics, as a concept, is difficult to define because people view the concept in different ways. According to Mintz and Morris (2007), ethics are acceptable standards of behavior that define how people ought to act (i.e., prescriptive), not how people really act (i.e., descriptive). Ethics, therefore, are principles or rules that guide people on what is considered right or wrong.

Ethics, in corporate governance, refer to moral values, professionalism, business legitimacy, integrity, competence and prudence (i.e., due care), equity, and fairness (Dorweiler and Yakhou, 2005; Tipgos and Keefe, 2004; Mintz and Morris, 2007; and Koestenbaum, Keys, and Weirich, 2005).

The Sarbanes-Oxley Act (Act) was passed in 2002 to correct, among other things, ethical issues in corporate governance that caused the collapse of corporations such as Enron, ImClone, WorldCom, Global Crossing, Adelphia, and Tyco (Ryan, 2005; Tipgos and Keefe, 2004; McLean, 2005; and Guerra, 2004).

There is however a controversy about whether or not the Act has any positive impact on ethics in corporate governance. Petra (2006), Sama and Shoaf (2005), and Koestenbaum, Keys, and Weirich (2005) argue that the Act does not promote ethics in corporate governance; neither does it prevent future corporate failures. The Act merely provides a way to handle unethical acts within the corporate environment. They concluded that only corporate leaders, not the Act, could create and sustain ethics that will ultimately prevent corporate fraud.

Tipgos and Keefe (2004), however, contend that provisions of the Act promote ethics in corporate governance. They note that the Act enhances the independence of board of directors and audit committees, reduces conflicts of interest among board members and management, and empowers auditors and employees. They point out that the Act strengthens internal control systems, promotes transparent financial reporting, discourages earnings manipulation, fraud, and falsification of accounting records, and could have prevented unethical corporate practices that caused the collapse of Enron, ImClone, WorldCom, Global Crossing, Adelphia, and Tyco.

The purpose of this paper is to examine how the Act impacts ethics in corporate governance. It examines ethical issues in corporate failures and reviews aspects of the Act that promote ethics in corporate governance. It also identifies limitations of the Act in promoting ethics in corporate governance, and presents a summary and conclusion.

ETHICAL ISSUES IN CORPORATE FAILURES

Smith (as cited in Verschoor, 2004) contends that market forces will result in more efficient markets if a personal guide of acceptable standards of behavior, i.e., conscience or ethics, restrains self-interest.

Ethical issues in corporate failures include excessive concentration of power in Chief Operating Officers (CEOs); questionable selection, quality, and independence of board of directors (board); and possible conflicts of interest among board members and management. They also include inappropriate composition and operation of audit committees; earnings manipulation, fraud, and falsification of accounting records; and impairment of auditors’ independence (Ryan, 2005).
Excessive Concentration of Power in CEOs

Ray (2005) indicated that the separation of dispersed owners of corporations from management tends towards inattentiveness, results in excessive concentration of power in CEOs, and causes corporate failures. Ryan (2005) argues that prior to the Act, CEOs, with their limitless and unchecked power, were influencing the composition of their boards and audit committees, allocating grossly disproportionate executive compensations to themselves and their docile board members, and engaging in earnings manipulation, fraud, and manipulation of accounting records.

CEOs were responsible for 72 percent of financial statement fraud and accounting failures between 1998 and 2003 (Committee of Sponsoring Organizations of the Treadway Commission [COSO], 2004). The excessive concentration of power in CEOs resulted in Tyco CEO’s indiscriminate acquisition of 200 companies around the world, lavish personal spending of corporate funds, and concealment of the corporation’s poor operating performance; it also caused WorldCom board’s approval of enormous personal loans to the corporation’s CEO (Ryan, 2005).

Questionable Selection, Quality, and Independence of Boards

The quality of performance of a board depends on the character of its individual members. If the CEO determines the membership of a board, then the board will likely consist of the CEO’s friends and family members, i.e., a board that lacks the experience and independence to exercise its oversight authority over the CEO. Petra (2006) argues that before the Act, dominating and powerful CEOs were in control of the nomination process for their board members: CEOs were hiring their board members instead of board members hiring CEOs. Greenspan (as cited in Petra, 2006) also contends that board members will always concede to powerful CEOs that appoint them and who could possibly remove them from future slots of board nominees. Ray (2005) notes that a passive and rubber-stamping board, that owes its allegiance to the CEO, rather than investors, will create weak corporate governance, yield to pressure and demand of the CEO, and fail to exercise appropriate ethical responsibility.

COSO (2004) identifies domination of insiders and “gray” board members - outsiders who have personal or family ties with the corporation or management - as a major cause of financial statement fraud. Petra (2006) traced the collapse of Enron, WorldCom, and Global Crossing to board members who lacked independence from management thereby failing to fulfill their oversight responsibility. Ryan (2005) also linked Adelphia’s collapse to a board consisting of family members nominated by the CEO, i.e., a board that lacked the independence to exercise any oversight function.

Dorweiler and Yakhou (2005) point out that key ethical issues are the selection, quality, and independence of board members as well as the corporation’s conception of board independence, board’s access to management, board’s size, and compensation policy for board members.

Possible Conflicts of Interest among Board Members and Management

Mintz and Morris (2007) note that a conflict of interest arises in corporate governance when private or personal considerations affect the judgment and decisions of board members and management.

Prior to the Act, most board members had consulting, advisory, or business relationship with corporations on whose board they sit. These relationships created conflicting roles that ultimately affected board’s judgment and fairness of decisions.

COSO (2004) highlighted that the negative impact of conflicts of interest among board members contributed significantly to management fraud and accounting failures: board members and management owned about one-third of equities in corporations involved in financial statement fraud, with CEOs personally owning about 17 percent. Ryan (2005) and Ray (2005) similarly traced Enron’s collapse to the board’s decision to suspend the corporation’s policies on conflicts of interest and code of ethics, and its subsequent involvement in fraud, concealment, and impenetrable creative accounting. They also linked Adelphia’s collapse to the board’s practice of awarding contracts to itself and its use of the corporation’s funds for exorbitant personal purchases. Ryan
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(2005) also associated WorldCom’s collapse to its passive board that was massively enriched by the fraud perpetuated by the corporation’s CEO.

**Inappropriate Composition and Operation of Audit Committees**

The ability of a corporation to engage in financial statement fraud and earnings manipulation depends on the composition and operation of its audit committee. Yakhou and Dorweiler (2005) reported that the power and influence of CEOs before the Act extended to the composition and activities of audit committees.

An audit committee, consisting of members personally selected by the CEO, lacks the independence and well-defined responsibilities to engage in effective oversight of management actions, and is an example of poor corporate governance that caused most corporate failures (Grace, 2005; and Guerra, 2004).

COSO (2004) highlighted the poor quality of audit committees and their inappropriate operations as major causes of corporate failures: Audit committees in failed corporations met either infrequently or not at all and 65 percent of the committees did not have any financial expert.

**Earnings Manipulation, Fraud, and Falsification of Accounting Records**

Mintz and Morris (2007) argue that a dominating and powerful CEO often determines the membership of the corporation’s board and audit committee. This process may result in a board and audit committee that lack the independence and experience necessary to exercise appropriate oversight functions. Such corporation frequently has a weak internal control structure, earnings manipulation, and financial misstatement.

**Impairment of Auditors’ Independence**

External auditors of most corporations, prior to the Act, were involved in auditing as well as accounting, tax, and other consulting services for same corporations they audit (McLean, 2005). These responsibilities could impair the independence of auditors thereby causing conflicts of interest. Romano (2005) found that auditors were receiving high non-audit service fees from corporations that made them to overlook questionable transactions and accounting malpractices in these corporations.

Guerra (2004) has noted that a compromised auditor has a limited capacity and authority to challenge management and will likely condone the breach of fiduciary duties by both management and board. COSO (2004) reported that a majority of audit reports were issued during the fraud period of several corporations with 55 percent of such reports containing qualified opinion only in the last year of the fraud. According to the study, external auditors were either allegedly involved in the fraud (30 of 56 cases) or were negligent in the audit (26 of 56 cases).

**ASPECTS OF THE ACT THAT PROMOTE ETHICS IN CORPORATE GOVERNANCE**

The Act mandates a code of ethics for management and specifies measures that enhance the authority, role, and independence of audit committees. It designates corporate responsibility for financial reporting and resolution of conflicts of interest on boards and management. It also established standards that may impact on the independence of auditors as well as empowering employees.

**A Mandatory Code of Ethics for Management**

Koestenbaum, Keys, and Weirich (2005) explain that investors’ trust in a corporation is based on a strong corporate control system and a code of ethics that align the corporation’s long-term interests with those of stockholders.

The Act mandates a corporation to file a disclosure that it has a code of ethics for its senior financial officers, and if not, list the reasons. It also requires a corporation to report any change or waiver of the code of ethics for these officers.
The Act specifies a “code of ethics” as standards necessary to promote an honest and ethical conduct of corporate activities. It views a code of ethics as a solution to problems of fraud, earnings manipulation, and falsification of accounting records; inappropriate executive compensation; excessive concentration of power in CEOs; and questionable composition and operation of boards and audit committees. It also requires a corporation to establish procedures for handling actual or apparent conflicts of interest between personal and professional relationships and also give a full, fair, accurate, timely, and understandable disclosure of such situations in its periodic reports.

Grace (2005) affirms that such a code of ethics acts as a check and balance to strengthen those inclined to stray in times of temptation and assists management to outline best practices in corporate governance. Daily and Dalton (2005) also suggest that it provides a strong signal to investors that a corporation is committed to act within current best business practices. It also provides an additional comfort to a prospective board member in deciding whether or not to accept a board position in a corporation.

Bernardi and LaCross (2005) commented that the Act encourages a corporation to nurture a good reputation and be more proactive in promoting ethical behavior. They identify the upward swing in corporations’ disclosure of their code of ethics as evidence that post-Act corporations are becoming more sensitive to meeting the expectation on ethics.

Enhanced Authority, Role, and Independence for Audit Committees

Rezaee, Olibe, and Mimmier (2003) explain that a strong and independent audit committee assumes an important oversight role in corporate governance, promotes public interest, enhances audit efficacy, and insures an effective oversight of financial reporting.

The Act specifies that the audit committee of a corporation should consist of its board’s independent members who do not receive any consulting, advisory, or other compensatory fees from the corporation. It also requires the committee to have at least one member who is a financial expert, and if not, the reasons.

The audit committee should be responsible for appointing, remunerating, and overseeing activities of the corporation’s external auditor. These responsibilities enable the audit committee to resolve conflicts in financial reporting between management and the auditor. It should also establish procedures for the receipt, retention and treatment of complaints on accounting, internal controls, and auditing matters, including employees’ anonymous submission on questionable accounting or auditing issues in the corporation.

Braiotta and Zhou (2006) suggest that the above measures can promote ethics in corporate governance because they enhance audit committee’s independence and effectiveness. Tipgos and Keefe (2004) affirm that an independent audit committee, as envisaged by the Act, can uphold ethical conduct, strengthen internal control systems, and monitor the collection of information regarding corporate misconduct. Braiotta and Zhou (2006) also point out that such an audit committee will discourage aggressive earnings manipulation, reduce the number of internal control problems, and minimize the need for financial restatements.

Imposition of Corporate Responsibility for Financial Reporting and Resolution of Conflicts of Interest on Boards and Management

The Act imposes corporate responsibility for financial reporting on boards and management by mandating CEOs, or other principal and financial officers of corporations, to sign an undertaking that they have reviewed the financial report and that the report does not contain any material omission or misstatement. They are also required to sign an undertaking that they accept responsibility for establishing and maintaining internal controls; that they have evaluated the effectiveness of their corporations’ internal controls; and that they have presented a report of the evaluation.

The Act requires an executive officer of a corporation to forfeit any bonus received from the corporation, and the profit from the sale of such bonus, if there is any material non-compliance that results in accounting restatement by the corporation. It also prohibits a board member or management from purchasing or selling the corporation’s
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equity during the blackout period. It restrains board members and management from obtaining any personal loan from their corporation except they obtain such loan in the ordinary course of the corporation’s business. It also mandates board members and principal officers of a corporation to disclose their ownership of more than 10 percent equity in the corporation.

The Act imposes accountability for corporate and criminal fraud on management by establishing stringent penalties for any criminal act of falsification and destruction of corporate accounting records. It also discourages any improper influence on the conduct of audits by prohibiting management from engaging in acts that fraudulently influence, coerce, manipulate, or mislead the auditor in the audit of the corporation’s financial records.

McLean (2005) noted that the Act expects these requirements to be enough deterrent to management fraud because they impose responsibility for financial reporting and resolution of conflicts of interest on management. Tinkler (2005) also argues that the Act may be an important step in improving corporate governance, especially in areas of commitment to transparency in financial reporting, support for ethical business behavior, internal control reporting, and independence of auditors.

**Improved Independence for Auditors**

Bernardi and LaCross (2005) found that the impairment of auditors' independence was a major cause of corporate fraud and failure. Therefore, the Act prohibits an auditor from engaging in non-audit services (such as, bookkeeping, financial information design and implementation, or internal audit outsourcing) for the same corporation that it audits. Yakhou and Dorweiller (2005) affirm that this prohibition enhances the independence of auditors and forecloses conflicts of interest between auditors and management.

The Act requires auditors to obtain a pre-approval for permissible non-audit services from the corporation’s audit committee while they are required to report any material communication with management to audit committees as well.

It prohibits an auditor from auditing a particular corporation if that auditor, during the past one year, employed the CEO, Controller, Chief Financial Officer, or any person in similar position in that corporation, and such person participated in the audit of the corporation during this period. It also requires the audit partner handling a particular corporate audit to rotate every five years and imposes stringent penalties on the auditor for any criminal act that results in the destruction of corporate audit records.

Furthermore, the Act creates and empowers the Public Company Accounting Oversight Board (PCAOB) to regulate auditing practice, establish auditing standards and guidelines, and enforce auditors’ compliance with the guidelines.

**Empowerment of Employees**

Tipgos and Keefe (2004) argue that a three-way relationship between the board, management, and employees will balance the power structure within a corporation, enhance corporate ethics, promote accurate financial reporting, and prevent management fraud.

The Act offers protection from discrimination, intimidation, or loss of employment, to any employee of a corporation that provides evidence of fraud, i.e., a whistleblower. Grace (2005) affirms that this protection underlines the importance of checks and balances in corporate governance.

Tipgos and Keefe (2004) contend that the Act supposedly prevents management fraud by making it difficult for management to manipulate accounting records and overrides internal controls under the watchful eyes of empowered employees.

**LIMITATIONS OF THE ACT IN PROMOTING ETHICS IN CORPORATE GOVERNANCE**

The Act has major limitations despite its provisions that promote ethics in corporate governance.
The Concept of “Ethics” is difficult to define

The Act avoids a definition of ethics since § 406 (c) of the Act merely gives a guide on the concept. Sama and Shoaf (2005) contend that an appropriate definition of “ethics” is however necessary to deter corporations from giving the concept different interpretations thereby confirming the fear that the Act cannot impose ethics because people will always define the concept to suit their purposes.

Importantly too, the Act does not really impose ethics on corporations because it merely requires them to disclose that they have a code of ethics, and if not, the reasons. Corporations are invariably excused from having the code if they have reasons.

The Act ignores the Role of People in creating an appropriate Environment for Ethics

Tinkler (2005) contends that greed may have caused the ethical problems in Tyco, Adelphia, Ahold, and WorldCom. He concluded that people tend to do what is most convenient, not necessarily what is right; they do whatever it takes to win; and they rationalize their choices based on whatever seems right to them at that time, i.e., situational ethics.

The Act requires corporations to improve on ethics whereas most ethical issues in previous corporate scandals were leadership problems not inadequate statutes (Verschoor, 2004). The solution is therefore a culture that rewards responsible behavior and encourages a more ethical approach to corporate governance. The concept of ethics in corporate governance is a culture that upholds stakeholders’ interests, i.e., shareholders, creditors, employees, customers, suppliers, and government agencies (Mintz and Morris, 2007).

Bernardi and LaCross (2005) affirm that ethics impose obligation on management to create a corporate culture of transparency and accountability. Koestenbaum, Keys, and Weirich (2005) also identify an important role for management and CEOs in creating a "tone at the top" that promotes ethical conduct and permeates the corporate culture. They recommend an environment that ideally deters misconduct before it takes place rather than punish it after the damage has been done. Levitt (2005) however contends that the lack of true leaders that put public interest above corporate interest and career benefits in the business community is overlooked.

Legislation cannot impose Ethics on People

Legislation cannot cover all ethical obligations. Abuses and unethical actions cannot be eliminated by legislation because the unethical will always devise ways to circumvent statutes without necessarily breaking them (Mintz and Morris, 2007; Sama and Shoaf, 2005; and Daily and Dalton, 2003). Verschoor (2004) argues that legislation only insures corporations’ adherence to the letter, not the spirit, of the law.

The Act requires a majority of outside independent members on a corporation’s board as a solution to ethical issues in corporate failures. However, studies by Romano (2005) and Petra (2006) revealed that independent boards do not improve ethics in corporate governance.

The Act also requires the audit committee of a corporation be composed of its outside independent board members with at least one financial expert. The evidence on the contribution of this requirement is inconclusive. Romano (2005) and Petra (2006) argue that audit committee’s independence might not be a deterrent to corporate fraud. They were unable to find a relationship between audit committee’s independence and corporate performance. Romano (2005) however cited other studies that found a positive correlation between board members with financial expertise and effective controls.

The problem of inappropriate and excessive executive compensation has not abated despite the provisions of the Act. Petra (2006) identifies the disconnection between corporate performance and executive compensation as a red flag that something is wrong with the corporate system especially when managers receive excessive executive payoffs while stockholders lose their investment through falling equity prices. Ward (2007) reports that Home Depot’s former CEO recently received $210m payoff despite the poor performance of the corporation’s equity. Guerrera and Callan (2007) point out that the U.S. Congress is now considering enacting another law that will tie executive pay to performance and also give shareholders the right to vote on executive compensation in
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order to tackle the problem of excessive executive compensation in corporations. The current position indicates that the Act has failed to solve the ethical issue in executive compensation and further regulations are possibly required to solve this problem.

Negative Perception of a Whistleblower

Tipgos and Keefe (2004) argue that the larger society and coworkers view a whistleblower as a traitor despite the protection guaranteed by the Act. This negative perception of a whistleblower may be a deterrent to any employee who may be willing to give information on financial malpractices in corporations.

SUMMARY AND CONCLUSION

The Act focuses on correcting critical areas of poor corporate governance by mandating ethics, integrity, and professionalism in corporations but it fails to have any major positive impact on ethics in corporate governance despite no corporate failure since its introduction in 2002.

The Act may, however, have succeeded in raising ethics to a level of prominence and concern in corporate governance. Petra (2006) contends that the Act has introduced a change in corporate thinking whereby corporations now focus on good character and moral conduct while they now compete for the reputation of having the most conservative and transparent set of books. The Act may not prevent future corporate fraud but it provides a way to handle unethical acts within the corporate environment.

Because the Act was just introduced in 2002, its time frame is not long enough to obtain sufficient insight on its positive impact on ethics in corporate governance. This limitation underlines the need for further research in future.

REFERENCE


ADMINISTRATION, SOCIAL AND POLITICAL WORKSHOPS
A LEADERSHIP IMPERATIVE

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ABSTRACT

This paper represents a partial summary of an external program evaluation done at a suburban public school. The gifted and talented program of this diverse district was examined. The district had recently changed central office administrators and now was an appropriate time to investigate the continuance of these services, modifying the program, or perhaps dropping the program entirely in favor of other options. The evaluation covered students, teachers, parents, alumni, and administrators. It became clear as the data was collected that leadership was a key element of concern from many vantage points.

A LEADERSHIP IMPERATIVE

External evaluators have an interesting window on school district functioning. We were recently hired to conduct a program evaluation on a long-standing program for gifted students at a suburban school district.

The program had existed since the late 1970's and had evolved and grown over the years in many ways. Now the district was interested in finding out if they should keep the program intact, modify it, or simply direct their resources elsewhere.

The program originally followed the Renzulli Enrichment Triad Model (Renzulli, 1976) that was highly favored in the late 1970's and early 1980's. Different personnel and different district emphasis caused inevitable evolution in the program. The leadership of the program had been solely in the hands of a veteran teacher who had been with the program from its inception. This teacher retired several years ago. Since that time the program was supervised by several administrators at several different levels within the district.

New administrators came along over the years and some are just a few years into their careers at this diverse suburban district with a K-12 student population of about 5,500.

We surveyed over 233 individuals regarding their opinions of the program. Students, alumni, teachers, parents, and administrators all were surveyed and, in addition, some were randomly selected for interview. The resultant data clearly indicated patterns regarding this program.

A survey questionnaire of 16 questions was developed to survey the students. Thirteen of these questions had students select from a four point Likert-type scale the additional three questions were open ended. Alumni, parents, teachers, and administrators were given congruent surveys that had a similar number of questions on similar issues but from their perspectives.

A survey questionnaire of 16 questions was developed to survey the students. Thirteen of these questions had students select from a four point Likert-type scale the additional three questions were open ended. Alumni, parents, teachers, and administrators were given congruent surveys that had a similar number of questions on similar issues but from their perspectives.

In addition, eight open ended questions were developed to use as face-to-face interview questions for a randomly selected group of parents, teachers, and administrators. These subjects that were interviewed had also taken the survey.

Students, student alumni, and parents were all generally positive about the program and wanted some continuation of services to the selected students. In a four point Likert-type scale the average score of the 216 respondents was 3.8 that they tended toward the “strongly agree” category of enjoying the program and getting value from it. This was the highest single score category of the 16 questions in the survey itself. Other questions
that seemed to logically support that question were also answered with high averages of 3.4 and 3.5 also tending toward “strongly agree”.

Three basic areas of need arose from the data collected by the interviews and surveys:

1. the curriculum needed to reflect a focus more directly related to the standards that the classroom teachers were directing instruction toward
2. the curriculum needed updating and differentiating in some ways, and
3. the program leadership was in need of serious attention.

This paper will focus mainly on the leadership elements since the authors feel that without addressing the leadership arena first, little will occur to restore the program to its former positive impact on students. Without solid leadership any of the other revisions that are needed will likely not be effective or be done with a level of ownership that will ensure long term success.

Teachers and administrators had interesting views of the program. The teachers and administrators both felt there was clear value in the program but indicated that perhaps a change was needed in the content and delivery of the services to increase the program’s overall effectiveness. Almost 98% of the respondents of these groups responded with such comments and/or survey response choices.

Differences them arose in what was to be the course, who would be in charge and how an effective evolution would best be undertaken. When asked who is in charge of the program many different responses came up including the majority (88%) that clearly stated “I don’t know”. Several people also responded with stating who “used to be” in charge, but that they were uncertain of who was currently responsible for the program. This was disconcerting as an outside evaluator to a program that was so well thought of by students, parents, and alums. How could it evolve if no one knew who was in charge? That indeed was the interesting dilemma that arose from this inquiry process.

The leadership gap was evident and needed attention. The teacher who, for years, had nurtured the program, helped to hire qualified professionals, fought for funding, and implored administrators to expand the services was no longer there. The mantle of leadership had truly not been taken up by any one person. Yes, an administrator was assigned to oversee the program but it was clear that many did not know exactly who that was and how to approach them for programmatic change.

The distributed leadership of the past, that lead teacher in charge of many program elements connecting with appropriate administrators, had worked for years. Now with new administrators on board and teachers who lacked the years of experience within the program a dilemma was unfolding. Change was clearly called for in areas of curriculum and service delivery (over 82% of the teachers and administrators responded that change was needed in this area). Who would lead them and in what direction? In the past those were fairly easy questions to answer, now no one really knew how to best answer that.

The program’s future clearly hangs in the balance. The leadership gap is far from the day-to-day interaction with the student but affects it most seriously. The program would neither evolve nor even continue without addressing this leadership gap.

When we talk about school leadership it is often couched in vague terms with lofty goals. In this case, leadership was clearly a function that would drastically affect student services in a very immediate and final fashion.

Many times school districts invest leadership in a distributed scenario where teacher-leaders form the base of student programming support. This typically works very well and is closest to the point of delivery that makes ultimate sense. In this case, as in many cases, when the teacher retired the program was adversely affected and a leadership gap appeared and began to grow. Within just a few years staff were not sure who to report to on program issues, administrators were not sure who at the building level clearly was maintaining program standards and had the ability to change service delivery, this became so evident that it was now being discussed, “What should we do with this program?”. 
School leadership is a critical element to student success and is no where more illustrated than an example such as this. Do not underestimate the power and leadership of quality teachers and how they maintain interaction with administration. Developing a plan of leadership and program evolution process is key to long-term success of a district and ultimately the students.

Two of our recommendations for the district were fairly direct: establish defined leadership and approach program evolution or redirection once that is in place. Students, alums, and parents clearly wanted program continuation (91%). Teachers saw advantages that were worth continuing as well. Who would do it, what path, and how it would be undertaken remained to the major issues. Quality leadership, of both teachers and administrators, could clearly save such a program and restore its effectiveness ultimately serving all district students.

This example clearly indicates that leadership is key to program, and therefore, student success. The leadership imperative was apparent by all parties in this evaluative process although discussion of leadership as a separate issue was not primary to any individual or group at the onset of this process. The commonality of the need was shown through the regularity at which the lack of leadership was mentioned, and the fact that accountability was vague, and the fact that the program hierarchy continually escaped clear definition.

It is the authors' opinion that clearing up the leadership issue will be a key element to the longevity and future success of the program. The program had other needs, identified through this evaluation process as well, which we have not fully detailed in this paper but all hinge on the leadership issue being resolved first. Quality leadership will obviously affect the evolution of the program and the degree to which the other factors will positively impact the students.

REFERENCES

SCIENCE AND TECHNOLOGY

FULL PAPERS
AN EXAMINATION OF THE FACTORS CONTRIBUTING TO INFORMATION TECHNOLOGY ACCEPTANCE IN A DEVELOPING COUNTRY

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ABSTRACT
This study examines how education and age could influence information technology acceptance in a developing country. We further examine the applicability of the factors identified in prior literature in a developing country by adapting Davis’ (1989) model and Ferguson’s (1997) model. Accordingly, two research questions were proposed. This study contributes to the IT acceptance literature by introducing the effect of education and age, in a developing country context. Instead of using a single questionnaire methodology from an employee perspective alone, we use both a questionnaire with the employees and interviews with the employers and the vice-mayor of the city to provide additional insights from multiple perspectives. The findings of this research indicate how practitioners in developing countries can motivate IT acceptance within their organizations.

