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LETTER FROM THE EDITORS

We are extremely pleased to present this issue of the *Journal of Strategic E-Commerce*, an official publication of the Allied Academies, dedicated to the advancement of knowledge, understanding and teaching of e-commerce throughout the world. The editorial mission of this journal is to publish empirical and theoretical manuscripts which advance the e-commerce initiatives.

The Allied Academies, Inc., is a non profit association of scholars whose purpose is to encourage and support the world-wide advancement and exchange of knowledge, understanding and teaching. The *JSEC* is a principal vehicle for achieving the objectives of the organization.

As has been the case with the previous issues of the *JSEC*, the articles contained in this volume have been double blind refereed. The acceptance rate for manuscripts in this issue, 25%, conforms to our editorial policies.

The Editors work to foster a supportive, mentoring effort on the part of the referees which will result in encouraging and supporting writers. They will continue to welcome different viewpoints because in differences we find learning; in differences we develop understanding; in differences we gain knowledge and in differences we develop the discipline into a more comprehensive, less esoteric, and dynamic metier.

Information about the Allied Academies, the *JSEC*, and the other journals published by the Academy, as well as calls for conferences, are published on our web site, www.alliedacademies.org. In addition, we keep the web site updated with the latest activities of the organization. Please visit our site and know that we welcome hearing from you at any time.

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ARTICLES for Volume 4, Number 1

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AN EMPIRICAL ANALYSIS OF WEB-BASED CORPORATE MISSION STATEMENTS

Charles A. Rarick, Barry University
Inge Nickerson, Barry University

ABSTRACT

Using the Business Week Global 1000, the largest U. S. firms were selected for inclusion this study. The statistical universe of this study consisted of the largest 424 American companies, based on market valuation. Researchers examined the websites of all 424 companies to determine whether the firms chose to display their mission statements, or similar type statements (vision, credo, values) on the Internet.

Any mission statement or similar statement found on the firm's website was printed and a content analysis was performed on the documents, using the Pierce and David mission statement content recommendations. The researchers also investigated relationships based on firm size and profitability.

INTRODUCTION

The study was conceived to be an update and expansion of a previously published study by Rarick and Vitton conducted in 1995 which determined mission statement content and its relationship to profitability. Recognizing that corporate environments have drastically changed since that time, the question arose as to how these changes are reflected in today's corporate mission statements. This study aimed to clarify these issues.

REVIEW OF LITERATURE

The history of research devoted to understanding the role of mission statements in the organizational strategic environment is long and varied. Some of the more influential researchers on the subject include John A. Pearce II who wrote an article entitled "The Company Mission as a Strategic Tool" which was published

in *Sloan Management* in the spring 1982. In the article Pearce asserts that a company's mission statement can be a valuable tool for strategic management. He provides a framework for developing a meaning company mission statement that can aid in addressing various conflicting demands a firm faces in both its internal and external environment. This work is generally accepted as the basis for later research on the subject of mission statements.

In 1986 Jerome H. Want wrote "Corporate Mission: The Intangible Contributor to Performance" in which he asserts that management needs to develop a mission statement because it helps employees recognize the firm's identity and future course, forges employee commitment through the establishment of commonly accepted values, and supports cohesion in operations and productivity. He also states that the CEO should serve as the standard bearer for the corporate mission.

In their article "Corporate Mission Statements: The Bottom Line" John A. Pearce II and Fred David (1987) focused on the nature and role of mission statements in organizational processes by surveying Fortune 500 companies as to the existence of a mission statement. They developed a framework of eight key components that have formed the basis for research into mission statements ever since. The components are:

1. The identification of target customers and markets.
2. The identification of principal products/services.
3. The specification of geographic domain.
4. The identification of core technology.
5. The expression of commitment to survival, growth, and profitability.
6. The specification of key elements in the company philosophy.
7. The identification of the company self-concept.
8. The identification of the firm's desired public image.

This seminal study was followed by flurry of studies examining mission statements in various environments. Among these was Fred David's (1989) investigation of mission statements of large manufacturing and service firms collected from the Business Week 1000 firms. Results from this study revealed nine key components: customers, products/services, location, technology, concern for survival, philosophy, self-concept, concern for public image, and concern for employees. Concern for employees was the additional component identified in this study.

In 1992 R. Duane Ireland and Michael A. Hitt wrote their article "Mission Statements: Importance, Challenge, and Recommendations for Development" in which they assert that mission statements are important for all types of organizations because they provide guidance for strategic and day-to-day operational decisions. They describe the firm's fundamental, unique purpose. Ireland and Hitt also speak about factors that tend to inhibit the development of mission statements in organizations; such as, the number and diversity of stakeholders, the work required in developing such statements, belief that mission statements may reveal competitive information, and the historical formality of the strategic planning process.

Laura Nash and Andrew Campbell (1993) in their survey of U.S., Japanese, and European seek answers to questions such as "What is a mission?" What is the difference between a mission and a sense of mission?" and "How can leaders define clear missions and how do they share them with employees to create a sense of mission?" They explain the value of having a sense of mission and a leader who is able to create a sense of mission.

In 1995 Charles A. Rarick and John Vitton published the results of their survey of Business Week 1000 companies in their article titled "Mission statements make cents." They found that having a mission statement does increase a firm's ROE. Firms with mission statements had ROEs of 16.1% versus those without who had ROEs of 9.7%. They found common mission elements to be: 1. concern for public image, 2. concern for quality, 3. commitment to survival, growth, and profitability, and 4. differentiation from competition.

In 1996 Mark C. Baetz and Christopher K. Bart published the findings of their research on the 500 largest industrial firms in Canada. The study sought to identify practitioner's thinking about the role of mission statements and the process for creating such a statement. They reported mission statements to be a recent, more fashionable development in firms and analyzed them without preconceived categories. They did, however, develop categories based on the responses which essentially followed those developed by earlier researchers. They also reported reasons for why (a strategic and operational motivational tool) and why not (too much effort, uncertain value, waste of time, too difficult to formulate) mission statements are/are not implemented.

Declaring a well crafted mission statement to be a key component of an effective strategic planning process, Romuald Stone (1996) published his article "Mission statements revisited" in which attempts to explain why mission statements are important, what mission statements are, and provide guidance on how to develop a mission statement.

Andrew Campbell (1997) speaks of mission statements as an expression of a company's purpose and ambition, a guide to behavior, a celebratory symbol of a company's culture. He also states that "A good mission statement, however, does not necessarily add value. In fact it may do serious harm." They may cause emotional resistance in employees if the values and behavior standards are different from their own. Senior management must model the expressed behavior in order for it to have credence.

Lance Leuthesser (1997) examined (63 of 393) annual reports selected from the Business Week 1000 list with mission statements for their content. They found stakeholders classified into four categories: customers, shareholders, employees, and suppliers and mission statements messages fitting into four categories: benefits, values, self-image, and focus. They found customers and shareholders addressed by benefits to them and employees were addressed through values statements.

In 1997 article "Sex, Lies, and Mission Statements" Christopher Bart examines why mission statements are not getting the credit they deserve or the results managers and experts have expected. Bart asserts that the power of mission statements lies in their ability to inspire and motivate organizational members to exceptional performance and their ability to guide the resource allocation process. That is, they provide a sense of purpose; they insure that the interests of key stakeholders are not ignored; they sharpen a firm's focus; they enable better control over employees; and, they promote shared values and behavioral standards. Bart sought answers as to the efficacy of these assertions from senior managers from 88 leading North American corporations. Their responses indicate that there appears to be much misrepresentation in published mission statements. Managers spoke of the impossibility of achieving published goals, of mission ambiguity, of dissatisfaction with the mission, of pursuit of the wrong mission, of dissatisfaction with the process by which the mission statements were developed, of little actual influence over behavior, and of limited and highly selective involvement in the process of mission development. Constituency groups mentioned in mission statements were: customers, employees, shareholders, society, and suppliers. Of the respondents, only 35 percent reported using mission statements to inspire and motivate their troops, and only 15 percent claimed that improved resource allocation was a consideration in their mission's development. Many managers in the survey believed their mission's influence over organizational members to be fairly limited. It is clear that "the impact and commitment mission statements can deliver in daily organizational life come only when they are of high quality and are pervasive throughout the firm."

In 1998 Bart in "Mission matters" reiterates the importance of a good mission statement in energizing stakeholders to a common purpose, and he offers this prescriptive: be unique, be inspirational, make personal values the cornerstone and bedrock of the mission, and focus on the basics.

Bart (1998) in "The relationship between mission statements and firm performance: An exploratory study" asserts from his sampling of 136 Canadian organizations that there is little empirical evidence to support the notion that mission statements are essential for superior organizational performance results.

Also in 1998 James R. Lucas in "Anatomy of a vision statement" elaborates on the need for a vision, the illusion of vision, and the visioning process.

In 1999 David Stamps in "Best mission statement" analyzes organizational mission statements dating back to the 1920 and components of some of the best ones.

A 2000 article by Bartkus, Glassman, and McAfee titled "Mission statements: Are they smoke and mirrors?" examine what a mission statement is, outline presumed benefits of mission statements, and analyze what's wrong with mission statements. They believe that for most employees and stockholders mission statements are simply redundant, the boundaries set by the mission may be so narrows as to threaten the firm's ability to adapt to change, given the brevity and general nature of most mission statements, it is hard to imagine how they would be of much use in helping employees make decisions. They also state that one of the generally accepted purposes of a mission statement "to inspire and motivate employees" is undercut by current attitudes favoring job mobility and the trends toward downsizing and the use of contingent workers, many employees see themselves as short-term hires with little desire to understand the big picture.

Aimee Forehand in her 2000 article "Mission and organizational performance in the healthcare industry" examines key elements of the organizational mission statement and its significance in relation to firm performance. Forehand outlines the eight performance-enhancing drivers of mission statements previously identified by Bart and Tabone (1998). They are:

1. to provide a sense of purpose
2. to increase CEO control
3. to define behavior standards
4. to enable employees to identify with their organization
5. to give greater recognition to the interests of external stakeholders
6. to inspire and motivate employees

7. to refocus the organization during a crisis
8. to improve the resource allocation process.

Based on the studies of Bart and Tabone (1998) and Bart and Baetz (1998), Forehand proposes an integrated analytic framework to assess healthcare mission statements to aid management in the healthcare industry.

In their 2001 study "A model of the impact of mission statements on firm performance" Bart, Bontis, Taggar tested their previously developed mission statement model on 83 large Canadian and U.S. organizations. They found that "commitment to the mission" and the "degree to which an organization aligns its internal structure, policies and procedures with its mission" were both positively associated with "employee behavior, with the latter having the most direct relationship with financial performance.

In 2001 Christopher Bart turned to investigate the extent to which the internet is used as a medium of conveyance for organizational missions. His article titled "Exploring the application of mission statements on the World Wide Web" discusses his survey of web sites of 100 Fortune 500 companies to determine whether they posted a mission statement (45 did have a mission posted), what types of organizations posted most frequently (educational institutions, for profit corporations, and not-for-profit associations were the most frequent posters of mission), and why they posted, or not. For the five respondents to the "why post" inquiry (all from for profit firms), reasons generally centered around spreading the mission as widely as possible to provide information to their stakeholders and to reinforce company values.

In 2002 Christie H. Amato reported her research on examining the relationship between a company's commitment to quality of life goals (as reflected in the corporate mission statement) and the firm size, profitability, and industry in which the firm operates. She found a positive correlation between ROE and workforce well being. Financial services firms often include societal goals in their missions statements, whereas ecological and safety goals are frequently mentioned in mining, metals and construction organizations.

Omran, Atrill, and Pointon (2002) in their study of 32 shareholder-oriented companies and 48 stakeholder-oriented companies found that mission orientation did not affect performance, whether in terms of stock returns or excess returns.

Sufi and Lyons (2003) in their study of the mission statements of 30 top hospitality enterprises found that while there was a statistically significant

correlation between the mission statements and the annual turnover (sales), there was no significant correlation with the net profit margin or the return on equity.

In 2003 Forest R David and Fred R David, in their article "It's time to redraft your mission statement" report on another internet-based research project, where 95 mission statements were collected from the computer, food, and banking industries. They state that "the mission statements from all 3 industries were incredibly deficient." They found mission statements to be either too short (phrase or sentence) or too long (2 pages). They reported banks to have the least comprehensive mission statements among the three industry groups sampled in the study. David and David offer the previously identified (by Pearce and David) nine components as the measures for their research in this study. They found that "Results from our preliminary study suggest that, when it comes to company mission statements, there is a great deal of room for improvement. The sample firms in our study generally did not include needed components in their mission statements."

In the 2003 article "Mission Statements: Is it Time to Shelve Them?" by Jatinder Sidhu results of an empirical investigation into the dynamic multi-media domain in The Netherlands are reported. Statement content as well as process were taken into account when studying the impact of mission statements. The findings of the research indicate that mission statements can lead to superior performance.

Another web-based study of mission statements by Bartkus, Glassman, and McAfee (2004) titled "A Comparison of the Quality of European, Japanese and U.S. Mission Statements: A Content Analysis" found that few firms included all stakeholder groups, most firms included about half of the recommended components, and most statements did not meet all of the recommended objectives. These researchers employed ten characteristics of mission statements which were similar to the previously developed components by Pearce and David. Both U.S. and European firms mentioned, on average, only two stakeholders in their mission statements. For Japan, the average was 1.3. The results of the study indicate that the statements fall short of meeting the quality criteria suggested in the academic literature.

In the 2004 article "Web-based mission statements in Slovenian enterprises" Roberto Biloslavo analyses mission statements of 50 top Slovenian enterprises which were published on the companies' web sites. His research indicates some significant differences between Slovenian mission statements and those of other European and American companies. He believes these differences to be culturally, institutionally, and historically based. He believes that despite globalization and

regionalization, convergence of various contents or roles of the mission statement is questionable. Instead a blending of individual elements among different cultural and economic systems should be considered as a factor when analyzing mission statement components.

Charles Toftoy and Joydeep Chatterjee (2004) in "Mission Statements and The Small Business" report findings from research conducted by the Council for the Advancement of Small Business at the George Mason University. The findings suggest that the "lackadaisical approach towards business planning has resulted in dismal failures for many young and enthusiastic entrepreneurs." They suggest that writing a mission statement is the first strategic decision a small business needs to take.

Scott Beagrie (2005) in "How to . . . develop a corporate mission" gives guidance on what a mission is, why it is important, where to start, drafting a mission, and ensuring that it is powerful.

Andrea Kilpatrick (2005) in "The power of vision" speaks to two unique challenges faced by non-profit organizations in creating a vision. First, there is the challenge of making focused decisions. This is difficult because nonprofits are driven by a mission, which can be defined in various ways by each stakeholder. Second is the funding process that sustains the organization which may not be conducive to the typical three-to-five year vision statement process. As a result, many nonprofit leaders compromise by broadening the scope of their vision.

Smith, Heady, Carson, and Carson wrote about their research in a study titled "Do Missions Accomplish their Mission? An Exploratory Analysis of Mission Statement Content and Organizational Longevity." (unpublished study retrieved 8/1/2005 from http://www.huizenga.nova.edu/jame/Missions.htm) Their comprehensive analysis of past research on mission statements is organized by the following scheme. They categorize mission statement research based on:

1. Motivations for development of a mission statement
2. Arguments against and reasons for not developing mission statements
3. Comparison of performance of firms with mission statements versus those without mission statements
4. Content of mission statements
5. Comparison of performance with firms with "high-content" mission statements versus those with "low-content" mission statements

6. Behavioral and subjective measures of performance
7. Subjective attitudes toward mission statements

It is evident from the discussion of important literature in the area of research on mission statements, that there exist widely divergent views on whether mission statements are effective or not. The divergence of opinions can be largely attributed to different research questions and design, akin to having several blind persons approach and touch an elephant on one part of its anatomy. That is, the person feeling an elephant's ear will have a different description of what an elephant looks like than one who touches the tail or a leg. Nevertheless, it is useful to look at mission statement construction, application, and results from various viewpoints to form a more complete understanding of the phenomenon. Clearly there has been an evolution of thought and procedure over time.

METHODOLOGY

Using the 2004 *Business Week Global 1000*, a list of the world's largest companies, the largest firms in the United States were selected. The statistical universe of this study consisted of the largest 423 American companies, based on market valuation. Researchers made a search of the websites of all 423 firms, looking to see if the firms chose to display their mission statements, or similar type statements (vision statement, credo, values statement) on the Internet.

Any mission statement or similar statement found on the firm's website was printed and a content analysis was performed on the documents, using the Pierce and David mission statement content recommendations. Because the *Business Week Global 1000* ranks firms on the basis of market value and provides information on return on equity (ROE), the researchers also were able to investigate any relationships based on firm size and profitability.

FINDINGS

The initial assessment of company websites revealed that many firms (57%) have mission statements and choose to put them on their websites. The results indicate that company size does not seem to be related to the likelihood of finding a firm's mission statement on its website. When comparing the top ten percent of firms with the bottom ten percent of firms based on market value, the percentages are identical. Fifth-two percent of top ten firms have mission statements on their

websites, and 52% of the bottom firms also have mission statements on the Web. A small difference can be seen between the top and bottom twenty percent of firms. In the top twenty percent of firms 61% have mission statements available on their websites, while in the bottom twenty percent of firms we find 56% having statements on-line (Figure 1).

Figure 1: **Mission Statements on the Web**

Total U.S. Companies in Business Week Global 1000	423	
With Mission Statements on the Web	244	58%
Without Mission Statements on the Web	179	42%
Top Ten Percent of Companies with MS on Web	22	52%
Bottom Ten Percent without MS on Web	22	52%
Top Twenty Percent of Companies with MS on Web	52	61%
Bottom Twenty Percent of Companies with MS on Web	48	56%

An analysis of return on equity shows some association with mission statement presence on the Web. Overall, firms with mission statements on their websites had an average ROE of 18.5% while firms without a mission statement on the Web had a ROE of 18.2%. More differences were seen between the top half of firms. The top half of firms with mission statements had an average ROE of 22.3% while the top half of firms without a mission statement had an average return of only 16%. The top quarter of firms with mission statements had a ROE of 24% and the top quarter without statements had a return of only 15.2%. This association, however, did not carry through with the bottom half and bottom quarter of the firms. More detailed information can be seen in Figure 2 concerning mission statement presence, firm size and return on equity.

Significant differences did show up among companies across industry groups. Some industries were more likely to have a mission statement on their website, such as materials where 88% of the firms published their mission statements on-line. Financial services were the least likely to have a mission

statement on-line, with only 38% of the firms choosing to publish a mission statement on their websites. Detailed information on the presence of mission statements by industrial classification can be seen in Figure 3.

Figure 2: Mission Statements and ROE	
Return on Equity (ROE)	
With MS on Web	18.5%
Without MS on Web	8.2%
Top Half with MS on Web	22.3%
Top Half without MS on Web	16.0%
Bottom Half with MS on Web	15.8%
Bottom Half without MS on Web	19.0%
Top Quarter with MS on Web	24.0%
Top Quarter without MS on Web	15.2%
Bottom Quarter with MS on Web	14.0%
Bottom Quarter without MS on Web	22.0%

An interesting observation from the Web search concerns the terms used to describe a firm's mission. While many organizations specifically use the term "mission statement" or "mission" when describing their organizational purpose, a number of other terms are commonly used including "values," "vision," "credo," "philosophy." Of the 244 companies that display some type of mission statement on their websites, 51 refer to the statement as a mission statement. A number of firms combine the terms to include "mission and vision," "mission and values," or "vision and values." A breakdown of the terms used to describe the organization's purpose and their frequency can be seen in Figure 4.

