

A Study of the Impact of Organizational Learning On Information System Effectiveness

Vincent Cho

*Department of Management and Marketing
Hong Kong Polytechnic University
msvcho@inet.polyu.edu.hk*

ABSTRACT

Past studies on system effectiveness capture the underlying factors (top management support, communication effectiveness, firm size, and user training) as well as different dimensions (system quality, information quality, use, user satisfaction, individual impact, and organizational impact) necessary to evaluate the effectiveness of a system. Although the framework of system effectiveness from DeLone and McLean [1992, 2003] is well established, some recent studies on organizational learning (OL), which is a more intrinsic concept, drive us to revisit the issue of system effectiveness. With a strong learning culture, companies can face the challenges of new things. It is hypothesized that an organization with good learning orientation will facilitate the implementation and use of a new system. A survey was conducted among those firms implementing an electronic document management system (EDMS). It is found that management support is still the most important factor and may improve an organization's performance in different ways. Other than that, organizational learning does impact the performance of employees and their satisfaction with new technology implementation. Its influence on EDMS effectiveness is stronger on employees than on the organization.

Key Words: IS effectiveness, organizational learning

1. INTRODUCTION

System effectiveness, which describes how successful a system is in terms of user satisfaction and the impact of that system on individuals and the organization itself, has been studied a lot in the past [Ortiz de Guinea et al., 2005; DeLone and McLean, 2003; DeLone and McLean, 1992]. Underlying factors affecting the effectiveness of an information system (IS) depend on two aspects: the organizational and the technical contexts. For the organizational context, the most important factors are top management support, user training, communication effectiveness, and firm size. With regard to technical context, two essential attributes are system quality and information quality. Society is now operating in the information age, which stresses learning, innovation, and creativity. Along with these trends, some management concepts such as knowledge management [Lewis, 2004] and organizational learning are emerging. These issues bring along new insight and shape a new landscape on the theories behind system effectiveness.

The concept of organizational learning is the subject of a fast-growing body of literature [Farrell and Mavondo, 2004]. There are many definitions of organizational learning in the literature. Examples include: “the capacity or processes within an organization to maintain or improve performance based on experience” [Nevis et al., 1995]; “the process of improving actions through better knowledge and understanding” [Fiol and Lyles, 1985]; “an entity learns if, through its processing of information, the range of its potential behaviors is changed” [Huber 1991]; “organizations are seen as learning by encoding inferences from history into routines that guide behavior” [Levitt and March, 1988]; “the detection and correction of error” [Argyris and Schon, 1978]; “modifying behavior to reflect new knowledge and insights” [Garvin, 2000]; and “a learning company is one which facilitates the learning of all its members, and which continuously transforms itself” [Pedler et al. 1991; Dixon, 1999].

Organizations are becoming important partners in this learning society [Sambrook and Stewart, 2000]. Appelbaum and Reichart [1998] view the organization as a learning system and focus on three key characteristics of a learning organization. They are the learning process, the learning orientation, and the facilitating factors within the organization. Organizations provide both formal and informal processes and structures for acquisition, sharing and use of knowledge and skills. Learning is no longer regarded solely as a classroom activity. It is necessary to enable employees to become more proficient at a certain task by focusing more on the learning orientation of an organization. Moreover, more resources should be put on the facilitating conditions such as communication platform and training programs for promoting organizational learning. Consequently, organizations are striving to create more opportunities for continuous employee learning, for instance, through teamwork, empowerment, and broader job structures and design [Nevis et al., 1995]. These arguments propose that organizational learning is getting more important

especially when information systems/technologies bring more business opportunities and induce more severe competition.

In order to better meet the rapid changes in technology and the business environment, learning is increasingly seen primarily as a continuous work-based activity for knowledge as a source of value, dynamic market place, increasing competition, greater customer demands, and easily imitable products/processes. Thus, employees need to learn or unlearn quickly in order to enable the company to sustain its competitiveness [Slater and Narver, 1995; Stata 1989; Senge 1990; de Geus, 1988; Calantone, Cavusgil, and Zhao 2002]. This will help these individuals identify innovative ways of working and make it easier to adopt new technology, which in turn permits the organization to differentiate from its competitors.

Based on changing technologies and business perspectives, our study focuses on the impact of organizational learning on information system effectiveness. Our framework consists of the following components: learning orientation, IS effectiveness, and some common underlying factors including management support, communication effectiveness, and firm size. The layout of this paper is as follows. Section 2 presents the literature review. Section 3 describes the framework and methodology. Sections 4 and 5 explain the investigated system and the data collection process. Section 6 discusses study results, and Section 7 presents the conclusions.