Key words: Information Technology, Developing Nations, Smes, Technology Acceptance Model

INTRODUCTION
In an international competitive business environment, it is increasingly important to exploit information technology (IT) to realize gains in efficiency, effectiveness or productivity (Bhattacherjee and Sanford 2006). This presupposes the acceptance of technology across nations with differing levels of development. However, developing nations have distinctive disadvantages which include lack of access to resources such as water, adequate housing and education (Walsham et al. 2007). Education coupled with information technology is one way that would be effective in overcoming the economic and social gap between developed and developing countries. Motivated by research that suggests that behavioural models do not hold universally across cultures (Iivari and Igbaria 1997), we examine the applicability of previous models of IT acceptance in a developing country such as China.

Our approach then diverges from prior research by examining the impact of education and age on acceptance of IT in a developing country. There is evidence from economic research that schools in developing countries are not effective (Glewwe 2002) and in China’s case the education system appears to be relatively successful only in meeting the lower-level skills needed for traditional industry (Venter 2004). We posit that the acceptance of IT will be hindered for individuals with a lower level of education in China. While age differences have been extensively studied by psychology researchers (Rhodes 1983; Girard 1993; McCarty and Shrum 1993), only a few IT studies have examined such an effect on IT acceptance (Morris and Venkatesh 2000; Venkatesh et al. 2003). However, evidence suggests that age differences in information processing impact on older workers’ performance of computer based tasks (Czaja and Sharit 1993; Shari and Czaja 1994). The impact of age on IT acceptance is expected to be more pronounced in developing countries such as China where only recently modern education practices have been adopted.

In addition to considering the impact of education and age on IT acceptance, we examine whether other factors such as perceived usefulness, perceived ease of use, attitude and anxiety identified in prior research also impact on IT acceptance in a developing country such as China. Two research questions tested in this paper are:

1. Are the factors impacting on IT acceptance identified in a developed nation also applicable in a developing country setting?
2. Does education and age impact IT acceptance in a developing country?
The remainder of this paper is organised as follows. The theoretical background of the study is described next. The research methodology and data analysis are then presented. The paper concludes with a discussion of results, limitations and suggestions for future research.

**THEORETICAL BACKGROUND**

In this section, we review the technology acceptance literature to develop the theoretical models. The initial Technology Acceptance Model (TAM) (Davis 1989) and an extended TAM model developed by Ferguson (1997) are used as the foundations for the theoretical models of this study.

Davis (1989) and Davis et al. (1989) conducted two of the earliest studies into IT acceptance using the Theory of Reasoned Action (TRA). TAM is based on TRA and the underlying relationships of TRA were proposed by Ajzen and Fishbein (1975) who posited that a person’s behaviour is driven by his behavioural intention to perform the behaviour and that, in turn, this intention is a function of his attitude toward the behaviour and his subjective norm. In this model, attitude affects behaviour through a person’s intention to perform this behaviour. The model developed enabled psychologists to explain why and how intention affects the behaviour of people. As such TRA is the theoretical basis for one of the main streams of IT acceptance models. Davis et al. (1989) state that, TRA is a well-researched intention model that has been widely used as a basis of predicting and explaining behaviour across a wide variety of domains. This model has been tested in a number of studies (Davis 1989; Davis et al. 1989; Hendrickson et al. 1993; Segars and Grover 1993; Compeau and Higgins 1995; Ferguson 1997; Taylor 2001; Venkatesh et al. 2003) which have demonstrated the validity and reliability of TRA.

Davis et al. (1989) applied TRA to an individual’s acceptance of IT and found that the variance explained was largely consistent with studies that had employed TRA in the context of other behaviours. In TRA, Davis (1989) defined PU as “the degree to which a person believes that using a particular system would enhance his or her job performance” while PEU was defined as “the degree to which a person believes that using a particular system would be free of effort.” Adams et al. (1992) replicated the Davis (1989) study and validated Davis’ measurement scales for PU and PEU. However, Segars and Grover (1993) re-examined PEU and PU by applying a confirmatory factor analysis. This analysis indicated that the original measurement scales of Davis (1989) could be improved. This paper therefore uses a modified set of items in the questionnaire to develop the measurement scales for PU and PEU.

Hendrickson et al. (1993) tested the reliability of PU and PEU by using the test-retest technique. While the PU and PEU individual scale item correlation results were not exceptionally high, the subscale correlations were satisfactory. The results were consistent with previous test-retest results for instruments measuring the success of information systems. Hendrickson et al. (1993) suggested that some caution should be taken when generalizing these results to applications for which the instrument had not been validated. Nonetheless, the results demonstrated that the Davis (1989) instrument exhibited a high degree of test-retest reliability. It should be noted that although the causal relationship of PEU to PU was suggested by Davis (1989), it was not tested in that study but subsequently tested in the Davis et al. (1989) study. We adapt the Davis (1989) model as the initial model (Model 1) to test research question one for the data collected concerning IT acceptance in China.

Ferguson (1997) further extended Davis (1989) by including anxiety and attitude as intervening variables between PEU, PU and usage. Ferguson found that PU and PEU affected computer attitude through computer anxiety. Furthermore, anxiety was negatively associated with computer attitude. Ferguson found that PU was not significantly correlated with usage while PEU was a significant predictor of usage. Such a strong effect from PEU to usage resulted in attitude having a non-significant effect on usage. These results indicate that the direct relationship between PEU and usage appears to mitigate the indirect effects from the variables through attitude to usage. The importance of Ferguson’s study is that it shows more generalisability to the business world because it was based on a survey of accountants employed by the Big Six accounting firms whereas Davis (1989) used data from student participants. While Ferguson (1997) focused on job satisfaction and job performance, this paper is concerned with IT acceptance and hence does not include these two variables. Therefore Model 2 is an adaptation of the Ferguson (1997) model and is used to test the generalisability of the relationships developed in Ferguson’s model towards IT acceptance in a business environment in China.
Furthermore, this paper focuses on Small and Medium Enterprises (SMEs) as sites for the research study. Altman and Sabato (2006) note that SMEs are important in the United States because SMEs provide approximately 75% of the net jobs added to the economy and employ around 50% of the private workforce, representing 99.7% of all employers. Similarly, George et al. (2002) found that SMEs account for more than 50 percent of employment in developing countries.

METHODOLOGY

The collection of data involved two methods. Firstly, a self-administered questionnaire was administered with employees in SMEs in the city of Changzhou of Jiangsu Province, China. The second involved interviews with six employers and one vice mayor of the city.

A list of 73,000 local companies was obtained from a Changzhou business directory produced by EmageCompany Ltd. A random selection of 65 small and medium manufacturing firms was taken from the list based on the criteria that they employed less than 500 employees (Harvie and Lee 2001).

The interviews with the six employers and vice-mayor of the city were conducted to provide further insight into factors affecting IT acceptance from an employee perspective. The interviews with the employers were used to determine motivators and inhibitors that were considered important to the employers in SMEs in a China which have not been previously covered in the literature. Furthermore, the viewpoints of the general managers could help to explain and/or reinforce the results obtained from the questionnaire data.

Initial contact via phone was made with the 65 general managers of the companies to obtain permission to conduct the survey. All the managers agreed to give the researcher access to their employees to administer the survey instrument. The researcher physically visited each company and met with each company representative and employees to explain the purpose of the research. The presentation informed the employees about the research project and stressed that their participation was purely voluntary. The direct contact made with the employees was aimed at improving the response rate as it was hoped the employees would gain a better understanding of the research and enable them to realise that the information being provided would be treated in a strictly confidential manner with anonymity being guaranteed at all times. Dillman (2000) suggests such an approach impresses the importance of the survey to respondents so as to improve the response rate.

After the initial visit, a total of 500 questionnaires with stamped self-addressed envelopes were distributed to 65 companies for employees to collect if they decided to participate in the project. Two hundred and eighty-two questionnaires (56.4% response rate) were returned from 57 manufacturing firms, representing 88% of the firms surveyed. Of these, twelve questionnaires were unusable because of incomplete data. This resulted in 270 usable responses (54%) which is considered a satisfactory response rate (Singleton and Straits 2005). Of the 270 respondents, 141 were male (52%) and 129 female (48%).

Computer usage was measured by a two item construct adopted from Davis (1989). IT acceptance factors measured in the questionnaire consist of PU, PEU, attitude and computer anxiety. All the items in the questionnaire measuring these factors (except computer usage) employed a 7-point Likert scale from 1-strongly disagree and to 7-strongly agree. Descriptive statistics are provided in Table 1.

Computer Usage

IT acceptance has consistently been measured by self reported computer usage (Davis 1989; Davis et al. 1989; Adams et al. 1992; Igbaria 1994; Ferguson 1997; DeLone 1998; Venkatesh et al. 2003). A two-item scale based on Davis (1989) was used to measure computer usage.

Perceived Usefulness (PU)

Perceived usefulness refers to “the extent people believe it will help them perform their job better” (Davis 1989). Davis (1989) developed a six-item scale to measure PU. Segars and Grover (1993) retested the Davis’ scale and found only three of the items were significantly correlated with usefulness. Therefore we adopt this three-item scale to measure PU.
Perceived Ease of Use (PEU)

Perceived ease of use, refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis 1989). Davis (1989) developed a six-item scale to measure perceived ease of use. Ferguson (1997) also used this scale to measure PEU. However, Segars and Grover (1993) retested the Davis (1989) scale and found that only three of the items were significantly correlated with ease of use. We adapt this three-item scale to measure PEU.

Attitude

Ajzen (1991) defined attitude as a favourable or unfavourable evaluation or appraisal of the behaviour in question. In the current research, we used an eleven-item scale to measure attitude adapted from Hatcher & Diebert (1987) and used by Ferguson (1997).

Computer Anxiety

Computer anxiety is defined as “the tendency of an individual to be uneasy, apprehensive, and/or phobic towards current or future use of computers in general” (Igbaria 1994). Heinssen et al. (1987) developed and refined prior anxiety scales to produce the Computer Anxiety Rating Scale (CARS). The CARS four-item scale was adopted for the current research to measure anxiety.

Education and Age

The majority of the respondents were aged between 20-40 years of age, with an average of 33. A significant number of respondents held a college or college-equivalent degree (47%) and of these 25.6% held a higher degree.

ANALYSIS AND RESULTS

Data analysis proceeded in two stages to test the two research questions. AMOS software was used to generate Structural Equation Models (SEM) to conduct path analyses for all the models tested. The correlation coefficients of all the variables with their standard deviations and means are provided in Table 2.

AMOS is also used to generate goodness of fit measures such as CMIN/DF, RMSEA, AGFI and NFI for models with multiple pathways. These measures determine how well a model is formulated and if the criteria for these measures are met then further statistical analysis of the models can be undertaken. Table 3 provides the criteria for model evaluation used in this study according to Schermelleh-Engel and Moosbrugger (2003) and Anderson (2005).

Two models were adapted to test the first research question: Model 1 and Model 2.

Model 1 – Adaptation of Davis (1989) Model

Model 1 is a modified version of the model tested by Davis (1989) which contains the most basic elements in IT acceptance models.

The test of goodness of fit based on the criteria in Table 3 demonstrates that Model 1 has a good fit and therefore the overall goodness of fit assumption is supported (CMIN/DF=0, AGFI=1, NFI=1, and RMSEA=0). Further statistical analysis of this model was conducted to determine the significance of the relationships proposed in the model for China.

For comparison purposes, the standardized regression weights for relationships between the variables and the respective p-values are presented in Table 4 with those obtained by Davis (1989).
Although Davis (1989) found that PU was a more significant predictor of Usage than PEU, the current research found that PU was not significantly correlated with Usage. The relationship of PEU to Usage was significant at the 0.1% level. While Davis (1989) achieved estimates of 0.45 and 0.59 for PEU to Usage in group one and group two respectively, the relationship in the current study of 0.37 is weaker than that reported by Davis (1989). The present study found that the causal relationship of PEU to PU suggested in Davis (1989) was 0.50 and significant at the 0.1% level. This effect is stronger than that found by Davis et al. (1989), where PU and PEU were found to be correlated at the 5% level with an estimate of 0.24. This association in Model 1 was found to be consistent with Davis’ (1989) suggestion that PEU is causally related to PU and might explain why PU was not significantly correlated with usage in this study. The difference the results obtained for between PU and Usage could be due to several factors. First, the use of a refined measurement scale for PU and PEU in the current study compared to Davis’ model. Second, as PEU was found to be significantly correlated with PU, the effect from PU to usage might be mitigated by such a strong correlation between PU and PEU.

**Model 2 - Modified Version of Ferguson (1997)**

Ferguson’s 1997 model adapted core concepts from Davis (1989) but extended the model to include other moderators and additional paths among the factors. The model and results are shown in Figure 2.

The overall goodness of fit tested by the four criteria for Model 2 indicates that this model has been accurately formulated (CMIN/DF=0.245, AGFI=0.995, NFI=0.999, RMSEA=0). The standardized regression weights for relationships between the variables are presented in Table 5.

From the analysis of Model 2, four of the nine relationships were significant at the 0.1% level and three were significant at the 1% level. The two relationships which were found not to be significant were Attitude to Usage and PU to Usage, which agrees with the results obtained by Ferguson (1997). Davis et al. (1989) reported a similar result when they included a path from PU to behavioural intention to usage in TAM where attitude became a non-significant moderator. Ferguson suggested this non-significance could be caused by the measurement of usage, and that a multi-dimension measurement for usage might be required. A further possibility is that PEU in Model 2 has a dominating effect to usage and this might mitigate the effect of both attitude and PU to usage in the model.

Inspection of the standardized estimates in Table 5 indicates that PEU has a strong positive relationship with PU. One reason offered to explain this significant relationship is that when people consider something easy to use, they also considered it to be useful. This relationship has been tested and verified in earlier studies (Davis 1989; Davis et al. 1989). Consistent with the results obtained by Ferguson (1997) anxiety was negatively correlated with attitude, PU and PEU. This can be explained by the proposition that when people are anxious about using IT, they in turn would have a negative attitude to IT, perceive it as less useful or more difficult to use and consequently use the technology less.

In summary, seven associations in Model 2 are significantly correlated and in the expected direction. Although Model 1 resulted in a different outcome compared to Davis (1989), the results from Model 2 were consistent with those of Ferguson (1997). PEU was found to be a significant predictor for Usage in both models. The results confirm that the PU, PEU and anxiety impact IT acceptance in SMEs in China. Therefore, the response to research question one is affirmative. The factors impacting on IT acceptance identified in a developed nation also applicable in a developing country setting such as China.

**Model 3 – Education and Age**

Researchers have proposed that external variables might impact on attitude through PU or PEU (Davis 1989; Davis et al. 1989; Igbaria 1994; Mumford 1995). Igbaria (1994) suggested that one of the most important findings from his research was that computer skills had the strongest effect on usage. Education is one of the means to improve the skills relating to computers and education was also identified as an important moderator for IT acceptance in Venkatesh (2003). Thus a positive relationship between usage and education is proposed. As an external variable, it is also proposed that education should affect usage through PEU or PU. Since PEU
illustrated to be a stronger predictor than PU from our findings in Model 2, two pathways related to education were established in Model 3 to test the direct and indirect relationship between Education and usage. (see Figure 3)

Age differences have been extensively studied by psychology researchers who apply life cycle approaches to job-related attitudes and behaviour as theoretically important contributions to studies of aging (Rhodes 1983; Girard 1993; McCarty and Shrum 1993). Morris and Venkatesh (2000) reinforced the importance of research on age differences in technology acceptance and usage in the workplace. The association between PEU and age was proposed in Model 3.

[Insert Figure 3 here]

The goodness of fit tests for Model 3, together with comparable values for Model 2 are provided in Table 6. Inclusion of the additional variables in Model 3 increased the complexity of the model. As a result, the goodness of fit for Model 3 has slightly decreased for all four criteria compared with Model 2. In spite of this increased complexity, all four criteria for goodness of fit are still met, which indicates that Model 3 is well formulated. (Schermelleh-Engel and Moosbrugger 2003; Anderson 2005)

[Insert Table 6 here]

The standardised regression weights and p-values for Models 2 and 3 are provided in Table 7. In Model 3, most of the estimates are consistent with Model 2 except the relationships between PU to usage and PEU to usage.

[Insert Table 7 here]

Although the estimates for attitude to usage were different in both models, they were non significant. This non-significant correlation is consistent with the result obtained by Ferguson (1997). The major difference for the variables between Model 2 and Model 3 is that, while PU was not a significant predictor for usage in Model 2, it is significant at the 5% level in Model 3. The estimate for the relationship between PU to Usage increases from 0.103 to 0.136. This is an improvement on Model 2 since usage was found to have significant association with attitude in many previous studies. (Davis 1989; Davis et al. 1989; Adams et al. 1992; Segars and Grover 1993; Igbaria 1994; Ferguson 1997; Venkatesh et al. 2003)

Another difference between Model 2 and Model 3 comes from the association between PEU to Usage where the estimate for PEU to Usage decreased from .398 to .142. Furthermore, the significance level for PEU to Usage has dropped from 0.1% to 5%. The decreased effect of PEU to Usage could result from the increase of the correlation between PU and Usage and/or the inclusion of the two new variables (age and education) into Model 3 changed the whole dynamic of Model 2, resulting in a redistribution of the effects of PU to Usage and PEU to Usage.

Having included age and education into Model 3, it was found that both of these factors are highly significant (p<0.001) predictors for PEU and Usage. All the other pathways included in Model 2 still hold in this extended model. Besides the associations existing in Model 2, age is found to be negatively associated with both usage and PEU. This indicates that older people tend to use IT less in their work and perceive IT as less easy to use than younger people.

Education is positively correlated with usage and PEU which means that highly educated staff find it easier to use IT and tend to use IT more in their work. The findings of this study indicate education is an important factor in the successful adoption of IT in a developing nation setting for SMEs.

In conclusion, after including age and education into the model, the overall goodness of fit for Model 3 is sound and PU is found to be a significant predictor for usage which is consistent with earlier studies in this area (Davis 1989; Davis et al. 1989; Adams et al. 1992; Segars and Grover 1993; Igbaria 1994; Ferguson 1997; Venkatesh et al. 2003). Age and education were found to be significantly correlated with PEU and Usage in the model. In response to research question two, the results demonstrate that the model proposed by Ferguson (1997) could be improved with the inclusion of the two variables age and education and their associated pathways.
FURTHER INSIGHTS PROVIDED BY INTERVIEWS

Interviews were conducted with 6 employers and the vice mayor from the city where the firms were located. While employees were found to be primarily concerned with whether IT was easy to use or useful, the employers indicated the major factors impacting on IT acceptance from a managerial perspective view were cost-effectiveness, human resources, education, age of the users, anxiety, government support and limited monetary resources.

Half of the employers considered human resources and monetary resources as essential factors impacting the companies’ adoption and acceptance of IT. One of the employers stated that

*(The major inhibitor is) the cash. We have already invested a lot of capital in this area. For example, you have to invest continuously on software and hardware, which have to be continuously updated as well. The investment has to be approved by the headquarter (sic) with some conditions. Another problem is the education and training of the employees. Some older employees and low educated employees are having problems with this (IT).*

One third of the employers acknowledged that lack of education is a major inhibitor for employees to accept IT. Such a result reinforces the findings from the analysis conducted on Model 3, where it was found that education was significantly correlated with IT acceptance.

Consistent with the Model 2 and Model 3, anxiety about not being able to rectify technical problems was also mentioned by one of the employers:

*For inhibitors, as a company, we think that from daily management view point, it is not practical to have such advanced technology in every unit. Once you have any technical problem, it is very hard for the user to rectify (sic). For example, rectification, maintenance or any problem with the daily problem could be inhibitors for using (IT).*

Additionally, limited monetary resources were consistently mentioned by employers as a major inhibitor for the use of IT.

*From the view of our whole company. We are a big company, talking about the inhibitors, I think first we don’t have enough resources. Second, our staff is not highly educated. …It is too expensive to train the staff. The training cost is very significant.*

The problem of limited resources was also emphasized by the vice-mayor:

*…Maybe not for Changzhou, although it is for SMEs, because of the system problem, they just don’t have a very urgent (need)… or not necessary to change, to apply new technology. In relation to capital… They are facing problems which they think are more urgent to handle, they may feel that it is urgent / necessary to invest the capital in product, or production itself, instead of investing some money in change of the facilities, improving the productivity, efficiency, those kind of things. They are facing these realities. That’s why, at this moment, first they have to choose, first to buy the (necessary) equipment instead of (investing in IT).*

The government’s encouragement for using IT was specifically discussed with the employers and the vice mayor. Half of the employers interviewed considered that the government support is weak in relation to the promotion of IT. One of the employers replied:

*The government at their website encourages us to update our profile at their websites, it should be said that the government is encouraging enterprises to use IT. However, although the government encourages the enterprises to use IT, they still have not done a lot in legislation, provision of any services. All the action has to be taken by the enterprises, the government only encourages …*
Another manager stated that:

_The government... They do provide training courses. But they have nothing beyond that. The government can only promote (IT) to SMEs rather than interfere with the management of a company._

The vice-mayor also acknowledged this problem concerning the government’s support for IT:

_(In the future) ...they may be funded or sponsored, or (provided with) incentive for (using IT). There is so far no special funds supporting SMEs (for using IT). (It) can be in the form of providing loans to upgrade. We should have this kind of organization (arrangement). The bank won’t provide them loans for investing in IT, it is rather only for production, products..._

In summary, the interviews reinforced the results from the analysis of the questionnaire data that age and education are significant factors impacting on IT acceptance. However, the interviews presented some different view points regarding factors impacting on IT acceptance from a top management level and a broader government perspective. Especially that limited monetary resources are considered as a major inhibitor for adopting IT by both the employers and the vice-mayor. Although the interview method has been rarely adopted, the reasons given by managers and the government representative from the interviews in this research could provide an avenue for future research into areas about IT acceptance.

**CONCLUSION**

From a theoretical perspective, this research finds that in the context of a developing nation, IT acceptance is primarily affected by PEU. PU was not found to be a significant determinant for IT usage in Model 1 or Model 2, however it eventually presented a significant relationship in Model 3 after we brought in age and education. These results confirm that findings from earlier IT acceptance studies conducted in developed countries can be generalised to SMEs in China.

The results from Model 3 highlight the importance of the inclusion of additional variables in gaining a better understanding of factors that influence IT acceptance in a developing nation. In Model 3, both age and education were found to be significant factors influencing both IT usage and PEU. These two factors explain much of the variance regarding IT usage in Model 3. The results suggest that users with higher education qualifications perceive IT as easier to use and thus they are more likely to have a more positive tendency to use the technology. The results for the age variable indicate that older users perceive IT as more difficult to use and consequently are less likely to use IT in their workplace. The answer to research question two is that the existing research models could be improved by the inclusion of age and education to better explain the factors that influence the acceptance of IT by users of technology in SMEs in a developing nation.

The importance of education is consistent with the significant gap in education standards and resources between developing and developed nations. A contributory factor towards this ‘education gap’ found from the study is that older users of technology are less well educated than their counterparts in developed nations and therefore are less likely to adopt IT innovations.

In regards to anxiety towards IT acceptance, perceptions about ease of use and usefulness of IT were found to reduce users’ anxiety and improve their attitude towards using IT in both developing and developed nations. This result suggests that if users believe IT is easy to use and useful to them in their work, they are less anxious about using the technology.

The relationship between attitude and usage was not found to be significant in either Model 2 or Model 3. An explanation for this result is that both PU and PEU had a stronger direct effect on usage than their indirect effects through Attitude to Usage. Furthermore, the significant effect of PEU to Usage mitigates all the indirect effects through Attitude to Usage and the results from Model 2 confirm those obtained by Ferguson (1997). These findings support an affirmative answer to research question one.

Consistent with other studies using this type of methodology, several limitations must be acknowledged. First, the result did not show a significant relationship between attitude and usage. This result is consistent with
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Ferguson (1997) model but inconsistent with the existing literature and may be due to the inability of the self-reported measure to capture actual usage. Second, this study was limited to SMEs in one developing nation. It is advisable that further research should be conducted in other nations such as Brazil, Chile and India for example to determine whether these results can be generalised to other developing nations for both SMEs and other businesses.

This research has a number of implications for managers of SMEs in developing nations. First, professional development programs and training courses should be designed to improve users' perceptions towards IT acceptance. The two factors this research found that have the greatest impact on changing user perceptions are how easy the technology is to use and how useful that technology is for users. Therefore, education programs and training courses related to IT need to address these factors if the resources are to be cost-effective in the long term. Second, managers of SMEs in developing nations need to consider targeting employees with the necessary IT skills in their recruitment processes if they are to remain competitive in the global economy. Therefore one recommendation is that recruitment processes be redesigned to include aptitude tests regarding IT for future employees of SMEs in China. Because older people in SMEs were found to perceive IT as more difficult to use, they should be paid and encouraged to undertake special computer training courses to facilitate their adoption of new technologies and improve their productivity. Finally, the results from interviews further suggest that the governing body in developing countries could assign more resources and establish appropriate policies to encourage SMEs to adopt IT improvements and invest in IT infrastructure and training.