Figure 3: Mission Statement Presence by Industry	
Financial Services	
With MS on Web	38%
Without MS on Web	62%
Health Care	
With MS on Web	80%
Without MS on Web	20%
Energy	
With MS on Web	64%
Without MS on Web	36%
Utilities	
With MS on Web	56%
Without MS on Web	44%
Consumer Staples	
With MS on Web	69%
Without MS on Web	31%
Industrials	
With MS on Web	62%
Without MS on Web	38%
Materials	
With MS on Web	88%
Without MS on Web	12%
Information Technology	
With MS on Web	62%
Without MS on Web	38%
Consumer Discretionary	
With MS on Web	49%
Without MS on Web	51%
Telecommunication Services	
With MS on Web	63%
Without MS on Web	37%

Figure 4: Organizational Purpose Statements	
Mission	51
Mission and Vision	26
Mission and Values	53
Mission Vision Values	24
Vision	11
Values	19
Vision and Values	10
Other	50

Figure 5: Organizational Purpose Statements Content				
(Percentages by Statement Type)				
Pierce & David Content Item	All Statements	Mission	Values	Vision
Customers (target market)	15%	40%	2%	14%
Products/Services	55%	96%	18%	88%
Geographic Market	17%	13%	14%	46%
Technology	20%	24%	16%	25%
Survival/Growth/ Profitability	50%	51%	56%	58%
Philosophy	60%	47%	100%	38%
Public Image	48%	47%	66%	54%
Employees	63%	47%	98%	42%
Distinctive Competence	51%	60%	59%	46%

A content analysis of the statements revealed some differences among the various terms used to describe the organization's purpose. Using the Pierce and David content model, mission statements came the closest to adhering to the recommendation; however, even with "pure" mission statements, many of the items were not often found in the statements. In over half of the mission statements no mention was made to target market, geographic market, technology, firm philosophy, public image, or the importance of employees. Vision statements and values statements often differed in their content, with some areas being frequently mentioned in one statement and seldom mentioned in the other. Wide variation appears to exist in statement content, and many of the traditional items suggested for inclusion are not frequently found. The results of the content analysis can be seen in Figure 5 with the percentages of items included in each type of statement.

SUMMARY AND CONCLUSIONS

Of the companies surveyed, 58% have mission statements and put them on their websites. There was some association between ROE and mission statement presence on the Web. The top half of firms with mission statements had an ROE of 22.3% while the top half without mission statements had an average return of 16%. This association did not, however, hold true for the bottom half of firms.

Some industries, notably materials and healthcare, were more likely to have mission statements online; whereas others, such as financial services, were not likely to have mission statements. The most common terminology used to describe a company's focus was values, mission, and vision. Analysis of the mission statements of the largest U. S. corporations also has revealed several other important recent developments.

The Pearce and David model does not seem to reflect the current state of mission statements. Mission statements of contemporary corporations vary not only by name but by content as well. Many mission statements now include different concerns, such as diversity, innovation, and teamwork. Future research into the area of mission statement content should consider including the new components in their analysis to better reflect current mission statement language. Mission statements are now often placed on firm websites and may now be developed to influence that external audience.

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THE ROLE OF INTERNET-BASED TRANSACTIONS IN EXTERNAL COLLABORATION BETWEEN HEALTHCARE TRADING PARTNERS

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ABSTRACT

Increased collaboration between trading partners is a precondition for successful performance of a supply chain. This paper investigates whether Internet technology improves the level of collaboration between sellers and buyers, a dyad relationship, in a healthcare supply chain. Such collaboration is determined by the amount of information sharing and operational participation between these healthcare trading partners.

Among other statistical methods, structural equation modeling is employed to analyze the collected data (N=106) from a survey of hospitals, pharmacies, pharmaceutical companies, and healthcare equipment and supply retailers in South Korea. The results indicate that Internet-based transactions lead to a significant increase in information sharing, collaborative planning and forecasting, which are important indicators of supply chain performance.

INTRODUCTION

Today, electronic commerce has become a major competitive weapon in reducing cost, improving efficiency, and increasing customer satisfaction. Just in the healthcare industry alone, $336 billion worth of business to business (B2B) Internet-based transactions took place in 2000 and Forrester Research predicts that Internet-based transactions will increase to $6 trillion by the year 2005 (Standifer & Wall, 2003). In this environment, supply chain management may provide a considerable

source of opportunity for improving the efficiency of organizations (Layden, 1996). Like other industries, healthcare can benefit from a successful incorporation of the Internet into its supply chain management activities. Studies have shown that 30%-46% of hospital expenses are allocated to various stages of logistical activities, and that the costs associated with the supply chain process could be reduced by almost 50% through the use of best practices (Poulin, 2003). Efficient Healthcare Consumer Response (EHCR) estimates that "the healthcare products industry could significantly improve its ability to deliver quality healthcare products and services to consumers" (Arbietman, Lirov, Lirov & Lirov, 2001).

A majority of hospitals and other healthcare centers still utilize fax and telephone communication as the primary or the secondary methods for their purchasing activity, even though they possess a strong knowledge and capability in information technology. Their reliance on these traditional means of communication may result in poor planning and many rush orders, which can lead to higher delivery charges and increased costs for the items ordered. Usually, fax and telephone ordering typically "fall outside" of what should be a smooth process designed to handle most supply situations.

As the literature suggests, managers can improve coordination by increasing the accuracy of information available at different stages in the supply chain (Chopra & Meindl, 2004, p. 487). Information accuracy can be achieved through better information sharing, more collaborative planning and forecasting. The objective of this research is to empirically examine the role of Internet-based transactions in information sharing and external collaboration in the area of supply chain management.

With the increasing concerns for healthcare cost containment and service quality improvement, it is important to develop a framework that indicates the impact of B2B Internet-based transactions in supply chain performance in general and its cost in particular. This paper is structured as follows: First, we provide a brief discussion of previous literature on healthcare supply chain management and the implementation of Internet-based transactions in this service sector. Based on this review, we develop a framework, which represents the impact of B2B Internet-based transactions in the level of external collaboration between healthcare trading partners. After discussing our method and the study's results, we finish the paper with a discussion of the data and our conclusions.

PREVIOUS RESEARCH

Supply Chain Management (SCM) is broadly defined as the coordination of activities of the companies involved in producing, maintaining, and delivering products and services to customers, who are located in geographically different places (Viswandadham & Raghavan, 2000). SCM is more than just order fulfillment and encompasses all the process from product creation through end-of life recycling. These activities involve product design, introduction, promotion, fulfillment, recycling, and disposal (Kopczak & Johnson, 2003).

Real-time information sharing allows the suppliers to anticipate changing expectations and quickly update their entire organization on the new demands, which essentially leads to improving responsiveness, reduction in costs, and reducing uncertainty for the supply chain processes (Closs & Savitskie, 2003). As a result, supply chain success is heavily dependent on the efficiency and effectiveness of information exchange (Closs & Savitskie, 2003).

Researchers have also pointed out that integration of the supply chain in a collaborative manner between the customer and the supplier is an essential characteristic in achieving the objectives of supply chain management (Maloni & Benson, 1997; Simatupang & Sridharan, 2002; Kopczac & Johnson, 2003). A collaborative supply chain in which two or more independent organizations work jointly, leads to greater success in supply chain operation than one organization acting in isolation (Simatupang & Sridharan, 2002).

The Internet provides significant opportunities for organizations to establish distinctive strategic positions than did previous generations of information technology (Porter, 2001). According to Ghosh (1998), the Internet provides organizations the ability to build interactive relationships with customers and suppliers, and deliver products and services at very low costs. In fact, both suppliers and buyers benefit from an increased use of the Internet for their purchasing activities (Deeter-Schmelz, Bizzari, Graham & Howdyshell, 2001). Other major benefits from Internet-based transactions implementation would be rapid data exchange, lower inventory cost, and quick response to the customers' changing requirements (Archer & Yuan, 2000; Crouch, 2003). Because of such advantages, healthcare organizations have gradually moved from traditional communication systems into Internet-based supply chain management systems.

RESEARCH MODEL

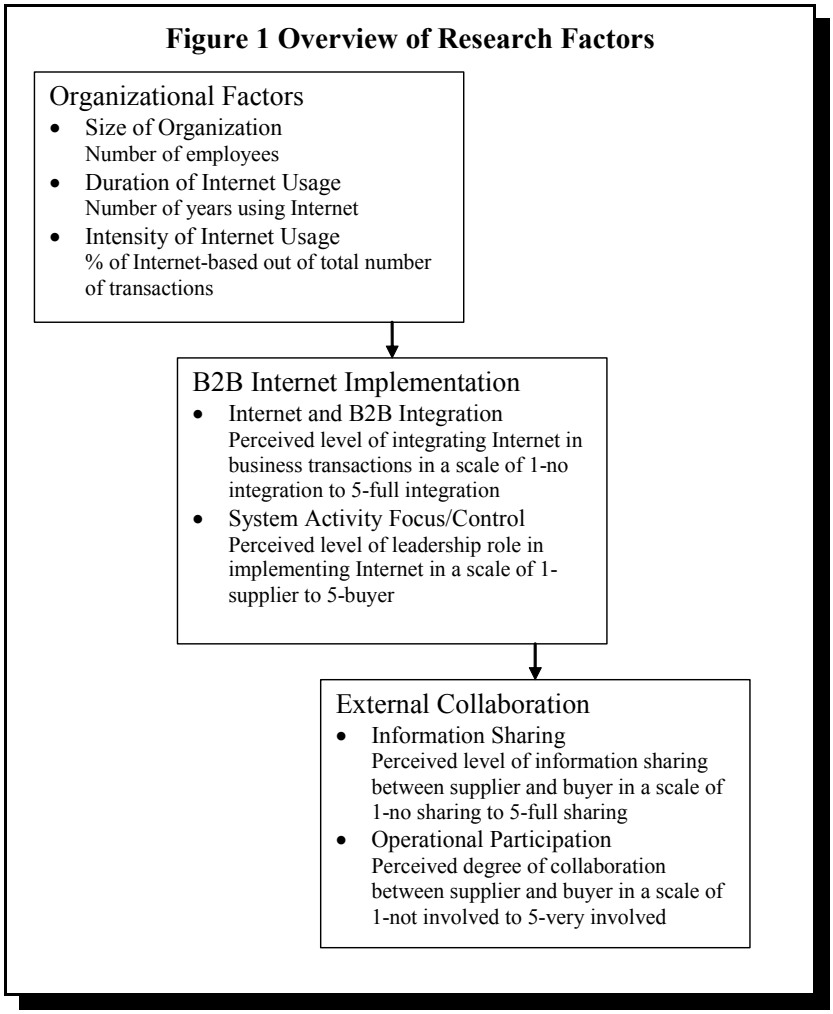
Two major research questions are addressed in this study: First, we explore whether there is a relationship between several organizational factors and the level of integration of the Internet in B2B transactions. Secondly, we investigate whether there is a relationship between the level of Internet usage for B2B transactions and the level of external collaboration between selling and buying healthcare organizations. An overview of the research factors is presented in Figure 1.

In this context, three organizational factors will be analyzed: size of the organization, duration of Internet usage, and intensity of Internet usage. The size of the organization is measured by the number of employees in the firm. The duration of Internet usage represents how long the organization has been using Internet for electronic transactions. The intensity of Internet usage indicates the proportion of the Internet-based transactions in the supply chain that the organization uses out of its entire supply chain transactions.

With respect to B2B Internet-implementation, we have identified two primary variables: the level of integration between Internet and B2B transactions and the system activity focus/control. Internet and B2B integration involves the connection of customers and suppliers who, through Internet-based transactions, working together to optimize their collective supply chain performance. The activity focus/control identifies which party, either the supplier or the buyer, takes the active lead in implementing the Internet-based B2B transactions for the supply chain, the orchestration. In other words, how the supply chain activity is shared and controlled between the supplier and the buyer, and which party puts more effort on implementing the activity (New, 1996).

The external collaboration indicates information sharing and operational participation. Information sharing between customers and suppliers occurs in such activities as collaborative planning and forecasting. Operational participation represents the degree that either the seller or the buyer is involved in the collaboration process. Often, the buyer and the supplier negotiate or agree on sales forecasts and resource constraints for a common goal and target projections (Chandrashkar & Schary, 1999). Supply chain success is heavily dependent on information exchange effectiveness and efficiency (Closs & Savitskie, 2003).

Figure 1 Overview of Research Factors



RESEARCH METHODOLOGY

A survey was conducted among healthcare organizations located throughout South Korea. South Korea is a world leader in information and communication technology. The Organization for Economic Cooperation and Development (OECD) considers Korea as the world leader in high-speed Internet technology and recommended Korea as the model for benchmarking (Lee, 2003). Besides being a

leading country in information and communication technology, Korea has recognized the need for improvement in supply chain effectiveness and the necessity of adapting to the new business environment. By 2006, business online connections are expected to be 100% and business electronic transactions are expected to reach 30%. Business-to-business network in Korea will be expanded to 50 industries by 2006 from 20 industries in 2001.

The initial questionnaire was developed in English, then it was translated into Korean, and finally it was translated back into English to ascertain the accuracy of the items in the questionnaire. The final version of the instrument is presented in Appendix A. The sample was drawn from 786 organizations in healthcare industry, which included hospitals, pharmacies, pharmaceutical companies, and healthcare equipments and supply retailers. The survey was conducted in the healthcare organizations throughout South Korea. Those samples were selected from the lists of Korean Hospital Association (KHA), Korean Medical Association (KMA), Korea Medical Devices Industry Association (KMDIA), and Korea Pharmaceutical Manufacturer Association (KPMA). Questionnaires were sent mostly to the director or vice president of the marketing department or operations department. For small sized organizations, the questionnaires were sent to the president or vice president.

Table 1: Organizational Position of Respondents

Position	Number of Respondents	Percentage
Presidents	5	4.72
Directors	29	27.36
Vice-directors	17	16.04
Managers	28	26.42
Staff	27	25.47
Total	106	100.00

Among the total of 786 questionnaires mailed, 142 were returned (18.01% returned response rate). Of those 142 returned questionnaires 36 of them were not usable because they were not answered completely nor did they indicate any usage of B2B Internet-based transactions. For the analysis, 106 subjects (13.48% usage

returned rate) were used from the mail survey. Although the questionnaires were sent to the director or vice president of marketing or operations department, the respondents indicate other positions, such as presidents, managers, and staff. Tables 1, 2, and 3 indicate major demographics of the pool of respondents and their organizations. The descriptive statistics of the duration of Internet-based transactions implementation and intensity of Internet-based transactions usage are presented in Tables 4 and 5.

Table 2: Size of Surveyed Organizations

Number of Employees	Number of Organizations	Percentage
Less than 49	26	24.53
50-99	14	13.21
100-499	30	28.30
500-999	21	19.81
1000 or more	15	14.15
Total	106	100.00

Table 3: Type of Surveyed Organizations

Type	Number of Organizations	Percentage
Hospitals	64	60.38
Equipment and Supply Retailers	23	21.70
Pharmaceutical Companies	11	10.38
Pharmacies	8	7.55
Total	106	100.00

Table 4: Duration of the Internet Usage		
Duration	Number of Organizations	Percentage
Less than 1 year	20	18.87
1 year to 2 years	29	27.36
2 years to 3 years	31	29.25
3 years to 4 years	15	14.15
5 years and more	11	10.38
Total	106	100.00

Table 5: Intensity of Internet Usage		
Intensity of Usage	Number of Organizations	Percentage
Less than 10%	6	5.66
10% to 19%	30	28.30
20% to 29%	34	32.08
30% to 39%	17	16.04
40% to 49%	9	8.49
50% and more	10	9.43
Total	106	100.00

RELIABILITY AND VALIDITY ANALYSIS

Reliability is defined as "a measure of internal consistency of the construct indicators, depicting the degree of which they indicate the common latent construct" (Hair, Anderson, Tatham, & Black, 1995). For instance, if reliability is high, the measurement gives the same results every time the same property is measured in the same way (Reaves, 1992). The results of reliability test for the Internet-B2B

Integration and External Collaboration are presented in Table 6. The Cronbach's alpha is used as a reliability measure, and its values are respectively 0.6472 and 0.9267. While external collaboration is a reliable measure in our study, Internet-based transactions integration has a reliability measure of 0.6472, which is lower than the suggested lower limit (0.7). However, considering the exploratory nature of this study this value will be considered acceptable.

Table 6: Reliability Test

Constructs	Number of Items	Alpha Value
Internet-B2B Implementation	2*	0.6472
External Collaboration	3**	0.9267

*items 5, 6 and 7 from section II of the questionnaire
** items 2, 3, and 4 from section II of the questionnaire

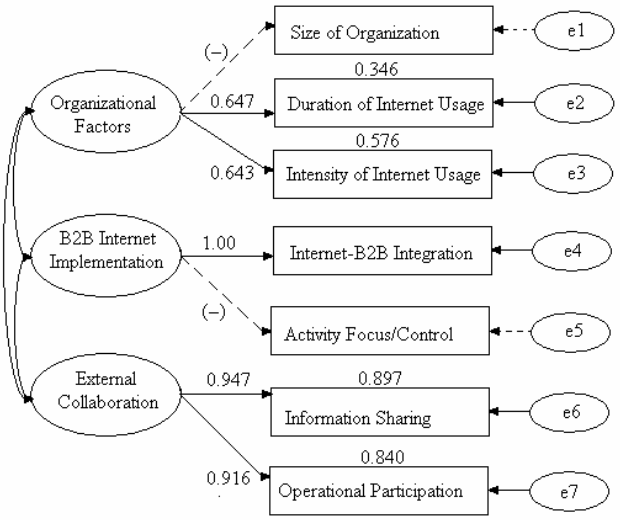
Validity is defined as "the extent to which the indicators accurately measure what they are supposed to measure" (Hair, Anderson, Tatham, & Black, 1995). There are several procedures to assess validity of a measure: content, criterion, and construct validity. In this research, construct validity is employed. The purpose of construct validity is to assess the quality of correspondence between a theoretical construct and its operational measures (Babbies, 1995). The most widely used method to test construct validity is factor analysis. Factor analysis is concerned with exploring the patterns of relationships among a number of variables (Hair, Anderson, Tatham, & Black, 1995). These constructs include Organizational Factors, B2B-Internet Implementation, and External Collaboration.

The SPSS AMOS 4.0 software program was used for the confirmatory factor analysis. The initial confirmatory factor analysis for the proposed measurement model failed to provide a statistically significant result. Therefore, a model modification process was followed by eliminating inappropriate (not significant) items from the relevant constructs. The eliminated items are "system activity focus/control" from the B2B-Internet-implementation and "size of the organization" from the organizational factors construct.

The final measurement model fit statistics indicate an adequate level of fit. The value of Chi-square statistic is 22.20 at 17 degrees of freedom. It has a statistical significance level of 0.1771, which is well above the minimum level of

0.05 and is also well above the recommended levels of 0.1. The Goodness-of-fit Index (GFI) is 0.926, which is quite high. The Adjusted Goodness-of-Fit Index (AGFI) is 0.880. This result suggests that the differences of the predicted and actual matrices are non-significant, indicative of acceptable fit. The final validated measurement model is presented in Figure 2.

Figure 2 Confirmatory Factor Analysis of the Model



In Figure 2, the numbers on the arrows indicate a standardized regression weight and the numbers on the top of the boxes indicate a squared multiple correlation. For instance, in the case of the external collaboration construct, 89.7 % of the variance of information sharing and 84.0 % of the variance in operational participation are accounted for by the variance in external collaboration. The remaining 10.3 % of information sharing and 16.0 % of operational participation can not be explained by this model.

DATA ANALYSIS AND RESULTS

To assess the strength of the overall relationships among constructs, correlation analysis was employed. A correlation matrix of the constructs is presented in Table 7. The correlation matrix shows that the constructs are highly correlated. In addition, there is no evidence of multicollinearity among the constructs. The criterion of multicollinearity is generally 0.9 and greater (Hair, Anderson, Tatham, & Black,1995).