2. LITERATURE REVIEW

Past studies relating to the impact of organizational learning focus mainly on sustainable competitive advantage [Porter, 1996; Senge, 1990; de Geus, 1997; Lindley and Wheeler, 2001; Lam, 2001]. The idea that an organization's ability to learn faster than its competitors is its only truly sustainable competitive advantage [de Geus, 1997; Lindley and Wheeler, 2001] challenges the assumptions underlying industrial organization theory [Porter, 1980] and provides a new basis for strategic decisions [Moingeon and Edmonson, 1996]. The needs to survive, to compete, and to grow are at the heart of strategic management.

Despite these imperatives, most large companies survive only a few decades because they are unable to adapt at the rate of change of their environment. The abilities to learn and to leverage the knowledge gained from learning [Bontis, 1998] are fundamental to survival, growth, and sustained competitive advantage [Fulmer et al., 1998]. Besides sustainable competitive advantage, organizational learning (OL) is associated with a higher level of competencies [Chaston et al., 2001]. In particular, there are studies [e.g., Farrell and Oczkowski, 2002; Bakers and Sinkula, 1999] that prove that organizational learning leads to innovativeness. For SME, McDonald [2002] argues that learning orientation has an influence on an entrepreneur's innovativeness. Also, it has been found that organizational learning makes business process re-engineering (BPR) easier [Smeds, 1997]. In terms of individual impact, some

research studies [Harris, Mowen, and Brown, 2005] indicate that learning orientation has an influence on employee job satisfaction and his or her ability to openly accept challenges and organizational commitment.

Moreover, some studies show that OL can promote IS development [Salaway, 1987], IS implementation [Nelson et al., 1995; Romm et al., 1996; Gulati et al., 2004; Lewis, 2004], and IS post-implementation monitoring [Lindley and Wheeler, 2001]. Salaway [1987] suggests that OL interaction methodology be used to improve user/analyst communication and to reduce the error-prone in IS development. Nelson et al. [1995] find that a learning organization with a more adaptive culture is necessary in order to accommodate changes in work procedure, organizational structure, and job responsibilities caused by IS implementation. Romm et al. [1996] explain the diffusion of e-mail use in a university using OL theories. Thus, a learning organization like a university would implement information systems easily.

Gulati et al. [2004] indicate that internal locus of control, learning orientation, and sales-related internet training positively enhance a sales agent's internet use. Lindley and Wheeler [2001] show that a learning organization will drive the continual development of an IS which caters to changing business processes. In contrast to typical IS practice, post-implementation – when responsibility is passed to support/maintenance people – is often marked by resistance to major enhancements thereafter. They further argue that obsolete information systems will initiate a learning organization to radically replace them with new information systems and new business processes.

Most of the foregoing are case studies. Since there are so few empirical studies on the impact of organization learning on IS effectiveness, this paper describes our research effort to investigate the relationship quantitatively.

3. THEORETICAL FRAMEWORK

This section presents the conceptual framework of this study, which entails the organizational learning culture and factors related to system effectiveness evaluation, especially with regard to information system implementation. The corresponding hypotheses are introduced and constructs are described as follows.

3.1. IS Effectiveness

Many approaches have been suggested to assess IS effectiveness. These include cost-benefit analysis, utility analysis, IS use estimation, measurement of user satisfaction, incremental performance in decision-making effectiveness, and the analytical approach [Ives and Olson, 1984; Lees, 1987; Remenyi and Smith, 1999; Kanungo et al., 1999]. Herner and Snapper [1978] proposed to use the utility function based on system quality and its impact on users to evaluate an information system. To evaluate system effectiveness, Hagood and Friedman [2002] developed a balanced scorecard based on objective measures in the aspects of user satisfaction, internal process efficiency, resources use, and

individual impact. Thus, many empirical studies have used as evaluation criteria either system quality (as determined by decision-making performance or measures of perceived quality) or system acceptance (including indicators of system use or changes in attitude).

Among the measures of IS effectiveness, the more frequently used are from the framework of DeLone and McLean [1992]. They have comprehensively reviewed and organized past research on IS effectiveness and have proposed that the success level of an information system depends on the quality of the system itself, its output information, its use level, whether users are satisfied with it, and its impact on individual and the organization.

System quality relates to hardware and software quality such as reliability, responsiveness, and user-friendliness. *Information quality* refers to relevancy, timeliness, and understandability of a report (on-line or print-out). These two system characteristics are related to the functionality of an information system and are more or less related to the system's intricate features that would not be improved with a better learning environment. That is, organizational learning would not affect the output at these two levels; thus, these two aspects are not being included in our study.