REFERENCES


An Examination of the Factors Contributing to Information Technology Acceptance in a Developing Country

Table 1 – Descriptive Statistics

<table>
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<tr>
<th></th>
<th>N</th>
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<th>Std. Deviation</th>
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<td>PEU</td>
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Table 2 - Correlation Coefficients, means, standard deviations for the variables

<table>
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<th>Gender</th>
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<th>PEU</th>
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<td>-.239(**)</td>
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** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 3 – Criteria for Goodness of Fit

<table>
<thead>
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<th>Fit Measure</th>
<th>Good Fit</th>
<th>Acceptable Fit</th>
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<tr>
<td>NFI</td>
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<tr>
<td>RMSEA</td>
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<td>.05 &lt; RMSEA ≤ .08</td>
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Table 4 - Standardized regression weights for Model 1 and Davis (1989) model

<table>
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<th>Relationships</th>
<th>Model 1 Estimates</th>
<th>p-value</th>
<th>Davis group 1 estimates</th>
<th>Davis group 2 estimates</th>
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<td>PU → Usage</td>
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<td>.408</td>
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<td>.85***</td>
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<tr>
<td>PEU → Usage</td>
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*: p<0.05  
**: P<0.01  
***: P<0.001

Table 5 - Standardized regression weights for Model 2 and Ferguson (1997) model

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<th>Relationships</th>
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<th>Ferguson’s P-values</th>
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<td>PEU → PU</td>
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<tr>
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<td>PU → Attitude</td>
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<td>PU → Usage</td>
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<td>Attitude → Usage</td>
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*: p<0.05  
**: P<0.01  
***: P<0.001
N.S.: Non-significant
Table 6 – Comparison of Goodness of fit between Model 2 and Model 3

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<th>Fit Measure</th>
<th>MODEL 2</th>
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<td>Result</td>
<td>Value</td>
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<td>NFI</td>
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<td>RMSEA</td>
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Table 7 - Standardized regression weights for Model 2 and Model 3

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<th>Relationships</th>
<th>Model 2</th>
<th></th>
<th></th>
<th>Model 3</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Estimates</td>
<td>p-Values</td>
<td></td>
<td>Estimates</td>
<td>p-values</td>
</tr>
<tr>
<td>PEU → PU</td>
<td>.500</td>
<td>***</td>
<td>.500</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>PEU → Anxiety</td>
<td>-.213</td>
<td>**</td>
<td>-.213</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>PEU → Attitude</td>
<td>.159</td>
<td>**</td>
<td>.159</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>PEU → Usage</td>
<td>.398</td>
<td>***</td>
<td>.142</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>PU → Anxiety</td>
<td>-.213</td>
<td>**</td>
<td>-.213</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>PU → Attitude</td>
<td>.399</td>
<td>***</td>
<td>.399</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>PU → Usage</td>
<td>.103</td>
<td>.160</td>
<td>.136</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Anxiety → Attitude</td>
<td>-.382</td>
<td>***</td>
<td>-.382</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Attitude → Usage</td>
<td>-.103</td>
<td>.154</td>
<td>-.032</td>
<td>.593</td>
<td></td>
</tr>
<tr>
<td>Age → PEU</td>
<td>N/A</td>
<td></td>
<td>-227</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Age → Usage</td>
<td>N/A</td>
<td></td>
<td>-327</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Education → PEU</td>
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<td></td>
<td>.243</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Education → Usage</td>
<td>N/A</td>
<td></td>
<td>.320</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>

*: p<0.05  
**: P<0.01  
***: P<0.001

Figure 1 – Model 1: Modified version of Davis (1989) model

P

.50**  

.05 N.S

PE

.37***

Usa

N.S.: Not Significant

*: p<0.05  
**: P<0.01
Figure 2 - Model 2: Modified version of Ferguson (1997) model

![Diagram 1: Model 2](image1)

- PU
- PEU
- Attitude
- Anxiety
- Usage

Coefficients:
- PU to Attitude: 0.40 **
- PEU to Attitude: -0.21 ***
- PU to Anxiety: 0.50 ***
- PEU to Anxiety: -0.21 **
- Attitude to Usage: -0.38 ***
- Anxiety to Usage: 0.40 ***
- N.S.

N.S.: Not Significant
*: p<0.05
**: p<0.01
***: p<0.001

Figure 3 – Model 3: a model including education and age

![Diagram 2: Model 3](image2)

- PU
- PEU
- Attitude
- Anxiety
- Usage
- Age
- Education

Coefficients:
- PU to Attitude: 0.40 ***
- PEU to Attitude: -0.21 ***
- PU to Anxiety: 0.16 **
- PEU to Anxiety: -0.21 ***
- Attitude to Usage: -0.38 ***
- Anxiety to Usage: 0.32 ***
- N.S.

N.S.: Not Significant
*: p<0.05
**: p<0.01
***: p<0.001
JAVA PROGRAM-ASSISTED ORGANIC SYNTHESIS OF MEMBERS OF THE TRIPTAMINE FAMILY OF MEDICATIONS

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Auburn University, USA

ABSTRACT

Molecular modeling programs have become increasingly important tools to help medicinal chemists and biochemists understand enzyme mechanisms and receptor sites in order to design effective medications. Unix shell scripts have been written which can launch these molecular modeling programs, and recently a computer program, written primarily in Java, has been developed to incorporate the use of these molecular modeling programs along with software drawing tools to predict the step-by-step organic synthetic routes to facilitate the work of medicinal chemists developing new pharmaceutical drugs with increased precision and efficiency. The neurotransmitter serotonin (5-hydroxytryptamine, 5-HT) receptor family is an important target for the design of receptor agonists and antagonists because this family of triptamine derivatives includes sumatriptan, which is used to treat migraine headaches, as well as the related compound melatonin, which is important for the regulation of sleep. Although the Fischer cyclization reaction has been reported as a successful synthetic route, the yield has been a low yield of less than 30%, due to the formation of byproducts. Therefore a similar route, but utilizing aminolysis during ring closure, named the Grandberg indolization, was implemented in the process used by GlaxoSmithKline to manufacture sumatriptan for consumer consumption. An advantage of this process was the ability to synthesize the sumatriptan product in essentially a one-pot synthesis, which facilitates large-scale production. However, this procedure has had several difficulties, such as the use of large amount of tin which creates the necessity of recycling this metal when applied toward large-scale production, making this procedure expensive, difficult, and time-consuming. One alternative is to use the Japp-Klingemann reaction, but it too has the drawbacks of byproducts which decrease the yield and require significant purification steps. Because these synthetic routes can be lengthy, clearly a trial-and-error approach toward efficient synthesis is not cost effective. Thus we have implemented a new Java-based computer program to design alternative synthetic routes and analyze potential byproducts. This program first analyzes the molecule which has been entered by the user via the software drawing program Isis/Draw in order to determine reactive sites. Next, the program searches through a database containing chemical reactions to select the reaction with the highest probability of completion based on the reactive sites in the first step. In order to narrow the choice of reactions, a function containing rules to eliminate improbable structures is called. If molecules with the same formulas but different spatial orientations are possible, these additional possible orientations are considered. The effects of alternative solvents and potential catalysts on reaction mechanisms are accessed via an Oracle-based database. As a result of the application of this program, a more efficient synthetic route has successfully been implemented.

Keywords: Java, Triptamines, Medications, Indoles, Heterocycles

INTRODUCTION:

Molecular modeling programs such as Macromodel and Jaguar have become increasingly important tools to help medicinal chemists and biochemists understand enzyme mechanisms and receptor sites in order to design effective medications. Unix shell scripts have been written which can launch these molecular modeling programs. Recently a computer program, written in Java primarily, has been able to incorporate the use of these molecular modeling programs along with the software drawing tool Isis/Draw, in order to predict the step-by-step
organic synthetic routes to facilitate the work of medicinal chemists developing new pharmaceutical drugs with increased precision and efficiency. In this paper we report the application of this program to the analysis of synthetic routes for members of the triptamine family of medications.

The neurotransmitter serotonin (5-hydroxytryptamine, 5-HT) receptor family is an important target for the design of receptor agonists and antagonists because this family of triptamine derivatives includes sumatriptan, which is used to treat migraine headaches, as well as the related compound melatonin, which is important for the regulation of sleep. The most common approach for the synthesis of these molecules uses the traditional Fischer indole synthesis, involving the reduction of a diazonium salt to generate a hydrazine, followed by the condensation of the hydrazine with a 4-amino- or 4-halogenobutyraldehyde derivative to produce the hydrazone which rearranges to the indole. Although the Fischer cyclization reaction has been reported as a successful synthetic route, the yield has been a low yield of less than 30%, due to the formation of byproducts, such as a bisindole.

When the halogen atom of the 4-halogenobutyraldehyde is subjected to aminolysis during ring closure, this reaction is named the Grandberg indolization which has been implemented in the process used by GlaxoSmithKline to manufacture sumatriptan for consumer consumption. An advantage of this process has been the ability to synthesize the sumatriptan product in essentially a one-pot synthesis, which facilitates large-scale production. However, this procedure has had several difficulties, such as the use of large amounts of tin, which creates the necessity of recycling when applied toward large-scale production, making this procedure expensive, difficult, and time-consuming.

One alternative is to use the Japp-Klingemann reaction to generate the hydrazone. Byproducts are common, however, which decrease the yield and require significant purification steps. These byproducts result from the nucleophilic indole being in the same flask with an electrophilic aldehyde in a reaction medium which is highly acidic. There have been several syntheses of indoles reported since 1992 by employing an alternative synthetic route involving the palladium-catalyzed heteroannulation of alkyne, but with relatively low yields.

Because these synthetic routes can be lengthy, clearly a trial-and-error approach toward efficient synthesis is not cost effective. Various computer-aided organic synthesis programs have been developed. However, most closely depend on the retrosynthetic analysis proposed by the scientist, causing the output to be highly variable with a lack of consistent plausible routes suggested by the program itself. Thus we have implemented a new Java-based computer program, Java Program-Assisted Organic Synthesis (JPAOS), to design alternative synthetic routes and analyze potential byproducts. This program first analyzes the molecule which has been entered by the user via the software drawing tool Isis/Draw in order to determine reactive sites. Next, the program searches through a database containing chemical reactions to select the reaction with the highest probability of completion based on the reactive sites in the first step. In order to narrow the choice of reactions, a function containing rules to eliminate improbable structures is called. If molecules with the same formulas but different spatial orientations are possible, these additional possible orientations are considered. The effects of alternative solvents and potential catalysts on reaction mechanisms are accessed via an Oracle-based database. As a result of the application of this program, a more efficient synthetic route has successfully been implemented.

RESULTS AND DISCUSSION:

While retrosynthetic analysis can produce slight variations for the input precursors necessary to achieve the same product, alternative catalysts, solvents, and temperature conditions for reactions allow for precise fine-tuning of transition state energies in order to minimize byproducts. In order to choose the most feasible routes toward a synthetic target, the JPAOS method forms all of the possible intermediates predicted to occur on the route from the Isis/Draw input molecule to the target product. The general steps of the algorithm for JPAOS are:

1. Input the reactant molecules.
2. Predict the reactive intermediates by selecting the most reactive sites and classify according to transformation.
3. Analyze the polarity of these intermediates and the transition states necessary to reach them in order to search a solvent database to select the best solvent.
4. Apply known rules of organic chemistry to calculate molecular mechanics, the reaction rates, and determine any stereoisomers.
5. Analyze the intermediates and the transition states necessary to reach them in order to search a catalyst database to select the best catalyst.
6. Evaluate the overall route and predict the product and any possible byproducts.

As a result, the shortest, most convenient route proposed involves construction of an advanced indole intermediate 3 (Figure 1) via a Heck cyclization reaction using 4-amino-3-iodo-N-methylbenzylsulfonamide 1 and 4-N-dimethylamino-1-trialkylsilyl-but-1-yn 2. Several byproducts have been observed to form when applying these experimental conditions in the lab, and have now been confirmed through our program.

Figure 1. Heteroannulation Using Silylated N,N-Dimethylaminobutyne

![Heteroannulation reaction diagram]

Clean separation of these byproducts using typical techniques such as column chromatography is not feasible. We have input the 2-iodoaniline 1 starting material into our JPAOS program, and analysis of the synthetic route after a search of the catalyst database revealed that the lithium chloride should be reduced to 1.0 equivalent in order to reduce byproduct formation via multiple insertion of the aniline 1 to the acetylene 2. The program results also have indicated that the reaction time should be shortened to two to four hours to minimize byproduct formation caused by decomposition of the target product. Dimethylformamide was confirmed to be the solvent of choice after completing a solvent search. The temperature has been lowered from 120 ºC to 110 ºC to minimize the formation of polymerization byproducts at high temperature.

Figure 2. List of Representative Catalysts Contained in the Oracle Database

<table>
<thead>
<tr>
<th>Catalyst</th>
<th>Reaction Conditions</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>AlCl₃</td>
<td>HBr (weak)</td>
<td></td>
</tr>
<tr>
<td>FeCl₃</td>
<td>HI (weak)</td>
<td></td>
</tr>
<tr>
<td>LiCl</td>
<td>HCl (concentrated)</td>
<td></td>
</tr>
<tr>
<td>SnCl₄</td>
<td>HBr (concentrated)</td>
<td></td>
</tr>
<tr>
<td>ZnCl₂</td>
<td>HI (concentrated)</td>
<td></td>
</tr>
<tr>
<td>SbCl₅</td>
<td>H₂SO₄ (weak)</td>
<td></td>
</tr>
<tr>
<td>HCl (weak)</td>
<td>H₂SO₄ (concentrated)</td>
<td></td>
</tr>
</tbody>
</table>

An alternative route using the bis-silyl 3-butyne-1-ol 4 as a substrate in the Heck reaction was investigated, with an excellent and almost quantitative yield produced (Figure 3).

Figure 3. Preparation of Bis-Silyl 3-Butyne-1-ol

![Bis-silyl 3-butyne-1-ol preparation diagram]
Heck cyclization of compound 4 with 1 (Figure 4) was much cleaner and the desired product 5 and the desilylation product 6 (2.5:1 ratio) were identified by \(^1\)H NMR. The overall yield of the reaction was 80-88%.

**CONCLUSIONS**

A successful palladium-catalyzed heteroannulation route with cost-saving efficiency has been developed for the synthesis of sumatriptan as a result of analysis using a newly developed JPAOS program. The proposed synthetic route via a palladium-catalyzed heteroannulation strategy was problematic when the silylated N,N-dimethylaminobutyn 2 was employed, but was successful when an alternative route using bis-silylated 3-butyn-1-ol 4 under similar conditions was implemented. Various reaction parameters including duration of reaction, temperature, solvent choice, and number of equivalents of lithium chloride employed were considered using the JPAOS program to improve the reaction profile, resulting in a cleaner reaction, furnishing a mixture of two indoles 5 and 6, with the latter being a product of desilylation of the hydroxyl group under the reaction conditions.

The strength of the JPAOS program is found in its ability to allow a scientist to enter an input molecule using the easy-to-use drawing program Isis/Draw via a user-friendly interface and fundamental rules of organic chemistry are applied by the program to generate and analyze possible intermediates. These intermediates are then analyzed using quantum chemistry and molecular mechanics calculations according to their electronic energy. A solvent database is searched to select the solvent which can most effectively solvate the transition state, which decreases the activation energy and facilitates the reaction. The more similar the polarity of the solvent is to the polarity of the transition state, the faster and more efficient the reaction, thus minimizing byproduct formation. As a result of the application of this program, a more efficient synthetic route has successfully been implemented.

**ACKNOWLEDGEMENTS**

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LITERATURE CITED:


Jaguar, version 4.2; Schrodinger, Inc.: Portland, Oregon, 2000.


A COMPUTATION OF THE TOTAL ELECTROSTATIC POTENTIAL OF THE TRYPTOPHAN PROTEIN IN THE GRAMICIDIN CHANNEL SIDE-CHAIN

Brett Sims and Rickey Thomas
Grambling State University, USA

ABSTRACT
We developed a code that computes the electrostatic potential of tryptophan dipoles in the Gramicidin channel. Experimentally it has been found that tryptophan, a side chain protein in the Gramicidin channel, plays a key role in ion flow through that channel. An ion flux model was modified to include an electrostatic term dependent on the tryptophan protein represented as an electric dipole. This new model incorporates a new term in the old ion flux model that represents tryptophan dipole influences within the channel. Our research suggests that an external electric action potential can cause changes in the tryptophan dipole movement that will modulate ion flow through the Gramicidin channel. Our model incorporates a voltage dependent matrix that influences the tryptophan dipole vectors via matrix vector multiplication.

Key words: Tryptophan, Gramicidin Channel, Dimmerization, Diffusion Coefficient, Electrostatic Potential

INTRODUCTION

Tryptophan is an amino acid, one of the 20 building blocks of protein and essential in human nutrition. In this research we are interested in the electric dipole effects of tryptophan on ion flow through the Gramicidin channel. The study of the effects tryptophan on ions traveling through the gramicidin channel at the molecular level is still in the early stages of research. To fully understand the effects of tryptophan we need a detailed study of the cell membrane in vitro. Within the Gramicidin channel there is a beta helix that stretches the length of the channel, which has tryptophan along the channel wall. Research suggests that electric potential energy acts upon the membrane wall regulating the effect of the tryptophan dipole on ions traveling through the channel [1]. The outer surface of the gramicidin dimer is hydrophobic. Ions pass through the inner polar lumen helix. In recent studies the gramicidin channel was thought of as a reversible dimmerization at which an open channel forms when two gramicidin molecules join end to end to span the membrane (Figure 1).

Figure 1. Gramicidin Dimer

Figure 2. Closed and open channel states
Figure 1 illustrates the upper Gramicidin helix (red) joined to the lower Gramicidin helix (blue). Figure 2 depicts the closed and open state of the Gramicidin Channel [2]. Figure 3 shows the applied current to produce the closed and open states.

EQUATIONS

Historically, ion flux through the cell membrane was described using Fick’s law [3]

\[ J = -D \frac{\partial \phi}{\partial x}, \]  

where \( J \) is the diffusion flux in dimensions of concentration per area per time, \( D \) is the diffusion coefficient and \( \phi \) is the concentration in dimensions of moles.

In 1986 Levitt, et al., developed a model for ion flux that describes ion transport through a cylindrical channel [4]:

\[ J = DA \int e^v dz \]  

where \( J \) is the Ion flux, \( D \) is the diffusion coefficient, \( v = \frac{e\phi}{kT} \) is an electric potential with out units, \( C_1 \) and \( C_2 \) are electric potentials, and \( A \) is the cross sectional area of the ion channel. Martinez and Sancho [1], studied the ion channel factors that contribute to the electrostatic environment in the typical ion channel,

\[ \phi(r) = \frac{1}{2\pi \varepsilon_0 (k_i + k_j)} \int \rho(r') dv' + \frac{1}{2\pi \varepsilon_0 (k_i + k_j)} \int \frac{\sigma(r')}{R} ds' - \frac{1}{2\pi (k_i + k_j)} \sum_{s_m} (k_i - k_m) \int \frac{\Phi(r)}{\varepsilon n} \left( \frac{1}{R} \right) ds, \]  

where \( \phi(r) \) is the total voltage in the direction of \( r \), \( \rho \) is the spatial charge density distribution. The first right-hand term is the contribution of space sources. The second term gives the contribution of polarized conductors with charge density \( \sigma \). The third term gives the influence of dielectric interfaces.

The typical three-dimensional flux equation is given by [6]

\[ J = D(n_c + c \beta n v) \]  

where \( J \) is the ion flux in moles per area per time, \( D \) is the diffusion coefficient, \( c \) is ion concentration in moles, \( v \) is the ion electric potential, and \( \beta \) is a constant, conversion factor. Investigation of ion channel sources for electrostatic potential influences on ion transport has led our research to present a first step in modeling the effect of tryptophan using equation (4).

Research students in the 2006 National Research Experience for Undergraduates Program (NREUP), at Grambling State University (GSU), hypothesized that the electrostatic influences of tryptophan, denoted by the vector \( P \) might be best incorporated as a factor of the diffusion coefficient. Writing \( D \) in equation (4) as the product \( kAP \), we have
\[ J = kAP \cdot (\nabla c + cA\nabla v) \quad (5) \]

where \( J \) is the ion flux, \( k \) is a constant conversion factor, \( A \) is a voltage dependent 3x3 matrix, and \( P \) is a three dimensional column vector representing the tryptophan dipole movement. Equation (5) could describe ion flow modulated by the voltage dependent matrix-vector interaction \( kAP \) in dot product with the flux sources \((\nabla c + cA\nabla v)\). In the present research, equation (5) was analyzed in context with new information found on biological structures and sources for ion transport. We propose a new ion flux equation where the tryptophan effects are now represented in summation with the ion flux sources, equation (6).

\[ J = D(\beta c\nabla v + \nabla c + \frac{\gamma}{4\pi\epsilon} \sum_{i=1}^{4} \frac{AP_i}{R_i}) \quad (6) \]

In equation (6) the term \( \frac{\gamma}{4\pi\epsilon} \sum_{i=1}^{4} \frac{AP_i}{R_i} \) describes the superposition electrostatic potential contributed by four tryptophan electric dipoles found in a Gramicidin channel. The channel is cylindrical in structure and each tryptophan dipole, \( P_i \), is located on the cylinder wall. \( R_i \) is the distance of any particular tryptophan dipole from the ion moving down the cylinder vertical axis. The 3x3 voltage dependent matrix is represented by \( A \). The permittivity of free space is \( \epsilon \), and \( \gamma \) is a constant conversion factor. The feasibility of equation (6) is studied by DiCarlo [7].

**COMPUTER CODE**

A computer code was written to compute the tryptophan electric potential term,

\[ V_{tryp} = \frac{\gamma}{4\pi\epsilon} \sum_{i=1}^{4} \frac{AP_i}{R_i} \quad (7) \]

from equation (6) where \( A \), with out units, and \( P \), in Coulombs times Angstroms, are give by

\[
A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix}, \quad P = \begin{bmatrix} -0.33 \\ -0.97 \\ -0.55 \end{bmatrix}.
\]

In this simulation the entries for matrix \( A \) were chosen (constant). In future research the goal is to determine the appropriate voltage dependent entries for matrix \( A \), that is, each entry of matrix \( A \) will be a function of the membrane action potential. The permittivity of free space is given as \( \epsilon = 8.541878176 \times 10^{-12} \) and let \( \gamma = 1 \). Distances \( R_i \) are in Angstrom units. The total electric potential term \( V_{tryp} \) is in units of volts.

**RESULTS**

Total tryptophan electric dipole potential, in vector coordinate form, computed before changes in matrix \( A \):

5.1509125870399984E-5 (volts)
1.5194680965535722E-4
1.5140561240693332E-4

\[
A = \begin{bmatrix} 1 & 0 & -1 \\ 0 & 0 & 0 \\ 1 & 0 & 1 \end{bmatrix}
\]
Total tryptophan electric dipole potential, in vector coordinate form, computed after changes in transformation matrix A:

\[-9.98964865365332E-5 \quad \text{(volts)}

\[0.0\]

\[2.029147382773333E-4\]

CONCLUSION

The objective was to observe changes in the total electrostatic potential with changes in the matrix A. Changes in the matrix values cause changes in each tryptophan electric dipole. A code to compute the theoretical superimposed electric dipole potential for given matrices A was accomplished. Further study of experimental data on ionic membrane current at the molecular level will elucidate the mathematical methodology to compute dipole transients in response to the action potential. The challenge is to develop the appropriate voltage dependent transformation matrix that will accurately represent the electrostatic influences on tryptophan.

REFERENCES

Sancho, M. & Martinez, G. Electrostatic Modeling of dipole-ion interactions in Gramicidin like channels.
Keener and Sneyd, Mathematical Physiology, Springer Verlag, 1998
Dicarlo, A., Theory And Model For Ionic Current Via Protein Dipole (Tryptophan) in An Ionic Channel, Technical Report 2007-1, Department Of Mathematics And Computer Science, Grambling State University, 2007
METRICS FOR INFORMATION SECURITY VULNERABILITIES

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ABSTRACT

It is widely recognized that metrics are important to information security because metrics can be an effective tool for information security professionals to measure, control, and improve their security mechanisms. However, the term “security metrics” is often ambiguous and confusing in many contexts of discussion. Common security metrics are often qualitative, subjective, without a formal model, or too naïve to be applied in real world. This paper introduces the criteria for good security metrics and how to establish quantitative and objective information security metrics with the recently released CVSS 2.0 (Common Vulnerability Scoring System), which provides a tool to quantify the severity and risk of a vulnerability to an information asset in a computing environment. We analyze some issues in CVSS 2.0 and propose our solutions. The discussion helps establish insights on security metrics and their applications in security automation and standardization.

Keywords: Information Security, Threats and Vulnerabilities, Metrics and Measurement, Common Vulnerability Scoring System

INTRODUCTION

It is widely recognized that metrics are important to information security because metrics can be an effective tool for information security professionals to measure the security strength and levels of their systems, products, processes, and readiness to address security issues they are facing. Metrics can also help identify system vulnerabilities, providing guidance in prioritizing corrective actions, and raising the level of security awareness within the organization. With the knowledge of security metrics, an information security professional can answer typical questions like “Are we secure?” and “How secure are we?” in a formal and persuadable manner. For federal agencies, a number of existing laws, rules, and regulations cite security metrics as a requirement. These laws include the Clinger-Cohen Act, Government Performance and Results Act (GPRA), Government Paperwork Elimination Act (GPEA), and Federal Information Security Management Act (FISMA). Moreover, metrics can be used to justify and direct future security investment. Security metrics can also improve accountability to stakeholders and improve customer confidence.

However, the term “security metrics” is often ambiguous and confusing in many contexts of discussion in information security. Some guiding standards and good experiments of security metrics exist, such as FIPS 140-1/2 [NIST 01], ITSEC [CEC 91], TCSEC [DOD 85], Common Criteria (CC) [CC1 99][CC2 99][CC3 99] and NIST Special Publication 800-55 [NIST 03], but they are either too broad without precise definitions, or too narrow to be generalized to cover a great variety of security situations. First, security metrics are often qualitative rather than quantitative. While TCSEC [DOD 85] provides seven levels of trust measurement called ratings, which are represented by six evaluation classes C1, C2, B1, B2, B3, and A1, plus an additional class D, ITSEC [CEC 91] provides six levels of trust, called evaluation levels, E1, E2, E3, E4, E5, and E6. The Common Criteria (CC) [CC1 99][CC2 99][CC3 99] delivers a measure of the evaluation result called a level of trust that indicates how trustworthy the product or system is with respect to the security functional requirements defined for it. This evaluation provides an independent assessment by experts and a measure of assurance, which can be used to compare products. Nevertheless, the level of trust of various methodologies is a qualitative indicator by nature. There are no mathematical formulas to be applied to obtain the level of trust as a value of such an indicator. The evaluation process is highly qualitative as well because all the evaluation evidence, evaluator’s qualification and experience, and evaluation methods are often difficult to quantify. Second, security metrics are often subjective.
rather than objective. The Delphi technique, for instance, measure a system security risk by collecting and comparing subjective opinions of individual members of a working group. Each member of the group writes down his or her opinion of a certain security risk on a piece of paper and turns it into the team that is performing the security analysis. The results are compiled and distributed to the group members who then write down their comments anonymously and return them back to the analysis group. The comments are compiled and redistributed for more comments until a consensus is formed. This method obtains a security metric mainly based on individual’s subjective opinions or experience, and reaches a final conclusion by consensus.