Table 7: Construct Correlation Matrix

	1	2	3
1. Organizational Factors	-	0.757	0.651
2. B2B Internet-Implementation	0.757	-	0.792
3. External Collaboration	0.651	0.792	-

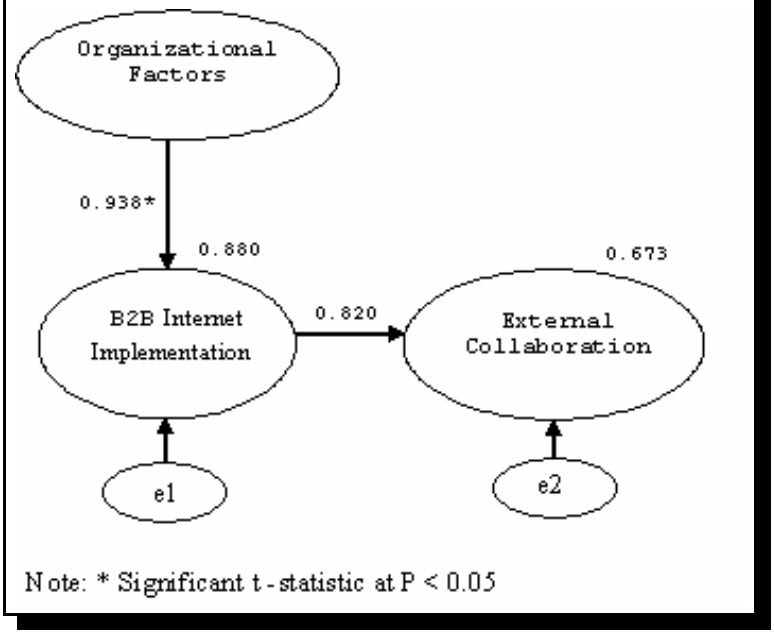
Note: Correlation coefficients are significant at the 0.01 level

Construct correlation between organizational factors and B2B-Internet implementation is 0.757 and correlation between B2B-Internet implementation and external collaboration is 0.792, both are statistically significant at the 0.01 level. These results show that organizational factors are positively related with B2B-Internet implementation, which in turn is positively related with external collaboration: information sharing and operational participation. In other words, an organization with a longer and more intensive usage of the Internet is more likely to use Internet for B2B transactions. In addition, those with a higher level of Internet-based transactions in its supply chain would have a higher level of external collaboration with its suppliers and/or customers.

The above findings are also supported by the analysis of structural relationship as shown in Figure 3. The overall model fit measures show an adequate level of fitness. The Chi-square value associated with the model is 36.67 at 32 degrees of freedom which yields a probability value of 0.2610. This indicates that the proposed structural relationships of the constructs and their estimated relationships are well matched with each other. The Tucker-Lewis Index (TLI) is

0.983 and the Comparative Fit Index (CFI) is 0.987. Both TLI and CFI well exceed the recommended level of 0.9, further supporting acceptance of the proposed model.

Figure 3 Regression Results of Structural Relationships



In Figure 3, the numbers on the arrows indicate standardized regression weights and the numbers on top of the circles indicate squared multiple correlation coefficients. In the case of the B2B Internet Implementation, 88.0% of the variance of external collaboration is accounted for by the variance of organizational factors. The remaining 12% can not be explained by this model. In the case of the external collaboration construct, 67.3% of the variance of external collaboration is accounted for by the variance of Internet-based transactions implementation. The remaining 32.7% can not be explained by this model.

In addition to structural equation modeling, we also use stepwise multiple regression analysis to analyze the relationship between organizational factors and Internet-B2B Integration. As mentioned in the previous section, size of the organization was dropped from the construct of organizational factors due to its low

standardized regression weight. Therefore, the construct of organizational factors includes only duration of Internet usage and intensity of Internet usage. Table 8 presents the result of regression analysis regarding Internet-B2B Integration.

Table 8: Stepwise Multiple Regression for Internet-B2B Integration

Variable	Standardized Coefficient beta	t-test	Significance
Duration of Internet Usage	0.315	4.571	0.000
Intensity of Internet Usage	0.585	8.472	0.000
$R^2 = 0.595$; Adjusted $R^2 = 0.587$; F-Ratio = 75.549; Sig. =0.000			

The result indicates the F-ratio for Internet-B2B Integration of 75.549, a strong significance level of 0.000, which suggests that organization factors have a linear relationship with the level of Internet-B2B Integration. R-square value of 0.595 indicates that 59.5% of the variance of Internet-B2B Integration is accounted for by organizational factors. Standardized coefficients beta for intensity of Internet usage and duration of Internet usage are 0.585 and 0.315, respectively. The t-test values for intensity of usage and duration of usage are 8.472 and 4.571 at significant at the level of 0.000 and 0.001, respectively. Thus, the intensity of usage seems to explain more of the Internet-B2B integration than the duration of usage.

CONCLUSIONS

This paper investigates the impact of the Internet in the efficiency of healthcare supply chain. First, we investigate the impact of organizational factors on the level of Internet and B2B integration. The results show that, the size of the organization does not have a direct relationship with the level of such integration. This finding implies that in spite of the size of the organization, supply chain managers can and must incorporate the Internet in their day to day supply chain management transactions. In addition, other organizational factors, such as duration and intensity of internet usage, are positively related with B2B-Internet

implementation. In other words, an organization with a longer and more intensive usage of Internet is more likely to use Internet for B2B transactions.

Secondly, we investigated the relationships between the Internet integration in supply chain and the level of external collaboration between trading partners. We found the while activity focus/ control is not a significant factor, those organizations with a higher level of Internet-based transactions in its supply chain would have a higher level of external collaboration with its suppliers and/or customers. This finding implies that in spite of which organization controls a given Internet based transaction, both organizations will mutually benefit from the implementation of Internet technology.

Finally, the implementation of Internet for supply chain transactions has a positive impact on external collaboration between trading partners. In other words, the users of Internet-based transactions in the healthcare industry have perceived that the implementation of the Internet in the B2B transactions has a positive effect on the collaborative supply chain activities, such as information sharing and operational participation with trading partners.

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Appendix A
Survey Questionnaire

I. The following questions are related to the environment of your organization.

1. Your job title: _____
2. The number of years in your organization: ____ years and ____ months
3. The number of employees in the organization: _____
4. Is your company currently using computer (information) system to manage data and inventory?
   Yes ( ) No ( )
5. Does your company currently have computer information systems for purchasing supply goods?
   Yes ( ) No ( )
6. Does your company currently have an information department? Yes ( ) No ( )
   If "Yes", how many persons work in that department? _____
7. Is your company currently using Internet or other on-line system to purchase supply goods or raw materials? Internet ( ) Other on-line systems ( ) None ( )
   a. If you answered "Internet"
      How long it has been implemented? __years and __months
      What is the portion (%) of Internet out of entire purchasing? ___
   b. If you answered "other on-line systems"
      Please specify what type of system you are using _____
   c. If you answered "none"
      Please specify your purchasing methods _____

II. The following questions are related to the operational relationship between you organization and your major suppliers. Based on your experience and perception, please circle or check on the appropriate number. (1- strongly disagree, 3- neutral, 5- strongly agree)

1. Your organization has close relationships with your major suppliers with common objectives.
2. Your organization effectively shares operational information with your major suppliers.
3. Your organization and your major suppliers participates each other for operational purposes, such as forecasting and operational plans.
4. Throughout the close interrelationship between your organization and your major suppliers, operational flexibility is increased.
5. Operational system for supply chain transaction between your organization and major suppliers is mainly controlled or focused by you, the buyer.
6. Operational system for supply chain transaction between your organization and major buyers is mainly controlled or focused by them, the buyer.
7. Your organization and your major suppliers are systematically and fully integrated in their purchasing or selling transactions.

FORECASTING PRACTICES IN THE ELECTRONIC COMMERCE RETAILING INDUSTRY

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ABSTRACT

This article reports findings from a study of retail E-Commerce firms' forecasting practices. The majority of such firms prepare sales forecasts, and top managers and financial managers most frequently prepare the forecasts. Most forecasts are for the entire company and are for annual time periods. Managerial judgment and percent of last year's revenue are the most common forecast techniques employed, and forecast accuracy varies considerably. The findings are discussed and recommendations are offered.

INTRODUCTION

Sales forecasts have been described as "Predictions of future revenues [that] are important to business planning, and are used to set production schedules, budget capital, and allocate resources to marketing programs" (Dalrymple, 1975, p. 69). Sales forecasting has been carried out, in one fashion or another, probably for as long as commerce has existed. Today, the managers of large and small concerns recognize this function's importance for all planning and control decisions. Despite the universal need, there is considerable variation across industries and firms in the manner the forecasting process is performed, and it is anything but a standardized process. Furthermore, sales forecasting practices change over time as the objectives and strategies of management and the dictates of the environment undergo alteration.

Retail electronic commerce (E-Commerce) firms require accurate and reliable sales forecasts to the same degree as any other type of business. Yet, due to

considerable developmental changes, the E-Commerce industry has become synonymous with uncertainty (Golicic et al., 2001). Some "dot-com" firms have disappeared, and many that remain spark both curiosity and apprehension among investors. Further obstacles to effective forecasting in the retail E-Commerce industry include factors such as dramatic increases in online purchases, aggressive competition, the brief history of time series data, and a paucity of insights regarding on-line consumer behavior. These forces can hinder efforts to control and plan the operations of these firms so that resources can be optimally allocated and strategies formulated.

To date, most inquiries into forecasting practices have focused on developed industries like manufacturing, traditional (bricks and mortar) retailing, financial institutions, and the purveyors of services. This is a logical concentration, as these sectors customarily have encompassed the bulk of the commercial activity taking place. Yet, the increased activity and the degree of uncertainty in the E-Commerce industry confirm the need for an inquiry into the forecasting activities of E-Commerce retailers. In this article, we describe a study of forecasting activities in the retail E-Commerce industry. We report upon the degree of forecasting, who prepared the forecasts, what techniques were used, the time period and business unit, and the accuracy of the results. We also compare the retail E-Commerce figures with those of some traditional industries in an attempt to provide insights that may help academicians and practitioners understand sales forecasting performance differences between E-Commerce and traditional retailers.

THE INQUIRY

A questionnaire derived from past studies of forecasting practices (Dalrymple, 1967, 1975; Jun and Peterson, 1991; Peterson, 1993) was employed for our research. The questionnaire was adapted for the retail E-Commerce industry and was field-tested on a group of 50 retail firms randomly selected from the Yellow Pages in phone books from across the United States. Feedback from the respondents in the field-test was employed to further edit the questionnaire so that it was appropriate for the E-Commerce industry.

The sample for the main study was again drawn from Yellow Pages. Although this publication does not include all web sites, it contains a comprehensive listing of a cross section of Internet retailers, and is assumed to represent the more viable sites on the Internet. The sample consisted of 1000 U.S. companies that maintained retail E-Commerce sites; these companies were selected randomly from

those listed in the Yellow Pages publications. Email questionnaires were forwarded to company managers and 328 completed questionnaires were returned. A follow-up message to the non-respondents resulted in 78 additional responses, for a final sample of 406 retail E-Commerce companies. The sample was widely dispersed geographically, and represented all regions in the United States including both small and large communities.

RESEARCH FINDINGS

The preliminary field-test suggested that sales forecasting efforts could be expected to diverge considerably across companies that are of different sizes, so respondents were asked to indicate the number of individuals employed by the firm. For the purposes of this inquiry, small companies were designated as those with fewer than 50 employees and large companies had 50 or more employees. The sample was made up of 316 small and 90 large E-Commerce retailers. A report concerning the degree of forecasting, who prepared the forecasts, what techniques were used, what time periods and business units, and the accuracy of the forecasts follows.

To begin, the respondents were asked to indicate if sales forecasts were prepared by someone in their firm. Responses to this question are summarized in Table 1. The majority of the firms (85.7%) do prepare forecasts. The percentage of large firms (93.3%) that prepare forecasts is greater than the corresponding figure for small enterprises (83.5%). Overall, the large majority of managers in the retail E-Commerce sector are committed to estimating future revenues, although a sizeable portion of small companies are not so inclined (16.5%).

Table 1: Percent of E-Commerce Retailers Preparing Forecasts

Company Designation	Number of Respondents	Number Preparing Forecasts	Percentage Preparing Forecasts
Small	316	264	83.5%
Large	90	84	93.3
Totals	406	348	85.7%

The questionnaire further requested that respondents indicate the title of the individual who was responsible for preparing sales forecasts. In smaller firms,

individuals often hold more than one title, thus respondents were asked to specify the title that best described the nature of the duties performed by the person preparing forecasts. The results appear in Table 2, where the sixth column indicates that the principal forecast preparers were financial officers, marketing managers, top managers, company accountants, and financial analysts. These were followed by outside accountants, consultants, and "other." For the sample of small businesses, the leading forecasters were top managers, financial officers, company accountants, and marketing managers. For the larger E-Commerce retailers the major sales forecast preparers were financial officers, marketing managers, financial analysts, and company accountants.

Table 2: Forecast Preparer's Title

Forecaster Title	Small Companies		Large Companies		All Companies	
	Number	Percent	Number	Percent	Number	Percent
Top manager	76	28.8	6	7.1	43	12.4
Financial officer	50	18.9	24	28.6	90	25.9
Company accountant	41	15.6	9	10.7	41	11.8
Marketing manager	31	11.7	15	18.0	59	17.0
Outside accountant	25	9.5	7	8.3	31	8.9
Financial analyst	22	8.3	11	13.1	41	11.7
Consultant	13	4.9	6	7.1	23	6.6
Other	6	2.3	6	7.1	20	5.7
Totals	264	100.0%	84	100.0%	348	100.0%

Across the entire sample of retail E-Commerce firms, financial officers, marketing managers, and financial analysts typically are the key forecast preparers. However, the list of preparers differs with firm size, as top managers more frequently prepared forecasts for small firms than for larger firms. This is reasonable because larger companies' top managers are heavily involved in organization-wide decision making and delegate forecasting responsibility to subordinates. Due to their

limited size, small retail E-Commerce firms are less likely than larger companies to have financial and marketing specialists who prepare forecasts.

The sample of respondents was asked to identify the categories for which forecasts were prepared, i.e., entire company, customer type, products and services, customer location, and "other." The results appear in Table 3. As might be expected, the most frequent category (100.0%) is sales forecasts for the entire company. Following this were breakdowns by customer type, products and services, customer location, and "other." The small companies ranked these in approximately the same order as larger firms, but it is clear that small E-Commerce retailers employ type of customer, products or services, customer location, and "other" sales forecasts less frequently than the larger companies.

Table 3: Categories for which Forecasts Were Prepared

Forecast Category	Small Companies		Large Companies		All Companies	
	Number	Percent	Number	Percent	Number	Percent
Entire Company	264	100.0%	84	100.0%	348	100.0%
Customer Type	165	62.5	68	81.0	233	67.0
Products	137	51.9	77	91.7	214	61.5
Customer Location	94	35.6	62	73.8	156	44.8
Other	26	9.8	11	13.1	37	10.6
Totals*	264	100.0%	84	100.0%	348	100.0%

*The sums of the columns exceed the totals because many firms prepared forecasts for more than one category

It should be noted that firms preparing forecasts for the entire company only—and not for categories such as customer type or product—fail to take advantage of the full potential of sales forecasting. When forecast preparers utilize only aggregate forecasts they lose much of the planning and control benefits that are available through the manipulation of forecast data. This, of course, can hinder effective managerial strategy formulation and decision-making. Companies are well-advised to develop sales forecasting procedures capable of generating estimates that are useful for managers with planning and control responsibilities.

The questionnaire also asked respondents to identify the time periods for which their firm prepared sales forecasts. The responses are set forth in Table 4. Annual forecasts received the largest number of mentions by the sample at large. Following this were 1-2.9 years, semi-annually, quarterly, five years and over, monthly, and 3-4.9 years. For the small companies, the ranking was annually, 1-2.9 years, five years and over, monthly, semi-annually, quarterly, and 3-4.9 years. For the large companies the ranking was annually, semi-annually, 1-2.9 years, quarterly, five years and over, monthly, and 3-4.9 years. For each of the time horizons, the percentages were lower for small firms than for large, which again suggests that small E-Commerce retailers are not utilizing forecasts as fully as the larger firms. In many cases, however, even large firms are not preparing forecasts for other than annual time periods. Managers can improve their planning and control activities by making use of both short and long run forecasts, especially in volatile industries such as retail E-Commerce.

Table 4: Sales Forecast Time Periods Reported

Time Period	Small Companies		Large Companies		All Companies	
	Number	Percent	Number	Percent	Number	Percent
Monthly	25	9.5%	31	36.9%	56	16.1
Quarterly	21	8.0	46	54.8	67	19.3
Semi-annually	24	9.1	61	72.6	85	24.4
Annually	264	100.0	84	100.0	348	100.0
1-2.9 years	36	13.6	52	61.9	88	25.3
3-4.9 years	14	5.3	19	22.6	33	9.5
5 years and over	34	12.9	33	39.3	67	19.3
Totals*	264	100.0%	84	100.0%	348	100.0%

*The sums of the columns exceed the totals because many firms prepared forecasts for more than one time period

One questionnaire item asked sample respondents to state which forecasting technique(s) their firm employed. Results appear in Table 5, and for the sample as

a whole the most widely used technique was managerial judgment (popularly known as the "jury of executive opinion"), followed by percent of last year's revenue, trend extension, and economic indicators. Regression, decomposition, econometric methods, computer simulation, customer survey, and "other" followed these.

Table 5: Forecasting Techniques Utilized

Techniques Employed	Small Companies		Large Companies		All Companies	
	Number	Percent	Number	Percent	Number	Percent
Managerial Judgment	264	100.0%	84	100.0%	348	100.0%
% of Last Year's Sales	194	73.5	58	69.0	252	72.4
Trend Extension	142	53.8	67	79.8	209	60.0
Economic Indicators	95	35.9	48	57.2	143	41.1
Regression	56	21.2	56	66.7	112	32.2
Decom-position	37	14.0	33	39.3	70	20.1
Econometric Models	22	8.3	23	27.4	45	12.9
Computer Simulation	11	4.2	8	9.5	19	5.5
Customer Survey	6	2.2	5	5.9	11	3.2
Other	10	3.8	4	4.8	14	4.0
Totals*	264	100.0%	84	100.0%	348	100.0%

*The sums of the columns exceed the totals because many firms use more than one forecasting technique.

Both the small and the large E-Commerce retailers followed approximately the same ranking priority. However, the frequencies for the larger companies suggest a higher degree of sophistication in forecasting. Except for managerial judgment and percent of last year's revenue, the percentages for all of the techniques

are much higher for larger than for smaller firms. Apparently the larger E-Commerce firms utilize more methods than smaller firms, but it is clear that both groups would likely benefit from a broader implementation of available forecast techniques.

A further observation obtained from Table 5 is that both large and small E-Commerce retailers rely heavily on relatively unstructured and non-quantitative forecasting methods. These include managerial judgment, percent of last year's revenue, and trend extension. Overall, the E-Commerce firms in the sample were infrequent users of quantitatively oriented techniques such as computer simulation, econometric methods, and decomposition. A possible explanation for these preferences is that the managers favor simple methods that appear to possess face validity.

A final issue addressed by the questionnaire was the degree to which sales forecasts were predictive of actual sales. That is, respondents were asked to specify the difference between their most recent annual forecast and the actual sales for that time period. This difference was divided by the actual sales to obtain an error percentage for the annual forecast time period, which provides a gauge of sales forecast accuracy.