Our research focuses, instead, on IS effectiveness within a company in which IS use is mandatory. Use of an information system is less relevant for assessing a mandatory information system that is embedded in daily operations and that is required to be used by employees. Our study examines the impact of organizational learning on the effectiveness of an information system with respect to user satisfaction and individual and organizational advancement. Their corresponding relationship is shown in Figure 1. The detail elaborations, justifications of the relationship, and hypotheses are explained in the subsequent subsections.

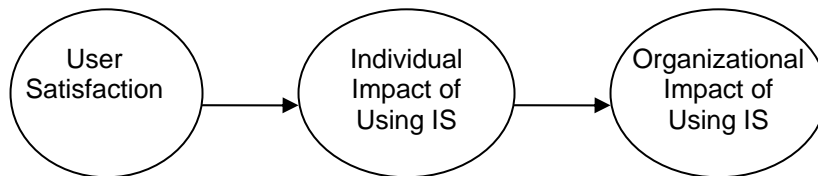


Figure 1. Relationship Among Variables in IS Environment

3.1.1. User Satisfaction

User satisfaction can be defined as the extent to which users believe the information system available to them meets their requirements [Ives and Olsen, 1984]. User satisfaction is considered a useful assessment of system effectiveness [Igbaria, 1993; Baroudi et al., 1986; Raymond, 1985; Montazami, 1987; Bailey and Pearson, 1993; Zmud, 1979; DeLone and McLean, 1992; Torkzadeh and Doll, 1993; Henry and Stone, 1994; Seddon, 1997; Blili et al., 1998; Foong, 1999; Mahmood et al., 2001; Aladwani, 2002; Shaw et al., 2003]. It is one of the most

frequently used criteria, and may be seen as a measure of both system quality and user acceptance. Among the reasons for its frequent use is that satisfaction of users with their information systems is a potentially measurable, and generally acceptable, surrogate for utility in decision-making.

3.1.2. Individual Impact

DeLone and McLean [1992] define *individual impact* as the effect of information on the behavior of a recipient and indicate that it is closely related to an individual's performance. Individual impact is concerned with whether the information system gives users a better understanding of the decision context, helps them improve their decision-making effectiveness, empowers them to perform their job scope, and enforces their perceptions of the importance or usefulness of an information system. It is closely linked with the efficient work flow of an individual. All these aspects will be enhanced by using an information system, thus increasing an individuals' productivity. Along with this rationale, Rivard and Huff [1984] include user productivity improvement in their measure of the effectiveness of an information system. Abdallah [1996] has pointed out that the quality of an information system should be justified by the productivity of employees. Similarly, Lubbe and Remenyi [1999] measure the return of IT investment by the productivity of employees.

Within a firm, higher user satisfaction may imply a better appreciation of a system. When a system satisfies the users, it is perceived to be useful and has a higher impact on the user's performance and his or her effectiveness [DeLone and McLean, 1992]. Thus, we predict the following hypothesis.

H1a: Individual satisfaction has a positive influence on individual effectiveness.

3.1.3. Organizational Impact

Organizational impact is the effect of information on organizational performance. McLean and DeLone [1992] indicate that organization performance is an important indicator for measuring the effectiveness of an information system, and that organizational impact is mainly related to cost, sales, and profit. Abdallah [1996] agrees that cost/benefit analysis is the most common method of information system evaluation. Collier and Dixon [1995] assert that an information system can be measured by cost-effectiveness. Teo et al. [1987] have demonstrated these aspects using an electronic data interchange (EDI) system, which changed the organizational structure, business process, business network, and business scope of the organization.

Furthermore, Serafeimidis and Smithson [1999] suggest that an effective information system should have the ability to reduce the risk and uncertainty of a changing environment. Lubbe and Remenyi [1999] have formulated a decision-making process to optimize an IT investment by considering the organizational impacts of the information system being invested. The factors to be included are

reducing risk, increasing productivity, bringing new opportunities and competitive advantages, increasing turnover, managing business changes, and streamlining business processes. Remenyi and Sherwood-Smith [1999] attempted to maximize the value of an information system by continuous monitoring, which relies on metrics such as increased competitive advantage in term of time and space. Thus, it is related to the financial contribution to an organization.

As a company is formed by employees under the coordination of senior executives, improvement of individuals in the company will surely strengthen the whole organization's performance. A positive individual impact from an information system would also imply that the information system is helpful and relevant to the daily tasks of the employees. Eventually, these individual employees will contribute much more to the organization because of implementation of an information system, and the individual effect will aggregate into an organizational outcome. Thus, we suggest the following hypothesis.

H1b: Individual impact upon using an IS has a positive effect on organizational impact.