Metrics are quantifiable measurement. Security metrics are quantitative indicators for the security attributes of an information system or technology. A quantitative measurement is the assignment of numbers to the attributes of objects or processes. For information security professionals, we are interested in measuring the fundamental security attributes of information such as confidentiality, integrity, and availability.

What is a Good Metric? First of all, a good metric must yield quantifiable measurement. Security metrics will measure information attributes such its size, format, confidentiality, integrity, and availability. Therefore, metrics define and reflect these attributes by numbers such as percentages, averages, or weighted sums. According to [Swanson 2003], information security metrics must be based on security performance goals and objectives. Security performance goals state the desired results of a security implementation. Security performance objectives enable accomplishment of goals by defining security policies and procedures and direct consistent implementation of security controls across the organization.

In the following, we list a few criteria for a good metric informally:

- **Objectiveness**: Measurement must yield quantifiable information such as percentages, averages, and weighted sums. The measure should not be influenced by the measurer’s beliefs or tasting. We may say that in a speed skating competition, the electronic timing system that automatically records skaters finish times provides objective measurement, while human judges in a figure skating competition may not be objective.

- **Repeatability**: If repeated in the same context, with exactly the same conditions, the measure should return the same result. A truly scientific experiment is always repeatable. A non-repeatable measurement creates uncertain result and is thus not useful.

- **Clarity**: A measure should be easy to interpret with a clearly defined semantics. For instance, while it can be clearly specified as how to measure the height and weight of a person, it is arguable to define a clear process and method to measure a person’s attractiveness and intelligence level.

- **Easiness**: The measurement of an attribute should be easy to perform. Sometimes one attribute may contain many different parameters. In order to make the measurement useful and effective, we may target a succinct measurement considering only the most important parameters. The measure should create or add knowledge about the entity itself, sometimes with the purpose of improving the usefulness of the entity.

The rest of the paper is organized as follows: Section 2 introduces CVSS, a measurement of vulnerabilities. Section 3 discusses the CVSS base score distribution. Section 4 presents several issues identified from CVSS base score calculation. Section 5 proposals a few solutions for the issues identified previously. The last section lists some further research issues.

**CVSS: COMMON VULNERABILITY SCORING SYSTEM**

The CVSS (Common Vulnerability Scoring System) provides a tool to quantify the severity and risk of a vulnerability to an information asset in a computing environment. It was designed by NIST (National Institute of Standard and Technology) and a team of industry partners. CVSS metrics for vulnerabilities are divided into three groups: **Base metrics** measure the intrinsic and fundamental characteristics of vulnerabilities that do not change over time or in different environments. **Temporal metrics** measure those attributes of vulnerabilities that
change over time but do not change among user environments. Environmental metrics measure those vulnerability characteristics that are relevant and unique to a particular user’s environment.

There are six base metrics that capture the most fundamental features of a vulnerability:

1) **Access Vector (AV):** It measures how the vulnerability is exploited, for instance, locally or remotely. The more remote an attacker can be to attack an information asset, the greater the vulnerability score.

2) **Access Complexity (AC):** It measures the complexity of the attack required to exploit the vulnerability once an attacker has gained access to the target system. The lower the required complexity, the higher the vulnerability score.

3) **Authentication (Au):** It measures the number of times an attacker must authenticate to a target in order to exploit a vulnerability. The fewer authentication instances that are required, the higher the vulnerability score.

4) **Confidentiality Impact (CC):** It measures the impact on confidentiality of a successfully exploited vulnerability. Increased confidentiality impact increases the vulnerability score.

5) **Integrity Impact (IC):** It measures the impact on integrity of a successfully exploited vulnerability. Increased integrity impact increases the vulnerability score.

6) **Availability Impact (AC):** It measures the impact on availability of a successfully exploited vulnerability. Increased availability impact increases the vulnerability score.

The temporal metrics in CVSS represent the time dependent features of the vulnerabilities, including exploitability in terms of their technical details, the remediation status of the vulnerability, and the availability of exploit code or techniques. The environmental metrics represent the implementation and environment specific features of the vulnerability. There are three environmental metrics as defined below, which capture the characteristics of a vulnerability that are associated with a user’s IT environment.

The scoring process first calculates the base metrics according to the base equation, which delivers a score ranging from 0 to 10, and creates a vector. The vector is a text string that contains the values assigned to each metric, and it is used to communicate exactly how the score for each vulnerability is derived.

Optionally, the base score can be refined by assigning values to the temporal and environmental metrics. If the temporal score is needed, the temporal equation will combine the temporal metrics with the base score to produce a temporal score ranging from 0 to 10.

Similarly, if an environmental score is needed, the environmental equation will combine the environmental metrics with the temporal score to produce an environmental score ranging from 0 to 10. For the purpose of this paper, we give below the base metric equations only. Table 1 summarizes the parameter values for the base score system.

**Base Equation:**

BaseScore = round_to_1_decimal ( ((0.6 * Impact) + (0.4 * Exploitability) – 1.5) * f(Impact))

Impact = 10.41 * (1 - (1 - ConfImpac * (1 - IntegImpact) * (1 – AvailImpact))

Exploitability = 20 * AccessVector * AccessComplexity * Authentication

f(Impact) = 0 if Impact = 0, 1.176 otherwise.
Metrics for Information Security Vulnerabilities

<table>
<thead>
<tr>
<th>Metric Name</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Vector (AV)</td>
<td>Local (L) 0.395</td>
<td>Adjacent network (A) 0.646</td>
<td>Network (N) 1.0</td>
</tr>
<tr>
<td>Access Complexity (AC)</td>
<td>High (H) 0.35</td>
<td>Medium (M) 0.61</td>
<td>Low (L) 0.71</td>
</tr>
<tr>
<td>Authentication (Au)</td>
<td>Multiple (M) 0.45</td>
<td>Single (S) 0.56</td>
<td>None (N) 0.704</td>
</tr>
<tr>
<td>Confidential Impact (CI)</td>
<td>None (N) 0.000</td>
<td>Partial (P) 0.275</td>
<td>Complete (C) 0.660</td>
</tr>
<tr>
<td>Integrity Impact (II)</td>
<td>None (N) 0.000</td>
<td>Partial (P) 0.275</td>
<td>Complete (C) 0.660</td>
</tr>
<tr>
<td>Availability Impact (AI)</td>
<td>None (N) 0.000</td>
<td>Partial (P) 0.275</td>
<td>Complete (C) 0.660</td>
</tr>
</tbody>
</table>

**Table 1 Parameter Values for Base Scores**

**ANALYSIS OF CVSS BASE SCORES**

**Exploitability Analysis**

According to the Base Equation, the Exploitability is a function of AV, AC, and Au, as shown below:

Exploitability = F (AV, AC, Au) = 20*AccessVector*AccessComplexity*Authentication

As an increased function with its parameters, Exploitability has 27 (= 3*3*3) possible values ranging from 0 to 10, and each value has an equal probability, 1/27, to be associated with a vulnerability. The minimum value of Exploitability is 1.24425, while the maximum value is 9.996799999999999.

<table>
<thead>
<tr>
<th>(AC AV Au) values</th>
<th>Occurrence</th>
<th>Exploitability Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local High Multiple</td>
<td>1</td>
<td>1.24425</td>
</tr>
<tr>
<td>Local High Single</td>
<td>1</td>
<td>1.5484000000000002</td>
</tr>
<tr>
<td>Local High None</td>
<td>1</td>
<td>1.94656</td>
</tr>
<tr>
<td>Adjacent network High Multiple</td>
<td>1</td>
<td>2.0349</td>
</tr>
<tr>
<td>Local Medium Multiple</td>
<td>1</td>
<td>2.16855</td>
</tr>
<tr>
<td>Local Low Multiple</td>
<td>1</td>
<td>2.52405</td>
</tr>
<tr>
<td>Adjacent network High Single</td>
<td>1</td>
<td>2.53232</td>
</tr>
<tr>
<td>Local Medium Single</td>
<td>1</td>
<td>2.69864</td>
</tr>
<tr>
<td>Local Low Single</td>
<td>1</td>
<td>3.1410400000000003</td>
</tr>
<tr>
<td>Network High Multiple</td>
<td>1</td>
<td>3.15</td>
</tr>
<tr>
<td>Adjacent network High None</td>
<td>1</td>
<td>3.1834879999999999</td>
</tr>
<tr>
<td>Local Medium None</td>
<td>1</td>
<td>3.3925799999999996</td>
</tr>
<tr>
<td>Adjacent Medium Multiple</td>
<td>1</td>
<td>3.54654</td>
</tr>
<tr>
<td>Network High Single</td>
<td>1</td>
<td>3.9200000000000004</td>
</tr>
<tr>
<td>Local Low None</td>
<td>1</td>
<td>3.948736</td>
</tr>
<tr>
<td>Adjacent network Low Multiple</td>
<td>1</td>
<td>4.12794</td>
</tr>
<tr>
<td>Adjacent Medium Single</td>
<td>1</td>
<td>4.4134720000000005</td>
</tr>
<tr>
<td>Network High None</td>
<td>1</td>
<td>4.928</td>
</tr>
<tr>
<td>Adjacent Low Single</td>
<td>1</td>
<td>5.136992</td>
</tr>
<tr>
<td>Network High None</td>
<td>1</td>
<td>5.49</td>
</tr>
<tr>
<td>Adjacent Medium None</td>
<td>1</td>
<td>5.5483648</td>
</tr>
<tr>
<td>Network Low Multiple</td>
<td>1</td>
<td>6.39</td>
</tr>
<tr>
<td>Adjacent Low None</td>
<td>1</td>
<td>6.457932799999999999</td>
</tr>
<tr>
<td>Network Medium Single</td>
<td>1</td>
<td>6.832</td>
</tr>
<tr>
<td>Network Low Single</td>
<td>1</td>
<td>7.952</td>
</tr>
<tr>
<td>Network Medium None</td>
<td>1</td>
<td>8.588799999999999999</td>
</tr>
<tr>
<td>Network Low None</td>
<td>1</td>
<td>9.996799999999999999</td>
</tr>
</tbody>
</table>

**Table 2 Value Distribution of Exploitability**
Impact Analysis

For formula for Impact Analysis is given below:

\[
\text{Impact} = G (\text{CI, II, AI}) = 10.41 \times (1 - (1 - \text{ConfImpact}) \times (1 - \text{IntegImpact}) \times (1 - \text{AvailImpact}))
\]

This function is obvious an increasing function with respect to its three parameters: ConfImpact, IntegImpact, and AvailImpact. There are 10 kinds of result of Impact. The minimum value is 0, and the maximum value is 10.0008536. The range is about from 0 to 10.

<table>
<thead>
<tr>
<th>CI, II, AI</th>
<th>Occurrence</th>
<th>Impact Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>NNN</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>PNN, NPN, NNP</td>
<td>3</td>
<td>2.86375</td>
</tr>
<tr>
<td>PPN, PNP, NPP</td>
<td>3</td>
<td>4.93824375</td>
</tr>
<tr>
<td>NNN</td>
<td>1</td>
<td>6.442976718750001</td>
</tr>
<tr>
<td>CNN, NCN, NNC</td>
<td>3</td>
<td>6.8706000000000005</td>
</tr>
<tr>
<td>CPN, CNP, PCN</td>
<td>6</td>
<td>7.843935000000001</td>
</tr>
<tr>
<td>PNC, NCP, NPC</td>
<td>6</td>
<td>7.843935000000001</td>
</tr>
<tr>
<td>CPP, PCP, PPC</td>
<td>3</td>
<td>8.549602875000001</td>
</tr>
<tr>
<td>CCN, CNC, NCC</td>
<td>3</td>
<td>9.206604</td>
</tr>
<tr>
<td>CCP, CPC, PCC</td>
<td>3</td>
<td>9.5375379</td>
</tr>
<tr>
<td>CCC</td>
<td>1</td>
<td>10.00084536</td>
</tr>
</tbody>
</table>

Table 3 Impact Calculation

Figure 1 Distribution of Exploitability Values

Figure 2 Distribution of Impact Values
Base Score Distribution Analysis

\[
\text{BaseScore} = T(\text{Exp, Imp}) = ((0.6\times\text{Impact}) + (0.4\times\text{Exploitability}) - 1.5) \times f(\text{Impact})
\]

\[
f(\text{Impact}) = 0 \text{ if Impact} = 0, \quad 1.176 \text{ otherwise.}
\]

This function is an increasing function with respect to its two parameters: Impact and Exploitability. There are totally 279 results for the BaseScore with 244 (= 9*27 + 1) kinds of BaseScores. The minimum of the BaseScore is 0, and the maximum is 9.995091206016. The range is about from 0 to 10.

<table>
<thead>
<tr>
<th>Interval</th>
<th>[0,1)</th>
<th>[1,2)</th>
<th>[2,3)</th>
<th>[3,4)</th>
<th>[4,5)</th>
<th>[5,6)</th>
<th>[6,7)</th>
<th>[7,8)</th>
<th>[8,9)</th>
<th>[9,10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers</td>
<td>33</td>
<td>33</td>
<td>48</td>
<td>68</td>
<td>127</td>
<td>193</td>
<td>122</td>
<td>69</td>
<td>28</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>279</td>
</tr>
</tbody>
</table>

Table 4 Base Scores

Figure 3 Base Score Distribution

THE CIA IMPACTS ON THE BASE SCORES

Suppose the Exploitability has a value of 10.0 (AV:Network;AC:High;Au:None), we change the metric of CIA Impact values step by step as shown in the following table. We would like to see how the impact values affect the final base scores.
Table 5 Relationship between Base Score and Impact Values

Table 5 shows that we change the metric of CIA Impact step by step to make the BaseScore form 10 to 0. Let us consider the rows with the same color as one step. It turns out that the BaseScore drops slowly in the first a few steps – every time when the impact values change, the BaseScore drops less than 0.5, but we in the last a few steps, the BaseScore drops sharply with a change of BaseScore greater than 1.3. How does this happen? It seems unreasonable to have a slower change when BaseScore is greater, while a faster change when BaseScore is smaller.

This problem is caused by the impact formula: \( \text{Impact} = 10.41 \times (1 - (1 - \text{ConfImpact}) \times (1 - \text{IntegImpact}) \times (1 - \text{AvailImpact})) \). Since \( \text{ConfImpact} \), \( \text{IntegImpact} \), and \( \text{AvailImpact} \) are all decimal numbers less than 1, the multiplication of them produces smaller result if two of them have smaller values. When the impact is small, the vulnerability score should be small accordingly with the same rate.
We extract some rows form Table 5 to indicate the unreasonable places in CVSS BaseScore calculation.

<table>
<thead>
<tr>
<th>Confidentiality Impact</th>
<th>Integrity Impact</th>
<th>Availability Impact</th>
<th>Exploitability Subscore</th>
<th>Impact Subscore</th>
<th>BaseScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>Partial</td>
<td>Partial</td>
<td>10.0</td>
<td>8.5</td>
<td>9.0</td>
</tr>
<tr>
<td>Complete</td>
<td>Partial</td>
<td>None</td>
<td>10.0</td>
<td>7.8</td>
<td>8.5</td>
</tr>
<tr>
<td>The value of change</td>
<td></td>
<td></td>
<td>0</td>
<td>0.7</td>
<td>0.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Confidentiality Impact</th>
<th>Integrity Impact</th>
<th>Availability Impact</th>
<th>Exploitability Subscore</th>
<th>Impact Subscore</th>
<th>BaseScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial</td>
<td>None</td>
<td>Partial</td>
<td>10.0</td>
<td>4.9</td>
<td>6.4</td>
</tr>
<tr>
<td>Partial</td>
<td>None</td>
<td>None</td>
<td>10.0</td>
<td>2.9</td>
<td>5.0</td>
</tr>
<tr>
<td>The value of change</td>
<td></td>
<td></td>
<td>0</td>
<td>2.0</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 6 Extract from Table 5

In both extractions in Table 5, we keep the metrics of Confidentiality Impact and Integrity Impact unchanged, and the metric of Availability Impact from Partial to None. It is unreasonable that the BaseScore values changed significantly for the same change of availability value from Partial to None. The second case in the lower table has a value change that is almost three times of that in the first case. The change of Impact subscore is 0.7, while the change of BaseScore is 0.5 in the first case. The change of Impact subscore is 2.0, and the change of BaseScore is 1.4 in the second case.

Let us see another pair of data indicating the similar problem:

<table>
<thead>
<tr>
<th>Confidentiality Impact</th>
<th>Integrity Impact</th>
<th>Availability Impact</th>
<th>Exploitability Subscore</th>
<th>Impact Subscore</th>
<th>BaseScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete</td>
<td>Complete</td>
<td>Complete</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Complete</td>
<td>Complete</td>
<td>Partial</td>
<td>10.0</td>
<td>9.5</td>
<td>9.7</td>
</tr>
<tr>
<td>The value of change</td>
<td></td>
<td></td>
<td>0</td>
<td>0.5</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Table 7 The Second Extraction from Table 5

Keeping Confidentiality Impact and Integrity Impact value fixed, when we change Availability impact from Complete to Partial as shown in Table 7, the BaseScore changes are significant and looks unreasonable.

THE UNREACHABLE VALUES IN (0, 5) FOR BASE SCORES

Checking the last two rows of Table 5, you will find the BaseScore values drops from 5.0 to 0 directly. This means that when AV:Network; AC:High; Au:None, the BaseScore can not reach any values between 0 and 5.0. This is unfair to some vendors because some products will a minimum CVSS score of 5.0 even their products are perfectly secure. The characteristics of these kinds of products include those with high Exploitability Subscores.

In the National Vulnerability Database (NVD), there are 34 vulnerabilities for AOL Instant Messenger with the following statistics:
Table 8 CVSS Scores for AIM

Most Exploitability Subscores for AOL Instant Messenger have a value of 10 because they have the following values by their product nature: AV: Network;AC:High;Au:None. Therefore, their CVSS BaseScore is always equal to or greater than 5.0. This is unfair to them as their product characteristics inherently have the high Exploitability.

With the similar approach, we found that the BaseScores could not reach the intervals (0, 0.84) and (8.4, 10) under certain exploitability and impact values.

RE-DEFINING CIA IMPACT ON BASE SCORES

The BaseScore equation has a multiplication factor $f(\text{Impact})$ as shown below:

$$\text{BaseScore} = \text{round_to_1_decimal} \left( \left( 0.6 \times \text{Impact} \right) + \left( 0.4 \times \text{Exploitability} \right) - 1.5 \right) \times f(\text{Impact})$$

$$f(\text{impact}) = 0 \text{ if } \text{impact} = 0, \text{ otherwise } f(\text{impact}) = 1.176$$

If a vulnerability has no impact on Confidentiality, Integrity, or Availability, the BaseScore of the vulnerability will be zero, as $f(\text{impact}) = 0$ if impact = 0. However, the current version of CVSS treats those minor impact situations as the same as those with significant impacts indicated by the equation $f(\text{impact}) = 1.176$ when the impact subscore is not zero.
As CIA (Confidentiality, Integrity, and Availability) impact plays an important role in CVSS calculation, the authors believe that we should define $f(\text{impact})$ as a multiple tiered function. The BaseScore should heavily depend on the CIA impact. In the example of AOL Instant Messenger examples given above, we found that the Impact value is around 2.9, the Exploitability value is 10, and the vulnerability BaseScore is always greater than 5.0.

<table>
<thead>
<tr>
<th>Impact Subscore</th>
<th>Exploitability Subscore</th>
<th>BaseScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.9</td>
<td>10</td>
<td>5.0</td>
</tr>
</tbody>
</table>

One way to resolve this issue is to re-define the CIA impact function $f(\text{impact})$ as a multi-tiered function as shown in Table 9 below.

<table>
<thead>
<tr>
<th>Confidentiality Impact</th>
<th>Integrity Impact</th>
<th>Availability Impact</th>
<th>$f(\text{impact})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None</td>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
<td>Partial</td>
<td>0.4</td>
</tr>
<tr>
<td>None</td>
<td>Partial</td>
<td>Partial</td>
<td>0.7</td>
</tr>
<tr>
<td>Complete</td>
<td>Complete</td>
<td>None</td>
<td>0.9</td>
</tr>
<tr>
<td>Other condition</td>
<td></td>
<td></td>
<td>1.176</td>
</tr>
</tbody>
</table>

Table 9 New Definition of $f(\text{impact})$

**CONCLUSION AND DISCUSSION**

CVSS provides a simple tool to define information system vulnerabilities reflecting the overall severity and risk presented by those vulnerabilities. Security professionals, executives, and end-users have a common language now to discuss security threats, vulnerability severity, and risk analysis with CVSS. Other metric and scoring systems for vulnerability do exist. But they are either tending to be subjective or qualitative. CVSS differs by offering an open framework for comparing and ranking vulnerabilities in a consistent fashion. This paper identifies some issues in the current version of CVSS 2.0, but we believe that CVSS has great potential to become a foundation for the automation of security tools. As CVSS matures, its metrics will become more accurate, more flexible, and more representative for common security vulnerabilities and their risks.

For the limitation of space, this paper does not cover the issues of temporal metrics and environmental metrics, which are two integral parts of CVSS 2.0. The temporal metrics represent the time dependent features of the vulnerabilities, including exploitability in terms of their technical details, the remediation status of the vulnerability, and the availability of exploit code or techniques. The environmental metrics represent the implementation and environment specific features of the vulnerability. There are three environmental metrics defined in CVSS 2.0, which capture the characteristics of a vulnerability that are associated with a user’s IT environment. The scoring process first calculates the base metrics according to the base equation, which delivers a score ranging from 0 to 10, and creates a vector. The vector is a text string that contains the values assigned to each metric, and it is used to communicate exactly how the score for each vulnerability is derived. Optionally, the base score can be refined by assigning values to the temporal and environmental metrics. If the temporal score is needed, the temporal equation will combine the temporal metrics with the base score to produce a temporal score ranging from 0 to 10. Similarly, if an environmental score is needed, the environmental equation will combine the environmental metrics with the temporal score to produce an environmental score ranging from 0 to 10.

Temporal metrics measures the severity of a vulnerability that may change over time. It is very interesting to see how temporal metrics could be extended to use time-based tools such as temporal logic or interval logic. Environmental metrics are directly related to a user’s IT environment. It merits further study in how temporal and environmental metrics affect IT product improvement from vendors and how end users take advantage of the tools like CVSS in their IT practice and administration.
REFERENCES


THE DEVELOPMENT OF TRANSFER FUNCTION DERIVATION METHODS IN CONTROL SYSTEM DESIGN AND ANALYSIS (CSDA) TOOL

Frank Cheng and Lin Zhao
Central Michigan University, USA

ABSTRACT

For a linear time-invariant (LTI) system, the system’s transfer function can be defined as the ratio of the Laplace transform of the output variable to the Laplace transform of the input variable. Deriving a system's open loop and closed loop transfer functions is necessary and critical for conducting the controller design, system stability analysis, and transient response analysis. For simple systems, transfer function derivation can be done manually. However, deriving transfer functions becomes more difficult and time-consuming as system’s complexity increases. To aid users in completing transfer function derivation for conducting control system analysis, a MATLAB-based graphical user interface (GUI) is developed for automatically deriving transfer function for a Simulink Model. The development is based upon the Mason’s gain formula, Simulink model parameters, and MATLAB programming functions. As a result, methods of automatically identifying all items defined by Mason’s gain formula from a Simulink model are developed. With such methods, the Mason’s gain formula can be successfully implemented in the MATLAB GUI.

Keywords: Block Diagram, Transfer Function, Graphical User Interface (GUI)

INTRODUCTION

The design and analysis of feedback control systems play important roles in control engineering education. The study topics include control system modeling, system characteristics analysis, and controller function design. The MATLAB software is powerful tool for learning control theory and designing control systems. To improve the learning and design environment for feedback control systems, we developed a Control System Design and Analysis (CSDA) Tool that integrates the basic functions of the MATLAB software for user-friendly functions in system modeling, model data manipulation, and model analysis as shown in Figure 1 (Cheng & Zhao 2004).

System modeling is an important task in control system design and analysis. Among many different modeling methods, block diagram techniques allow users to describe the system components and functions through functional blocks and their connections. In the MATLAB software, a control system can be graphically represented as a Simulink block diagram model and saved as a MATLAB file with the extension “mdl.” Figure 2 shows the Simulink model of a DC motor speed control system.
In most situations, deriving the open loop and closed loop transfer functions of a Simulink model is necessary and critical for conducting the controller design, system stability analysis, and transient response analysis. For simple systems, transfer function derivation can be done manually. However, as the model complexity increases deriving transfer function becomes more difficult and time-consuming. In addition, there lacks of effective ways of verifying the manually-derived transfer function of a complex system. To aid users in transfer function derivation, we developed the Transfer Function Derivation GUI in CSDA Tool. The development is based upon the Mason’s gain formula (Phillips & Harbor 2000), Simulink model parameters, and MATLAB programming functions (The MathWorks, 2006). With such a GUI, users simply specify an input block and an output block in a given Simulink model and click “Derive” button in the GUI to obtain the corresponding transfer function without errors as shown in Figure 3. To implement the Transfer Function Derivation GUI in CSDA Tool, all loops, forward paths, and non-touching loops defined by Mason’s gain formula must be automatically identified from a Simulink model and recorded in corresponding MATLAB structural variables.