Table 6: Sales Forecast Error (Percent)

Percent Error	Small Companies		Large Companies		All Companies	
	Number	Percent	Number	Percent	Number	Percent
0-9.9%	16	6.0%	9	10.7%	25	7.2%
10-19.9%	11	4.2	11	13.1	22	6.3
20-29.9%	42	15.9	14	16.7	56	16.1
30-39.9%	20	7.6	8	9.5	28	8.0
40-49.9%	25	9.5	6	7.1	31	8.9
50-59.9%	35	13.3	13	15.5	48	13.9
60-69.9%	40	15.2	6	7.1	46	13.2
70-79.9%	24	9.1	8	9.5	32	9.2
80-89.9%	34	12.9	6	7.1	40	11.5
90-100%	17	6.4	3	3.6	20	5.7
Totals	264	100.0%	84	100.0%	348	100.0%

The figures in Table 6 indicate that there was considerable spread in the degree of accuracy of the sales forecasts. Especially for the smaller firms, it is evident that a high percentage of firms had substantial error in their sales forecasts. Median categories were 50-59.9 % error for the smaller E-Commerce firms and 30-39.9 % for the larger firms. Certainly, some of this variation is due to the considerable volatility that is inherent in the E-Commerce industry, at least in its current stage of development. It appears that considerable potential exists for improving E-Commerce firms' sales forecast accuracy. Such improvements could improve endeavors by these firms to advance planning and control efficiency.

A COMPARISON OF E-COMMERCE AND TRADITIONAL FIRMS

We contrast our results with those from previous studies to provide an indication of the relative performance of sales forecasting for E-Commerce retailers, when compared to other industries. Specifically, we compare the percentage of small and large firms that prepare forecasts, who prepares the forecasts, what techniques are used, for what time period and business unit, and the accuracy of the results. Based on these comparisons, we conclude that E-Commerce retailers are similar to other industries in their sales forecasting practices, although there are some important differences.

To begin, the frequency with which the E-Commerce retailers in our sample prepare sales forecasts (83.5% for small firms and 93.3% for large firms, Table 1) is higher than reported by Peterson (1996) for a sample of small businesses (62.0%). However, 100% of a sample of large and small retailers (Peterson, 1993), 93.2% of small wholesalers and 100% of large wholesalers (Peterson and Jun, 1999), and 98% of a sample of Canadian firms prepared sales forecasts (Klassen and Flores, 2000). Thus, it appears that small firms are less likely to prepare sales forecasts, and our sample of E-Commerce retailers does not differ in this regard.

The people preparing the forecasts also are similar across industries. Either top managers (28.8% of small companies) or financial officers (28.6% of large companies) are the most likely to prepare sales forecasts for E-Commerce retailers (Table 2). Peterson (1993) found that top managers were the most likely preparers of forecasts for small traditional retailers (61.6%), but this function was delegated to finance, marketing, or accounting for large traditional retailers. Peterson (1996) reported that managers were the most likely to prepare sales forecasts (64.6%) for small businesses, whereas Jun and Peterson (1991) found that top managers were

more likely to prepare forecasts for small companies than for large companies. Peterson and Jun (1999) revealed that sales managers were most likely to prepare forecasts for large wholesalers (23.3%), but top managers were again more likely to prepare the forecasts for small wholesalers. Overall, top managers are more likely to prepare sales forecasts for small companies, but specialized forecasters (e.g., marketing or finance) are more likely for larger concerns. Our sample of E-Commerce retailers provides the same interpretation.

Table 3 reports on the categories for which E-Commerce retailers prepare sales forecasts. Of the companies that prepared forecasts, 100% of our sample forecast company sales. A large number also prepared forecasts by customer type (66.0%), by product or service (61.5%), or by customer location (44.8%). The large firms were more likely to prepare forecasts of the latter categories than small firms were. Peterson (1996) found that forecasts for the entire company were the most common type, as did Peterson (1993), and Peterson and Jun (1999). The earlier studies also determined that large retailers and wholesalers were more likely than small retailers and wholesalers to prepare forecasts on other bases, such as by product line, geographic area, or customer type.

Dalrymple (1967, 1975) reported that the most common time period for which sales forecasts were prepared was annual. Based on a sample of small businesses, Peterson (1996) made the same observation. In our sample of E-Commerce retailers, annual forecasts are again the most common time period for which forecasts were prepared (Table 4). Large E-Commerce retailers were more likely than small E-Commerce retailers to prepare forecasts for other time periods; Peterson (1993) and Peterson and Jun (1999) observe the same trend for the retailing and wholesaling industries, but Klassen and Flores (2000) found that monthly and quarterly forecasts were more common than annual for their sample of Canadian firms.

Table 5 (Forecasting Methods) indicates that the forecast methods used by E-Commerce retailers are similar to those used by wholesale firms (Peterson and Jun, 1999), small businesses (Peterson, 1996), and retailers (Peterson, 1993). Managerial judgment is used by virtually all the businesses in our sample and the other samples. However, Klassen and Flores (2000) and Kahn and Mentzer (1995) report that the sales force composite and simple exponential smoothing methods, respectively, were the most commonly used, although managerial judgment was popular and ranked second in both studies. Our sample of E-Commerce retailers reveals that small firms are less likely than large firms to employ quantitative techniques such as regression and other econometric forecasting methods. This

finding is consistent with a traditional retailer sample (Peterson, 1993) and a wholesale firm sample (Peterson and Jun, 1999). Based on figures reported in earlier studies, it appears that E-Commerce retailers are more likely to use quantitative forecasting methods than other industries. Perhaps this is a result of the higher level of computer technology required by E-Commerce firms than for many of the traditional firms, which do not always require extensive computer use to conduct business.

Lastly, we reported earlier that the median forecast error category was 50-59.9 % for the small E-Commerce retailers and 30-39.9 % for the larger firms. These figures are considerably higher than those for wholesalers, whose median forecast error category was 20-29.9 % for small wholesale firms and 10-19.9 % for the larger wholesalers (Peterson and Jun, 1999). Jain (2001a) found an aggregate sales forecast error rate of 19% across all industries, but this study used a quarterly forecast instead of an annual forecast. Dalrymple (1967) reported a 5.3% forecast error across all industries, thus the error rates reported by our sample of E-Commerce retailers is higher than found in previous studies. A possible explanation for this observation is offered by Jain (2001b), who suggests managerial and industry experience typically contributes to greater forecast accuracy. The E-Commerce industry is still relatively new, and managers are unlikely to have as much experience in this industry as managers in other industries. As already noted, the E-Commerce retailing industry is characterized by rapid change and uncertainty, which presumably contributes to greater sales forecast errors.

CONCLUSION

In this article, we explore the forecasting environment of retail E-Commerce firms, and compare this environment with those of traditional industries for which corresponding data are available. We find that large E-Commerce retailers are more likely than small enterprises to undertake forecasting, and forecast preparation by someone other than a top manager (e.g., a marketing manager or financial officer) is more likely in the larger firms. Of the E-Commerce retailers in our sample that performed forecasting, all performed firm-level and annual forecasts, but the larger firms were far more likely than small firms to also undertake forecasts for alternative categories (Table 3) and time periods. Larger firms also are more likely to employ forecasting methods beyond managerial judgment (e.g., quantitative methods such as regression models), which may contribute to the larger firms' slightly more accurate forecasts (Table 6).

A considerable amount of uncertainty characterizes the retail E-Commerce industry, as evidenced by high forecast error rates. The disparity in forecast error rates is the biggest difference between the E-Commerce retailers and the other industries included in our comparison (traditional retailers, wholesalers, and small businesses). With the exception that E-Commerce retailers are more likely to use quantitative forecasting methods than the other industries, industry comparisons did not identify further notable differences between E-Commerce retailers and other firms.

The primary purpose of our study is investigating forecasting practices in a new industry, but we also briefly discuss forecasting accuracy differences between our sample of E-Commerce retailers and other industries. One explanation for such differences is that E-Commerce firms are relatively new and have operated in an environment of significant uncertainty (Golicic et al., 2001). In the late 1990s, the E-Commerce industry grew quickly with the strong economy. Since the beginning of 2000, there has been significant shrinkage in investment markets and inconsistent growth in retailing. In this changing economic environment, E-Commerce retailing has continued to grow when compared to traditional retailing. Thus, as the E-Commerce industry matures, future research may find that E-Commerce retailers have forecast error rates similar to other industries.

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End of ARTICLES for Volume 4, Number 1

ARTICLES for Volume 4, Number 2

ARTICLES for Volume 4, Number 2

DEVELOPMENT OF AN ELECTRONIC DATA INTERCHANGE MODEL FOR CHANNEL MANAGEMENT

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ABSTRACT

In this paper, the authors propose a new paradigm for distribution management based upon research and data collected over an eighteen month period through contributions made to an online conference sponsored by the Journal of Business and Industrial Marketing. Technological linkages between value chain partners using Electronic Data Interchange (EDI) and Automatic Data Collection (ADC) offers firms significant potential for the transformation of interorganizational relationships. Electronic data transfers offer considerable benefits and responsibilities for all participants and, with the increasing technical literacy of the customer-base, are becoming a requirement for sustaining operations rather than a competitive advantage. The growing importance and ubiquitousness of ADC and EDI in logistics and distribution is considered as well as the need for additional conceptual consideration in strategic business pedagogy.

INTRODUCTION

The World-Wide Web was used not only to survey those interested in distribution, but also to collect and synthesize global input on the topics of Automatic Data Collection and Electronic Data Interchange. Automatic Data Collection (ADC) is defined as the collection of data by a firm without human input or with minimal effort. Scanning devices to read products and meters are normally used to collect the data. Electronic Data Interchange (EDI), the main focus of the paper, is defined as the electronic exchange of business transactions between companies from one computer to another using an accepted standard format (Jenkins, 1994).

Poised to change channel relationships profoundly, the objective of EDI was to obtain time and cost efficiencies through the direct exchange of data between supplier and purchaser systems (Sawabini, 2001). EDI is sometimes mistaken for other communication methods, such as electronic mail, general access to the Internet (Larson & Kulchitsky, 2000) or derivatives such as "Rip-and-Read" (Lauer, 2000). When EDI is confused with other communication methods, its full potential is not realized (Quinn, 1991). For the exchange to be considered truly EDI, the process must go from one system to the other with no manual intervention (Porter, 1990).

In recent years the growth of EDI has been significant (Hill & Swenson, 1994). It is estimated that over one half of all interorganizational business documents is transmitted between corporations by way of electronic data interchange. Further, channel issues such as efficient customer response, Just-In-Time (JIT) manufacturing and stockless inventories have been researched based upon EDI. Organizations utilizing any of these strategies force their supply chain partners, either suppliers or purchasers of goods, to implement EDI or face possible extinction. Thus, organizations are being forced to realign their goals and make decisions with their supply chain partners in mind (Kopczak & Johnson, 2003). However, the data linkages provided by EDI can enable organizations to reduce their inventory costs while improving their response to customer demands. The speed at which data is electronically exchanged is much faster than the traditional paper-based method and systems can be programmed to replenish inventory levels automatically (Ali, 1994).

The increased accent on managerial application has again placed emphasis on the input of the social sciences and non-economic paradigms. However, any new development of channel marketing theory must contain both economic and non-economic concepts. Relationships can be considered within the economic political paradigm concept. The paradigm is an excellent tool to structure teaching lessons regarding channel management. Marketing pedagogy will be improved with additional concepts to account for and explain the information access influence on channels as well as the economic impact of EDI and ADC on business.

Allowing other channel members access to electronic data makes each firm more dependent upon the other and more committed to them and the system of distribution. The concept of areas of linkage relates well with the most current business thinking and the value web concept. For example, firms are attempting to segregate services that add value to customers. They determine which competencies distinguish that service and link it to customers (Fine, Vardan, Pethick & Hout,

2002). Allowing channel partners' electronic access fits well with the concepts of re-engineering or process engineering of customer services.

ADC allows firms to track product information throughout the channels of distribution all the way to raw materials assembling and thereby measure more carefully the value that is added. There are several factors that should be considered such as Efficient Consumer Response (ECR). ECR is an example of a value added service for customers linked by ADC and EDI. ECR is a series of business practices that utilizes data sharing and cooperation between retailers and distributors, wholesalers and producers to reduce distribution costs. An ECR program can encompass any or all of the following emerging business concepts: contiguous replenishment (CRP), direct store delivery (DSD), cross docking, category management, vendor-managed inventory and activity-based costing. However, ECR is more than new terminology for old distribution ideas. It is the assimilation of data capture information technology combined with the unparalleled cooperation between trading partners.

The data allows for ECR to create a demand-driven supply chain and eliminate expenses by reducing inventories and improving delivery efficiency (Burnell, 1995). In a few years, most firms will be forced to become part of an EDI/ADC system to be competitive. Business schools need to make this knowledge part of distribution management pedagogy including the organizational costs and strategic impacts of such arrangements.

What are the organizational impacts of the EDI/ADC wave pressing on logistics activities of all businesses? Nike has joined the mass customization bandwagon through the creation of <www.nikeid.com> which allows customers to go online to design personalized athletic shoes, sport bags, sport watches and golf balls. Land's End also allows their Web site visitors to design a custom fit for a limited number of products and styles. Customers are able to access a Web-based form where they are able to answer a series of questions regarding measurements and body shape. Levi Strauss Jean manufacturers also experienced the product customization and product proliferation phenomenon. The firm tapped into two key consumer trends by using EDI/ADC technology to adjust the final inventory at retail locations and computerized customization of jeans with its "Personal Pair Jeans" customer interface. The company used in-store computers to create jeans cut to the customers' measurements. As mass customizing capabilities increase and as more variety becomes available, consumers will expect, and eventually demand, specific varieties and customized products and services before spending their money. The

purchasing profile of shoppers is changing and is evidenced in decreasing product loyalty and the demise of individual brands (Miller, 1995).

Middle management, throughout the system, tends to resist changes in the way firms administer their distribution. Therefore, an EDI system that is unique would require greater bureaucratic upheaval and resistance to change. Bowersox and Cooper (1992) assert that given the traditional norms, functions, and institutions, a new set of norms and values would have to be promoted by a change agent in order to impact traditional structure. The change agent effort would likely be met with resistance and hostility from established channels. For example, Hill and Swenson (1994) describe how the sales representative job is changing due to electronic data interchange. The nature of the interchange will affect the nature of his job. Any change in that system will further change the salesperson's job. The less compatible the change to old systems the more they and other middle managers might resist the change.

Peter Drucker (1988) has discussed how new practices of management must evolve for the facilitation of information flow. New practices could doom or greatly alter traditional hierarchical command and control organizations. Whatever the level of change resulting from trends in electronic data linkages, it will surely be a factor in future organizational thinking. Organizations are predicted to experience three changes from information technology linkages; they are (1) flatness, (2) empowerment and (3) outsourcing (Meyer & Power, 1989; Rockart & Short, 1989; Savage, 1990).

Flatness may lead to more one-on-one marketing. Thus, the organizational distance between the manufacturer and final consumer will shrink. These concepts are primarily for business-to-business issues thereby final consumers should be linked by ADC/EDI. Empowerment will allow retailers and their various department managers more power over product mix and inventory. Outsourcing could lead to more specialization among channel service operations as well as manufacturers and retailers.

PROPOSITIONS

This paper examines the underlying interrelationships between EDI/ADC, process and channel participation (Figure 1). Process is defined as the application and use of EDI/ADC technology characterized by increased/decreased efficiency, value and channel system customization. Channel participant focuses upon the role

that channel members hold in the value chain process characterized by power, politics participation and exit costs (Figure 2).

Figure1: Interrelationship Model

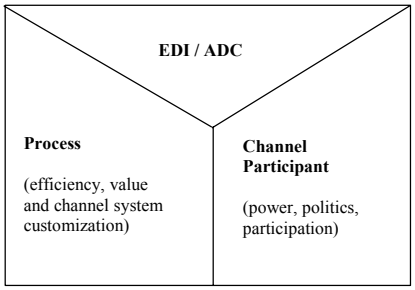

Figure 2: Major Components of Political Economy

Environment	Relations to the Environment	Internal Structure and Processes	
	Political Relations	Internal Polity	
	Dependence relations	Goals of the social unit	
	Interorganizational form	Distribution of power	
	Control mechanisms	Power bases	
POLITY			
		Boundary-spanning positions	
		Mechanisms for managing conflicts	
Characteristics of the Environment			
Proximity			
Capacity			
Differentiation			
Concentration	Economic Relations	Internal Economy	
Turbulence	Competitive markets	Structure of the social unit	
	Quasi-integrated systems	Internal exchange processes	ECONOMY
	Integrated vertical marketing systems	Allocation rules	
		Incentive systems	

Source: (Arndt 1983)

A set of twelve propositions, concerning the use of EDI and ADC technologies in distribution management, were developed based upon a review of

relevant literature. These propositions were then placed on a Web-based conference, sponsored by *the Journal of Business and Industrial Marketing,* for eighteen months. Conferees posted their reactions to the propositions and a revised set of six propositions were developed based upon collected comments. This paper focuses upon the six revised propositions.

The first proposition focuses upon the investigation by many companies into the potential extended benefits available through electronic linkages. One such opportunity is associated with JIT II in which the supplier provides its customers with an onsite company representative acting as a direct salesperson/purchasing agent. The onsite representative infuses his product knowledge with the customer's business plans and operations in order to increase value through improved efficiency and effectiveness of both the supplier and customer (Oliva, 2002). Companies are also beginning to appreciate the benefits associated with JIT III as their relationships with customers are further strengthened via the exchange of information over secure networks at the knowledge-level of the organization. This increasing dependence upon the development of channel relationships via EDI technology promotes the following proposition.

P1 *The higher the level of uniqueness of the EDI-Inventory system for a channel of distribution, the higher the political exit costs for channel members.*

In a study on EDI adoption in the marketing and logistical channels of individual firms, Williams (1994) found that EDI adoption was influenced by organizational size, product demand uncertainty and, in some cases, power. According to a study conducted by Heide and John (1990), the authors found that when technological unpredictability, defined as uncertainty associated with hardware, software, and human resource requirements in EDI channels, was present, firms resisted establishing long-term linkages with channel partners. Some studies have found that the higher the investment associated with EDI linkages and thus, the probable sophistication of the technology utilized, the greater the likelihood of a sustained EDI relationship (Heide & John, 1990; Williams, Magee & Suziki, 1998).

In studies examining the relationships of small to medium sized enterprises (SME) with larger channel members, researchers found that several of the SME's studied were reactive in their use of EDI and implemented it at minimalist levels due, in part, to inadequate resources (Chen & Williams, 1998; Dhillon & Caldeira, 2000; Williams, 1994). Some of the SME's were forced to implement EDI or be

faced with per paper document charges or lost business (Williams, 1994). This implied power associated with individual channel members leads to the second proposition.

P2 *The more unique and individualized the EDI-Inventory system, the more power the channel leader will possess over other channel members.*

As the development of technology and the complexity of supply chains continue to increase, organizations are looking beyond their own boundaries to managing their entire supply chain (Hart & Saunders, 1998; Sohal, Power & Terziovski, 2002; Whipple & Frankel, 2000). The Internet and Web-based technologies have enabled organizations to take broader roles in supply chain management (Chan & Swatman, 2000; Cottrill, 1997; Oliva, 2002; Williams, 1994). Organizations are finding that in order to keep their large customers, they often must comply with their requests to utilize strategic alliances such as EDI (Chen & Williams, 1998; Lacovou, Benbasat & Dexter, 1995; Teo, Wei & Benbasat, 2003; Whipple & Frankel, 2000). Often this shift is in the form of an Internet-focused product rather than a more traditionally-oriented form (Bhatt, 2001; Oliva, 2002; Premeaux, 2002).

Organizations maintaining dominant chain roles are in positions to require business partners to adopt specified structures or programs conducive to their business operations (Dyson, 1992; Pfeffer & Salancik, 1978). Some selectively build relationships only with channel partners possessing compatible technologies (Williams, Magee & Suzuki, 1998). Competition is arising between supply chain networks rather than just individual firms (Angeles & Nath, 2001). Interest in seamless integration continues to move trading partners to eliminate traditional boundaries and operate as a unified organization (Towill, 1997). Thus, some firms are feeling pressured to join the EDI/ADC technologies fully or lose clients (Williams, 1994).