3.2. Underlying Factors for IS Effectiveness

Our survey of literature [Serafeimdis, 1997; Serafeimdis and Smithson, 1999; Coombs et al., 1999] on the factors affecting IS effectiveness reveals that the organization's situation has a significant impact on the information system. Serafeimdis [1997] and his subsequent research with Smithson (Serafeimdis and Smithson, 1999) argue that, in order for an information system to be a success, the organization's situation must be more deeply examined than has traditionally been the case. Coombs et al. [1999] have proved that there is a relationship between organizational characteristics and system success.

Among organizational characteristics, DeLone and McLean [1992], Dewar and Dutton [1986], Raymond [1985]) have identified the essential factors as: management support, user education and training, communication effectiveness, and size of the organization. The size of the organization influences the degree of management support toward IS and communication effectiveness. Larger firms tend to have stronger support from management on computerization. Also, they spend more effort on improving communication media and its effectiveness because of operational, organizational, and business complexity.

Instead of including user education and training in our framework, we have chosen to study a more fundamental factor - organizational learning, which describes the learning ability of an organization, and is part of the organization's characteristics. Thus, our framework, shown in Figure 2, is a revision of the traditional framework. Following are details on each of the related factors.

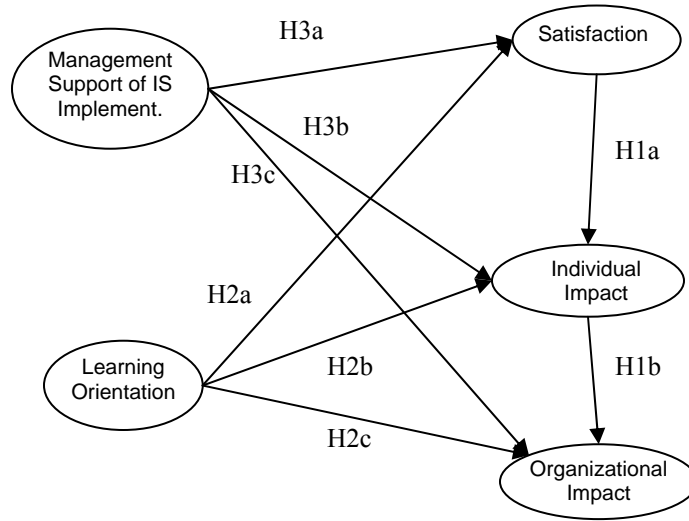


Figure 2. Framework for IS Effectiveness on the Influence of Organizational Learning Culture

3.2.1. Organizational Learning

According to Locke and Schweiger [1979] and Garvin [2000], the impact of *organizational learning* on IS effectiveness can be traced to three overlapping stages. The first stage is *cognitive*. Employees are exposed to new ideas on business processes that are enabled by information systems, and begin to expand their knowledge on the use of IS. The second stage is *behavioral*. Employees begin to internalize their insights and alter their behavior. The third step is *performance improvement*. Changes in behavior, higher satisfaction in using IS, and enhancement of individual efficiency will produce overall enhancement of organizational efficiency. Similar views can be found in Ives and Olson [1984], who have used cognitive and motivational mechanisms as a theoretical explanation of how user involvement affects IS effectiveness. Also, Torkzadeh and Doll [1993] have applied the three psychological mechanisms (cognitive, motivational, and value attainment) to elaborate how user documentation enhances user satisfaction.

On the other hand, research in achievement goal theory reveals that the orientation adopted by an individual guides how he or she interprets and reacts to achievement-relevant information [Dweck 1986]. In an organizational setting, Sujan et al. [1994] reveal that performance feedback influences goal orientation formation. In an organizational learning environment, individuals adopt an adaptive response pattern [Dweck, 1986] wherein negative feedback information leads to persistence and determination in challenging achievement situations. As

such, employees with a strong degree of learning orientation are not afraid to make mistakes while using IS, and they openly accept the challenges that come with facing difficult situations when adopting IS.

Moreover, some employees may find some creative ways of using IS through generative learning [Senge, 1990]. This generative learning, in which employees think outside the box of the normal use of an information system, will motivate employees to investigate different perspectives of using IS.

Organizations with a strong learning orientation generally have a more effective training program in IS implementation [Noe, 2002; Hasan 2006], and their effective training program, in turn, drives higher user satisfaction and overall IS effectiveness [Lucas, 1975; Torkzadeh and Dwyer, 1994; Gardner and Gundersen, 1995; Khalil and Elkordy, 1997; Yaverbaum and Nosek, 1992]. Well-trained users feel more capable of operating the system and are thus more satisfied with it. Laboratory studies confirm that training can elevate use, satisfaction, and performance [Davis and Bostrom, 1993]. Indeed, Gist et al. [1989] found that some training methods raise computer efficacy, which leads to higher performance and satisfaction. Field studies supply further evidence [Lees, 1987; Mawhinney and Lederer, 1991; Nickell and Seado, 1986; Zeffane and Cheek, 1993]. In this case, organizational learning enhances IS effectiveness indirectly through effective training programs.