This paper presents the solutions for successfully searching all required items in a Simulink model for automatic transfer function derivation. To this end, section 2 discusses the method of identifying all block parameters of a Simulink model. In section 3, the method for searching all forward paths in a model is illustrated through an example model. Section 4 describes the method of searching all loops with designed MATLAB variables. Based upon the loop searching method, the solution for finding all non-touching loops are described in section 5. Finally conclusions are given in section 6.
BLOCK IDENTIFICATION FUNCTION

The block identification function is designed to collect two types of block parameters in a Simulink model and save them in MATLAB structure variable "BlockInfo" as shown in Figure 4. The first type of parameters is regard to block properties. This includes block’s name, handle, position, type, inputs and outputs as shown in Figure 4a. Table 1 shows eight different standard block types that are commonly used by a Simulink model, each of which is defined by an associated transfer function and assigned a number of 1 to 8 as its handle. With block type and block parameters saved in structure variable "BlockInfo" the transfer function of each block can be retrieved by using MATLAB command “get_param.” For example, the command Gain = get_param (gainblockhandle, “Gain”) can get the gain value of a Gain block through its handle. The second type of block’s parameters is regard to block interconnections that are defined by blocks’ input signals and output signals in a Simulink model as shown in Figure 4b. A block’s input (or output) signal is identified by: (1) the block’s input (or output) port that receives (or sends) the signal; and (2) the block’s input (or output) block that sends (or receives) the signal to the block’s input (or output) port. For example, in Figure 2, block "Kd" has one input port that receives a signal from its input block “Filter.” Two special cases should also be considered in block identification function. The first one is the sign of a sum block. The actual input transfer function of a sum block is its input block’s transfer function multiplied by its sign. The second case is the manipulation of a subsystem block that consists of multiple blocks in a Simulink model. This requires the block identification function first derive the transfer function of a given subsystem and then replace it into a single standard Simulink block in the model.

Figure 3 Transfer function derivation result display
Figure 4 Identification of block parameters

<table>
<thead>
<tr>
<th>Block Type</th>
<th>Gain</th>
<th>Transfer function</th>
<th>Zero-pole</th>
<th>Integrator</th>
<th>Derivative</th>
<th>Sum</th>
<th>Sub system</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Block Transfer Function</td>
<td>Gain</td>
<td>Numerator</td>
<td>Gain</td>
<td>1/s</td>
<td>s</td>
<td>Sign (+/-)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zero</td>
<td>Zero</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Denominator</td>
<td>Pole</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FORWARD PATH SEARCHING FUNCTION

The forward path searching function is designed to identify all forward paths in a given Simulink model and record these paths in MATLAB structure variable “PathInfo.” The input parameters of the function are user selected system’s input and output blocks which define the start and end points of a forward path. During a
The development of transfer function derivation methods in control system design and analysis (CSDA) tool.

Forward path searching the forward path searching function must record an encountered multi-output node as an item with three fields as shown in Figure 5. The “NodeIndex” field records the ith multi-output node n in the model; the “BranchNum” field records total m outputs of the ith multi-output node; and the “CurrentState” field records the kth output of the ith multi-output node that is used in the current path searching.

The forward path searching function begins with finding a possible path that starts at the user selected input block and ends at either the output of the last block in the path, or the block that has on output. A possible path is a forward path only when its end point is the user selected output block. To examine every possible path in the model, the function uses a method that is illustrated by the model example as shown in Figure 6. In Figure 6, the nodes s represents the user selected input of the model; nodes e1 to e6 represent six outputs of the system; and nodes n1 to n5 represent five multi-output nodes. Assume e1 is the user selected output of the system. In this case, there is only one forward path: s → s1 → n1 → n2 → e1, among all six possible paths in the model. To find this forward path, the forward path searching function will search all six possible paths one at a time through changing the field values of structure variable “PathInfo” as shown in Table 2. The path searching starts from the selected input (e.g., node s). When a new multi-output (e.g., node n1) node is encountered, the function adds a new item (e.g.,

<table>
<thead>
<tr>
<th>Item</th>
<th>Fields</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Item in “PathInfo”</td>
<td>NodeIndex</td>
<td>The index of the multi-output node in the current searching path</td>
</tr>
<tr>
<td></td>
<td>BranchNum</td>
<td>The total number of outputs in the multi-output node</td>
</tr>
<tr>
<td></td>
<td>CurrentState</td>
<td>The index of output of a multi-output node in the current searching path</td>
</tr>
</tbody>
</table>

![Figure 5 The fields of an item in structure variable “PathInfo”](image)

![Figure 6 An example of system model in signal flow representation](image)
output node in the "NodeIndex" field, the function uses the current value of the "CurrentState" field to choose the output of the node (e.g., node n₁) for the search. The same procedure can be applied to any non-last multi-output node in the current search path until the last multi-output node in the "NodeIndex" filed (e.g., node n₂) is met. In this case, the value of the "CurrentState" field of the node (e.g., node n₂) is increased by 1, (e.g., changing the value from 1 to 2 for node n₂), indicating the next (e.g., second) output of the node (e.g., node n₂) is used for the search. In the example, the second possible path can be identified as s → s₁ → n₁ → n₂ → e₁. Searching a possible path continues until the last recorded item in the "NodeIndex" field has equal values in its "CurrentState" and "BranchNum" fields. Then, the path searching function won't consider this last node in the future path searching. The searching process for all possible paths completes until all items recorded in the "NodeIndex" field of structure variable "PathInfo" has equal values in their "CurrentState" and "BranchNum" fields.

Each identified forward path is saved as an item in structure variable "PathRecord" with three fields: block’s names, block handles, and block indices. They are used by the GUI as the output parameters of the forward path searching function.

LOOP SEARCHING FUNCTION

The loop searching function is designed to find all loops according to Mason’s gain formula. A loop can be treated as a path that starts and ends at the same node in the model. In a Simulink model, a loop must start and end at a sum block. Thus, the loop searching function must use each identified sum block in the model to search all corresponding possible loops. The method used by the forward path searching function can be used in loop searching. However, a loop can be repeatedly identified with the method. For example, the model as shown in Figure 7a has two sum blocks represented as nodes n₁ and n₂. Starting with node n₁, the loop searching function can find loop n₁ → n₂ → n₃ → n₁; and starting with node n₂, it identifies loop n₂ → n₃ → n₂ and loop n₂ → n₃ → n₁ → n₂. However, loop n₁ → n₂ → n₃ → n₁ and loop n₂ → n₃ → n₁ → n₂ are identical. To resolve this problem, the function has to remove a repeated loop by checking whether it has the exactly same nodes with other identified loops in the record. With this method, for example, the model in Figure 7b has only 6 different loops. The output of the loop searching function is a structure variable "finalLoopRecord" that stores all identified loops in the model.
Table 2 The dynamic changes of structure variable “PathInfor”

<table>
<thead>
<tr>
<th>Possible Path</th>
<th>Filed</th>
<th>Value</th>
<th>Start Value</th>
<th>End Value</th>
<th>Start Value</th>
<th>End Value</th>
<th>Start Value</th>
<th>End Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>s → s _1 → n _1 → n _2 → s _1</td>
<td>NodeIndex (n)</td>
<td>n _1</td>
<td>n _2</td>
<td>n _1</td>
<td>n _2</td>
<td>n _1</td>
<td>n _3</td>
<td>n _1</td>
</tr>
<tr>
<td>3</td>
<td>BranchNum (m)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>CurrentStates (k)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>s → s _1 → n _1 → n _2 → n _3</td>
<td>NodeIndex</td>
<td>n _1</td>
<td>n _2</td>
<td>n _3</td>
<td>n _1</td>
<td>n _2</td>
<td>n _3</td>
<td>n _1</td>
</tr>
<tr>
<td>3</td>
<td>BranchNum</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>CurrentStates</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>s → s _1 → n _1 → n _4 → e _5</td>
<td>NodeIndex</td>
<td>n _1</td>
<td>n _4</td>
<td>n _1</td>
<td>n _4</td>
<td>n _1</td>
<td>n</td>
<td>n _1</td>
</tr>
<tr>
<td>3</td>
<td>BranchNum</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>CurrentStates</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 7 Example models in signal flow representation
**Table 3 The 2-2 non-touching loop table**

<table>
<thead>
<tr>
<th>Loop i</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**NON-TOUCHING LOOP SEARCHING FUNCTION**

According to Mason's gain formula, the gains of all non-touching loops have to be calculated. By definition, an \( n \)-\( n \) non-touching loop has no shared common nodes among \( n \) loops in the model, where \( n = 2, 3, 4, \text{ etc.} \) The searching function uses the model's \( n \)-\( n \) non-touching loop tables to identify all possible non-touching loops and saves their index in array variable "Non-touchingLoopList" as the output.

The searching function starts with the identification of all 2-2 non-touching loops by checking whether there are common nodes between any two loops in the model. The searching results are recorded in the model's 2-2 non-touching table. Table 3 is the 2-2 non-touching loop table of the model in Figure 7b, where row index "loop \( j \)" and column index "loop \( i \)" represent the index of 6 identified loops of the model, respectively. The non-zero value "1" in the table indicates that loop \( i \) and loop \( j \) form a 2-2 non-touching loop. As a result, all 2-2 non-touching loops in the model are indicated by the non-zero values in the upper-triangle of the 2-2 non-touching loop table.

The model's 3-3 non-touching loop table records all possible 3-3 non-touching loops in the model; and it can be directly generated from the generated 2-2 non-touching loop table through using the following procedures:

**Step 1:** Choose the row index of the 2-2 non-touching loop table as the row index of the 3-3 non-touching loop table.

**Step 2:** Determine the column index of the 3-3 non-touching loop table through checking whether an identified 2-2 non-touching loop can form a 3-3 non-touching loop with any other loops in the model according to equation (1):

\[
R(i)_{1 \times n} \times I(1)_{n \times 1} > 1
\]

where \( R(i)_{1 \times n} \) is a \((1 \times n)\) array whose elements represent the values of the \( i \)th row in the 2-2 non-touching loop table; and \( I(n) \) is a \((1 \times n)\) unity array that has the same dimension as \( R(i) \). If the equation (1) is true, it means that it is likely for the \( i \)th loop in the 2-2 non-touching loop table to form a 3-3 non-touching loop with any other two loops in the \( i \)th row of the table. For example, because equation (1) is true for loop 1 in Figure 7b, thus, loop 1 may likely form a 3-3 non-touching loop with any other two loops among 3, 4, 5, and 6 loop in the 1th row of the 2-2 non-touching loop table. In fact, equation (1) needs to be applied to every row in the 2-2 non-touching loop table in order to find all possible 3-3 non-touching loops in the model. Based upon the
identification results, the column index of the 3-3 non-touching loop table can be formed as \((i, j)\) where \(i\) is the identified \(i\)th loop in equation (1) and \(j\) is the \(j\)th loop that has non-zero value in the \(i\)th row of the 2-2 non-touching loop table. Table 4 shows the 3-3 non-touching loop table of the model in Figure 7b.

Step 3: The non-zero values of the \(k\)th row of the 3-3 non-touching loop table, denoted as \(C(k(i, j))\), represents an identified 3-3 non-touching loop, which can be determined by equation (2):

\[
C(k(i, j)) = R(i) \bullet R(j) \tag{2}
\]

where \(R(i)\) and \(R(j)\) is the \(i\)th and \(j\)th rows in the 2-2 non-touching table, respectively. For example, it is obvious that loop 1, loop 3, and loop 5 in Figure 7b form a 3-3 non-touching loop. This result can be directly obtained by applying equation (2) for the 1th row in the 3-3 non-touching loop table as:

\[
C(1(1,3)) = R(1) \bullet R(3) = (0 0 1 1 1 1) \bullet (0 0 0 0 1 0) = (0 0 0 0 1 0)
\]

All 3-3 non-touching loops of the model in Figure 7b can be found after applying equation (2) to each row of the 3-3 non-touching table as shown in Table 4. In fact, the same method can be applied to find any \(n-n\) non-touching loops table if these loops exist in a given model.

CONCLUSIONS

Transfer function derivation is an important task in control system analysis and design. The developed MATLAB graphical user interface (GUI) allows users to automatically derive a system’s transfer function of a Simulink model without errors. It is implemented through applying Mason’s gain formula to a Simulink model. The modeling of model parameters and the procedures of path searching algorithms presented in this paper provide effective approaches and solutions for identifying all required forward path, loops, and \(n-n\) non-touching loops in a Simulink model.

REFERENCES


ANALYTICAL AND NUMERICAL APPROACH TO EVALUATE THE PROPERTIES OF PULTRUDED COMPOSITES CONTAINING CLAY PARTICLES

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Minnesota State University, USA

ABSTRACT
This paper presents analytical and numerical methods to evaluate polymer composite material with consideration of clay particles and voids in matrix materials. These techniques are simple and cost effective procedure to estimate mechanical properties prior to expensive lab testing. Research consisted of creating, analyzing, and validating calculation models of fiber composites containing fibers, isotropic resin, clay particles, and voids. There are two parts in evaluation of the fiber composite mechanical properties. The first part was to calculate matrices’ mechanical properties. This part involved finite element analysis of matrix material of three different fiber composites with various volume fractions using known tensile moduli, in-plane shear moduli, and Poisson’s ratios of matrix’s constituents. These results were compared with hand calculations using micromechanical models. The second part was to calculate the mechanical properties of fiber composites using these same material properties as determined using the matrix’s mechanical properties from the FEA combined with theoretical approach. These results were compared with experimental results of the three fiber composites for validation. This research showed utilizing FEA can produce the mechanical properties of fiber composites within eleven percent of the experimental results.

Keywords: Finite Element Methods, Polymer Composites, Clay Particles, Mechanical Properties

INTRODUCTION
Thermosetting polymer composite material is widely used in many engineering applications: airplanes, boats/ships, vehicle bodies, bridge/building, military, and electrical insulation. Aircraft industries have begun utilizing thermosetting polymer composite in replacement of traditional aluminum alloy. The result is cost effective design, high fuel efficiency, and environmental friendly.

There is a need to estimate matrix mechanical properties. For example, when packaged electronic device, such as ground fault detection system, is to be mounted on a generator rotor rotating at high speed, the device must be subjected to engineering analysis to ensure the integrity of the rotating apparatus. Typical ground fault detection system consists of a few electronic circuit boards in an enclosure filled with thermosetting polymer. A proper design will call out minimum tensile strength for durability, minimum dielectric strength for short circuit prevention, and maximum weight for minimum centrifugal force. A typical thermosetting polymer consists of a two-part resin and fillers formulated to optimize the device’s strength to weight ratio. Although mechanical properties of thermosetting polymers can be determined by physical experiment, this method is costly and time consuming. Adding optimization process requires iterations that increase cost and time required.

Analytical models exist for solving mechanical properties of micro/macromodel composite material. Eshelby [1] was the first to develop micromechanical models that estimated the mechanical properties of isotropic homogeneous material containing isotropic inclusion. A couple of decades later, these models were modified by Budiansky and Wu [2] and Mori-Tanaka [3]. The Mori-Tanaka and Self-Consistent Model have been known as very effective micromechanical models for estimating composite material mechanical properties. Mura [4] performed reviews of all the methods above. Some polymer composite materials are structurally complicated. To obtain properties of fiber composites, the classical laminate theory must be utilized.
OBJECTIVES

There are two main objectives for this study: (1) present a finite element method for evaluating extensional moduli, shear moduli, and Poisson's ratio of polymer micro-mechanical composite structures, and (2) compare finite element solutions with the analytical results obtained using conventional micromechanical models and experimental data to verify the validity of the finite element method and analysis.

MATERIALS

This study analyzed long fiber composites to demonstrate FEA of thermosetting polymer composite matrices. These composites are made using pultrusion process with combination of two common types of layers: (1) the roving layer has unidirectional E-glass fibers and the matrix, and (2) the mat layer has randomly oriented continuous E-glass fibers. The cross-sections of these composites are shown in Figure 4.1.

Figure 4.1. Cross section of (a) fiber composite LFC-1, (b) fiber composite LFC-2, and (c) fiber composite LFC-3
The constituent volume fractions of the composites are given in Table 4.1. The volume fraction of mat and roving in these composites are given in Table 4.2.

**Table 4.1 Average volume fractions of the constituents of composite**

<table>
<thead>
<tr>
<th>Composite constituent</th>
<th>Symbol</th>
<th>LFC-1</th>
<th>LFC-2</th>
<th>LFC-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-glass in roving layers</td>
<td>$\upsilon_{\text{FiberRoving}}$</td>
<td>0.183</td>
<td>0.120</td>
<td>0.177</td>
</tr>
<tr>
<td>E-glass in mat layers</td>
<td>$\upsilon_{\text{FiberMat}}$</td>
<td>0.152</td>
<td>0.170</td>
<td>0.154</td>
</tr>
<tr>
<td>Vinylester resin</td>
<td>$\upsilon_{\text{Resin}}$</td>
<td>0.578</td>
<td>0.587</td>
<td>0.588</td>
</tr>
<tr>
<td>Kaolin clay filler</td>
<td>$\upsilon_{\text{Filler}}$</td>
<td>0.081</td>
<td>0.111</td>
<td>0.075</td>
</tr>
<tr>
<td>Total voids</td>
<td>$\upsilon_{\text{Void}}$</td>
<td>0.007</td>
<td>0.009</td>
<td>0.007</td>
</tr>
</tbody>
</table>

**Table 4.2 Average volume fractions of roving and mat of composite**

<table>
<thead>
<tr>
<th>Layer</th>
<th>Symbol</th>
<th>LFC-1</th>
<th>LFC-2</th>
<th>LFC-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roving</td>
<td>$\upsilon_{\text{Roving}}$</td>
<td>0.55</td>
<td>0.42</td>
<td>0.53</td>
</tr>
<tr>
<td>Mat</td>
<td>$\upsilon_{\text{Mat}}$</td>
<td>0.45</td>
<td>0.58</td>
<td>0.47</td>
</tr>
</tbody>
</table>

The matrix is a mixture of isotropic vinylester resin, Kaolin clay particles, voids, and small amount of catalyst. Kaolin clay particle is filler adding to improve resin properties and reduce cost. It has a hexagonal platelet shape \[7\] as shown in Figure 4.2.

![Schematic shape of the clay particle](image_url)

**Figure 4.2. Schematic shape of the clay particle**

**ANALYSIS**

**Theoretical Analysis of Matrix Material**

**Matrix Material in Thermosetting Polymer Composites**

This study examined fiber composites as a common thermosetting polymer composite. These composites are made using the pultrusion process with combination of two common types of layers: (1) the roving layer has unidirectional E-glass fibers and the matrix, and (2) the mat layer has randomly oriented continuous E-glass fibers. The fibers of roving and mat layers are embedded in matrix material and bonded together as a composite. This matrix is a mixture of isotropic vinylester resin, Kaolin clay particles, voids, and small amount of catalyst. The volume fraction of each element of polymer composites can be determined using the process described in ASTM D 790 \[8\]. The average volume fraction of each constituent of three different fiber composites (denoted as LFC-1, LFC-2, and LFC-3) is measured and reported in Table 4.1 \[9\]. The amount of catalyst is negligible.

Vinylester resin holds the composite together, protect it from corrosive environment. Kaolin clay particle is filler adding to improve load transfer properties and reduce cost. Voids are bubbles get trapped in the resin as a natural phenomenon. Void shapes in composite vary. Clay filler particles have a hexagonal platelet shape \[7\] as shown in Figure 4.2. However, void and filler can be approximated as having spherical shape with equivalent spherical diameter. This simplification permits matrix properties to be estimated using micromechanical models.
**Calculation of Matrix Properties**

Typical calculations assume all component volume fractions of a fiber composite are known, such as $\upsilon_{\text{FiberRoving}}$, $\upsilon_{\text{FiberMat}}$, $\upsilon_{\text{Resin}}$, $\upsilon_{\text{Filler}}$, and $\upsilon_{\text{Void}}$ for volume fraction of fiber in the roving layers, fiber in the mat layers, resin, filler, and void within a fiber composite, respectively. Then the volume fraction of resin, filler, and void with respect to matrix material (resin-filler-void mixture) is labeled as $\upsilon_{\text{Resin/Matrix}}$, $\upsilon_{\text{Filler/Matrix}}$, and $\upsilon_{\text{Void/Matrix}}$, respectively. These volume fractions can be expressed as follow:

\[
\begin{align*}
\upsilon_{\text{Resin/Matrix}} &= \frac{\upsilon_{\text{Resin}}}{\upsilon_{\text{Resin}} + \upsilon_{\text{Filler}} + \upsilon_{\text{Void}}} \\
\upsilon_{\text{Filler/Matrix}} &= \frac{\upsilon_{\text{Filler}}}{\upsilon_{\text{Resin}} + \upsilon_{\text{Filler}} + \upsilon_{\text{Void}}} \\
\upsilon_{\text{Void/Matrix}} &= \frac{\upsilon_{\text{Void}}}{\upsilon_{\text{Resin}} + \upsilon_{\text{Filler}} + \upsilon_{\text{Void}}}
\end{align*}
\]

(5-1)
(5-2)
(5-3)

Based on conventional micromechanics \cite{4}, the evenly positioned and oriented micro-particles in a matrix can be assumed as evenly positioned spherical inclusions in the matrix. For polymer composite matrix material, we can assume particles and voids have a spherical shape. A typical matrix material with particles is showed in Figure 5.1.

**Figure 5.1. Typical matrix containing spherical particles**

It is assumed that all the inclusions are evenly distributed in the matrix. Then, the Mori-Tanaka Model\cite{9} can be modified and used to calculate the matrix shear modulus ($G_{\text{Matrix}}$) and matrix bulk modulus ($K_{\text{Matrix}}$) as follow:

\[
\begin{align*}
G_{\text{Matrix}} &= G_{\text{Resin}} \left\{ 1 + \frac{\upsilon_{\text{Filler/Matrix}} (G_{\text{Filler}} - G_{\text{Resin}})}{G_{\text{Resin}} + 2S_{1212} \upsilon_{\text{Resin/Matrix}} (G_{\text{Filler}} - G_{\text{Resin}})} \right. \\
&\quad \left. + \frac{\upsilon_{\text{Void/Matrix}} (-G_{\text{Resin}})}{G_{\text{Resin}} + 2S_{1212} \upsilon_{\text{Resin/Matrix}} (-G_{\text{Resin}})} \right\} \\
K_{\text{Matrix}} &= K_{\text{Resin}} \left\{ 1 + \frac{\upsilon_{\text{Filler/Matrix}} (K_{\text{Filler}} - K_{\text{Resin}})}{K_{\text{Resin}} + \frac{1}{3} S_{\text{ijkl}} \upsilon_{\text{Resin/Matrix}} (K_{\text{Filler}} - K_{\text{Resin}})} \right. \\
&\quad \left. + \frac{\upsilon_{\text{Void/Matrix}} (-K_{\text{Resin}})}{K_{\text{Resin}} + \frac{1}{3} S_{\text{ijkl}} \upsilon_{\text{Resin/Matrix}} (-K_{\text{Resin}})} \right\}
\end{align*}
\]

(5-5)
(5-6)

where $S_{1212}$ and $S_{\text{ijkl}}$ are Eshelby’s tensor for spherical inclusions.
\[
S_{1212} = \frac{3K_{\text{Resin}} + 6G_{\text{Resin}}}{15K_{\text{Resin}} + 20G_{\text{Resin}}} \\
S_{1111} = \frac{9K_{\text{Resin}}}{3K_{\text{Resin}} + 4G_{\text{Resin}}}
\]

where \(K_{\text{Resin}}\) and \(G_{\text{Resin}}\) are bulk and shear moduli of resin. Then, the matrix tensile modulus (\(E_{\text{Matrix}}\)), and matrix Poisson’s ratio (\(\nu_{\text{Matrix}}\)) can be calculated from \(K_{\text{Matrix}}\) and \(G_{\text{Matrix}}\).

\[
E_{\text{Matrix}} = \frac{9K_{\text{Matrix}}}{1 + 3\frac{K_{\text{Matrix}}}{G_{\text{Matrix}}}}
\]

and

\[
\nu_{\text{Matrix}} = \frac{E_{\text{Matrix}}}{2G_{\text{Matrix}}} - 1
\]

**Finite Element Models of Matrix Material**

ANSYS was utilized in this study. Utilizing FEA software to calculate composite material properties can save time and reduce cost compared with fully analytical or experimental methods. With mechanical properties of each constituent are available, finite element methods to evaluate matrix material properties can be used as a cost-effective means of obtaining matrix material properties.

Moaveni\(^{[11]}\) and ANSYS Manual\(^{[12]}\) were consulted for analysis procedure and understand finite element theory and application within ANSYS. In this study, matrices are treated as an isotropic medium containing isotropic inhomogeneities and isotropic inclusions. Matrix material of fiber composite LFC-1 will be analyzed as a core study using FE-models. These models are similar to one another but have one or more of the following variations: FE-model size, filler size, void size, filler quantity, void quantity, filler location, and void location. The results of each FE-model are then compared with hand calculations using micromechanical models for the first validation. This comparison will reveal the recommended FE-model profile to be used for matrix FEA. The recommended FE-model will be used to obtain mechanical properties of matrices of other fiber composites, namely LFC-2 and LFC-3.

**Models**

An 8-node quadrilateral element (PLANE82) was utilized to model this two dimensional structural solid problems. It is a higher order version of the four-node quadrilateral element type, PLANE42. Therefore, the PLANE82 element type offers more accuracy when modeling problems with curved boundaries\(^{[11]}\).

There are two basic approaches in FE-modeling for evaluating matrix material mechanical properties. First, the combined one step model type is a “do it all” model. It consists of resin, fillers, and voids in one FE-model. Second, the step by step model type is a simple model that will analyze combined two materials at a time. For matrix material containing resin, fillers, and voids, the analysis procedure consists of two steps model. The first step involved FE-model to calculate properties of intermediate material, the combined resin and filler; it is done to produce input for the second step. The second step is FE-model to calculate matrix properties from the intermediate material with void. When fillers and voids are evenly distributed in the matrix, it is essential to analyze a piece of material from the member (specimen) in the form of unit area. Figure 5.2 shows the concept of unit area.
Figure 5.2. Concept of unit area for evenly distributed particles in matrix
(Micro area is taken from the structural body for analysis)

For the first step, the unit area is a squared plane stress resin area containing one filler at the center of the square. For the second step, the unit area is a squared plane stress of matrix containing one void at its center and the combined resin-fillers material. The unit area is defined as plane stress FE-model area containing and representing actual size of filler and/or void particles.

Boundary Condition
FE-models presented here are quarter model having axisymmetry restraint. Restraints are applied to the line along the plane stress edges and the axis of symmetry (X-axis and Y-axis). The two hundred pound of negative pressure is applied on the right hand side vertical edge.