P3 *EDI-Inventory systems will provide consumers with more value for their purchases. The distribution system will become more efficient as EDI expands. As EDI/ADC expands, consumers will demand this level of value and service of all firms.*

In an article studying multiple cases from various industries, Kumar and Crook (1996) found that suppliers involved in the chemical sector used EDI to differentiate their services by providing automated inventory handling services to track and order raw materials for their customers. The banking industry was also found to use EDI-initiated cash management applications to subsume their customers' accounts receivable/payable operations. Some financial services organizations worked with institutions of higher education in order to serve as clearinghouses for student loan and scholarship payments.

Levi Strauss utilized their EDI systems to strengthen relationships with their customers by providing remarkable improvements in inventory replenishment speed (Keen, 1999). Likewise, Westinghouse Electric utilized EDI to streamline delivery time for Portland General Electric from 15 days to one-half day and the processing costs from $90 to $10 (Keen, 1999). Upper Deck Company, a manufacturer of sports trading cards, developed an EDI system with its major retailers in order to establish a more precise, season-oriented JIT system. With this system, shipments are based upon customer sales and the amount manufactured is more precisely matched with the amount demanded (Auguston, 1995). These examples of tailored products and services for individual channel member needs support the fourth proposition.

P4 *Retailers will be inclined to join channels with manufacturers who can deliver more computerized, custom-made products efficiently, than manufacturers who cannot customize.*

The United Nations is working to develop global standards and procedures for the exchange of electronic data between importers and exporters in the areas of banking, customs, transportation and insurance (Mulligan, 1999). Their aim is to develop agreements on "message standards and structures, implementation rules, translation software, communication links and internal systems integration" (Mulligan, 1999). During his time in office, President Clinton made it mandatory that by 1997, all government purchases had to be made using EDI (Kessler, 1994). Likewise, the Administrative Simplification section of the Health Insurance Portability and Accountability Act of 1996 required members of the health care industry to transfer data electronically by imposed deadlines (CMS, 2002). As demonstrated by the Utility Industry Group, there are specific industries that are encouraging its members to adopt a common format for EDI transmission thus simplifying the capability of switching channel partners (Drazga, 2000).

Representatives from large enterprises acknowledged that they were working toward data sharing capabilities with both current and future applications. Proposition 5 is supported by the previous examples.

P5 *Major retailers will encourage the development of common EDI-inventory control systems or software to accomplish the same goals so that the exit costs associated with changing suppliers will be lower.*

Advances in information technology make it possible to provide mass customization and design numerous products to fit individual customer preferences (Istook, 2002; Liechty, Ramaswamy & Cohen, 2001; Zipkin, 2001). As mentioned earlier, one such company, Levi Strauss, has found that mass-customization is definitely a viable option for satisfying customer needs (Miller, 1995). Due to the rising cost of labor and ever-increasing level of imports, U.S. clothing and textile manufacturers are seeking alternative options for differentiating their products and maintaining their share of the market (Istook, 2002). However, firms struggle with the issue of increasing product lines to satisfy customer demands, yet managing the diseconomies associated with such a broad product scope (Dobson & Yano, 2002). Thus, Bhatt (2001) countered that although an industry was information intensive, this did not automatically imply new product and service innovations. Rather, EDI would influence customer responsiveness to sharing information across multiple firms (Bhatt, 2001).

P6 *Computerization will lead to more product proliferation with an increase in custom-made products.*

METHOD AND RESULTS

Hundreds of individuals responded to the Internet conference including some from the St. Louis Council of Logistics. They were introduced to the Internet article and encouraged to respond at Logistic meetings.

Internet Qualitative Research

Analysis of Internet postings can be considered a form of qualitative research. Qualitative research consists of research procedures that produce

descriptive data; the subjects' own written or spoken words and observable behavior. This conference allowed subjects to input written comments from a global audience on a particular topic. Recently, due to cost considerations and a realization that big samples do not necessarily produce accurate findings, qualitative research has reemerged and much of it using the Internet. In fact, Trachtenberg, (1987) suggested that the reason for the success of Japanese companies may be partly attributable to their use of more qualitative research techniques. Qualitative research is a method to engage subjects in conversation on their terms, thus making it an effective exploratory research method.

PROCEDURE

Individuals were encouraged by the author to visit the website or, coincidentally, found it while searching the MCB publication website <ww.mcb.co.uk/>. They were encouraged to register and e-mail comments to the posted article. The article explained that the conference was in response to the vast shift in logistics management toward utilization of electronic data interchange and automatic data collection. The described movement in industry required additional theoretical underpinnings and distillation of procedural knowledge. The article also explained that procedures for instituting EDI linkages and a new paradigm for distribution management would be developed based on results from the Internet conference sponsored by the *Journal of Business and Industrial Marketing*. The conference paper presented twelve theoretical hypotheses and procedural guidelines for improved logistical linkages. Six of the hypotheses received enough support to consider as new propositions (Appendix).

RESULTS

Approximately 1,498 individuals posted comments on the conference web site and an unknown number of others read all or portions of the Internet conference. Although a large audience commented upon a few concepts, they did not contribute new concepts to those already listed. Generally, respondents felt that EDI and ADC were valuable tools that would increasingly become a necessity for potential players in the world marketplace (Appendix).

A request was made for comments regarding the six propositions of the lead paper. Results indicated that, in regards to proposition one, "The higher the level of uniqueness of the EDI-Inventory system for a channel of distribution, the higher the

political exit costs for channel members," 93% of respondents agreed with this proposition and only 7% disagreed that it was true. Proposition two, which stated that, "The more unique and individualized the EDI-Inventory system, the more power the channel leader will possess over other channel members," found that only 75% agreed with this statement while 25% disagreed. Proposition three stated that, "EDI-Inventory systems will provide consumers with more value for their purchases. The distribution system will become more efficient as EDI expands. As EDI/ADC expands, consumers will demand this level of value and service of all firms." This proposition was *unanimously* accepted by all respondents. Only 3.5% of respondents disagreed to Proposition four which stated that, "Retailers will be inclined to join channels with manufacturers who can deliver more computerized custom-made products efficiently, than manufacturers who cannot customize," all others respondents agreed to the statement. Proposition five found that 86% agreed with the statement, "Major retailers will encourage the development of common EDI-Inventory control systems or software to accomplish the same goals so that the exit costs associated with changing suppliers will be lower," while 14% disagreed. Proposition six revealed that only 3.5% disagreed with the statement that, "Computerization will lead to more product proliferation with an increase in custom-made products," while 93% agreed and 3.5% were unsure.

Some respondents felt that Proposition two was not true because advances in technology will allow for greater interchangeableness of systems and connectivity of different systems and software. Others felt that a truly unique system would make usage more complicated. It would make it harder for customers and channel members to utilize and benefit from the individualized system. A standard EDI system, similar to other channels of distribution, would be recommended. Also, the higher cost associated with exiting the system would hinder companies from joining a channel with very unique EDI systems. Others had a "qualified yes" for Proposition two if the compatibility of the unique systems really worked well. Some felt that custom-made products would greatly proliferate because of the increased information flow created by EDI/ADC. Some respondents indicated that it would take a long time for the third proposition to eventually take affect in the marketplace. Demand for higher levels of product services would take a number of years to be fulfilled.

RECOMMENDED PROCEDURAL IMPROVEMENTS FOR FUTURE INTERNET-BASED STUDIES

Those posting comments did not always display expertise but were interested in the topic and produced reasonable levels of constructive feedback regarding the study. Some of the comments that were received regarding the Web-based data collection method included:

1. The purpose should be to showcase works to a wide audience, normally wider than most journal readership, amongst interested parties in academia, students as well as faculty, and amongst industry executives. Therefore, substantial promotion of the website and its purposes are recommended.

2. The convener should assume the role of master of ceremonies or moderator more forcefully introducing topics, drawing attention to areas of controversy, and specifically inviting responses from the visitors and those posting articles.

3. Surfers must be encouraged to comment on specific concepts and each other's responses generating greater interaction and creativity of new concepts.

4. A strong opening article is essential. A researcher cannot expect surfers and others to develop the concepts. Totally new concepts from observers would be welcome but not essential to generate discussion.

5. At the end of the conference period, the convener should count and summarize the results as in any other qualitative study.

MODEL DEVELOPMENT

Figure three is a full drawing of the model including a short summation of the three propositions that received the highest support and acceptance from the global respondents to the electronic conference. Proposition three garnered unanimous support from conference respondents. Proposition four had the second highest level of support. Proposition one received the third highest level of acceptance and is the third item on the model. The political realities of the channel

members, the outer ring of the model, are a limiting factor. Managers will resist change, therefore, the political realities of the varying channel members must be considered. Thus, the political economic paradigm must be considered an environmental limiting factor. The channels of distribution can best be linked for efficiency among members externally by EDI and internally by ADC (Figure 3). This sharing and linking of data should heavily influence conditions associated with the exit costs. Pressure from competitors and customers for faster order cycles and customization of products will act as a bond to encourage close channel cooperation when EDI/ADC is working effectively. Also, when unique EDI/ADC systems raise the costs of exiting the system, they act as a bond to strengthen the channel relationships.

Figure 3: The Electronic Data Interchange Linkage Model

* The higher the levels of EDI/ADC and ordering efficiency, the higher the levels of consumer expectations and demand for value and service of all firms.

** The higher the levels of EDI/ADC inventory, the higher the demands for customizing retail products.

*** The higher the level of uniqueness of the EDI/ADC-Inventory system, the higher the level of the political exit cost for channel members.

MANAGERIAL IMPLICATIONS AND CONCLUSION

The business and its trading partners must discuss and decide upon the overall strategic objectives and standards that the EDI system is to follow. Product related customer service and possibly, product customization, will become high priority concerns in the future. Further, the EDI standard should be consistent with the needs of all channel members and possibly the final customer as well. Data transmissions set the "format of electronic transactions, ensuring the verifiability and audit-ability of each" (Tageldin, 1994). These standards work as the engines of EDI by transforming data into a format that is understood by all computer systems in the channel, however, they "must be consistent with the needs of all interested parties" (Ali, 1994).

Once the system is running properly and efficiently, the business can expand the system. EDI conversion should start with a narrow focus to diminish political resistance and then expand as workers adjust to the new systems. Additional trading partners and transaction sets can be acquired to improve and strengthen the system (Cannon, 1993). The firm's "high-tech communications" capability can be used as a marketing and promotional selling point. This will help the channel members realize greater economies of scale and many other EDI benefits. These benefits can be used to attract other channel members and hold them in the system.

Marketing theory has been moving in the direction of increased channel cooperation, relationship marketing and a need for special alliances like the Japanese keiretsu. In Leenders and Blenkhorn's (1988) book regarding reverse marketing, they described the advantages of greater cooperation and integration of suppliers into a major system. EDI is expected to energize these new and improved channel structures and alliances thus necessitating further investigation.

It is critical that all channel members in the merchandise flow are capable of both making the connections and handling the EDI system. Thus, before application of EDI, businesses must confirm that there are "mature information technology systems at both ends of the transaction and that both systems are well equipped for transmission" (Ali, 1994, p. 17). It is imperative to ensure the integrity, reliability and operability of the existing and planned environments before the implementation of EDI. EDI will not improve ill-conceived business procedures and will not refurbish poorly designed systems. In fact, the introduction of EDI into an unstable channel environment will probably worsen the situation by accelerating the

rate of information transfer. Eventually, poorly designed systems will become overburdened and fail (Ali, 1994 p. 17).

Before implementing EDI, both the initiating business and its trading partners must have a well-structured business environment with current and stable information technology systems. Implementation of ADC and EDI as part of the corporate strategy is a challenge. The business must understand the time and costs involved in implementation and the extent of impact it will have on the business functions. All corporate levels in the organization will absorb the pressure of preparing the business to implement an EDI system. Therefore, it is a major political and economic decision for all firms involved as shown by the model and will require everyone's complete cooperation and effort. The first step is to receive top level corporate support. One way to build corporate support is through third party, corporate-wide presentations to educate the company. Once the presentations have been conducted, the organization should schedule additional meetings to determine if EDI is right for them. Throughout these meetings, they should discuss issues that could become implementation obstacles and answer questions regarding application of the technology to business processes.

Next, approval should be sought for the EDI project and funding (Cannon, 1993). Once the EDI project has been approved, the next step is to establish a trading relationship with the businesses that will participate in the EDI exchange (Porter, 1990). Power retailers are politically and economically forcing these reforms on channel members. Although portions of past theory and empirical research support some aspects of this model, the relationships proposed in this model demand further empirical examination. Further, the conceptualization and proposed propositions in this model demand further anecdotal analysis relative to distribution issues.

APPENDIX

	Proposition	Agree	Oppose
P1	The higher the level of uniqueness of the EDI-Inventory system for a channel of distribution, the higher the political exit costs for channel members.	93%	7%
P2	The more unique and individualized the EDI-Inventory system, the more power the channel leader will possess over other channel members.	75%	25%
P3	EDI-Inventory systems will provide consumers with more value for their purchases. The distribution system will become more efficient as EDI expands. As EDI/ADC expands, consumers will demand this level of value and service of all firms.	100%	0%
P4	Retailers will be inclined to join channels with manufacturers who can deliver more computerized custom-made products efficiently, than manufacturers who cannot customize.	96.5%	3.5%
P5	Major retailers will encourage the development of common EDI-Inventory control systems or software to accomplish the same goals so that the exit costs associated with changing suppliers will be lower.	86%	14%
P6	Computerization will lead to more product proliferation with an increase in custom-made products.	93.3%	3.5% 3.5% unsure

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WEB-BASED TRAINING: A MARKETING PERSPECTIVE OF ISSUES CONCERNING CORPORATIONS AND CUSTOMERS

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ABSTRACT

Web-based training is an emerging service that is encroaching on traditional corporate and individual training systems. This paper reviews literature in an effort to identify key marketing and consumer behavioral conditions and issues unique to this service. Emerging trends and opportunities for small businesses, both providers and customers are identified.

INTRODUCTION

Corporate and individual training represents a multi-billion dollar market in the United States. According to research firm IDC (McGee, 2004), the global market for corporate e-learning and Web-based training is expected to grow nearly 27% compounded annually over the next four years, and is estimated to reach $21 billion by 2008. This emerging form of training, defined as an educational service aimed at providing specific skills for professional or personal gain, ranges from certification programs to one-time seminars aimed at addressing a particular skill or issue. The multibillion dollar e-learning business consists of vendors ranging from Harvard Business School to dot-com start-ups (Melymuka, 2002). The rapid encroachment of Web-based training into a mature corporate training market presents many questions for marketers seeking to understand the evolving nature of this phenomenon. This paper explores the Web-based training market, what forms of Web-based training are emerging, and suggests how Web-based training can best be marketed to and by small business firms.

DESCRIBING E-LEARNING AND WEB-BASED TRAINING

E-Learning is a broad classification that applies to the delivery of educational services through electronic media. Universities and other educational institutions are the most visible providers of e-learning services. Famed management guru, Peter Drucker, offered this comment about online education: "Universities won't survive. The future is outside the traditional campus, outside the traditional classroom. Distance learning is coming on fast"(Blake, Gibson & Blackwell, 2003). This may not come to fruition any time soon, but the impact of e-learning is resonating across all forms of education and training. As in the area of commerce, the Internet is fundamentally altering the structure of education, specifically in the area of skills training. The Internet provides the technology element that makes up the product and its delivery system as well as providing distribution channels and a means to promote the e-learning product or service (James-Gordon, Young, & Bal, 2003). The power of e-learning comes from the opportunity to leverage technology and information to alter the basic tenets of learning by eliminating the one-size fits all approach to instruction and customizing content to meet individual needs and learning styles (Pantazis, 2002). Web-based training is a subset of e-learning that is generally geared to more focused applications such as corporate and personal training.

WEB-BASED TRAINING SYSTEMS

One way to describe Web-based training systems is by delivery system: Web/computer-based training, Web/electronic performance support systems, Web/virtual synchronous classrooms, and Web/asynchronous classrooms (Blake, Gibson, & Blackwell, 2003). Computer-based training and electronic performance systems are generally off-the shelf products or resources that are limited in terms of providing a dynamic learning experience. They include CD-ROMs, online forums and tools that the learner can access to obtain answers to specific questions or to "self-study" specific content. Web-based synchronous and asynchronous classrooms represent the most dynamic area of Web-based training. In the asynchronous approach, the student and instructor can interact through e-mail and discussion forums. The student accesses materials posted by the trainer. In the synchronous approach, students and instructors meet online at designated times in a manner that mimics actual classroom instruction.

Another way of describing the nature of e-learning is offered by Benbunan-Fich (2002), noting that Web-based methods can be integrated into education and corporate training in two different ways: 1) by transmitting content (to deliver instruction), and 2) by supporting communication between teacher and student, or among students. Transmission of content generally occurs in lectures where instructors present materials and students try to understand and assimilate concepts – the objectivist model of knowledge transmission. Alternatively, Web-based training can maintain online learning communities that exist beyond the scheduled lectures or training sessions. These online communities support an alternative learning model known as constructivism, where knowledge emerges from peer interaction, evaluation, and cooperation.

The communication aspects of Web-based training are often scrutinized by the training community. One perceived downside of Web based training is the lack of human interaction (Melymuka, 2002). This lack of face-to-face communication is often at issue. Yet, Web-based training systems can provide powerful new venues to communicate effectively via discussion forums, online chats, blogs, and e-mail. In fact, online relationships have the potential to be even more emotionally powerful because many of the barriers associated with face-to-face communication are eliminated (Giguere & Minotti, 2005).

Both corporations and individual consumer/students are adopting e-learning and web-based training as a result of either realized or perceived benefits. These benefits include: cost effective learning; efficient management; customization; accessibility to current information and material; utilization of existing hardware and resources; and consistency and control of training material (James-Gordon, Young, & Bal, 2003). Furthermore, e-learning and Web-based training programs are built on a foundation that relies on the dynamic relationship that links people, learning and organizational performance (Pantazis, 2002). The communication technologies that underpin Web-based training provide place and time-independent communication modalities that traditional training approaches cannot approximate (Benbunan-Fich, 2002).

WEB-BASED TRAINING TRENDS

As with most technologically-based services, Web-based training continues to evolve in a quest to find the customer-driven services that realize returns on investment for training firms and consumers. The complex nature of learning and the reality of ever-emerging technologies add to this challenge. One formula that

is finding success is blended training: an approach that combines delivery modalities to meet consumer/student needs(Picardi-Newman, 2005). This approach is in effect a cross-channel marketing approach that delivers the service through several venues, both Web-based and traditional.

Blended learning is the integration of independent e-learning with group instruction, and appears to be where e-learning is heading. For example, self-paced e-learning combined with traditional classroom instruction allows training managers to meet group learning requirements while taking into account individual learning styles (Carlivati, 2002). Blended learning makes it possible to reach a much broader audience for effective learning, retention, and on-the-job applications. Training professionals can mix an instructor-led classroom-based course with online delivery methods such as virtual classrooms, Web seminars and self-paced tutorials, as well as traditional media such as workbooks (Picardi-Newman, 2005). Blended learning is not just about the delivery – it must be considered along with the other key components of the learning life cycle, including needs assessment, development requirements, and program evaluation.

Blended learning approaches are being adopted by some of the biggest corporate training firms. After concluding that its Web-based training services had become "disjointed," the American Management Association launched a blended learning initiative last year when it began offering pre- and post-Web based support tied to its instructor-led seminars focused on project management ("AMA to delve further into blended learning, pursues legal community", 2005). Blended training seems to be able to win over even the most reluctant techno-phobic HR manager, who may have previously shied away from pure online learning because it cut out the social interaction of the classroom or training session, or learners who wished to discuss material face-to-face (Sparrow, 2004). Of all the terms and concepts behind technology based training, 'blended training' seems to be the most likely to stick around. Its appeal lies in the mix of delivery media such as classroom training, web-based training, virtual classrooms, books and mentoring.