Learning orientation, therefore, results in persistent IS use and eventually a higher level of satisfaction because of the ability to command IS [Vandewalle and Cummings, 1997; Vermetten, Lodewijks, and Vermunt, 2001). In this regard, we suppose that learning orientation will have an influence on one's satisfaction with a workable IS once he or she puts the effort in learning and using IS. Compared with employees in organizations with a low-learning orientation, employees in a high-learning orientation are more willing to learn new challenges, such as adopting IS for their work. Even though it may make no difference in their IS use (since most organizational information systems are compulsory), we suppose that employee working in an organization with a high-learning orientation will be more satisfied using their IS.

H2a: Strong learning orientation has a positive effect on user satisfaction.

Besides user satisfaction, employees in an organization with a high-learning orientation are more open-minded about unlearning their existing practices and accepting new challenge in using IS for their work. They are also more committed to learn, even though some employees may generate their own ways of using the information system. This is especially true when the learning organization comes along with an effective training program that, in turn, injects a better understanding of the IS-enabled business process. With their understanding and acceptance of IS, employees will receive more positive impact

from using it. Thus, we expect that there will be a large individual impact for an organization with a high-learning orientation.

H2b: Strong learning orientation has a positive effect on individual impact from using an IS.

Moreover, employees in a learning organization will try to achieve a common goal, which is to use their learning from the new challenge (i.e., a new information system) in a better way so as to make the organization more productive. Sometimes, unexpected outcomes may be detected from an information system; employees may dig out the source of errors and fix the bugs through the technical support team [Baker and Sinkula, 1999]. In some cases, the unexpected outcomes will bring along issues that challenge the fundamental way of handling business processes. Employees in a learning organization may even radically change existing information systems or some modules of them in order to make them perform accordingly [Senge, 1990].

It is a practice that learning organizations review successes and failures in their IS implementation, assess them systematically, and record the lessons in a form that employees find accessible. At the heart of this approach is a mind-set that enables learning organizations to recognize the value of productive failure in contrast to unproductive success in IS implementation. A productive failure is one that leads to insight and understanding, and, thus an addition to the commonly held wisdom of the organization. An unproductive success occurs when something goes well, but nobody knows how or why. Thus, the information system in a learning organization should have better use and a greater impact on the organization as a whole. In this sense, we expect there will be a greater organizational impact from the use of IS in learning organizations than in traditional ones.

H2c: Strong learning orientation has a positive effect on organization impact from using an IS.

3.2.2. Management Support of IS

Top management involvement is an important factor associated with the effectiveness of an information system [Collier and Dixon, 1995; Coombs, 1999]. Baroudi et al. [1986] suggest that *management support* has a positive and direct effect on the use of microcomputers. Guimaraes and Igbaria [1997] in their study of client/server systems have identified top management as an important factor affecting user satisfaction, use, and IS impacts. Mahmood et al. [2001] have found that organizational support has a significant effect on system use, which is an indicator for system effectiveness. It is reasonable that, when managers dedicate a high level of resources to support information technology; they tend to foster a greater use of information systems within that organization.

If senior executives support using an IS, they may establish some reward systems to encourage staff to use the IS. Under this circumstance, staffs are more willing and satisfied while facing an information system. As individual outcomes improve, the performance of the whole company would increase.

H3a: Management support of an IS has a positive relationship with user satisfaction.

H3b: Management support of an IS has a positive relationship with individual impact from using the IS.

H3c: Management support of an IS has a positive relationship with organizational impact from using the IS.

3.3. Control Variables

In order to have a clear understanding on the impact of organizational learning on IS effectiveness, we have to control some other underlying factors that have an impact on IS effectiveness. Top management support of IS is one variable we have included and described above. There are two more common variables, *communication effectiveness* and *firm size*, which influence not only IS effectiveness, but also learning orientation and management support of IS.

3.3.1. Communication Effectiveness

Teare [1998], Raymond [1985] and Smith et al. [1996] indicate that *communication effectiveness* is related to the effectiveness of information technology. An effective communication platform can enable messages from top management to be passed throughout the organization, enhance the incidence of users and technical support people working together; and provide ways to share experiences so as to improve information system effectiveness. In this regard, we expect communication effectiveness to have a positive relationship with top management support of IS and IS effectiveness (i.e., user satisfaction, individual impact, and organizational impact).