Assumptions
It is assumed that Kaolin Clay Reinforced Particles (filler) and cavities (voids) are isotropic material. Filler and voids typically take the shape of platelet and ellipses, respectively. These shapes can be represented in 3D-solid finite element model as sphere with equivalent volume of their real shapes. Fillers and voids can be further simplified in a plane stress finite element model as circular areas with diameter such that the area fraction of resin, void and filler equal to their volume fraction.

Matrix Material Finite Element Analysis Results, Comparison and Discussions
In this section the FEA results are compared with hand calculations using micromechanical models for the first validation. Observation is made to eliminate unacceptable FE-modes which produce unusable results. Figure 5.3 shows result of thirty-one different arrangement of matrix composite LFC-1. Some models have an extreme location of void that produces a Poisson’s ratio far from expected values. These ratios will be abandoned. Overall, all results are in agreement within 6% for tensile & shear moduli and up to 17% for Poisson’s ratio. Matrix FEA is conducted in a general procedure which can be used for any micro/nano particle composites that consist of polymer resin and micro/nano sized inhomogeneities. Similar results are expected.

Figure 5.3. Comparison the results of 31 FE-models

Comparison of matrix mechanical properties for FEA versus micromechanical method
Using the recommended model number 20 analyzing matrix composite LFC-1, model 32 and 33 are developed and calculated for matrices of fiber composite LFC-2 and LFC-3, respectively.
The tensile modulus and shear modulus obtained by FEA are consistently lower than micromechanical model; however, the two methods produce the results that were within 6% of each other. The properties obtained by the two methods are showed in Figure 5.4.

**Figure 5.4. Comparison of matrix properties obtain by FEA versus micromechanical model**

**Laminate Theory and Evaluation of Fiber Composite Mechanical Properties**

Classical laminate theory is used to determine the mechanical properties of the three fiber composite materials: LFC-1, LFC-2, and LFC-3. These composites are made of E-glass fibers and matrix material. Their layers structure details can be seen in Figures 4.1. These figures are the cross-sections cut thru different layers of the composite materials and perpendicular to the fibers in roving layer. The properties of each layer must be determined prior to utilizing laminate theory to calculate the combined mechanical properties. There are two typical fiber layers: (1) roving fiber layer (2) mat (CSM) fiber layer.

**Roving Layer Analysis**

Roving layer is made with unidirectional continuous fiber threads. The fibers are bonded and embedded in matrix to form the roving layer. The longitudinal direction is in the straight fibers; and the direction perpendicular to the fibers is the transverse direction.

The longitudinal modulus of roving layer ($E_{11Roving}$) is determined by using the following expression:

$$E_{11Roving} = \frac{E_{Fiber} \nu_{Fiber/roving} + E_{Matrix} \nu_{Matrix/roving}}{\nu_{Fiber/roving} + \frac{E_{Fiber}}{E_{Matrix}} \nu_{Matrix/roving}}$$  \hspace{1cm} (5-11)

where $E_{Fiber}$ and $E_{Matrix}$ are Young’s modulus of long fiber and matrix material, respectively; $\nu_{Fiber/roving}$ and $\nu_{Matrix/roving}$ are volume fraction of long fiber and matrix material in the roving layers, respectively.

The transverse modulus of roving layer ($E_{22Roving}$) can be obtained using the Halpin-Tsai\(^{[10]}\) model:

$$E_{22Roving} = \frac{1 + 2\eta_{T} \nu_{Fiber/roving}}{1 - \eta_{T} \nu_{Fiber/roving}} E_{Matrix}$$  \hspace{1cm} (5-12)

where

$$\eta_{T} = \frac{E_{Fiber}}{E_{Matrix}} - 1$$ \hspace{1cm} (5-13)

$$\eta_{T} = \frac{E_{Fiber}}{E_{Matrix}} + 2$$
The shear modulus of the roving layer \((G_{12Roving})\) can be obtained using Halpin-Tsai model:

\[
G_{12Roving} = \frac{1 + 2\eta_G G_{Fiber/roving}}{1 - \eta_G G_{Fiber/roving}} G_{Matrix}
\]  
(5-14)

where

\[
\eta_G = \frac{G_{Fiber}}{G_{Matrix}} - 1
\]  
(5-15)

where \(G_{Fiber}\) and \(G_{Matrix}\) are shear modulus of long fiber and matrix, respectively. Roving layer Poisson’s ratio can be calculated as follow:

\[
\nu_{12Roving} = \nu_{Fiber} G_{Fiber/roving} + \nu_{Matrix} G_{Matrix/roving}
\]  
(5-16)

\[
\nu_{21Roving} = \nu_{12Roving} \frac{E_{22Roving}}{E_{11Roving}}
\]  
(5-17)

**Mat Layer Analysis**

In most processes, the randomly oriented continuous fiber strands in mat layer lie generally parallel to the surface. Therefore, properties of mat layer can be isotropic; that is, they are the same in any direction within the plane of the layer. The Tsai-Pagano model can be used to calculate the tensile modulus, shear modulus, and Poisson’s ratio of mat layer.

\[
E_{Mat} = \frac{3}{8} E_{11}^* + \frac{5}{8} E_{22}^*
\]  
(5-18)

\[
G_{Mat} = \frac{1}{8} E_{11}^* + \frac{1}{4} E_{22}^*
\]  
(5-19)

\[
\nu_{Mat} = \frac{E_{Mat}}{2G_{Mat}} - 1
\]  
(5-20)

where \(E_{Mat}\), \(G_{Mat}\), and \(\nu_{Mat}\) are the Young’s modulus, shear modulus, and Poisson’s ratio of mat layer, respectively; the \(E_{11}^*\) and \(E_{22}^*\) are longitudinal and transverse moduli of unidirectional fibrous composite, respectively, containing the same volume fractions of identical fibers and matrix as the mat layers under consideration.

The value \(E_{11}^*\) and \(E_{22}^*\) can be obtained from the following equations:

\[
E_{11}^* = E_{Fiber} \nu_{Fiber/mat} + E_{Matrix} \nu_{Matrix/mat}
\]  
(5-21)

\[
E_{22}^* = \frac{1 + 2\eta_T G_{Fiber/mat}}{1 - \eta_T G_{Fiber/mat}} E_{Matrix}
\]  
(5-22)

Where

\[
\eta_T = \begin{bmatrix}
\frac{E_{Fiber}}{E_{Matrix}} - 1 \\
\frac{E_{Fiber}}{E_{Matrix}} + 2
\end{bmatrix}
\]  
(5-23)
Fiber Composite Material Analysis

Classical laminate theory is used to calculate the combined properties of the layers of composite material.

\[
E_{11\text{Composite}} = \eta_{E11} + \eta_{Mat} - \frac{(V_{12\text{Roving}}\eta_{E22} + V_{Mat}\eta_{Mat})^2}{\eta_{E22} + \eta_{Mat}}
\]

\[
E_{22\text{Composite}} = \eta_{E22} + \eta_{Mat} - \frac{(V_{12\text{Roving}}\eta_{E22} + V_{Mat}\eta_{Mat})^2}{\eta_{E11} + \eta_{Mat}}
\]

\[
G_{12\text{Composite}} = G_{12\text{Roving}}\eta_{Roving} + G_{Mat}\eta_{Mat}
\]

\[
V_{12\text{Composite}} = \frac{V_{12\text{Roving}}\eta_{E22} + V_{Mat}\eta_{Mat}}{\eta_{E22} + \eta_{Mat}}
\]

where

\[
\eta_{E11} = \frac{E_{11\text{Roving}}\eta_{Roving}}{1 - V_{12\text{Roving}}V_{21\text{Roving}}}
\]

\[
\eta_{E22} = \frac{E_{22\text{Roving}}\eta_{Roving}}{1 - V_{12\text{Roving}}V_{21\text{Roving}}}
\]

\[
\eta_{Mat} = \frac{E_{Mat}\eta_{Mat}}{1 - V_{Mat}^2}
\]

EXPERIMENTAL RESULT

Six specimens of each of fiber composites groups LFC-1, LFC-2, and LFC-3 were prepared and tested. For extensional properties, The average mechanical properties are listed in Table 6.1.

<table>
<thead>
<tr>
<th>Material (No. of Samples)</th>
<th>Experimental Mechanical Properties</th>
<th>Average Longitudinal Tensile Modulus $E_{11}$ (KSI)</th>
<th>Average Shear Modulus $G_{12}$ (KSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFC-1 (6)</td>
<td>2,990</td>
<td>656</td>
<td></td>
</tr>
<tr>
<td>LFC-2 (6)</td>
<td>2,823</td>
<td>662</td>
<td></td>
</tr>
<tr>
<td>LFC-3 (6)</td>
<td>2,789</td>
<td>649</td>
<td></td>
</tr>
</tbody>
</table>

COMPARISON OF FEA-BASED ESTIMATION WITH EXPERIMENTAL RESULT

Comparison of matrix properties obtain using FEA with hand calculation using micromechanical model is done in section 4.2.4. This section presents the second validation comparing fiber composites experimental values with calculated value from the FEA combined with laminate theory.

To further validate our FEA calculation, laminate theory is utilized to evaluate fiber composite mechanical properties for comparing with the experimental results. The calculated result agreed with lab determined result with in 11%. Comparison of the result is graphically presented in Figure 7.1.
CONCLUSIONS

This paper reveals the results of analytical and experimental investigation in evaluating the mechanical properties of fiber-reinforced pultruded composites. It presents the procedure of creating, analyzing, evaluating, and validating calculation models of fiber composites containing E-glass fibers, vinylester resin, clay particles, and voids. Calculation of the composites mechanical properties was done in two parts. In the first part, the micromechanical models and finite element models were utilized to obtain composites' matrices mechanical properties. The second part was done to obtain the mechanical properties of fiber composites. Halpin-Tsai and Tsai-Pagano models were employed to evaluate the mechanical properties of roving and mat layers. Finally, laminate theory was used to combine the properties of layers to obtain the properties of polymer composites. These results were compared with experimental results of the three different fiber composites groups for validation. Both finite element models and micromechanical models correlated with experimentally determined tensile and shear moduli within eleven percent. This research shows utilizing the FE-models produced results consistently closer agreement with experimental results than with the conventional micromechanical models.

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REFERENCES

APPLICATION OF JAVA PROGRAMMING TO EFFICIENTLY DESIGN N-PROTECTED AMINO ACIDS

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ABSTRACT

Synthesis of N-protected amino acid active esters is known to be one of the most useful methods to cause the activation necessary for peptide coupling, with applications in studies involving receptor-binding affinities and in protein stereochemical studies to elucidate enzymatic mechanisms. Amino acid esters incorporating glycine, proline, phenylalanine and related methyl esters have often been synthesized due to their usefulness, and the lysine derivative named $N_a$–Benzylxycarbonyl - $N_e$–tert –butyloxy carbonyl – L – lysin - (N - hydroxy-succinimidester) has also been used extensively as a coupling agent for the formation of peptide bonds and to facilitate the synthesis of endorphins and enzyme inhibitors. We are reporting a multi-step sequence involving the selective addition and subsequent removal of several common protecting groups developed using a computer program written primarily in Java. This program has been developed to incorporate the use of molecular modeling programs along with the software drawing tool Isis/Draw to predict the step-by-step organic synthetic routes to facilitate this work of importance to medicinal chemists developing new pharmaceutical drugs. Because these synthetic routes can be lengthy, clearly a trial-and-error approach toward efficient synthesis is not cost effective. Thus we have implemented a new Java-based computer program to design alternative synthetic routes and analyze potential byproducts. Enantioselectivity is maintained, providing undergraduates an opportunity to be actively involved in a stereoselective synthesis involving amino acids.

Keywords: Java, Protecting groups, Amino acids, Peptides, Lactams

INTRODUCTION:

Synthesis of $N$-protected amino acid active esters is known to be one of the most useful methods to cause the activation necessary for peptide coupling (Giralt et al. 1990; Riniker et al. 1993). These $N$-protected amino acid derivatives are important for the synthesis of peptides for studies involving receptor-binding affinities and for protein stereochemical studies to elucidate enzymatic mechanisms. Reports of syntheses of other amino acid esters incorporating glycine, proline, phenylalanine and related methyl esters have been widespread (Ishizu et al. 1991; Furlan et al. 1998). The target compound of this report, $N_a$ – Benzylxycarbonyl - $N_e$ – tert –butyloxy carbonyl – L – lysin - (N - hydroxy-succinimidester) 6 (Figure 1), has been used extensively as a coupling agent for the formation of peptide bonds (Hiskey et al. 1975) and for application in the synthesis of endorphins and peptide factors (Moroder et al. 1994), analogs of somatostatin (Allen et al. 1988), enzyme inhibitors (Sawayama et al. 1989), and in structure activity relationship studies of hormones (Moroder et al. 1979).

Molecular modeling programs have become increasingly important tools to help medicinal chemists and biochemists understand enzyme mechanisms and receptor sites in order to design effective medications. Because these routes to synthesize medications can be lengthy, clearly a trial-and-error approach toward efficient synthesis is not cost effective. Thus we have implemented a new Java-based computer program, Java Program-Assisted Organic Synthesis (JPAOS), to design alternative synthetic routes and analyze potential byproducts. This program first analyzes the molecule which has been entered by the user via the software drawing tool Isis/Draw in order to determine reactive sites. Next, the program searches through a database containing chemical reactions to select the reaction with the highest probability of completion based on the reactive sites in the first step. In order to narrow the choice of reactions, a function containing rules to eliminate
improbable structures is called. If molecules with the same formulas but different spatial orientations are possible, these additional possible orientations are considered. The effects of alternative solvents and potential catalysts on reaction mechanisms are accessed via an Oracle-based database. As a result of the application of this program, the synthetic route shown in Figure 1 has successfully been implemented.

**RESULTS AND DISCUSSION:**

As shown in the first step shown in Figure 1, L-(+)-Lysine was cyclized to the ε-caprolactam intermediate, (S)–(α) - Amino – (α) - caprolactam 2, in order to cause pronounced differentiation between the two amino groups of lysine. Previous syntheses of the target compound, Nα-benzoxycarbonyl – Nε-tert-butyloxycarbonyl – L – lysin - (N - hydroxysuccinimidester) 6 (Pearson et al. 1996) have not used this ε-caprolactam as an intermediate and required lengthy purification steps, such as flash column chromatography, after each intermediate step, causing this type of multi-step synthesis to be unsuitable for undergraduate laboratory classes. The use of the ε-caprolactam intermediate causes pronounced differentiation between the two amino groups of lysine to then facilitate benzoxycarbonyl protection of the primary (α) amino and subsequent tert-butyloxycarbonyl protection of the secondary (ε) amide group, with higher yields and less racemization.

In order to choose the most feasible route shown in Figure 1, the JPAOS method formed all of the possible intermediates predicted to occur on the route from the Isis/Draw input molecule to the target product, with the following general steps for its algorithm:

1. Input the reactant molecules.
2. Predict the reactive intermediates by selecting the most reactive sites and classify according to transformation.
3. Analyze the polarity of these intermediates and the transition states necessary to reach them in order to search a solvent database to select the best solvent.
4. Apply known rules of organic chemistry to calculate molecular mechanics, the reaction rates, and determine any stereoisomers.
5. Analyze the intermediates and the transition states necessary to reach them in order to search a catalyst database to select the best catalyst.
6. Evaluate the overall route and predict the product and any possible byproducts.

Literature precedence has shown that cyclization to produce the ε-caprolactam 2 in Figure 1 or the ε-caprolactam 10 in Figure 2 using either of these reagents can take up to two days for completion.

**Figure 2. Synthetic Steps and Reagents Used to Protect and Deprotect L-β- Lysine**

![Synthetic Steps Diagram](image)

- a) 1,3-Bis(trimethylsilyl)urea, dicyclohexylamine, THF, reflux; b) CBz-Cl, saturated NaHCO3, THF; c) (BOC)2O, DMAP, THF; d) 1N LiOH, aqueous THF; e) Trimethylacetyl chloride, TEA, THF; f) N-acetylhydroxysuccinimide, THF; g) Pd/C, H2, Ethyl acetate; h) aqueous HCl

Analysis of the synthetic route after a search of the catalyst database revealed that dicyclohexylamine could be effective for increasing the rate of the reaction by functioning as a bulky base for general base catalysis. Therefore, dicyclohexylamine was used as the catalyst and a Dean-Stark trap was used to facilitate the removal of water from the reaction, resulting in complete cyclization within a 30 minute reflux instead of the 48 hours previously reported.

**CONCLUSION:**

The common benzyloxy carbonyl, tert-butyloxy carbonyl, and succinimide protecting groups have been used by undergraduates in a multi-step sequence to synthesize optically pure enantiomers by using procedures and materials which can be applied during an undergraduate organic laboratory class. Analysis of the possible synthetic routes using a newly developed JPAOS program was of great assistance in developing this new synthetic route. Use of dicyclohexylamine as a bulky base for general base catalysis and the use of a Dean-Stark
trap decreased the time required for complete cyclization to the ε-caprolactam intermediate. Optical rotation, \(^1\)H NMR, \(^{13}\)C NMR, FTIR, GC-MS, and elemental analysis have been used to analyze the purity and optical activity. The retention of enantiomeric purity and one-pot synthetic sequence indicate that this method provides a useful learning experience for undergraduates.

**ACKNOWLEDGEMENTS:**
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**LITERATURE CITED:**


**SUPPLEMENTAL INFORMATION**

**Experimental and Characterization Data**

General Experimental. Reagents and solvents were used as received from commercial vendors and no attempts were made to purify or dry these components further. Thin layer chromatography was performed using 1‖x 3‖ Analtech GF 350 silica gel plates with fluorescent indicator. Visualization of TLC plates was made by observation in iodine vapors. The proton and carbon magnetic resonance spectra were recorded on a Bruker AC 300 MHz Nuclear Magnetic Resonance Spectrometer, using either CDCl\(_3\) or CD\(_3\)OD as the solvent with tetramethylsilane as an internal reference. Melting points were obtained using an Electrothermal melting point apparatus and are uncorrected. Infrared spectra (IR) were obtained as KBr pellets and obtained on a Perkin-Elmer Spectrum 1000 FT-Infrared Spectrophotometer. Low resolution mass spectroscopic analyses were performed on a Shimadzu QP-5000 GC/Mass Spectrometer (Cl, methane) by direct insertion.

\((S) - (\alpha) - \text{Amino} - (\alpha) - \text{caprolactam (2).}\) To a 100 mL 3-necked flask equipped with a magnetic stir bar, a water cooled reflux condenser, and a Dean-Stark trap was added L-(+)-lysine hydrochloride (1) (5.00 g, 27.38 mmol). THF (50mL) was added and the stirrer was started. A solution of 1,3-bis(trimethylsilyl)urea (8.40 g, 41.07 mmol) dissolved in THF (20 mL) was added in one portion, followed by the addition of dicyclohexylamine (2.50 mL, 13.69 mmol) via syringe. The 3-necked flask was placed in an electric heating mantle and the mixture was
heated at reflux for 30 minutes, until thin layer chromatography (TLC) (silica gel plate eluted with 1: 1 Ethyl Acetate: Hexanes; iodine visualization) indicated the complete consumption of the lysine. The solution was cooled to ambient temperature and was poured into a 100 mL separatory funnel. The solution was washed with saturated aqueous sodium chloride (1 x 10 mL), water (2 x 15 mL), and 0.1 N hydrochloric acid (1 x 15 mL). The organic layer and the interfacial precipitates were washed over anhydrous sodium sulfate, filtered, and the solvent was evaporated under reduced pressure conditions to afford an 87% yield of (S) - (α) - Amino - (ε) - caprolactam (2) (3.05 g) as a white solid. mp: 97 - 101º C. Rf: 0.49 (1:1 Ethyl Acetate: Hexanes). 1H NMR (300 MHz, CDCl3): δ 7.19 (br s, 2H), 5.12 (d, J = 11.1 Hz, 1H), 3.58 (s, 1H), 3.15 (m, 2H), 1.49 – 1.14 (m, 6H). 13C NMR (75 MHz, CDCl3): δ 178.26, 52.82, 41.01, 33.72, 28.17, 27.94. IR (KBr): 3448, 3321, 2929, 1676, 1166 cm⁻¹; CI Mass Spectrum (methane) m/z 129 [M + 1]. [α]D = - 25.2º (c = 1.00, CH3OH). Anal. Calcd. for C13H17N3O3: C, 62.97; H, 7.23; N, 7.73. Found: C, 63.05; H, 7.37; N, 7.52.

(S) - N – (α) - Benzyloxycarbonyl – (ε) - caprolactam (3). To a 100 mL round-bottom flask equipped with a magnetic stir bar was added (S) – (α) - Amino – (ε) - caprolactam (2) (0.75 g, 5.85 mmol) and THF (30 mL). Saturated sodium bicarbonate (10 mL) was added to adjust the pH to 8. Benzylic chloroformate (0.84 mL, 5.85 mmol) was added via syringe. The solution was stirred at room temperature for 15 minutes. Then the mixture was poured into a 100 mL separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic phase was dried over anhydrous sodium sulfate, filtered, and the solvent was removed under reduced pressure to afford an 96% yield of (S) - N – (α) - Benzyloxycarbonyl – (ε) - caprolactam (3) (1.31 g) as a white solid. mp: 142-146 ºC. Rf: 0.88 (1:1 Ethyl Acetate: Hexanes). 1H NMR (300 MHz, CDCl3): δ 7.72 (m, 1H), 7.32 (s, 5H), 7.01 (d, 1H, J = 11.1 Hz), 6.21 (s, 1H), 5.01 (s, 2H), 3.08 (m, 2H), 2.19-1.26 (m, 6H); 13C NMR (75 MHz, CDCl3): δ 186.75, 172.05, 154.72, 140.89, 134.85, 128.13, 127.95, 127.61, 126.52, 69.24, 45.79, 31.34, 28.79. CI Mass Spectrum (methane) m/z 262 [M⁺]; IR (KBr): 1776, 1686, 1134, 791, 750 cm⁻¹. Anal. Calcd. for C14H18N2O3: C, 64.11; H, 6.92; N, 10.68. Found: C, 64.38; H, 7.11; N, 10.37.

(S) - N – (3) - Benzyloxycarbonyl – N – (1) – tert - butyloxycarbonyl – (ε) - caprolactam (4). To a 100 mL round-bottom flask equipped with a magnetic stir bar was added (S) - N – (3) - Benzyloxycarbonyl – (ε) - caprolactam (3) (0.500 g, 1.92 mmol) and DMAP (0.0370 g, 0.303 mmol). THF (30 mL) was added. Di-tert-butyldicarbonate (0.132 g, 0.605 mmol) in THF (20 mL) was added to the solution. The solution was stirred at room temperature for 20 minutes and then was poured into a separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic layer was dried, filtered, and evaporated to afford a 96% yield of (S) - N – (3) - Benzyloxycarbonyl – N – (1) - tert-butyloxycarbonyl – (ε) - caprolactam (4) (0.639 g) as a pale yellow solid. Rf: 0.47 (1:4 Ethyl Acetate: Hexanes). 1H NMR (300 MHz, CDCl3): δ 7.34 (s, 5H), 5.11 (s, 2H), 3.92 (m, 1H), 3.62 - 3.30 (m, 2H), 1.86 - 1.52 (m, 5H), 1.51 (s, 9H), 1.37 - 1.08 (m, 2H). CI Mass Spectrum (methane) m/z 362 [M⁺]; IR (KBr): 3448, 3102, 2929, 1741, 1702, 1684, 1455, 1122, 1091, 699 cm⁻¹. Anal. Calcd. for C15H22N2O5: C, 62.97; H, 7.23; N, 7.73. Found: C, 63.05; H, 7.37; N, 7.52.

N3 - Benzoyloxy carbonyl – N3- tert – butyloxycarbonyl – L – lysine (5). To a 100 mL round-bottom flask equipped with a magnetic stir bar and containing aqueous THF (70 mL) was added (S) - N – (3) - Benzyloxycarbonyl – N – (1) tert-butyloxycarbonyl – (ε) - caprolactam (4) (0.380 g, 1.04 mmol). Lithium hydroxide (1.0 N, 3.0 mmol, 3.0 mL) was added and the solution was stirred at room temperature for 15 minutes until TLC analysis (1: 1 Ethyl Acetate: Hexanes) indicated the complete disappearance of starting material. The solution was poured into a 100 mL separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic layer was dried over anhydrous sodium sulfate, filtered, and the THF was removed under reduced pressure to afford an 89% yield of N3 - Benzoyloxy carbonyl – N3- tert – butyloxycarbonyl – L – lysine (5) (0.337 g) as a clear oil which solidified to a pale yellow solid. Rf: 0.28 (1:1 Ethyl Acetate: Hexanes). 1H NMR (300 MHz, CDCl3): δ 7.34 (s, 5H), 5.11 (s, 2H), 4.70 (s, 1H), 3.12 (m, 2H), 1.86 - 1.09 (m, 7H), 1.51 (s, 9H). 13C NMR (75 MHz, CDCl3): δ 155.69, 137.27, 128.51, 127.61, 127.94, 128.54, 126.80, 68.67, 66.43, 55.42, 31.18, 27.76, 26.28, 25.47. CI Mass Spectrum (methane) m/z 380 [M⁺]; IR (KBr): 3504 – 3102, 2931, 1741, 1726, 1650, 1292, 1292, 1021, 768, 698 cm⁻¹. Anal. Calcd. for C15H22N2O5: C, 59.99; H, 7.42; N, 7.36. Found: C, 60.22; H, 7.50; N, 7.28.
$\text{N}_2$ - Benzoylcarbonyl - $\text{N}_2$ - tert - butyloxy carbonyl - L - lysine (5) (0.260 g, 0.690 mmol) and THF (40 mL). Triethylamine (0.100 mL, 0.690 mmol) was added via syringe. Trimethylacetyl chloride (0.090 mL, 0.690 mmol) was added and the solution was stirred for 10 minutes at room temperature. N-hydroxysuccinimide (0.0790 g, 0.690 mmol) was added, which caused a white precipitate to form, and the solution was stirred at room temperature for 10 minutes. The solution was poured into a 100-mL separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic layer was collected, dried over anhydrous sodium sulfate, filtered, and the solvent removed under reduced pressure to yield a clear syrup, which solidified to afford an 92% yield of $\text{N}_2$ - (3) - Benzyloxy carbonyl - $\text{N}_2$ - (1) - tert - butyloxy carbonyl - L - lysin - (N - hydroxysuccinimide ester) (6) (0.293 g) as a pale yellow solid. Crystalization using isopropyl alcohol and hexanes afforded an 87% yield of $\text{N}_2$ - (3) - Benzyloxy carbonyl - N - (1) - tert-butyloxy carbonyl - L - lysin-N-hydroxysuccinimide ester (6) (0.277 g) as white crystals. mp: 96 - 100°C. Rf 0.30 (1:1 Ethyl Acetate: Hexanes).