Another developing trend in Web-based training is the emerging focus on content as opposed to communication technology. In some cases, slow acceptance of e-learning has been rooted in content considerations (Carlivati, 2002). Picardi-Newman (2005) suggests that providing asynchronous (self-paced) learning content before a traditional synchronous (all together) e-learning program is an ideal way to give participants an agenda, an overview of key concepts, and pre-session assignments. Although the interactive capabilities of Web-based training are well established, only 15-20 percent of e-learning today is conducted using interactive

content (Britt, 2004). This is clearly an area that can and will be exploited by providers who seek to leverage the interactive benefits of Web-based training. Finally, the need for customized content is being addressed by Web-based training providers. As Brit points out, most early adopters of e-learning point to customized content as having the greatest strategic impact on their businesses.

CORPORATE SIZE AND STRUCTURE PROVIDE DIFFERENT NEEDS

As with all sound marketing efforts, strategy should be developed on the basis of customer orientation addressing the needs and wants of the consumer (Sheth & Mittal, 2004). Buyers of Web-based training services tend to fall into two categories: small and large businesses. Each category represents unique wants and needs.

In today's economy, large companies often place a premium on efforts to contain costs and achieve efficiencies through business process re-engineering and outsourcing. Web-based training offers an avenue to address both needs. As companies re-engineer themselves to cut costs and achieve efficiencies, many have realized savings obtained through online training (Bailey, 2002). As previously noted, large corporations spend billions of dollars on training annually. According to Brandon Hall Research (brandonhall.com), most training departments spend up to two-thirds of their budget buying off-the-shelf training and hiring outside consultants or instructors to deliver courses (Johnson, 2004). Web-based training appears ripe to grow in this market, especially when tailored to specific needs of the large corporation. The fact that in many cases training that typically would take 6 to 9 months can be compressed to 2 to 3 weeks through Web-based initiatives gains the attention of many corporate executives (Pantazis, 2002).

The cost savings evident in integrating Web-based training into the re-engineering of corporate training functions can be seen in several high profile cases. General Motors University, the training arm of the parent company, has found that for every $1 of e-learning that a company adds, it estimates that it saves $2 for traditional class-room tuition and another $1 for travel time or lost personnel time (Pantazis, 2002). Parker Hannifin has realized savings with Web-based training through a reduction in travel expense and lost work time (Schrader, 2003).

The trend in the outsourcing of key business processes is also a market factor driving the growth of Web-based training. The top reasons respondents listed for outsourcing included cost savings, time savings that allow them to focus on business strategy, and improvements in compliance and accuracy (Johnson, 2004).

Additionally, a recent survey from the Society of Human Resource management revealed that 57% of the HR and training professionals surveyed outsource all or portions of their training and management development programs.

Providers of Web-based training must consider the buying behavior of large corporate training functions. Large companies want to deal with larger, more solid vendors. It's easier for a department to buy from a small, private company than it is for the entire enterprise to buy from that same small company (Dolezalek, 2004). Furthermore, corporate buyers are relatively new to the purchase of Web-based training services. Four out of five organizations using e-learning for employee training started within the last four years, so the market is early in its life cycle (Britt, 2004).

While sharing some of the same training needs as large corporations, small businesses present a set of unique needs. Small businesses often lack the internal resources need to coordinate training services, therefore, they tend to rely more on vendors to develop content and manage delivery. Recognizing this dynamic, the federal government has entered the e-learning game with high visibility programs operated by the Small Business Administration and other agencies, all given a push from the Bush administration's e-commerce initiative (Harris, 2005). Although this service meets many of the Web-based training needs of small business, there is still a growing market for profit-based e-learning providers. Small business has not been penetrated much by e-learning and shows much market potential for e-training vendors (Dolezalek, 2004).

USER/LEARNER PERSEPCTIVES

From the user (learner) perspective of Web-based training services, there are several factors providers should consider in developing an effective product or service. Providers must understand and focus on the benefits Web-based training provides. Primary benefits of Web-based learning include convenience, adaptability, student comfort, and interaction. Convenience comes in the form of 24 hour availability and accessibility from any place there is a computer and Internet access. Training programs can be updated immediately and thus are easily adapted to changing course content needs. Self-paced instruction and self-designated settings are characteristics of Web-based training that lead to improved student comfort (Blake, Gibson, & Blackwell, 2003). As previously, stated the interactive aspect of the Internet can and should be leveraged in a customer-oriented approach to marketing Web-based training. The partial anonymity of Web-based learning

may allow students to feel freer to express themselves and the text-oriented environment allows people to take more time contemplating fellow students' responses, as well as taking more time in forming their own responses.

The size of the Web-based training class also is a factor to consider. Contrary to conventional wisdom, providers should limit the number of participants in online learning sessions. Limited class size fosters a "community feeling" and ensures that instructors will have enough time to be a visible presence and provide personal attention (Giguere & Minotti, 2005). It is suggested that in a synchronous environment, participants should be limited to about ten. Asynchronous offerings that occur over a period of time can include more, usually 20-30 participants.

Skill and knowledge level differences among users are another factor to consider in designing effective Web-based training products and services. An e-learning program design (Britt, 2004) needs to allow a user to skim or skip content he or she is already familiar with and go deeper into materials when necessary. This enables the user to control his or her learning environment. E-learning components need to include simple content that enables the user to find their way around the application. One of the keys to converting instructor-led training to the Web is an environment in which individuals are able to attach meaning to what they learn (Giguere & Minotti, 2005). Web-based training is most successful when it encourages levels of self-directedness and competency.

WEB-BASED LEARNING ENVIRONMENT

Finally, the market dynamics surrounding Web-based training services must be considered in developing a profitable training enterprise. Traditionally, the B2C training services market has been dominated by national training and consulting firms. Online training allows smaller training vendors the opportunity to compete with national training companies as some companies prefer to work with local businesses (Bailey, 2002). However, competition is stiff for small Web-based providers that offer little differentiation in the products or services they provide. Profiting from Web-based training is difficult, as the Internet is overflowing with online instruction (Giguere & Minotti, 2005). A strong market growth and relatively low barriers to entry are attracting new e-learning providers, including competitors from other related business areas such as the consulting industry (James-Gordon, Young, & Bal, 2003). The key for providers is to seek niche opportunities and focus on emerging needs. One such need is the growth in training requirements associated with governmental regulations. Compliance training,

including training in regulatory matters and specialized issues such as sexual harassment, is a niche presenting growth opportunities, because the return on investment on compliance training isn't hard to convey to executives (Dolezalek, 2004). E-learning is particularly appealing when employees need quick training and companies must record who gets that training (McGee, 2004).

MARKETING WEB-BASED TRAINING

The basic requirements of e-marketing apply to the Web-based training industry. E-learning providers are likely to be more successful in attracting customers if they are more attuned to the marketplace. The environment consists of the following uncontrollable factors: market demand, political and legal forces, social and ethical influences, technology, and competition (James-Gordon, Young, & Bal, 2003). The e-marketing strategic themes of personalization and customization, community, reintermediation, disintermediation, consumer tracking, enhanced customer service, and mixing bricks and clicks can be affectively applied to the challenges of providing e-learning services (Granitz & Greene, 2003). Blended training, the adaptability features of Web-based training, and the ability to track student/consumer progress efficiently go a long way toward meeting these strategic marketing imperatives.

In *The 22 Immutable Laws of Branding,* authors Reis and Reis (2002, p. 133) note that the Internet will spawn successful educational brands because education is a discipline based on interactivity. Web-based training brings much to the table in terms of unique approaches to interaction between instructors and student. This is evident in the emerging trends of blended learning and improved content that seek to address the needs of the user (student) and buyer (business). This growth market like other e-commerce scenarios is rapidly changing and requires sound marketing approaches that are based on an understanding of consumer needs and environmental/market conditions.

FUTURE OPPORTUNITIES

The future of Web-based learning and training programs is bright. The venue provides significant opportunities that would appear to be specifically suited to small businesses, either program provider or program consumer. Particularly important to small Web-based learning providers is the need to be cognizant of buyer needs, and to have the ability to leverage the technology to their advantage,

as well as providing personalized, customer-specific content. From the consumer/buyer perspective of training programs, Web-based learning offers flexibility, timeliness/immediacy, and customization to meet the needs of a small business. Furthermore small businesses, either provider or consumer will be better-able to match/meet costs of such training programs to the mutual benefit of both entities. It can be concluded that a blended approach which leverages Web-based learning and technology, while providing interactivity and personal contact provides the greatest opportunity for small business enterprises. Specific program content that addresses governmental regulations as well as investigating governmental funding/support for such programs may be the first resource for small businesses to investigate. Web-based learning programs would appear to provide the opportunity for small businesses to level the playing field a little, on both sides of the market. Costs to buyers as well as return on investment for providers should be optimal when small providers match their training programs to the needs of small business buyers of such training programs.

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THE ANTECEDENTS OF M-COMMERCE ADOPTION

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ABSTRACT

The growth of Internet shopping has been attributed to rapid advances in technology and other influences such as convenience. We empirically investigate the relationship between demographics, ease of use, convenience, usefulness and enjoyment and intention to use m-commerce and attitude toward m-commerce. Two studies were conducted where a student and a non student sample was used.

Data analysis revealed age, gender and educational level of customers do not play a role in influencing intention to use m-commerce. However, convenience, ease of use, usefulness and enjoyment all play a role in the customer's intention to use m-commerce, with enjoyment and usefulness being the most important. Both hedonic and utilitarian considerations are important factors in intention to use m-commerce. This presents a dilemma that would need more investigation.

INTRODUCTION

The Census Bureau of the Department of Commerce estimated U.S. retail e-commerce sales for the second quarter of 2004 at $17.7 billion, an increase of 23.1 percent from the second quarter of 2003. Concurrently with the rise in e-commerce, wireless phone use has been increasing. For example, between June 2000 and June 2002, the number of wireless subscribers increased by well over 38.6% (2002 Cellular Telecommunications & Internet Association Report). Of Korea's 48 million people, 33.2 million are now wireless subscribers (Joshi, 2003).

The US Department of Commerce (2000) concluded that digital inclusion in the US is rapidly increasing and groups that have not been digital are making a dramatic gain (Cyberatlas, 2002.). Third generation wireless technologies will bring broadband to hand-held devices. Higher speeds and increased capability are already leading to new audio, video, and other applications, creating what many are calling

"mobile-commerce" (m-commerce). Moreover, an international effort is underway to make it possible for the next generation of wireless phones to work anywhere in the world (National Telecommunications and Information Administration 2000 p.16).

Despite this confluence of technology and use, m-commerce has received inadequate attention in the academic arena in terms of empirical research (Peterson et al, 2002). We attempt to alleviate this lack of attention by pursuing two objectives in this paper. One is to empirically investigate the relationship between demographics and the likelihood of using m-commerce. The second objective is to explore the relative impact of hedonic and utilitarian elements on consumer decisions to use m-commerce. In pursuing the first objective we test relations between demographic characteristics (gender, education, income and age) and the intention to use m-commerce. To meet the second objective, we investigate the relationship between intention to use m-commerce and usefulness, ease of use, enjoyment and convenience.

The E-and M-Commerce Distinction

Building on the assumption that m-commerce and e-commerce are similar in many ways (Coursaris et al, 2003), we rely on research that has been done in e-commerce to help realize the objectives stated in this paper. However, the distinctions between e-commerce and m-commerce are important and should be made clear. We refer particularly to three of these differences. The first distinction between e-commerce and m-commerce is the notion of "anywhere, anytime." For example, a consumer using his desktop computer at home to communicate with a web site with signals carried over a satellite network would qualify as wireless but not mobile communications (Peterson et al, 2002). On the other hand, using a PDA or a cell phone to communicate with a web site would qualify as mobile communication. The distinction lies in the communication mode used. Wired e-commerce takes place through a wired connection to a LAN while m-commerce takes place through a wireless network.

The second distinction lies in the concept of "communication-in-motion". Here we emphasize motion as movement by a human being that is not dependent on a vehicle. For example, a consumer sitting in his mobile home using his desktop computer and surfing the Internet may not qualify as "communication-in-motion." The third distinction lies in the type of devices used for e-commerce and m-commerce. Traditionally e-commerce involves the use of desktop or a lab top

computer while m-commerce involves using a PDA or a cell phone. M-commerce has the advantage of combining the power and speed of the Internet with the geographic freedom of mobile telephony in terms of receiving and transmitting data and the ability to conduct transactions. Moreover, m-commerce combines the benefits of mobile telephony in terms of receiving and transmitting information and conducting transactions with the Internet.

DETERMINANTS OF M-COMMERCE USE

In this section we propose several possible determinants of m-commerce use and provide an argument as to why we think these variables might play an important role in determining intention to use m-commerce.

Age

Several studies have investigated age and adoption of new technologies. The elderly's resistance to change has been well documented (Botwinick, 1973; Gilly & Zeithaml, 1985; Kasteler, Gay & Carruth, 1968; Pollman, Johnson, 1974; Baggozi & Lee, 1999). Studies by (Robertson, 1971; Uhl, Andrus & Poulson, 1970) revealed that older (adult) consumers are among the last to adopt a product, service or idea innovation. (Ram & Sheth 1989) concluded that consumers may resist innovation where it conflicts with consumers' prior beliefs and it threatens to create changes in well established routines. Because the elderly have a tendency to resist change, we propose that:

H1: The likelihood to use m-commerce will decrease with age.

Gender

There is a fundamental difference between m-commerce and e-commerce and that is the location where each takes place. E-commerce takes place at a fixed location such as homes, offices, etc. M-commerce can take place anywhere at anytime. The U.S. Department of Commerce (2002) investigated gender as one of the factors regarding the use of the Internet. In September 2001, the Internet use rate was 53.9 percent for males and 53.8 percent for females. The report concluded that women, from approximately age 20 to age 50, are more likely to be Internet users

than men. However, from about age 60 on, men have higher rates of Internet use than women.

A recent trend indicates a 13 percent increase in full-time motherhood in less than a decade: Nearly 10.6 million children were being raised by full-time stay-at-home moms last year, up 13 percent in a little less than a decade (Associated Press 2003). Based on this information, it would be reasonable to assume that women may spend more time using their PC to be online while at home and have a relatively greater chance of shopping online than men.

On the other hand, research suggests that women enjoy the actual shopping experience more than men and as a result may be relatively less welling to engage in m-commerce because m-commerce lacks the actual (touching, feeling, and seeing the product) shopping experience. According to (Casewell, 2000, p. 5), "Security alone…is not enough to explain the observed difference between men and women shoppers. The social experience of shopping is also a factor. Women enjoy shopping and browsing whereas men see it as an intrusion. As a result women are not as likely as men to click and buy something. They are more likely to want to see it and touch it first." (Rosen & Maguire, 1990) found that women exhibit greater anxiety and more negative perceptions toward a technology compared to men.

In sum, we have presented two contradictory views regarding gender and online shopping. Since we find both arguments compelling, we propose the following hypothesis:

H2: There will be no difference between men and women in regard to the use of m-commerce.

Education

The US Department of Commerce (2002) concluded that better educated adults are more likely to use and become familiar with computers and the Internet. In September 2001, about 85% of those who had an education beyond a bachelor's degree were using the internet, 82% of those with a bachelor degree, 62% of those with some college, 40% of those with a high school diploma and only 12% of those with less than high school.

We posit that m-commerce requires less knowledge of computers and Internet use than e-commerce. M-commerce requires only the knowledge of operating a cell phone or a PDA, which is much simpler, compared to using a computer. Thus, we believe that education will not play an important part in the

usage of m-commerce. Those who are able to use a cell phone or a PDA and have no college education will be as likely to use m-commerce as those who use a cell phone or a PDA and have college education or higher. Thus, we propose that:

H3: The likelihood to use m-commerce will not be related to educational attainment.

Ease of Use and Usefulness

There has been an extensive amount of research on the issue of perceived ease and usefulness of technology use, which we employ as a theoretical foundation for this part of the paper. (Schultz & Slevin, 1975) suggested perceived usefulness influences system utilization. (Robey, 1979, p. 537) theorized that: "A system that does not help people perform their jobs is not likely to be received favorably in spite of careful implementation efforts". Although we do not intend to approach m-commerce from the job performance standpoint, we believe that the technology acceptance model can be applied to m-commerce for the reason that m-commerce relies on the use of technology, and without technology m-commerce would not exist. Peoples' decision to use or not to use an application is dependent on their belief in whether it will help them perform their job better and this is referred to as perceived usefulness (Davis, 1989). We may find a potential user who believes an application to be useful, while he/she may, at the same time, believe the system is too hard to use and that the performance benefits of usage are outweighed by the effort of using the application (Davis, 1989). (Davis, 1989) concluded that usage is influenced by perceived ease of use. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance." (Davis, 1989, p.320).

Perceived ease of use, on the other hand, is defined as "the degree to which a person believes that using a particular system would be free of effort." (Davis, 1989 p.321). Childers et al (2001) stated that "ease of use" refers to the process leading to the final outcome. "When shopping on the web, ease of use can be thought of as the process of using the new media while engaging in shopping behavior." (Childers et. Al, 2001, p. 513). We believe the above definitions could apply to the perceived usefulness and perceived ease of use of devices used for m-commerce and m-commerce as a method of shopping. It is true that when (Davis, 1989) conducted his research regarding perceived usefulness and perceived ease of use of technology, he had work performance in mind; however, we believe that the

perceived usefulness and perceived ease of use of technology can apply to anything that has to do with technology. As m-commerce devices become more simplified and easier to use, resulting in easier and more ways to shop, attitudes toward m-commerce will be more positive. Approaching the issue from this standpoint we present the following hypotheses:

H4a: As the ease of use of m-commerce devices increases, the intention to use m-commerce will increase.

H4b: As the ease of use of m-commerce devices increases, attitudes toward m-commerce become more positive.

H5a: As the usefulness of m-commerce increases, the intention to use m-commerce will increase.

H5b: As the usefulness of m-commerce increases, attitudes toward m-commerce become more positive.

Convenience

Perception of convenience is another factor that is expected to influence the adoption of m-commerce as manifested by the opportunity to shop at any location 24 hr/7 days a week. (Alba et al. 1997, p. 41) stated, "Persons living in Florida can shop at Harod's in London through the web in less time then it takes to visit the local Burdines department store." Consumers search for benefits in the marketplace and the benefits of using interactive shopping as compared to traditional channels are important in delineating whether consumers will have a positive attitude toward these interactive media (Childers et al, 2001). (Swartz, 2001) views convenience as a key advantage for consumers who can use their mobile device to gain information about a product or service at the time that they are making a buying decision while shopping at physical locations. Convenience in interactive shopping increases search efficiency through the ability to shop (any where for m-commerce) by eliminating fighting traffic, looking for a parking space, and avoiding long check out lines (Childers et al, 2001).

As reported in (Mort & Drennan, 2002) SkyCode, for example, has a new service that makes it easier and convenient for anyone with a mobile device to interact with advertisements instantly and in any medium. With this service,

advertisements in traditional media have a short string of numbers that a consumer is able to dial from any mobile phone to initiate an interactive session. It therefore has the convenience of the traditional 800 number and makes the mobile Internet mainstream and makes it simple for consumers to act on an impulse sparked by an advertisement. For example, if a teenager sees a magazine advertisement for a movie such as "Lord of the Rings", he or she could dial *R_I_N_G_S* to access more information and promotions, purchase tickets, or play movie-related games on the mobile device.

For customers who use m-commerce, it is no longer necessary to make a trip to a store to buy a product. E-commerce has even made it unnecessary for customers to talk to any one on the phone to make a purchase that could be done online. However, with e-commerce, customers are still tied to one location where there is a PC connected to the internet. M-commerce breaks goes beyond that where the idea of "anywhere, anytime" comes into play. A study conducted by SkyGo suggests that permission-based alerts delivered to wireless phones capture consumer attention, drive action and build brand awareness. The study showed that 64% of the ads SkyGo delivered as Wireless Access Protocol (WAP) alerts to mobile phones were opened by consumers. These alerts generated an overall ad recall rate of 58 percent, and 15 percent of the ads resulted in action or planned action (Skygo.com 2001). We believe convenience will play an important role in customers' decision as to whether to adopt m-commerce or not. Thus,

H6a: As the convenience of m-commerce increases, intention to use m-commerce will increase.