A communication platform can be regarded as an essential element of the learning infrastructure [Watkins and Ellinger, 1998; Teare, 1998]. A learning organization should have enough channels to transfer and encode individual learning, and should communicate effectively with its customers, employees, suppliers, and all other stakeholders. Hill [1996] suggests that a learning organization should rely on an effective communication platform that enables its staff to discuss issues freely and openly. According to Nonaka [1991] and Dixon [1999], although individuals may learn themselves, unless this learning is shared and acted on, and unless the organization as a whole can change, then there is no learning organization. Individual learners alone can choose not to use their learning, or even take their learning with them if they leave the organization. The building blocks of a learning organization are initially individuals, and then

teams, who create, share, and act on collective learning through an open communication platform. Such an organization operates an organizational learning cycle – where new knowledge is created, captured, shared, and implemented (Garavan, 1991; Watkins and Ellinger, 1998). Thus, we envision that effective communication has a positive impact on learning orientation.

3.3.2. Firm Size

Organization theory posits that size is a key determinant of an organization's structure and operations [Robbins, 1990]. Size is also seen as a major organizational attribute within the field of firm management [Vallen, 1985]. Research confirms that size is either directly or indirectly related to the information technology an organization adopts [Carter, 1984]. Robbins [1990], Droge and Germain [1991] and Mahmood et al. [2001] mentioned that the firm size, which relates to its economies of scale, is an essential factor affecting the effectiveness of an information system. Moreover, larger firms adopt greater levels of technology [Meyer and Goes, 1988].

Phofl and Zollner [1987] and Raymond [1985] believe that the centralization of logistics activities and administrative tasks, and the formalization of a strategic plan, may be more common in larger firms, thus encouraging both computerization and use of more controls. It follows that the superior capabilities of such systems, coupled with more extensive application, will cause employees of larger firms to use them more often and to experience greater satisfaction.

This logic is also consistent with Ein-Dor and Segev's [1978] proposition that organizational size is directly related to IS effectiveness, including system use and user satisfaction, because large firms are more resourceful. On the other hand, according to Lees [1987], IS satisfaction and use are greater in organizations that are large because smaller organizations tend to be less mature, thus reducing their IS effectiveness. Thus, IS effectiveness is more prevalent in large firms, which should have higher management support of IS, and IS effectiveness (user satisfaction, individual impact, and organizational impact).

For large firms, the organizational structure is more complicated, and this fact is a challenge to top executives to operate the firm effectively. Thus, there is pressure on top management to support the implementation of new technologies and/or information systems. Besides, large firms usually have a more mature communication platform; thus, communication among staffs is more effective. Based on this reasoning, we expect that large firms will have a higher support from top management of an IS implementation and that large firms will have an effective communication platform.

3.4. Other Concerns

Beside the abovementioned concerns, IS strategic alignment, as defined by Chan et al. [1997], has proved to be a predictor of IS effectiveness. They derived IS strategic alignment from business strategic orientation and IS strategic orientation and found that there is a link between IS strategic alignment and IS effectiveness and business performance. Our study focuses on the perceived effectiveness of IS by the managers who implement and use the IS. Managers who are at middle level or above may not be able to answer strategic issues such as business strategic orientation or IS strategic orientation. Thus, the factor of IS strategic alignment is dropped from our study.

4. THE INVESTIGATED SYSTEM

In order to capture the impact of organizational learning on system effectiveness, we surveyed firms using an electronic document management system (EDMS). Currently, most EDMS's are capable of handling workflow within a business. An EDMS goes beyond office automation and may include activation, tracking, status monitoring, messaging, queue handling, and routing of documents. These capabilities allow us to monitor a business process and track the associated route of document flows [Zantout and Farhi, 1999].

Although an EDMS can compensate for the disadvantages of a traditional paper document system, there are still many barriers to applying EDMS's in business. One critical barrier is associated with a change of workflow. This leads to business process redesign with strong top management support. Another possible barrier is the ability of an organization to adapt to changes or to a new work environment. The effect of new technologies, such as EDMS, has created an increased demand for new skills and innovative business solutions, which require both individual and organizational learning [Hendry et al., 1995]. Thus, an organization with a stronger learning orientation may find it easier to adopt an EDMS. It is supposed that organizational learning will have a more important role to play in the effectiveness of implementing EDMS.

4.1. Instrument and Questionnaire Construction

Using the above arguments, we formulated the research framework shown earlier in Figure 2. It consists of seven variables (firm size, communication effectiveness, learning orientation, management support, user satisfaction, individual impact, and organizational impact). The measure of *user satisfaction* is the adapting of items suggested by DeLone and McLean [1992], which is related to the level of satisfaction of end users with an IS and is captured by a single item: "The end users are satisfied with the performance of EDMS."