$^1$H NMR (300 MHz, CDCl$_3$): δ 7.35 (s, 5H), 5.12 (s, 2H), 4.69 (s, 1H), 4.11 (m, 1H), 3.52 - 3.30 (m, 2H), 2.80 (s, 4H), 1.77 - 1.22 (m, 7H), 1.42 (s, 9H). $^{13}$C NMR (75 MHz, CDCl$_3$): δ 173.14, 169.05, 155.45, 137.08, 133.04, 128.14, 127.96, 127.38, 68.39, 66.20, 55.24, 38.09, 30.09, 29.37, 26.86, 26.67, 26.05, 25.37, 25.24. CI Mass Spectrum (methane) m/z 147 [M + 1].

13 Amino L-lysine (6) (0.280 g, 0.583 mmol) was added 5% Palladium on carbon (0.05 g) and ethyl acetate (50 mL). The flask was evacuated and purged with nitrogen three times, then filled with hydrogen (30 psi). The reaction was monitored by thin layer chromatography (TLC) (2:3 Ethyl Acetate: Hexanes; iodine visualization) and after 10 minutes the reaction was complete. The contents of the flask were filtered through a pad of Celite and the filtrate was concentrated to afford an 99% yield (0.198 g) of $\text{N}_2$ - (3) - Amino - $\text{N}_2$ - (1) - tert - butyloxy carbonyl - L - lysin - (N - hydroxysuccinimide ester) (7) (0.293 g) as a white solid. mp: 97 - 98°C. Rf 0.690 mmol) was added, which caused a white precipitate to form, and the solution was stirred at room temperature for 10 minutes. The solution was poured into a 100-mL separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic layer was collected, dried over anhydrous sodium sulfate, filtered, and the solvent removed under reduced pressure to yield a clear syrup, which solidified to afford an 92% yield of $\text{N}_2$ - (3) - Amino - $\text{N}_2$ - (1) - tert - butyloxy carbonyl - L - lysine - (N - hydroxysuccinimide ester) (7) (0.355 g, 1.04 mmol). A 0.1 N solution of hydrochloric acid (20 mL) was added and the stirrer was started. The reaction was monitored by thin layer chromatography (TLC) (2:3 Ethyl Acetate: Hexanes; iodine visualization) and after stirring for 10 minutes the reaction was complete. The solution was filtered and concentrated to afford a 99% yield (0.198 g) of $\text{N}_2$ - (3) - Amino - $\text{N}_2$ - (1) - tert - butyloxy carbonyl - L - lysine - (N - hydroxysuccinimide ester) (7) (0.293 g) as a colorless oil. $^1$H NMR (300 MHz, CDCl$_3$): δ 4.67 (s, 2H), 4.10 (m, 1H), 3.48 - 3.30 (m, 2H), 2.79 (s, 4H), 1.75 - 1.19 (m, 7H), 1.41 (s, 9H).

L - (+) - lysine (8). To a 100 mL round-bottom flask equipped with a magnetic stir bar was added $\text{N}_2$ - (3) - Amino - $\text{N}_2$ - (1) - tert - butyloxy carbonyl - L - lysine - (N - hydroxysuccinimide ester) (7) (0.355 g, 1.04 mmol). A 0.1 N solution of hydrochloric acid (20 mL) was added and the stirrer was started. The reaction was monitored by thin layer chromatography (TLC) (3:2 Ethyl Acetate: Hexanes; iodine visualization) and after stirring for 10 minutes, the reaction was complete. The solution was filtered and concentrated to afford a 99% yield (0.149 g) of L - (+) - lysine (8) as a white solid. $^1$H NMR (300 MHz, CD$_3$OD): δ 4.05 (t, 1H, J = 6.0 Hz), 3.02 (t, 2H, J = 7.1 Hz), 1.99 (m, 2H), 1.71 (t, 2H, J = 7.2 Hz), 1.52 (m, 2H). CI Mass Spectrum (methane) m/z 147 [M$^+$ + H]; [α]$_D^{25} = + 10.2^\circ$ (c = 1.00, H$_2$O).

(R) - (α) - Amino - (ε) - caprolactam (10). To a 100 mL 3-necked flask equipped with a mechanical stirrer, a water cooled reflux condenser, and a Dean-Stark trap was added D - (α) - lysine hydrochloride (9) (5.00 g, 27.38 mmol). THF (80 mL) was added and the stirrer was started. The solution was added to a 1,3-bis(trimethylsilyl)urea (8.40 g, 41.07 mmol) dissolved in THF (20 mL) in one portion, followed by the addition of dicyclohexylamine (2.50 mL, 13.69 mmol) via syringe. The 3-necked flask was placed in an electric heating mantle and the mixture was heated at reflux for 30 minutes, until thin layer chromatography (TLC) (silica gel plate eluted with 1: 1 Ethyl Acetate: Hexanes; iodine visualization) indicated the complete consumption of the lysine. The solution was cooled to ambient temperature and was poured into a 100 mL separatory funnel. The solution was washed with saturated aqueous sodium chloride (1 x 10 mL), water (2 x 15 mL), and 0.1 N hydrochloric acid (1 x 15 mL). The organic layer and the interfacial precipitates were dried over anhydrous sodium sulfate, filtered, and the solvent was evaporated under reduced pressure to afford an 88% yield of (R) - (α) - Amino - (ε) - caprolactam (10) (3.09 g) as a white solid. mp: 97 - 101°C. Rf 0.49 (1:1 Ethyl Acetate: Hexanes). $^1$H NMR (300 MHz, CD$_3$OD): δ 7.16 (br s, 2H), 5.10 (d, J = 11.1 Hz, 1H), 3.55 (s, 1H), 3.11 (m, 2H), 1.50 - 1.13 (m, 6H). $^{13}$C NMR (75 MHz, CD$_3$OD): δ 178.14, 52.37, 40.96, 33.62, 28.09, 27.52. IR (KBr): 3447, 3322, 2929, 1677, 1154 cm$^{-1}$; CI Mass Spectrum (methane) m/z 129 [M$^+$ + 1]. [α]$_D^{25} = + 25.4^\circ$ (c = 1.00, CH$_3$OH).

(R) - N – (α) - Benzyloxycarbonyl – (ε) - caprolactam (11). To a 100 mL round-bottom flask equipped with a magnetic stir bar was added (R) – (α) - Amino – (ε) - caprolactam (10) (0.75 g, 5.85 mmol) and THF (30 mL). Saturated sodium bicarbonate (10 mL) was added to adjust the pH to 8. Benzyl chloroformate (0.84 mL, 5.85 mmol) was added via syringe. The solution was stirred at room temperature for 15 minutes. Then the mixture was poured into a 100 mL separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic phase was dried over anhydrous sodium sulfate, filtered, and the solvent was removed under reduced pressure to afford an 89% yield of (R) – N – (α) - Benzyloxycarbonyl – (ε) - caprolactam (11) (1.28 g) as a white solid. mp: 142-145 °C. Rf 0.88 (1:1 Ethyl Acetate: Hexanes). ¹H NMR (300 MHz, CDCl₃): δ 7.71 (m, 1H), 7.30 (s, 5H), 6.99 (d, 1H, J = 11.1 Hz), 6.19 (s, 1H), 4.98 (s, 2H), 3.07 (m, 2H), 2.18 - 1.24 (m, 6H); ¹³C NMR (75 MHz, CDCl₃): δ 186.55, 172.04, 154.69, 140.77, 134.81, 128.11, 127.92, 127.59, 126.49, 69.22, 45.71, 31.31, 28.79. CI Mass Spectrum (methane) m/z 326 [M⁺] +; IR (KBr): 3449, 3102, 1776, 1764, 1687, 1452, 1121, 1094, 701 cm⁻¹. Anal. Calcd. for C₁₇H₁₅N₂O₃: C, 64.11; H, 6.92; N, 10.68. Found: C, 64.27; H, 7.09; N, 7.56.

(R) - N – (3) - Benzyloxycarbonyl – N – (1) - tert - butyloxycarbonyl – (ε) - caprolactam (12). To a 100 mL round-bottom flask equipped with a magnetic stir bar was added (R) – N – (α) - Benzyloxycarbonyl – (ε) - caprolactam (11) (0.500 g, 1.92 mmol) and DMAP (0.0370 g, 0.303 mmol). THF (30 mL) was added. Di-tert-butyl dicarbonate (0.132 g, 0.605 mmol) in THF (20 mL) was added to the solution. The solution was stirred at room temperature for 10 minutes and then was poured into a 100 mL separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic layer was dried, filtered, and evaporated to afford an 89% yield of (R) – N – (3) - Benzyloxycarbonyl – N – (1) - tert - butyloxycarbonyl – (ε) - caprolactam (12) (0.585 g) as a pale yellow solid. Rf 0.47 (1:4 Ethyl Acetate: Hexanes). ¹H NMR (300 MHz, CDCl₃): δ 7.33 (s, 5H), 5.10 (s, 2H), 3.90 (m, 2H), 3.61 - 3.29 (m, 2H), 1.82 - 1.52 (m, 5H), 1.50 (s, 9H), 1.39 - 1.10 (m, 2H). CI Mass Spectrum (methane) m/z 362 [M⁺] +; IR (KBr): 3449, 3102, 1776, 1764, 1687, 1452, 1121, 1094, 701 cm⁻¹. Anal. Calcd. for C₁₉H₂₁N₂O₅: C, 62.97; H, 7.23; N, 7.73. Found: C, 63.11; H, 7.31; N, 7.56.

N₆ - Benzyloxycarbonyl – N₆ - tert – butyloxycarbonyl – D – lysine (13). To a 100 mL round-bottom flask equipped with a magnetic stir bar and containing aqueous THF (70 mL) was added (R) – N – (3) - Benzyloxycarbonyl – N₁ - tert butyloxycarbonyl – D – lysine (α) - caprolactam (12) (0.380 g, 1.04 mmol). Lithium hydroxide (1.0 N, 3.0 mmol, 3.0 mL) was added and the solution was stirred at room temperature for 15 minutes until TLC analysis (1:1 Ethyl Acetate: Hexanes) indicated the complete disappearance of starting material. The solution was poured into a 100 mL separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic layer was dried over anhydrous sodium sulfate, filtered, and the THF was removed under reduced pressure to afford an 85% yield of N₆ - Benzyloxycarbonyl – N₆ - tert - butyloxycarbonyl – D – lysine (13) (0.322 g) as a clear oil which solidified to a pale yellow solid. Rf 0.28 (1:1 Ethyl Acetate: Hexanes). ¹H NMR (300 MHz, CDCl₃): δ 7.32 (s, 5H), 5.08 (s, 2H), 4.65 (s, 1H), 4.09 (m, 1H), 3.63 - 3.30 (m, 2H), 1.85 - 1.07 (m, 7H), 1.50 (s, 9H); ¹³C NMR (75 MHz, CDCl₃): δ 155.58, 137.23, 128.49, 128.32, 127.59, 126.90, 68.72, 66.42, 55.38, 31.14, 27.72, 26.24, 25.45. CI Mass Spectrum (methane) m/z 380 [M⁺] +; IR (KBr): 3505 - 3104, 2930, 1742, 1726, 1650, 1293, 1023, 769, 699 cm⁻¹. Anal. Calcd. for C₁₉H₂₁N₂O₅C₆H₄: C, 59.99; H, 7.42; N, 7.36. Found: C, 60.16; H, 7.53; N, 7.29.

N₆ - (3) - Benzyloxycarbonyl – N₆ - (1) - tert – butyloxycarbonyl – D – lysin – (N – hydroxysuccinimide ester) (14). To a 100 mL round-bottom flask equipped with a magnetic stir bar and capped with a rubber septum was added N₆ - Benzyloxycarbonyl – N₆ - tert – butyloxycarbonyl – D – lysine (13) (0.260 g, 0.690 mmol) and THF (40 mL). Triethylamine (0.100 mL, 0.690 mmol) was added via syringe. Trimethylacetyl chloride (0.900 mL, 0.690 mmol) was added and the solution was stirred for 10 minutes at room temperature. N-hydroxysuccinimide (0.0790 g, 0.690 mmol) was added, which caused a white precipitate to form, and the solution was stirred at room temperature for 10 minutes. The solution was poured into a separatory funnel and washed with saturated sodium chloride solution (1 x 5.0 mL) and water (2 x 5.0 mL). The organic layer was collected, dried over anhydrous sodium sulfate, filtered, and the solvent removed under reduced pressure to yield a clear syrup, which solidified to afford a 90% yield of N₆-(3)-Benzyloxycarbonyl-N(1)-tert-butyloxycarbonyl-D-lysine-N-hydroxysuccinimide ester (14) (0.286 g) as a pale yellow solid. Crystallization using isopropl alcohol and hexanes afforded an 87% yield of N₆ - (3) - Benzyloxycarbonyl – N₆ - (1) - tert-butyloxycarbonyl-D - lysin - N - hydroxysuccinimide ester (14) (0.277 g) as white crystals. mp: 95 - 98°C. R. 0.30 (1:1 Ethyl Acetate: Hexanes). ¹H NMR (300 MHz, CDCl₃): δ 7.34 (s, 5H), 5.11 (s, 2H), 4.68 (s, 1H), 4.10 (m, 1H), 3.50 - 3.32 (m, 2H), 2.78 (s,
Application of Java Programming to Efficiently Design N-Protected Amino Acids

13C NMR (75 MHz, CDCl3): δ 173.12, 169.03, 155.43, 137.01, 133.02, 128.12, 127.94, 127.37, 68.37, 66.18, 55.22, 38.05, 30.06, 27.48, 26.82, 26.02, 25.33, 25.22. CI Mass Spectrum (methane) m/z 478 [M+]; IR (KBr): 3421, 2933, 1808, 1778, 1732, 1728, 1687, 1211, 1069, 749, 698 cm⁻¹. [α]D²⁵ = -16.3º (c = 1.00, CHCl₃). Anal. Calcd. for C₂₃H₃₁N₃O₈: C, 57.85; H, 6.54; N, 8.80. Found: C, 57.91; H, 6.82; N, 8.65.

Nₐ –(3) –Amino –Nₑ –1 – tert – butyloxy carbonyl – D – lysin – (N - hydroxysuccinimide ester) (15). To a 100 mL flask charged with Nₐ – (3) - Benzyloxy carbonyl – Nₑ – (1) – tert – butyloxy carbonyl – D – lysin – (N - hydroxysuccinimide ester) (14) (0.280 g, 0.583 mmol) was added 5% Palladium on carbon (0.050 g) and ethyl acetate (50 mL). The flask was evacuated and purged with nitrogen 3 times, then filled with hydrogen (30 psi). The reaction was monitored by thin layer chromatography (TLC) (2:3 Ethyl Acetate: Hexanes; Iodine visualization) and after 1.5 hours the reaction was judged to be complete. The contents of the flask were filtered through a pad of Celite and the filtrate was concentrated to afford a 93% yield (0.186 g) of Nₐ –(3) – Amino –Nₑ –1 – tert – butyloxy carbonyl – D – lysin – (N - hydroxysuccinimide ester) (15) as a colorless oil.

D - (1) - Lysine (16). To a 100 mL round-bottom flask equipped with a magnetic stir bar was added Nₐ –(3) –Amino –Nₑ –1 – tert – butyloxy carbonyl – D – lysin – (N - hydroxysuccinimide ester) (15) (0.355 g, 1.04 mmol). A solution of 0.1 N hydrochloric acid (10 mL) was added and the stirrer was started. The reaction was monitored by thin layer chromatography (TLC) (3:2 Ethyl Acetate: Hexanes; Iodine visualization) and after stirring for 6.0 hours, the reaction was complete. The solution was filtered to afford an 87% yield (0.132 g) of D – (-) - lysine (16) as a white solid.

1H NMR (300 MHz, CD₃OD): δ 4.03 (t, 1H, J = 6.0 Hz), 2.97 (t, 2H, J = 7.1 Hz), 1.93 (m, 2H), 1.68 (t, 2H, J = 7.2 Hz), 1.48 (m, 2H). CI Mass Spectrum (methane) m/z 147 [M+ + H]; [α]D²⁵ = -12.8º (c = 1.00, H₂O).
COMPUTATIONAL STUDIES TO FACILITATE THE DESIGN OF NONLINEAR OPTICAL MATERIALS

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ABSTRACT

Push-pull chromophores are molecules which are widely investigated because of their useful nonlinear optical (NLO) properties. These NLO properties are caused by the efficient intramolecular delocalization of the \( \pi \)-electrons in these push-pull chromophores. This intramolecular movement of their \( \pi \)-electrons allows them to be useful for many biological processes and also for making logic devices which can essentially be turned “on” or “off.” This fluorescent “on-off” feature is the result of the intramolecular movement of the \( \pi \)-electrons which is made possible in a molecule which has one portion of its structure that can donate electrons temporarily at one side of the molecule (donor) while another portion of its structure can accept this electron density (acceptor). The overall effect of this movement of electron density is a type of “push-pull” movement of the electron density, which can be influenced and fine-tuned by the choice of the electron donor (D) group, the electron acceptor (A) group, and also through the bond length and bond angles of the \( \pi \)-conjugated spacer located between these donor and acceptor portions of the molecule. The programming, computational, and relational database tools in the rapidly developing field of chemoinformatics have been applied to facilitate the design of one type of push-pull chromophore based on the sydnone functional unit for use as nonlinear optical materials. Computational studies of the molecular geometries based on bond length and bond angle data as the result of applying the B3LYP/6-31G** optimization level have been used to in structural activity relationship studies to facilitate the development of these NLO materials.

Keywords: Nonlinear optical materials, Push-pull chromophores, Cheminformatics

INTRODUCTION:

Push-pull chromophores are molecules which allow for efficient intramolecular delocalization of \( \pi \)-electrons which makes them useful for many biological processes and for making logic devices that can essentially be turned “on” or “off.” Movement of these \( \pi \)-electrons is made possible in a molecule which has one portion of its structure that can donate electrons temporarily at one side of the molecule (donor) while another portion of its structure can accept this electron density (acceptor).12 The synthesis and properties of these compounds represent important research for their application as electrooptic materials which are useful in photonic devices for telecommunications and optical information processing.3-6

The intramolecular movement of the \( \pi \)-electrons in these push-pull (“on-off”) chromophores is made possible when one portion of a molecule can temporarily donate electrons (donor) while another portion of this molecule’s structure can accept this electron density (acceptor). In order for this movement to occur, the molecule must be coplanar (remain in one plane without twisting about too much). Thus, the bond angles of the spacer portion of the molecule which connects the donor (D) and acceptor (A) parts is crucial, and bond angle is one aspect that can be fine-tuned through synthetic organic methods and choice of reactants. The types of attached groups and the length of this spacer are important as well. Long spacers and extended \( \pi \)-systems can cause problems such as bathochromic absorption along with an efficiency-transparency trade-off. The Sonogashira coupling reaction has been applied to the synthesis of various acceptor-substituted enamines’ which function as short push-pull chromophores with excellent NLO properties. However, this Sonogashira’s method uses hazardous, carcinogenic solvents which are also converted into waste byproducts, which cannot be recycled. Thus, the development of an efficient, safe, and environmentally friendly method is of great interest.
Chemoinformatics is a rapidly developing field of research which applies computer programming in languages such as Unix, C++, Python, and Java along with scripting languages such as Perl, to solve problems in the traditional research areas of molecular modeling in 3D, computation of structural properties and energy, design of synthetic routes, and investigation of reaction mechanisms. Computational studies of the molecular geometries based on bond length and bond angle data as the result of applying the B3LYP/6-31G** optimization level have been used. Scanning the bond lengths and bond rotations in order to locate stationary points has been applied to investigate the potential surfaces for coupling the substituted alkynes to the heteroaryl bromide, shown as Acc-Br in Figure 1.

**Figure 1. Coupling-Aminovinylation Sequence to Produce Enamine Chromophores**

\[
\begin{align*}
R^1 + \text{Acc-Br} & \quad \text{Ionic Liquid} \\
\text{NEt}_3/\text{THF (1:10), room temp.} & \quad \text{Acc} \\
\rightarrow & \quad \text{R}^1 \text{R}^2 \text{R}^3 \text{NH} \\
\text{CH}_3\text{OH, heat} & \quad \text{R}^1 \text{R}^2 \text{R}^3 \text{NH}
\end{align*}
\]

RESULTS AND DISCUSSION:

Figure 1 outlines the synthetic route when using phenylacetylene as the alkyne. Shown in Figure 2 is synthetic route information regarding the use of phenylacetylene, heteroaryl bromides, and amines forming proposed push-pull chromophore enamines.

**Figure 2. Reagents for Coupling-Aminovinylation to Produce Chromophores**

<table>
<thead>
<tr>
<th>Alkyne (1)</th>
<th>Heteroaryl Bromide (2)</th>
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<th>Enamine (5) Expected</th>
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</tbody>
</table>

This synthetic route utilizes an efficient one-pot coupling-aminovinylation sequence to produce a series of acceptor-substituted enamines which can function as push-pull chromophores. These chromophores are designed to be short and consequently not have the disadvantages of the long and extended \( \pi \)-systems. In addition, this unique one-pot coupling aminovinylation sequence allows the introduction of a wide variety of attached groups to create flexible substitution patterns to facilitate the fine-tuning process to develop the most effective NLO materials. Other reaction methods are more rigid and have limited scope. The two Room Temperature Ionic Liquids (RTILs) of -butyl-3-methylimidazolium tetrafluoroborate ([bmim][BF_4]) and 1-butyl-3-methylimidazolium triflate ([bmim][OTf]) have been used as green solvents to catalyze many organic reactions, including the Sonogashira coupling, while replacing the toxic metals traditionally used to catalyze these reactions.\(^9\)

The general synthesis reacts a terminal alkyne with an electron-deficient aromatic or heteroaromatic \( \pi \)-electron system to provide an activated electron-deficient alkyne which then combines with a secondary amine in a Michael type of reaction to produce the enamine product. The Michael addition to acceptor-substituted alkynes has been reported as a useful reaction\(^1\), but the in-situ alkyne activation in an environmentally friendly ionic liquid medium proposed in this research project is an innovative development designed as a result of these computational studies. This sequence can be completed in the same reaction flask, commonly called “one-pot,” which increases efficiency by eliminating additional isolation steps that require extra solvents and generate unnecessary hazardous waste.

Calculations were completed using the triple \( \zeta \) basis sets (B3LYP/6-311++G**) for each of the possible products. All isomers have a nearly planar five-member ring which allows for delocalized \( \pi \)-bonding. Stationary points on the enamine (push-pull chromophore) potential surface were optimized at the UB3LYP/6-31G* and
CASSCF(6,6)/6-31G* levels to determine the minimal product energies, and single point energies were also computed at the CASPT2(6,6)/6-31G*//UB3LYP/6-31G* level. These UB3LYP/6-31G* and CASSCF(6,6)/6-31G* calculations were obtained using the GAUSSIAN 98 program, while the CASPT2(6,6)/6-31G* single point calculations were performed using MOLCAS.\textsuperscript{12}

Table I shows the UB3LYP/6-31G*, CASSCF(6,6)/6-31G*, and CASPT2(6,6)/6-31G*//UB3LYP/6-31G* energies for all of the stationary points via the synthetic route shown in Figure 1. Free energy corrections were made for UB3LYP/6-31G* and CASSCF(6,6)/6-31G* optimized structures via frequency calculations. In order to separately identify and investigate reactants, intermediates, transition states and enamine products, vibrational frequency calculations were completed using CASPT2(6,6)/6-31G* and UB3LYP/6-31G* single points with zero point and thermal corrections.

Table 1. Calculated Energies of Stationary Points for Enamine Products (5)

<table>
<thead>
<tr>
<th>T.S. represents transition state energy</th>
<th>UB3LYP/6-31G* kcal/mol</th>
<th>CASSCF kcal/mol</th>
<th>CASSCF kcal/mol</th>
</tr>
</thead>
<tbody>
<tr>
<td>trans- R¹= Ph</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>cis- R¹= Ph</td>
<td>24.8</td>
<td>22.7</td>
<td>25.4</td>
</tr>
<tr>
<td>trans- ring addition T.S. R¹=CHCH₂</td>
<td>43.0</td>
<td>41.7</td>
<td>43.7</td>
</tr>
<tr>
<td>cis- ring addition T.S. R¹=CHCH₂</td>
<td>44.8</td>
<td>42.9</td>
<td>45.2</td>
</tr>
<tr>
<td>trans- ring addition T.S. R¹=CHCCIH</td>
<td>40.7</td>
<td>38.1</td>
<td>42.4</td>
</tr>
<tr>
<td>cis- ring addition T.S. R¹=CHCCIH</td>
<td>42.4</td>
<td>44.2</td>
<td>44.1</td>
</tr>
<tr>
<td>trans- ring addition T.S. R¹=CCH</td>
<td>40.3</td>
<td>41.7</td>
<td>42.2</td>
</tr>
<tr>
<td>cis- ring addition T.S. R¹=CCH</td>
<td>40.8</td>
<td>41.9</td>
<td>42.4</td>
</tr>
</tbody>
</table>

The trans conformer when R¹= Ph is more stable according to UB3LYP/6-31G* indicating the stability due to the favorable orientation of the π molecular orbital framework, whereas the cis conformation when R¹= Ph experiences a significant increase in energy, to such an extent as indicating an endothermic reaction, and thus, much less favorable. Hence the RTILs of (1bmim)[BF₄] and (1bmim)[OTf] have been selected for the ability of their counteranions of [BF₄] and [OTf] to catalyze the reaction due to their ability to stabilize the HOMO-LUMO interaction during the addition step.