H6b: As the convenience of m-commerce increases, attitudes toward m-commerce will be more positive.

Enjoyment

Retail shopping includes both utilitarian and hedonic dimensions (Childers et al, 2001). (Hirschman & Holbrook, 1982) describe consumers as either 'problem solvers" or fun, fantasy, arousal, sensory stimulation, and enjoyment seekers. This dichotomy has been investigated by (Fischer & Arnold, 1990; Sherry, Mcgrath & Levy, 1993) and was represented in the retail context by the theme of shopping as work versus the more enjoyable perspective of shopping as fun (Bloch & Bruce, 1984; Sherry, 1990; Babin, Darden & Griffin, 1994). There is no doubt that many

motivations exist as shopping goals (Westbrook and Black, 1985). Some consumers view shopping from a utilitarian perspective where things needed are bought but others view shopping as a hedonic activity where enjoyment and gratification can be achieved. Consumers holding the utilitarian view are concerned with purchasing products in an efficient and timely manner to achieve their goals with a minimum of irritation. Consumers holding the hedonic view are concerned with having fun and enjoyment while shopping. As one consumer noted, "I enjoy looking around and imagining what one day, I would actually have money to buy. Shopping….is an adventure" (Sherry, 1990, p.27). This hedonic view of shopping reflects shopping's potential entertainment and enjoyment resulting from the fun and play arising from the experience versus the achievement of any pre-specified end goal (Hirschman and Holbrook, 1982).

Although m-commerce is convenient, it certainly lacks many aspects of the traditional shopping experience. With m-commerce, consumers are no longer able to see, touch, or feel the actual product, which according to (Citrin et al, 2003; Peck & Childers, 2003; Peck & Childers, 2003) are important qualities of the shopping experience. The QVC home shopping channel has recently opened a store at the Mall of America to allow customers to see and touch jewellery and other merchandise, since their executives said, "prospective customers are reluctant to purchase merchandise without touching it" (Childers et al 2001, p. 515). Thus:

H7a: As the enjoyment demanded by customers from shopping increases, the intention to use m-commerce decreases.

H7b: Customers who are goal oriented and do not view shopping as a source of enjoyment (utilitarian view) will have more positive attitudes toward M-commerce than those who view shopping as a fun and enjoyable activity (hedonic view).

STUDY ONE METHODOLOGY

Sample

A convenience sample of undergraduate, graduates and faculty members was obtained from a large Midwestern University in the United States. A total

number of 126 usable questionnaires were collected. The sample consisted of 45% males and 55% females. Ages ranged from 18 to 70. The total number does not add to 100% due to rounding. The sample included 11 who had a high school diploma or less, 98 either had a college degree or were currently obtaining one, and 18 had or were currently obtaining a graduate degree.

The questionnaires were administered in the classroom and no compensation was provided to the students. According to (Modahl, 2000) student consumers are an appropriate sample because they represent the younger end of the market for online buying (m-commerce) that cyber marketers want to attract owing to their long-term potential as affluent customers. The lack of randomness in the sample limits generalizability of the point and interval estimates to a larger population; but since the main purpose of the study was to develop a profile of m-commerce users, this is a minor limitation (Calder et al, 1981).

Measures

Perceived Usefulness and Perceived Ease of Use were adopted from the Perceived Usefulness and Perceived Ease of Use developed by Davis (1989). Each is a 6 item scale with perceived usefulness having an alpha of **.**97 and ease of ease having an alpha of .91**,** which projects excellent reliability (Hair et. al 1998). All items were measured by a 7 point Likert scale (strongly disagree to strongly agree).

Convenience and enjoyment scales were adopted from Childers et al. (2001) Convenience was measured by 5 items and had an alpha of .92, while enjoyment was measured by 8 items with an alpha of .87. All items were Likert type items measured on a 7 point scale.

Attitude and intention to use scales were adopted from Mathieson's (1991) user intention scale and Mathieson's (1991) predicting user intention scale. Attitude was measured by 3 items with an Alpha of .92. Each of the three items provided the respondent with two choices (e.g. very good/very bad) and the respondent was asked to pick one. Intention was measured by 3 items with an alpha of .96. The three items were measured on a 2 point scale (agree-disagree). All items used were slightly modified to fit the purpose of the study.

Demographic measures. The measures used in this study were sex, age, education, income, and ethnicity. Age was measured on a nine-category scale, ranging from less than 18 years to over 65 years. Education was measured on four categories (e.g., less than high school, high school, college, graduate school). A six-category scale was used to assess income (e.g., less than $15,000, 15,000-25,000,

25,000-50,000, 50,000-75,000, 75,000-100,000, 100,000-120,000). Ethnicity was measured as Caucasian, Hispanic American, Asian, African American, and Other.

DATA ANALYSIS

To assess construct validity and reliability of the measures, exploratory factor analysis was conducted. The KMO test was significant at the .000 level indicating a correlation between the variables and appropriateness of factor analysis. Factor analysis produced six factors explaining 70% of the variance. Four items had to be deleted due to low and cross loadings. As shown in table one, reliability tests showed high internal consistency assessed by Cronbach alphas for all constructs.

Table 1: Cronbach Alphas (study one)

Construct name	Number of items	Alpha Level
Intention	3	.869
Convenience	5	.866
Enjoyment	6	.884
Attitude	2	.718
Usefulness	5	.900
Ease of Use	6	.866
Overall		.853

Table 2: Goodness of Fit Statistics (study one)

Constructs	X^2/df	GFI	AGFI	NFI	RFI	RMR
Convenience	.85	.98	.95	.98	.97	.06
Ease of Use	3.6	.91	.798	.92	.87	.16
Enjoyment	.49	.98	.97	.98	.98	.04
Usefulness	4	.93	.80	.94	.89	.12

To further assess the measures, Confirmatory Factor Analysis was conducted. All constructs had a GFI and NFI of .91 or above showing an excellent fit (Hair et al 1998).

To test hypotheses 1, 2 and 3, a simple ANOVA was conducted. There was no significant difference between the elderly and the young in terms of intention to use m-commerce and attitude toward m-commerce. Thus hypothesis 1 was not supported. There was no significant difference between men and women in regard to intention to use m-commerce. Hypothesis 2 was supported. There was no difference between those who had a college degree, a graduate degree and less than a high school diploma in terms of intention to use m-commerce. Thus hypothesis 3 was supported.

To test hypotheses 4a, 5a, 6a, and 7a, separate linear regressions were used. There is a significant relationship between ease of use and intention to use. Ease of use explains 37% of intention to use. Thus hypothesis 4a is supported. We also found a strong relationship between usefulness of m-commerce and intention to use. Usefulness explains 53% of the variance. Thus hypothesis 5a is also supported. The relationship between intention to use and convenience was not as strong as the previous variables but it did account for 41% of the variance explained. Thus hypothesis 6a is supported. Finally, enjoyment accounted for 57% of the variance explained. All relationships were significant at the .000 level. Thus hypothesis 7a is supported.

Table 3: Regression results for intention to use (study one)

Variable	R Square	Sig.
Ease of Use	.37	.000
Usefulness	.53	.000
Convenience	.41	.000
Enjoyment	.57	.000

To assess the relationship between all variables collectively and intention to use, another regression was conducted. Ease of use, usefulness, convenience and enjoyment accounted for 61% of the variance and the relationship was significant at .000 level. Usefulness and enjoyment were the most influential variables in the regression equation.

To test hypotheses 4b, 5b, 6b, and 7b, separate linear regressions were used. Each variable was regressed against attitude toward m-commerce and then all variables were collectively regressed against attitude. Ease of use explained only 4.5%. However, an f-test was significant at the .01 level. Usefulness accounted for 12% of the variance explained and an f-test was significant at the .000 level. Finally, convenience and enjoyment accounted for 6% and 9% respectively and each had a significant f-test at the .00 level. When all variables were regressed against attitude, R2 was .155 and f-test was significant at the.000 level. Usefulness was the single most important variable. Although all f-tests were significant, these variables do not explain a lot regarding attitude toward m-commerce.

Table 4: Regression results for attitude (study one)

Variable	R square	Sig.
Ease of Use	.044	.018
Usefulness	.12	.000
Convenience	.06	.005
Enjoyment	.09	.000

STUDY TWO METHODOLOGY

Sample

The same measures used in study one were used in study two. The data was collected through a group of junior and senior students who were offered extra credit for collecting a certain number of questionnaires. Students were provided with a description of the sample needed and each student was asked to meet certain requirements. To increase the representation of the sample, a stratified sample was collected. Students were asked to provide, on a separate sheet, the name and phone number of each participant so the researchers could verify the information collected. This procedure was followed to decrease the tendency of students filling the questionnaires themselves. A 160 questionnaires were collected with a few missing data. Sample demographics are provided in table 5.

Table 5: Sample Demographics (Sample 2)		
Variable		Percentage
Age		
	Under 18	5.6%
	18-25	16.3%
	25-35	35.6%
	35-50	28.1%
	50-60	9.4%
	60-70	4.4%
	Over 70	.6%
Gender		
	Male	44.4
	Female	54.4
Education		
	Less than High School	5.6%
	High School	23.8%
	College Degree	45.6%
	Graduate	23.8

Reliability tests showed acceptable internal consistency assessed by Cronbach alphas for all constructs (Intention to use = .90, Convenience = .90, Enjoyment = .65, Attitude = .93, Usefulness = .92, and Ease of Use = .89).

DATA ANALYSIS

A simple ANOVA revealed that there was no significant difference between men and women in regard to intention to use m-commerce confirming what was

found in study one. There was no significant difference between men and women in regard to attitude toward m-commerce. As revealed in study one, study two revealed that there was no difference between those who had a college degree, graduate degree and high school diploma or less than high school in regard to intention to use m-commerce. Because multicollinearity can be a problem when using regression analysis, we assessed multicollinearity through collinearity diagnostics. VIF values were found to be below the suggested cutoff point of 10, suggesting that multicollinearity was not a problem (Hair et al 1998). To assess the rest of the hypotheses, a regression analysis was conducted. The regression model is significant at the .000 level and the adjusted R2 is .627. This result is similar to the one found in study one. The separate regression analysis revealed that usefulness is the most influential variable with an adjusted R2 of .78 in regard to intention to use m-commerce followed by convenience with an adjusted R2 of .46, ease of use with an adjusted R2 of .44 and enjoyment with an adjusted R2 of .43. The results of the second study confirm the results of the first study in regard to the factors that influence m-commerce.

We also investigated the relationship between demographics and attitude toward m-commerce. There was no significant difference between men and women in regard to their attitude toward m-commerce. We also found that there was no significant difference between those who have a college degree or a graduate degree and those who do not. Moreover, we found no significant difference between those who have a high and low income in regard to attitude toward m-commerce. Finally, multiple regression was used to test the impact of ease of use, usefulness, convenience and enjoyment on attitude toward m-commerce. Regression results indicated that none of these variables had an impact on attitude toward m-commerce which confirms the results found in the first study.

LIMITATIONS OF THE STUDY

The study has several limitations. First, to make it possible for our subjects to respond to our survey, we provided them with a simplified definition of m-commerce. As mentioned in this paper, m-commerce has not yet been fully conceptualized and as a result our definition may have influenced subjects' responses.

CONCLUSION AND DISCUSSION

This study revealed some very important findings regarding m-commerce. We suspected that age will play an important role in determining intention to use m-commerce. However, our analysis revealed no differences in intention to use or attitude toward m-commerce between the young and the elderly. Our data analysis also showed that ease of use and usefulness seem to be the most important factors in determining intention to use m-commerce. Moreover, this study shows there is no statistical difference between the intention of men to use m-commerce and the intention of women to use m-commerce. We therefore conclude that demographics do not influence the intention to use m-commerce.

Our results also yield a dilemma that needs further investigation. We show that both hedonic and utilitarian factors are important in considering m-commerce. This may pose a dilemma for practitioners who need to know which factors to focus on to attract m-commerce users. For those emphasizing utilitarian factors, the decision to use m-commerce may be easier than for those who care about both utilitarian and hedonic factors. However, the solution of the later group could be to use m-commerce to search for information and then go to the store and enjoy the shopping experience. This study supports previous studies that found enjoyment to be an important factor in intention to shop on line. For example (Casewell, 2000) found that 65 percent of U.S. adult women make time to browse and shop versus 35 percent of men. 70 percent of men say they try to get in and out of stores as quickly as possible versus only 43 percent of women. Thus those viewing shopping as an enjoyable experience may not be interested in shopping online because they cannot touch and feel the actual product (Citrin et. al. 2003; Peck & Childers, 2003; Peck & Childers, 2003).

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DEVELOPMENT OF WEB-BASED DECISION SUPPORT SYSTEM FOR BUSINESS PROCESS REENGINEERING IN A HEALTH-CARE SYSTEM*

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ABSTRACT

A web-based decision support system (DSS) can provide management with a strategic plan for business process reengineering (BPR) in a health-care system. An attempt is made to develop a DSS for designing, evaluating, and implementing a strategic plan for BPR. A model is developed and analyzed to simulate a real hospital setting. Goal criteria and priorities are identified and established. The model results are evaluated and discussions are made along with web application in order to enhance the model applicability. The model provides the management with valuable information for planning and controlling hospital e-commerce activities.

INTRODUCTION

As the dynamics of the demanding marketplace and the requirement of competitive advantage have transformed, the need for decision support system (DSS) models for process reengineering in the health-care e-business system has been emphasized. Successful linkages of these planning processes play a critical role affecting business performance (Ackerman, Wall & Borman, 1999; Aldowaisan and Gaafar, 1999; Sheng, 2002; Short and Venkatraman, 1992; and Teng, Grover and Fiedler, 1996). Factors affecting business performance in a health-care e-business system are widely identified. Financial and non-financial factors should be considered together in the health-care decision process. The health-care e-business strategy needs to be based on compromise among the diverse stakeholders in the health-care system. Among DSS types, a model-driven DSS emphasizes access and

control of a model that uses data and parameters provided by decision-makers to support them in analyzing a real-world e-business situation.

Due to the web technology and organizational paradigm shift, business operations in health-care e-business systems may become more tightly coupled with primary business processes such as admissions, capacity, financing, manpower, and revenue planning. Web technology can deliver unprecedented opportunities to reengineer the business processes in health-care systems. Web technology is considered an emerging area for DSS and an important tool for DSS development. Web technology can enrich model-driven DSS. Web-based DSS has the advantages of reducing current technological obstacles of computerized systems, because of better sharing in decision information, and making more efficient decisions with less cost for model implementation (Courtney, 2001; Rao & Turoff, 2000; and Shim et al., 2002).

Strategic business process reengineering (BPR) in a health-care environment is a growing requirement for improving profitability and productivity. Subjective decision-making processes can be very critical in the multiple and complicated problems with trade-off relationships. When management considers several conflicting goals to achieve, a DSS model enables effective results in business processes and other operational environments in health-care e-business system (Sarker & Lee, 1999; and Stoddard & Jarvenpaa, 1995). However, previous DSS studies have rarely explored to develop an integrated model based DSS dealing with comprehensive core functions in health-care e-business system. Thus, an appropriate model development is essential to create a long-term opportunity for BPR in a health-care e-business system.

The purposes of this paper are (1) to develop a DSS model that aims at designing, evaluating, and implementing a strategic plan for BPR in a health-care system, and (2) to provide management with an insight on a web-enabled DSS model that can enhance business performance and refine operational strategy in health-care e-business activities.

Section 2 reviews a brief literature of decision support systems and business process reengineering. Section 3 presents a problem background with data modeling and goal decomposition. Section 4 presents model development dealing with decision variables, constraints and model formulation. Section 5 provides the developed model solution and discussion, followed by a conclusion.

LITERATURE REVIEW

Decision Support System

Decision support system (DSS) is an intelligent model dealing with semi- or ill-defined and structured decision-making problems in order to support better judgment amongst decision-makers. The concept of DSS has been defined as a system using management activities and decision-making types (Gory & Morton, 1971). Decision-making process stages in DSS consist of four stages: intelligence stage for recognizing appropriate problems in management environment, formulation stage for developing possible alternatives, choice stage for selecting a satisfying solution among potential alternatives, and implementation stage for analyzing and evaluating solutions with sensitivity analysis.

Information needs in DSS environment are characterized as requiring different types of information systems and technologies (Min, 1998). DSS has following characteristics: it is designed specifically for facilitating decision-making process and planning process; it is responded promptly for fulfilling decision-makers needs in short and long term; and it is supported intelligently for making better decision. With this context, DSS research has focused on four directions: intelligent computer system, model application, problem-solving model, and user-interface system. DSS applications have extended to collaborative DSS, negotiate DSS, knowledge-based DSS, and web-based DSS.

Web-based DSS is defined as a system that communicates decision support information or tools to decision-makers through a web environment. Web-based DSS is a DSS using web technology in order to provide decision-makers with business information through internets, extranets and intranets. The web technology is considered as an emerging area for development of DSS. Web-based DSS has advantages of reducing current technological obstacles of computerized systems, because of better sharing in decision information, and making more efficient decisions with less cost for model implementation.

DSS in health services sector has steadily appeared in the literature due to the quality of care, information technology, and financial significance (Collen, 1999; and Miller, 1994). Effective decision support systems in health-care systems rely on accurate patient data and health information, efficient decision-making models, and standardized data production mechanisms. Several issues in health-care decision support areas have changed the current research paradigm. Health-care DSS have recently focused on admissions planning (De Veries & Beekman, 1998; and Kurster

& Groot, 1996), health-care financing (Mosmans, Praet & Dumont, 2002), information management (Lee & Kwak, 1999), information technology (Forgionne & Kohli, 1996), knowledge management (Pederson & Larsen, 2001), medical diagnosis (Mangiameli, West & Rampal, 2004); patient relationship (Kohli et al., 2001), and resource allocation (Vissers, 1998).

Business Process Reengineering

Business process reengineering (BPR) is defined as fundamental rethinking and innovative redesign of business processes to achieve a dramatic improvement in critical and core measures of performance, such as cost, quality, speed, flexibility, and value-added service. Business process itself is a management philosophy or strategy that considers a collection of management activities taking input resources and deriving valuable outputs for a customer.

BPR characteristics take various forms. There are four types of characteristics based on scope and scale: functional integration, functional refinement, business redefinition, and process redesign. The efforts of BPR focus on (1) getting users of the outcome of the process, (2) merging information-processing into the origin of information production, (3) treating geographically dispersed resources, (4) linking parallel activities, (5) putting the decision point into the process, and (6) capturing necessary information when needed. The goals in BPR decisions are conflicting due to the existence of different goals in each sub-unit. It is difficult to meet current needs of multi-dimensional sub-units unless a systematic approach to evaluate potential future BPR decisions is undertaken (Davenport & Short, 1990; and Kettinger, Teng & Guha, 1997).

Many BPR issues in a health-care system have appeared in recent literature (Corlett, Maher & Sidman, 1998; Grimson, 2001; and Li, Benton & Leong, 2002). Efforts of BPR in a health-care system are called for within the organization. Most researchers and practitioners agree that BPR success relies on mission, leadership, new investments, process reengineering, resource allocation, and strategic alliance (Ho, Chan & Kidwell, 1999; Kohn, 1994; Newman, 1997; and Seymour & Guillett, 1997).