The construct of *individual impact* is adopted from DeLone and McLean [1992], who indicate that it can be measured by changes in understanding of decision context, communication environment, job creativity and employee productivity after using an IS. Thus, the following items are included in this construct: "EDMS can enhance communication," "EDMS can reduce the

required time to handle documents,” “EDMS can enhance staff toward working more innovatively,” and “EDMS can immediately recall the information.” These items capture the perceived impacts of EDMS on an individual.

DeLone and McLean [1992], Serafeimidis and Smithson [1999], Lubbe and Remenyi [1999] and Remenyi and Sherwood-Smith [1999] point out that *organizational impact* can be assessed by changes of organizational performance on profit margin, cost efficiency, competitive advantage, customer satisfaction, sales turnover, and effectiveness of administration processes. We capture the perceived organizational impact with five items: “EDMS can improve the profit,” “EDMS can reduce cost,” “EDMS can increase the competitive advantage,” “EDMS can enhance customer service,” and “EDMS can avoid risk.”

Learning orientation may be viewed as the degree to which firms proactively question whether their existing beliefs and practices actually maximize organizational performance [Argyris and Schon, 1978]. This orientation forms a pattern that defines a given organization’s “learning style.” In essence, learning orientation is reflected by the presence of values that influence the propensity of a firm to proactively pursue new knowledge and challenge the status quo [Sinkula, Baker, and Noordewier, 1997; Slater and Narver, 1995; Baker and Sinkula, 1999]. Factors such as criticality of errors, employees’ professionalism, leadership vision, and commitment are respective indicators.

As Sinkula et al. [1997] argue, learning orientation is concerned with the degree to which proactive learning occurs. Three organization values routinely associated with the predisposition of the firm to learn are commitment to learning, open-mindedness, and shared vision [Day, 1991; Senge, 1990, 1992; Tobin, 1993]. According to Sinkula et al. [1997, p. 309], “They are core components that reflect the learning orientation construct.” It is because, in order for the employee to be critical of their errors, they need to be open-minded. Also, a professional employee will be very committed to learning new things, and a good leader will share his or her vision with employees as well as to encourage them to share their own vision.

The literature of organizational learning proves that learning orientation is a well-defined construct, which captures the essential elements of the organizational learning culture, and allows us to study the impact of organizational learning on the effectiveness of implementing new technologies or information systems. Firms with strong learning orientations encourage employees to constantly question the organizational norms that guide their activities [Day, 1991; Garvin, 2000; Sinkula, 1994].

4.1.1. Commitment to Learning

If an organization places little value on learning, little learning is likely to occur [Sackman, 1991]. Similarly, Galer and Heijden [1992] believe that a culture amenable to learning is a prerequisite to its ability to improve its understanding of its environment over time. According to Shaw and Perkins [1991], learning-efficient companies are reflective; they value the need to

understand the causes and effects of their actions. This attitude encourages employees to challenge the established rules and regulations within a firm. Senge [1990] relates *commitment to learning* to whether a firm views learning as one of its fundamental core activities. Tobin [1993] also mentions that commitment to learning allows employees to think and reason outside the pre-established framework. This dimension is measured by four items: “Managers agree that the ability to learn is the key to competitive advantage,” “Our culture is one that does not make employee learning a top priority,” “The basic value of learning is a key to improvement,” and “Employee learning is an investment in a company.”

4.1.2. Open-Mindedness

As time passes, employee may stick to familiar ways of thinking and acting unless they are open-minded enough to question [Porac and Thomas 1990; Senge, 1992]. *Open-mindedness* is closely linked to the notion of unlearning [Nystrom and Starbuck, 1984]. The ability to unlearn is critical to a learning-oriented organization. Without the capacity to actively unlearn existing knowledge, organizations are in danger of letting core capabilities become core rigidities [Leonard-Barton, 1992; March, 1991], or competency traps [Levitt and March, 1988]. In effect, unlearning involves deep introspection that questions both the practices of the organization and the assumptions underpinning such practices. This continual introspection inevitably leads to new means for achieving organizational goals, with past procedures confined to organizational memory. This is referred to as double-loop learning [Argyris and Schon, 1978], or generative learning [Senge, 1990], whereby the organization’s underlying norms, policies, and objectives are modified. Three items are used to measure this dimension: “Our business unit places a high value on open-mindedness,” “Managers encourage employees to think outside the box,” and “Original ideas are highly valued in this organization.”

4.1.3. Shared Vision

According to Sinkula et al. [1997], shared learning is crucial for proactive learning because it provides direction for learning [Day, 1994]. Without commitment to and agreement with the direction, the organization has less motivation to learn [McKee, 1992; Senge, 1990]. Moreover, Sinkula et al. [1997] state that, without *shared vision*, individuals are less likely to know what organizational expectations exist and what outcomes to measure in operation.