When R¹=CHCH₂ rotation away from the developing cation has been termed "endo", and a reduction in overlap between the two termini allows an alternative, "exo", transition state to be possible, thus minimizing the energy difference between the cis and trans conformers. The exo transition state is characterized by C3-C4 bond rotation in such a way that the p orbital on C4 is directed toward the π system, thus increasing the overlap with the aromatic the π system. This electron-rich vinyl group when R¹=CHCH₂ twists "outward" to avoid unfavorable interactions with the filled HOMO of the breaking σ bond in the transition state. The result of this twisting can also be confirmed by the increased C1-C4 bond distance as well as C2-C3 and C3-C4 bond rotations of 11º and 34º, respectively.

When R¹=CHCCIH the energies for both the trans and cis conformers are less, indicating the favorable inductive electron-withdrawing capability of the chlorine in decreasing the HOMO-LUMO energy gap. This energy value decreases using CASPT2(6,6)/6-31G*//UB3LYP/6-31G*. This energy stabilization allows for the theoretical occurrence of the opposite regioisomer, because it is this rotation about the C3-C4 bond that causes inversion of stereochemistry at C4. When R¹=CCH the energy difference between cis and trans product conformers becomes negligible, indicating the free-rotation possible in this ethynyl fragment, with little regioisomer preference.
CONCLUSIONS:

The products of these computationally analyzed reactions will be push-pull chromophores with excellent NLO responses. The recyclable, environmentally safe RTILs 1-butyl-3-methylimidazolium tetrafluoroborate ([bmim][BF₄]) and 1-butyl-3-methylimidazolium triflate ([bmim][OTf]) will be a significant improvement over the volatile solvents that are damaging to the environment. The UB3LYP/6-31G*, CASSCF(6,6)/6-31G*, and CASPT2(6,6)/6-31G*/UB3LYP/6-31G* energies for all of the stationary points on their potential surfaces indicate energy minimization made possible by the RTIL catalysts of bmim][BF₄] and ([bmim][OTf]), as well regioselectivity made possible via favorable HOMO-LUMO interactions. This synthetic route can be completed in the same reaction flask, commonly called “one-pot,” which increases efficiency by eliminating additional isolation steps that require extra solvents and generate unnecessary hazardous waste. These compounds will find many applications as electrooptic materials which are useful in photonic devices for telecommunications and optical information processing. Additional structural activity relationship studies are currently in progress to develop new NLO materials.

ACKNOWLEDGEMENTS:

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LITERATURE CITED:

INTERNET APRS DATA UTILIZATION FOR BIOSURVEILLANCE APPLICATIONS

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ABSTRACT

Conventional disease surveillance mechanisms that rely on passive reporting may be too slow and insensitive to rapidly detect a large scale infectious disease outbreak. The reporting time from a patient's initial symptoms to specific disease diagnosis may take days to weeks. To meet this need, new surveillance methods are consisting being developed. Referred to as syndromic surveillance, these new systems typically rely on prediagnostic data to quickly detect infectious disease outbreaks, such as those caused by bioterrorism. Using data from our created systems involving APRS and collected data from the Essence II model as well as data from the Center of Disease Control base, we discuss the development, implementation, and evaluation of a time-series syndromic surveillance detection algorithm for influenza like illness (ILI) in Georgia. Automatic Packet Reporting System (APRS) is a real time radio frequency data reporting protocol which contains GPS position and email messages in the form of packets from stationary and mobile stations. This system is employed by licensed amateur radio operators throughout the world with repeaters and digipeaters that collect and transmit the packets to Internet sites. This data is free of normal privacy concerns due to the FCC licensing for Part 97 service. The data stream generates over 100kb/day, has been active for greater than 10 years, and archives are available spanning several years. We introduce two projects utilizing this data stream for biosurveillance with a Citizen Health Observer Program (CHOP) and a Web traffic cam capture demonstration.

Keywords: APRS, Biosurveillance, Health Data.

INTRODUCTION

In 2001, Montgomery County health officials joined with Johns Hopkins University Applied Physics Laboratory to develop a model Biosurveillance System to be used in local health departments to rapidly detect important changes in community health status. The model was titled Essence II [1]. In parallel to this project, the Electronic Surveillance System for the Early Notification of Community based Epidemics (ESSENCE) was a plan for response to significant reportings of community health status in evaluation of influenza activity as well as monitoring signs and symptoms of illness of epidemiology. Using this model we have developed software tools to collect very early indications of illness from APRS Internet data. APRS is an abbreviation for Automatic Packet Reporting System, and is a computer graphics display method of broadcasting GPS positioning information in real time from packet radio-equipped stations. It was designed in the early 90's, but it has seen explosive growth in the last few years due to user-friendly software such as WinAPRS or UI-View, and Kenwood's APRS enabled radio transceivers becoming available [2]. APRS equipped stations send latitude and longitude information, their locations then displayed on a map in Windows, Mac and Linux application software. As well as the actual location, the course, speed and altitude of mobile stations can be included as well as telemetry. Even the US Space Shuttle has an APRS repeater on board, with amateur earth stations watching its position on their PC screens as it goes overhead [3]. Many stations also transmit weather data, which is collected for use by the US Weather Service.

APRS Internet Service

In its most widely used form APRS is transported over the air using the AX.25 protocol at 1200 baud audio frequency-shift keying on frequencies located in the amateur 2-meter band. An extensive digital repeater, or
digipeater network provides transport for APRS packets on these frequencies. Internet gateway stations (i-Gates) connect the on-air APRS network to the APRS Internet System (APRS-IS), which serves as a worldwide, high-bandwidth backbone for APRS data. Stations can tap into this stream directly. Databases connected to the APRS-IS allow web-based access to the data as well as more advanced data mining capabilities [4]. A number of low-earth orbiting satellites and the International Space Station also relay APRS data. APRS-IS consists of three core servers with a number of second tier servers. There are lower tier servers that exist as well. An IGate, server, or client can connect to any server in the APRS-IS network and receive the full APRS-IS feed. Many servers also support message-only ports that reduce the bandwidth requirements for the connection. Most second tier and lower tier servers support a history port allowing clients, such as javAPRS, to get a quick view of recent activity on APRS-IS. At any one time, there are usually over 300 connections to three central servers. The average bandwidth required for a single full APRS-IS feed is over 10,000 bits per second.

1.2 Citizen Health Observer Program (CHOP)

We are constructing a system that monitors the health of a large number of anonymous individuals from a group of volunteers transmitting this data as APRS packets[5]. Collecting this data allows tracking health symptoms by GPS location and collected data will be used to correlate with CDC flu data in a program called Citizen Health Observer Program (CHOP). This is modeled after a related APRS program for collecting weather data. APRSWXNET/Citizen Weather Observing Program (CWOP) uses the APRS-IS to collect weather data from citizens (hams and non-hams) with personal weather stations and send these data to users around the country [6]. In addition to providing different types of displays and archiving capability for weather data, CWOP also provides quality checking for the data and feedback to the weather station operator that can be used to improve the quality of the data and increase the value to users. Over 3000 data contributors send weather data to APRSWXNET/CWOP via APRS-IS on a regular basis. Most of those are stations from North America, but there are a significant number from other parts of the world.

The CHOP program is being established in a similar manner to the weather program. Participants would list some number of anonymous subjects for which the participant would have daily knowledge of any health symptoms. Every day, these participants would submit current health conditions of each person as packets transmitted to APRS-IS with associating codes used in the Essence biosurveillance model. Using the ninth division of the International Statistical Classification of Diseases and Related Health Problems (ICD-9), symptoms would be coded in terms of observables such as fever, cough, vomiting, etc., that would be relevant for bioweapons attack or flu monitoring. The extreme value of this collected data is that it is presented before the subjects seek medical attention. Patterns in the reporting of this data can be analyzed for correlation to collected CDC flu or other data. Software is being developed to present daily pop-up windows to each CHOP participant, with simple check boxes for symptoms and subjects. The software routines could be incorporated into the common APRS applications as an add-on menu option. If 3,000 CHOP participants report on the health status of 10-20 subjects each, then close to 50,000 health reports would be processed daily. Since licensed radio operators are typically older, the participants in CHOP will sample a population more sensitive to flu or bioweapons outbreaks.

1.3 Health Data Privacy Issues

To implement this program involving individuals, one has to cover all issues involving confidentiality and privacy matters. We consulted and gathered information as to what can and cannot be on the CHOP website. After contacting the Department of Health and Human Services (Atlanta, GA office), a consensus was established as to how confidentiality and privacy issues should be covered. HHS published Privacy Rule in December 2000, setting national standards for the protection of health information, as applied to the three types of covered entities: health plans, health care clearinghouses, and health care providers who conduct certain health care transactions electronically. Covered entities must implement standards to protect and guard implements of these standards. Fortunately, this form of CHOP data collection does not require such adherence to the Privacy Rule. We are cognizant of the fact that this is not a covered entity under HIPAA or the Privacy Rule. However, after speaking with proper representation in the Office for Civil Rights within the Department of Health and Human Services, all the components in which the site should entail and all parameters that need to be covered were
specified. The go-ahead to begin the CHOP project was given after presenting all the specifications of this research study.

Since the CHOP website isn’t under the following entities: a healthcare provider, a healthcare clearinghouse, or a health plan it is a void form in the Privacy Rule, so long as the volunteered participants can sign in and are not required to identify their true character on the site, nor may their actual information be accessed by the public. 1) The website must include a Release form for individuals to agree to the research study which should be filed. 2) Reference information for individuals to file a complaint should they wish to do so must also be provided. Following the above stipulations, construction of the website may be initiated as agreed upon by the Office for Civil Rights with the Department of Health and Human Services.

The collection of this health data will assist in the development of monitoring programs for early detection of flu or bioweapons usage[7]. We will be able to use this data to assess different pattern recognition algorithms for disease spread models.

OBJECT PREDICTION FOR TRAFFIC-CAM IMAGE CAPTURE (OPTIC)

In addition to CHOP described above, use of collected APRS data could be used for detection of pattern changes in transportation to detect incidence of illness. APRS contains GPS information that could be used to identify locations of destinations for mobile stations. Patterns can be monitored for unusual trips to drug or grocery stores at unusual times that may be indicative of illness onset for a family member. Again, this data would be collected several days before the subjects would seek medical attention. This could give early warning of an impending disease outbreak. To test if this could be accomplished, we are writing a program to test the predictive capability of the APRS data. The setup for this system is similar to other efforts at studying traffic patterns using image analysis [8].

A Java program is being developed to implement Object Prediction for Traffic-cam Image Capture (OPTIC). This will monitor the APRS-IS data stream for identifiers (licensed radio amateur call signs) involved in this study. For example, KG4EYO-14 is the call sign of a GPS tracker installed in one of the author’s cars, while KG4EYO-1 is a portable tracker that one of the other authors will temporally install in their vehicle. The packets containing these call signs are parsed for GPS location, direction of travel and speed. A table of Internet accessible traffic cameras in the Atlanta (GA) area lists the web address of the photo images, the GPS location of the camera, and the camera’s update frequency. The nearest traffic camera in the table to the predicted track of the target vehicle is identified and a predicted time at which the vehicle is in view of the traffic camera is set. If no other APRS-IS data packets are received for the target vehicle, three web traffic camera image captures are executed based on the camera’s update frequency. These images would be captured as “early”, “predicted”, and “late”, and then sent to an email address so the subject of the vehicle can check the images to score success. Accuracy of target vehicle predicted locations would be assessed as the OPTIC program is modified to include algorithms with greater knowledge of roads and traffic.

Successful capture of target vehicles in the traffic camera images would indicate we could accurately predict if these vehicles are arriving at drug or grocery stores from APRS-IS data. The OPTIC program’s table of traffic cameras would be increased to contain the GPS locations of drug stores, grocery stores, and health clinics in the Atlanta area. Pattern detection routines will be added to data mine the APRS-IS for interruption of daily vehicle patterns. Interruptions by trips to health-related vehicle stops will be correlated to personal logs kept by the authors to score when the event is due to an illness [9]. The pattern detection routines can then be adjusted to give greater predictive measure for subject illness by vehicle traffic pattern analysis.

CONCLUSION

APRS data contains real time GPS, email content, weather and other telemetry data that is easily captured from Internet sites. This information can be data mined for biosurveillance applications without normal privacy concerns due to FCC regulations of Part 97 communications. The data is generated by an older population that is more sensitive to flu or bioweapons incidents. Several years of archived APRS data is available from the corresponding author. This data provides a test bed for algorithm development in biosurveillance research.
ACKNOWLEDGMENTS.

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REFERENCES


Dimise, S. (www.findu.com).


Citizen Weather Observer Program official web site (www.wxqa.com).


CRITERIA BASED SOFTWARE PRODUCT INTEGRATION ARCHITECTURE

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ABSTRACT

Various software architectural connectors have been proposed for creating new products by coupling existing components. The software engineers can no longer stay within a self-contained single architecture but will need the aid of these software connectors, preferably commercially available ones, to develop an integrated software product. In a global, commercial environment, a product family is often created through integrating disparate, existing products through various partnerships; thus a broader set of criteria beyond just connectors must be considered. In this paper a set of criteria is first introduced. Then a multi-leveled product integration architecture, in terms of the set of criteria, is discussed. The need for software connectors becomes evident as software products are integrated at higher levels of the integration architecture. The perspective presented here is one that champions the users’ and customers’ need for an integrated product family, not just a developers’ view of product integration.

Keywords: Integration, Software Architecture, Coupling, Cohesion

INTRODUCTION:

Various software architectural connectors [1,2,3,4] have been proposed for creating new products by coupling existing components. The software engineers can no longer stay within a self-contained single architecture but will need the aid of these software connectors, preferably commercially available ones [5], to develop an integrated software product. In a global, commercial environment, a product family is often created through integrating disparate, existing products through various partnerships; thus a broader set of criteria beyond just connectors must be considered. In this paper a set of criteria is first introduced. Then a multi-leveled product integration architecture, in terms of the set of criteria, is discussed. The need for software connectors becomes evident as software products are integrated at higher levels of the integration architecture. The perspective presented here is one that champions the users’ and customers’ need for an integrated product family, not just a developers’ view of product integration.

CRITERIA AND RATIONALE FOR SOFTWARE PRODUCT INTEGRATION ARCHITECTURE:

In today’s fast pace software industry and industry domain specialization, many of the software enterprises are forming global partnerships from simple sales alliances all the way to product line and business integration [6,7]. When the relationship of two software enterprises is to just perform cross-sales of each other’s software products, the software engineers of the two enterprises are not heavily involved. The product support personnel, however, will often face questions that touch on the various incompatibilities of the two “integrated” software products that were built under different architectural designs.

When two or more enterprises extends their relationships beyond just cross-sales, the software engineers and the issue of architectural compatibility and integration are now brought into play. Depending on the degree of partnerships, the following issues concerning the integration of two or more different software products will start to emerge.
1. terminology
2. packaging and delivery
3. aspects of applications' user interface
4. products' manuals and user guides
5. application components and functions
6. application flow and control
7. data stored, processed, and shared
8. systems, subsystems, and middleware platforms
9. support and maintenance
10. internationalization

These issues are considered by the software engineers when they are building their single product line. However, when faced with partnership formation based on business and marketing reasons, these same topics require a clearer framework for software products integration. This set of issues may serve as the criteria upon which a framework for product integration architecture may be built. Without some framework of software integration architecture, the software engineers on both sides of the partnership are left with potentially a mismatch of interests and thus a high potential of non-integrated product family. The users and customers are usually left bearing the brunt of this problem. The next section will discuss an applications' integration architecture that will help us move away from the integration of applications based on arbitrary, self interests of the partners.

3.0 A SOFTWARE PRODUCT INTEGRATION ARCHITECTURE:

In this section, a multi-leveled applications' integration architecture is introduced. It is important to point out that many of the proposed integration of software applications are done after these products have independently showed success in their subject domain. An example would be a customer relations management (CRM) application that will be merged with a manufacturing application to form an enterprise resource planning (ERP) application.

While, in general, one is guided by the design principles of loose coupling and strong cohesion [8,9], the applicability of these principles will differ depending on the specific criterion under consideration of integration. At each level of integration, the items under consideration may be totally decoupled to tightly coupled. Similarly, the item under consideration may be non-cohesive to strongly cohesive. At the heart of applications integration architecture, is the desire to have the users feel that the different products are, in fact, from one product family.

Criteria based, four-level software product integration, as shown in figure 1, is proposed.

Co-Existence Level Integration:

At the lowest level of applications integration architecture is co-existence. In the co-existence stage, two different software applications are totally decoupled. The co-existence level of applications integration architecture addresses the rules of integration for the three areas:
First criterion is the packaging and delivery area. The two different products must be packaged together on a CD or in a downloadable file. There is a single medium of packaging and delivery, even though the contents are two separate sets of material (e.g. code, screens, text, etc.). When the products are packaged and delivered together it will provide an appearance of a single product family. The second area of integration is that the two different software applications must run under the same system platforms. That is, the applications systems and tools pre-requisites must be the same for the application products. For example, both applications utilize the same database sub-system, the same operating system, the same communications sub-system, and the same presentation sub-system such as the same web browser. This second criterion may seem a bit stringent and excludes the scenario of integrating an application running on a server system and another application running on a client system with totally different platforms. Relaxing this second criterion of common platform will be discussed later in the intermediate and strong levels of integration. At the co-existence level of integration, the platform pre-requisites are required to be the same. The third area is that both of the applications software must be of the same country language version. With today’s global economy, partnerships are formed across international enterprises. An English accounting application may run on the same platform as the Spanish retail application. However, it is highly unlikely that these two applications may be used by the same set of users except for those unique environments where the retail applications are utilized by the Spanish speaking users and the back-office accounting applications are utilized by the English speaking accountants. This third criterion may be relaxed for special environments. Otherwise, the two applications must be of the same language and internationalized version, whether it is English, Spanish, Japanese, French or some other language.

The rules for the three criteria are fairly straightforward. The applications must be of the same file format and delivered together so that they may be read and installed in the same fashion. The internationalization criteria enforces that the application presents the same language version to accommodate for a uniform user or customer environment. The system, sub-system, and middleware platform commonality rule will ensure that the pre-requisites of the applications enforces no duplication of subsystems such as two similar, but different, databases.

Low Level Integration:

The software enterprises may present a higher level of integration to their users and customers by further integrating the major interfaces to those users beyond the co-existence level. The focus at this level is to present a more cohesive interface to the users. At the low level of integration, the applications continue to remain totally decoupled as in the co-existence level. In low level integration, the partnering enterprises need to consider four more criteria in addition to those described in the co-existence level.

- terminology
- applications’ user interface
- product manuals
- product support and maintenance

The first of the four is the terminology integration. The words, phrases, and icons used need to be the same and carry the same semantics. Note that even within the same language version such as in English, the term, error, and the term, problem, are often utilized interchangeably. If they represent the same concept, the two terms should be reconciled to one common term. The software products should utilize the same term to mean the same thing. This is not a difficult request if the two software products are initially designed together. It is very difficult to achieve when the products are already released to users who are just becoming acquainted and comfortable with the terms. One potential rule of integration is as follows. The software product with the larger user set will dictate the term conformity. A dictionary of vital, subject matter terms needs to be created, and the translation of terms needs to be performed on the software product with lesser user set to conform to that which has more users.
The next criterion is the actual user interface integration. There are several aspects to application user interface. The main concern at the low-level product integration is the looks. The user screens and the icons contained within the software products need to have a common look. Once again, this rule is not very difficult to enforce at the architecture and design steps of the software development cycle. However, for two successfully released products to be integrated with a common look is going to require one of them to change. The rule of integration may be the same as the one utilized above for common terminology.

The third criterion touches on the product manuals. These manuals should be similar in content and flow. For example, if one product manuals have table of contents, then the other should also have that. If one contains screen shots as part of the user example, then so should the other. Thus the manuals may have to be modified. If one product has manuals in English and Spanish, then so should the other. It is possible that two software products are both in only English version but have English and French user manuals. In a global economy, it is very plausible for a U.S. software enterprise to partnership with a Canadian software enterprise to jointly develop and market a software product family for customers in a dual-language speaking city of Montreal.

The fourth criterion at the low level of integration is to offer a common user support and maintenance interface. The two software products may internally have geographically separate groups of support staff. But to the users and customers, the products need to present a common product family support structure. Here, the rules of integration include at least a single support phone number or a single web-enabled, online support URL. The user may be directed to a different support staff organization once the initial gathering of the user information and problem description is complete. In order to present an integrated support interface, the product support organizations need to utilize the same call management system and problem resolution mechanisms. The problem fix and release policies for both products must be the same. For example, a high severity problem such as a problem that comprises the database is classified as a high severity problem and has a 24 hour turn around policy for both products. The policy for the cycle of releasing low severity problem fixes must also be consistent across the products within the product family.

The low-level product integration is focused on presenting a better interface to the users such that they will feel that the integrated products form a single family of products, even though they may have originated from different software enterprises. This is the level where product family cohesion starts to be emphasized.

Intermediate Integration:

Further emphasis on presenting a cohesive product family to the users is emphasized at the intermediate level. The applications will be coupled through two areas:

- data stored, processed, and shared and
- application flow and control.

The applications are no longer decoupled as in the co-existence level and as in the low level. While each level of integration is built upon the previous level, one earlier criterion is relaxed at the intermediate level. That is, the two applications may reside on differing platforms and may have different system and subsystem pre-requisites. This criterion may be relaxed due to the introduction of applications coupling through data and control flow. The partnering enterprises need to consider two additional criteria and revisit one of the earlier criteria.

The coupling of data stored, processed, and shared is one of the criterion that is introduced at the intermediate level. The rule for integration is that shared data in the common database must allow both applications to access those data elements. This will require the applications to utilize common data element names and/or develop some data access connectors [4] to access the shared data in the common data base. For those data that reside on different databases, there must be some stream connectors [4] developed across the applications to transfer large amount of data or data access connectors for the two different applications to access each others databases. This criterion is quite complex whether it is imposed at the initial architecture and design time or at a post release time. However, it is probably more difficult to develop the connectors afterwards.
The second criterion is the integration of application flow and control. The integrating applications may transfer control among each other. The rule of integration is that there will never be a transfer of control that results in an error that will require the users to restart the system. Once again, software connectors [3,4] will be needed. The chance of these partnership applications needing a slew of software connectors is very high; for these are most likely post released applications.

The earlier criterion of common system and subsystem platforms is relaxed at the intermediate integration level. Decoupled applications residing on different platforms present the users with a relatively limited product family cohesion. In order to provide more product family cohesion, coupling among applications is introduced through the two additional criteria of data and of control flow.

**Strong Integration:**

This is the most robust level of integration. In addition to the criteria considered in all the earlier levels, the integration of applications’ components and functions is considered. The rule of integrating components and functions is more complex.

First consider a group of common functions such as the error and message processing function or the user help function. These must operate the same way across the applications integrated into an application family. For example, the users’ experience with handling a warning or an error message should be the same across the applications. Similarly, the level of help functions must be uniform. For example, if defaults are provided for input fields, then that feature must be uniform across the application family. This level of application integration may require some complex, fundamental changes if the original applications were not built with architectures that allow modifications and decoupling of these common functions within each application. Architecture connectors are of no help in this situation. On the other hand, for example, if the error processing functions are all designed and localized within a single component, then the modification or even complete replacement of the component is not as difficult. It may still be time consuming, though.

The second consideration addresses the group of different functions. Most of the partnerships are struck up because it is envisioned that the integration of these different, but complementing, functions in the two applications will provide more powerful domain coverage. The integration consideration is that if a particular function is offered by only one of the applications, then that unique function is integrated into the product family. If a module contains only one function, then the integration process is considerably simplified. If the module contains several, but only the unique functions, then that module is integrated into the family. However, if the module contains some other functions that should not be integrated, then this module needs to be transformed and made into a more cohesive, single function module before integration. There are also cases where the function has duplicative coverage in both applications. Then a decision must be made to integrate only one into the product family. This rule is important not only for presenting a cohesive product family to the users, but also alleviates the product support effort when a functional problem is reported by a user. A further consideration is that in the global economy, one application may already be translated into multiple languages. The integrated functions from an application that has not been translated need to be translated so that the same product family may be presented to the supported set of countries.

In order to manage the integration of application components and functions across multiple internationalized versions, one would not only need software linkage connectors and adaptor connectors [3,4,5] but must also have a sophisticated system build mechanism. An automated configuration management system tool that allows one to uniquely label every version of every module in the partner-shipped applications would greatly aid this level of integration.

**CONCLUDING REMARKS:**

In this paper we have first proposed a set of criteria. Then a multi-leveled product integration architecture based on this set of criteria is proposed for applications that are brought together due to business partnerships. These domain specific applications are often successful products that already have users. Many of the integrations of applications, as a result of corporate merger and acquisition, are often performed without clear definitions,
resulting in user confusion and dissatisfaction. Many times the user interface, along with packaging, is picked as
the first level of integration. Then different aspects are picked for integration based on availability of funds or
customer complaints. This haphazard approach has lead many commercial software products to become very
difficult to maintain. The proposed integration architecture moves the individual applications from decoupled and
separately cohesive situation to a coupled and product family-wise cohesive condition. We have tried this
proposed integration architecture on a well known ERP software and have experienced wide customer
appreciation. An additional benefit we experienced with a clearly defined integration architecture was that the
software partners, who develop add-on software, were able to follow and define their integration commitments.
While the set of criteria and the levels of integration may change, a criteria based multi-leveled software product
integration architecture is needed to provide some guideline to both the partnering software enterprises and their
users.

In the future, we are investigating other sets of criteria for integrating software. We are also investigating metrics
for success of integration architecture with commercial software organizations.

REFERENCES:
Lopes, A., Wermelinger, m, and Fiadeiro, J.L., “Higher-Order Architectural Connectors,” ACM Transactions on
Egyed, A., Mehta, N, and Medvidovic, N., “Software Connectors and Refinement in Family Architectures,”
Proceedings of 3rd International Workshop on Development and Evolution of Software Architecture for
Product Families, Las Palmas de Gran Canaria, Spain, March 2000.
Hansen, m. and Mamorski, P., “Java Connector Architecture: The future of EAI?” Business Integration,
Oracle Application Integration Architecture, http://www.oracle.com/applications/oracle-application-integration-
Allen, E.B., Khoshgoftaar, Taghi, Chen, M., Ye, “Measuring Coupling and Cohesion of Software Modules: An
Information-Theory Approach,” Proceedings of Seventh International Software Metrics Symposium
(METRICS’01), 2001