PROBLEM STATEMENT

Data Collection

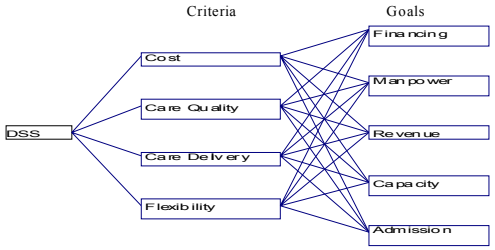
The health-care system in this study is a comprehensive hospital, a leading patient-oriented provider of health services. The hospital's goal is to provide high quality and cost-effective health services while enriching a catholic-affiliated organization's mission. The organization has five different independent health-care systems located at different areas. The organization has built a web system with intelligent functions in supporting hospital e-business activities through web-based order communication system (OCS). Top decision-makers from the hospital and a consulting firm have participated in the overall review process. The related goals and criteria are justifies by the task force team. Data templates pertinent to the strategic proposal are derived. The task force team is responsible for all validated data sets from the hospital, examines the data, and acknowledges the validation for the collected data set. Based on the data set, an initial proposal of the DSS model development for process reengineering is established. Some data utilized in this study had been modified slightly to meet a software system requirement, even though the modified data have not distorted the original justification of input data.

The management wants to provide better services for patients in the health-care organization. Among 17 departments in the hospital, OB/GYN/pediatrics departments, five surgery departments, and an internal medicine department are selected for this study since they are the most core areas in the hospital. Characteristics of patients are divided by residency status (resident in the city or non-resident in the city) and visit type (first visits or revisits). Identifying these characteristics is very important to estimate the potential profitability of the hospital. Three major divisions have an admissions goal as well as hospital admissions status and system utilization rate.

Goal Justification

Establishing goal decomposition and prioritization is completed for the proposed decision support model development. Synthesized priority is calculated for each goal in order to obtain the overall relative importance of the five goals using an expert opinion (Saaty, 1980).

Figure 1. Criteria and Goal Decomposition



Based on the above data, the goal priorities and the relevant information about business process redesign are established as follows: priority 1 (P_1) - financial goal (G_3), priority 2 (P_2) - manpower goal (G_4), priority 3 (P_3) -revenue goal (G_5), priority 4 (P_4) - capacity goal (G_2) and priority 5 (P_5) - admissions goal (G_1).

There are sub-goals under five major goals. Financing planning goal has two sub-goals: service expenditure goal (P_{11}) and information facility goal (P_{12}). Manpower planning goal have two sub-goals: manpower utilization (P_{21}) and payroll increase agreement (P_{22}). Revenue planning goal has two sub-goals: total revenue increase (P_{31}) and profitability fulfillment (P_{32}). Capacity planning goal have three sub-goals: accommodation (P_{41}), hospital utilization (P_{42}), and hospital admission (P_{43}). Admission planning goal has three goals: residential patient admission (P_{51}), non-residential patient admission (P_{52}), and revisit patient admission (P_{53}). These sub-goals are prioritized based on internal agreements. Decision-makers such as the hospital president, a chief information officer (CIO), a medical unit director, and a financial unit director have justified the synthesized prioritization of the overall goals for the business process in the health-care organization under consideration.

MODEL DEVELOPMENT

Decision Variables

DSS models in business process reengineering have generally been limited to addressing financial goals, rather than other strategic policies of an organization.

In this paper, a DSS model is formulated based on the following information. There are five different types of decision variables embracing 24 decision variables.

X^a_{ij} = admissions level in patient group i (i = 1, 2, 3, and 4) and department j (j=1,2, and 3)
X^f_i = financing level for services expenditure (i=1) and for information facilities (i=2)
X^m_i = manpower level in different types of work i (i = 1, 2,...,6)
X^p_i = payroll level in different types of work i (i = 1, 2,...,6)
X^r_i = revenue level in different types of work i (i = 1, 2,...,6)
where X^a_{ij}, X^f_i, X^m_i, X^p_i, and X^r_i ³ 0

X^a is number of admission in patient group i: first-visit resident (i=1), re-visit resident (i=2), first-visit non-resident (i=3), and re-visit non-resident (i=4); department j: OB/GYN/ pediatrics (j=1), surgery (j=2), and internal medicine (j=3). X^m is number of manpower in physician (i=1), nurse (i=2), technician I (i=3), technician II (i=4), management I (i=5), and management II (i=6). X^p and X^r are payroll amounts and revenue amounts in physician (i=1), nurse (i=2), technician I (i=3), technician II (i=4), management I (i=5), and management II (i=6).

Systems Constraints

There are two different types of constraints: system constraints and goal constraints. System constraints (1-3): First-visit resident patient cannot exceed the maximum level of accommodation in each patient group of in OB/GYN/pediatrics (1,800 patients), surgery (900 patients), and internal medicine (850 patients). System constraints (4-6): Re-visit resident patient cannot exceed the maximum level of accommodation in each patient group of in OB/GYN/pediatrics (5,700 patients), surgery (1,900 patients), and internal medicine (2,100 patients).

System constraints (7-9): First-visit non-resident patient cannot exceed the maximum level of accommodation in each patient group of in OB/GYN/pediatrics (1,500 patients), surgery (400 patients), and internal medicine (550 patients). System constraints (10-12): Re-visit non-resident patient cannot exceed the maximum level of accommodation in each patient group of in OB/GYN/pediatrics (2,500 patients), surgery (800 patients), and internal medicine (1,200 patients).

Goal Constraints

Financial Planning Goal Constraints have two sub-goals. Goal constraint (13) of sub-goal (P_{11}) -Prepare proper funds for service expenditure ($2,5200,000). Goal constraint (14) of sub-goal (P_{12}) - Supply an appropriate budget for information facilities ($2,088,000).

Manpower Planning Goal Constraints have two sub-goals. Goal constraints (15-20) of sub-goal (P_{21}) - Meet effective utilization of the required human resource level of physician group (37 persons), nurse group (166 persons), technician I (10 persons), technician II (39 persons), management I (53 persons), and management II (13 persons). Goal constraints (21-26) of sub-goal (P_{22}) - Achieve the payroll increase agreement by certain percentage points required from the current salary level of physician group ($53,860,000), nurse group ($11,090,000), technician I ($18,070,000), technician II ($13,30,000), management I ($13,250,000), and management II ($14,300,000).

Revenue Planning Goal Constraints have two sub-goals. Goal constraint (27) of sub-goal (P_{31}) - Do not allow an over-achievement of total revenue increase ($ 2,860,000) from the current level in terms of patient satisfaction. Goal constraint (28) of sub-goal (P_{32}) - Achieve the expected profitability level ($80,000) that is the difference between the expected revenue increase amount and the expected expenditure increase amount.

Capacity Planning Goal Constraints have three sub-goals. Goal constraint (29) of sub-goal (P_{41}) - Minimize the under-achievement of the accommodation goal of patients (1,380 persons) that is the sum of three divisions based on the residential status and patient type: capacity utilization percentage with first visit and resident (70%), revisit and resident (80%), first visit and non-resident (40%), revisit and non-resident (50%). Goal constraints (30-32) of sub-goal (P_{42}) - Meet the hospital resource utilization capacity to handle total admissions of 9,000 in OB/GYN/pediatrics, 3,500 in surgery, and 4,000 in internal medicine. Goal constraint (33) of sub-goal (P_{43}) - Meet the hospital admissions goal of 15,000 new patients in three divisions.

Admission Planning Goal Constraints have three sub-goals. Goal constraint (34) of sub-goal (P_{51}) - Minimize the under-achievement of the targeted admission with 70% of hospital admission capacity for residential patients. Goal constraint (35) of sub-goal (P_{52}) - Minimize the over-achievement of the targeted admission with 30% of hospital admission capacity for non-residential patients. Goal

constraint (36) of sub-goal (P_{53}) - Meet the targeted goal with 60% of hospital admission capacity for revisit patients.

MODEL FORMULATION

DSS for BPR in the health-care system is to minimize the value of the objective function subject to goal constraints (13)-(36), satisfying the preemptive priority rules, as shown in Table 1.

MODEL ANALYSIS AND DISCUSSION

Model Solution

The proposed model is solved and the solution is derived after 43 iterations. The possible solutions are enumerated at the first goal priority level and reduced at each subsequent goal priority level until overall goal satisfaction is no longer achieved. The solution yields the model results, as shown in Table 2.

The financial planning goal is the most important goal for hospital BPR. This goal has two sub-goals: prepare appropriate funds for both service expenditure (P_{11}) and information facilities (P_{12}). These two priorities are fully satisfied, since $P_{11} = 0$ and $P_{12} = 0$. All related deviational variables are zero (d^+_1, d^-_1, d^+_2, and $d^-_2 = 0$). The manpower planning goal has two sub-goals: manpower utilization (P_{21}) and payroll increase agreement (P_{22}). These two goals are fully satisfied, since $P_{21} = 0$ and $P_{22} = 0$. All positive and negative deviational variables are zero. The revenue planning goal has two sub-goals of total revenue increase rate (P_{31}) and profitability fulfillment (P_{32}). These two goals are fully satisfied, since $P_{31} = 0$ and $P_{32} = 0$. All related deviational variables, d^+_{15} , d^-_{16} , and d^+_{16} are zero. Even though d^-_{15} is not directly related to achieving the goal (P_{31}), negative deviational variable, d^-_{15}, has 260. This means that the amount of 260 is less than the originally estimated total revenue.

The capacity planning goal has three sub-goals: the accommodation level (P_{41}), hospital utilization (P_{42}), and hospital admissions level (P_{53}). This priority is not fully satisfied, since P_{41} = 12,095, P_{42} = 3,700, and P_{43} = 3,300. The related deviational variables are not zero (d^+_{17} = 12, 095, d^+_{18}= 2,500, d^+_{19}= 500, d^+_{20}= 700, and d^+_{21} = 3,300). The admissions planning goal has three sub-goals: admissions for residential patients (P_{51}), admissions for non-residential patients (P_{52}), and admissions for revisit patients (P_{53}).

Table 1. Modeling for BPR in Health-Care System

$$\text{Min } Z = P_{11}d^-_1 + P_{12}d^+_2 + P_{21}\sum_{i=3}^{8}(d^-_i + d^+_i) + P_{22}\sum_{i=9}^{14}(d^-_i + d^+_i) + P_{31}d^+_{15} + P_{32}(d^-_{16} + d^+_{16}) + P_{41}d^-_{17} + P_{42}\sum_{i=18}^{20}(d^-_i + d^+_I) + P_{43}(d^-_{21} + d^+_{21}) + P_{51}d^-_{22} + P_{52}d^+_{23} + P_{53}(d^-_{24} + d^+_{24})$$

Subject to

1	$X^a_{11} \leq 1800$
2	$X^a_{12} \leq 900$
3	$X^a_{13} \leq 850$
4	$X^a_{21} \leq 5700$
5	$X^a_{22} \leq 1900$
6	$X^a_{23} \leq 2100$
7	$X^a_{31} \leq 1500$
8	$X^a_{32} \leq 400$
9	$X^a_{33} \leq 550$
10	$X^a_{41} \leq 2500$
11	$X^a_{42} \leq 800$
12	$X^a_{43} \leq 1200$
13	$X^f_1 + d^-_1 - d^+_1 = 2520$
14	$X^f_2 + d^-_2 - d^+_2 = 2088$
15	$X^m_1 + d^-_3 - d^+_3 = 37$
16	$X^m_2 + d^-_4 - d^+_4 = 166$
17	$X^m_3 + d^-_5 - d^+_5 = 10$
18	$X^m_4 + d^-_6 - d^+_6 = 39$
19	$X^m_5 + d^-_7 - d^+_7 = 53$
20	$X^m_6 + d^-_8 - d^+_8 = 13$
21	$X^P_1 + d^-_9 - d^+_9 = 59{,}400$
22	$X^P_2 + d^-_{10} - d^+_{10} = 13{,}200$
23	$X^P_3 + d^-_{11} - d^+_{11} = 19{,}800$
24	$X^P_4 + d^-_{12} - d^+_{12} = 14{,}850$
25	$X^P_5 + d^-_{13} - d^+_{13} = 14{,}850$
26	$X^P_6 + d^-_{14} - d^+_{14} = 15{,}950$
27	$X^P_1 + X^R_2 + X^R_3 + X^R_4 + X^R_5 + X^R_6 - d^+_{15} = 2860$
28	$X^R_1 + X^R_2 + X^R_3 + X^R_4 + X^R_5 + X^R_6 - X^B_1 + d^-_{16} - d^+_{16} = 80$
29	$0.7X^a_{11} + 0.7X^a_{12} + 0.7X^a_{13} + 0.8X^a_{21} + 0.8X^a_{22} + 0.8X^a_{23} + 0.4X_{31} + 0.4X^a_{32} + 0.4X^a_{33} + 0.5X^a_{41} + 0.5X^a_{42} + 0.5X^a_{43} + d^-_{17} = 1380$
30	$X^a_{11} + X^a_{21} + X^a_{31} + X^a_{41} + d^-_{18} - d^+_{18} = 9000$
31	$X^a_{12} + X^a_{22} + X^a_{32} + X^a_{42} + d^-_{19} - d^+_{19} = 3500$
32	$X^a_{13} + X^a_{23} + X^a_{33} + X^a_{43} + d^-_{20} - d^+_{20} = 4000$
33	$X^a_{11} + X^a_{12} + X^a_{13} + X^a_{21} + X^a_{22} + X^a_{23} + X^a_{31} + X^a_{32} + X^a_{33} + X^a_{41} + X^a_{42} + X^a_{43} + d^-_{21} - d^+_{21} = 15{,}000$
34	$0.3X^a_{11} + 0.3X^a_{12} + 0.3X^a_{13} + 0.3X^a_{21} + 0.3X^a_{22} + 0.3X^a_{23} - 0.7X^a_{31} - 0.7X^a_{32} - 0.7X^a_{33} - 0.7X^a_{41} - 0.7X^a_{42} - 0.7X^a_{43} + d^-_{22} = 0$
35	$-0.3X^a_{11} - 0.3X^a_{12} - 0.3X^a_{13} - 0.3X^a_{21} - 0.3X^a_{22} - 0.3X^a_{23} + 0.7X^a_{31} + 0.7X^a_{32} + 0.7X^a_{33} + 0.7X^a_{41} + 0.7X^a_{42} + 0.7X^a_{43} - d^+_{23} = 0$
36	$-0.6X^a_{11} - 0.6X^a_{12} - 0.6X^a_{13} + 0.4X^a_{21} + 0.4X^a_{22} + 0.4X^a_{23} - 0.6X^a_{31} - 0.6X^a_{32} - 0.6X^a_{33} + 0.4X^a_{41} + 0.4X^a_{42} + 0.4X^a_{43} + d^-_{24} - d^+_{24} = 0$

Table 2. Solution Analysis of DSS for Hospital BPR		
Priority	Goal Achievement	Deviational Variables
P11 = 0	Fully achieved	d+17 = 12,095
P12 = 0	Fully achieved	d+18 = 2,500
P21 = 0	Fully achieved	d+19 = 500
P22 = 0	Fully achieved	d+20 = 700
P31 = 0	Fully achieved	d+21 = 3,300
P32 = 0	Fully achieved	d-22 = 890
P41 = 12,095	Partially achieved	d+23 = 890
P42 = 3,700	Partially achieved	d+24 = 2,080
P43 = 3,300	Partially achieved	
P51 = 890	Partially achieved	
P52 = 890	Partially achieved	
P53 = 2,080	Partially achieved	

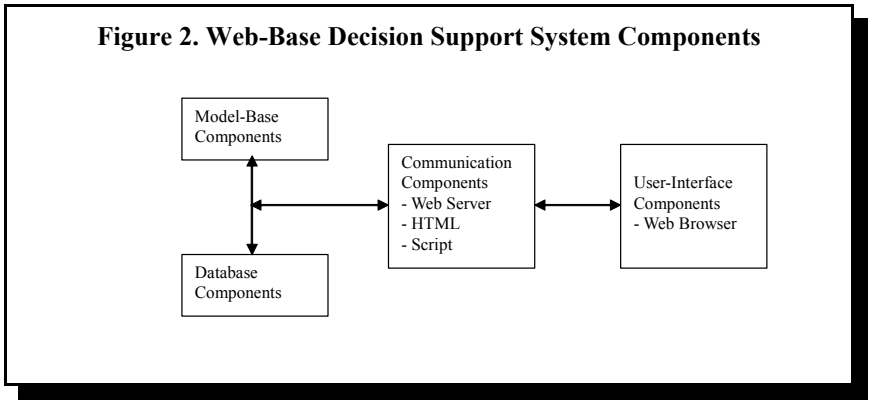
This priority is not fully satisfied, since P_{51} = 890, P_{52} = 890, and P_{53} = 2,080. The related deviational variable of P_{51}, P_{52} and P_{53} are not zero (d^-_{22} = 890), (d^+_{23} = 890), and d^+_{24} = 2,080).

In this DSS model, a non-dominated solution has been sought. A non-dominated solution is defined in the following manner: a feasible solution to a multicriteria decision-making problem is non-inferior, if no other feasible solutions derive an improvement in one objective, without creating a trade-off in another objective. Regardless of the weighting structures and the goals, this model can lead to inferior, sub-optimal solutions. These solutions are not necessarily the optimal ones available to the decision-maker. Therefore, it is called a satisfying solution. Opportunity costs are given as well as the increases and decreases in the values of the coefficients and the right-hand-side elements. Management can determine in advance what will happen if the outcome deviates from overall objectives. In the example given, management can use the information from the solutions to alter their decision variables as any plan can come up with the new satisfying solution.

WEB APPLICATIONS

Web-based DSS is important for strategic decision-making process. More effective DSS can be implemented by web-based model dealing with organizational view in decision-making processes. Recent DSS applications take advantage of the opportunities in web technologies, along with other internet technologies. With this perspective, web-based DSS can be one of the most promising options, increasing core business competition in the new health-care market environment. However, simply making an existing DSS accessible by using a web technology to hospital managers, patients or other stakeholders will often lead to unsatisfactory results and less competitiveness within the market. Developing the user interface, modeling, data mining for web-based DSS remains hard and major tasks. Thus, developing web-based DSS model should be considered system's flexibility for the future expansions. Figure 2 shows brief web-based DSS components along with their relationships.

Figure 2. Web-Base Decision Support System Components



The hospital has launched its strategic DSS model with on-going base. The hospital top decision-makers have accepted the final results as valid and feasible outputs for implementing the DSS model in their web environment. The effects from this model outputs will be evaluated in the next two or three fiscal years, since any mistakes in medical and clinical management may result in serious damage for the patients and the hospital operations and performance. The future agenda will be arranged to compare with this proposed DSS model for hospital BPR planning. The BPR planning based on the model will provide the management with a significant insight to set an appropriate hospital resource planning and order communication

system in their web environment, while meeting customer demand and enhancing competitive advantages. Thus, the hospital currently reviews all these planning strategies as the possible alternative operations.

CONCLUSION

In today's information technology age, rapid penetration of web technology into a business process enables more efficient and strategic management decisions. The health-care environment is not an exception to this trend. The growth of web technology can allow decision-makers to overcome many of the challenges confronting health-care systems. Health-care business environments are dramatically changing with multiple and complicated decision-making problems. The global health-care environment provides new business markets to management. The DSS model for hospital business process planning is developed and analyzed to aid total resource planning. The health-care system in this study considers the proposed DSS model as the potential business strategies. Thus, this study provides both the satisfying solution and other important implications.

This study's contributions are as follows. This proposed DSS model enhances a practical way for planning the hospital business process planning considering tangible and intangible business aspects. Previous studies in DSS are limited to covering simultaneously comprehensive issues such as patient admission, hospital capacity, financing, manpower, and revenue. This study provides the management with insights improving overall performance through web-enabled hospital business process. This study utilizes an integrated multicriteria decision-making model that most previous studies in developing DSS models have not been explored in health-care area. The proposed results make better implication and more meaningful suggestions to the real decision-making settings.

The hospital decision-makers have accepted the final results as valid and feasible for implementing the hospital business process planning in real-situation. This proposed model's outputs will be evaluated during the next two or three fiscal years. In short, in situations where many complex e-business activities and conditions are involved, it can be much more practical to use the proposed DSS model to find a satisfying solution, especially when time and resources are limited.

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