In this ambiguous environment, even if one is motivated to learn, it is difficult to know what to learn [Sinkula et al., 1997]. According to Senge [1992, p. 35], there needs to be a collective wish to learn. Tobin [1993] describes such vision as “visible leadership.” Galer and Heijden [1992] sketch shared vision as goal convergence. Baker and Sinkula [1999, p. 414] argue that the lack of a universally understood organizational focus also lowers motivation to learn. Shared vision gives an organization a sense of purpose and direction but, like any organizational assumption, is subject to examination and is likely to evolve over

time. We have three items to capture this concept: “There is a total agreement on vision across all levels,” “All employees are committed to the goals of this business unit,” and “Employees view themselves as partners in charting the direction of an organization.”

The measure of *communication effectiveness* is adopted from Teare [1998]. He argues that communication involves information-sharing, cutting boundaries among departments, and so on. This construct is measured by three items: “There are many communication channels in the company,” “The internal communication is inefficient in the company,” and “There are enough IT resources that help communication among the company.”

To measure the extent of *management support*, we adopt from Mahmood et al. [2001], who believe that top management support and involvement are very important. Thus, there is an item to measure this construct: “The top management actively participates in EDMS implementation.”

For the *firm size*, we adopt the scale of Droge and Germain [1991], who state that, other than the number of staff in a company, size is associated with formalization and the number of layers in a firm. Thus, we have two items for this variable: “There is a high level of formalization in your company,” and “There are many levels of managers in your company.”

A questionnaire based on the above constructs is designed for data collection. Its purpose is to evaluate the extent of organizational learning and effectiveness of an IS in the organization. For each question, respondents are free to choose one of the seven likelihood scales:

- 1 – Strongly Disagree
- 2 – Disagree
- 3 – Slightly Disagree
- 4 – Neutral
- 5 – Slightly Agree
- 6 – Agree
- 7 – Strongly Agree

Some items – e.g., “Our culture is one that does not make employee learning a top priority” – are negatively quoted. Then, the tendency of respondents to mechanically circle the points toward one end of the scale is minimized. Besides the stated measuring constructs, we also include the type of EDMS being used, along with biographic data on the respondents. Face validity and pilot test are maintained by distributing the questionnaire to five experts of system evaluations. They include senior operation managers, financial controllers, and one MIS professor. Some items have been rephrased according to their advice in order to be clearer in meaning and more relevant to the study.

5. DATA COLLECTION AND ANALYSIS

This study evaluates the influence of organizational learning on the effectiveness of an EDMS. Our target population is those firms using EDMS's. The potential respondents are managers or above, who are using an EDMS in their daily tasks on document management and retrieval. They have a better understanding of the effectiveness of their EDMS and its impact on organizational performance.

Questionnaires were distributed by mail to potential respondents, who were managers using EDMS's in their firms. The target respondents were from a random sampling of the companies listed in the Hong Kong Yellow Pages, which is a public-printed telephone directory of Hong Kong companies. A telephone call was made to the selected companies to survey their existing practices on document processing. For those companies using an EDMS, the corresponding responsible manager was identified and a questionnaire was sent to him or her. Attached to each questionnaire was a letter to the company, clearly stating the study purpose so that respondents could better understand the study before completing the questionnaire. To ensure that the respondent had the competency to answer the questions, the questionnaire asked the respondent to indicate the frequency of use on the EDMS and his or her job position.

This study is firm-based. Each respondent represented his or her firm. There were no multiple respondents from the same firm.

6. RESULTS AND DISCUSSION

Out of 500 questionnaires sent to firms using an EDMS, 230 responses were received. Nearly 71% of the respondents are male. Most of the respondents (82%) have an education level that is tertiary, or above. Around 16% have a secondary school education, and less than 2% have an education level that is primary or below. The most commonly used EDMS is the tailor-made system using DBMS such as Oracle, followed by FileNET. In addition, 5.2%, 14.3%, and 5.7% of the sampled companies use OnBase, Real Vision Imaging, and Domino.Doc, respectively.

Table 1. Type of EDMS Functions Used by Respondent Companies

Function(s) Used in the Company	Use Frequency (%)
Imaging Function	58.9
OCR & Text Retrieval	28.8
Workflow	57.7
Computer Output to Laser Disks (COLD)	7.1
Web Publishing	24.1
Others	4.3

As Table 1 indicates, the most common EDMS functions being equipped are workflow (58.9%) and imaging function (57.7%). Organizations adopting EDMS have a common goal of improving the efficiency of documents processing and handling. Allowing staff to view documents and pass them on to others quickly can surely improve efficiency.

In addition, 24.1% of the companies are using it for web publishing, and 28.8% use it for OCR and text retrieval. The latter has a relatively low use rate because companies may not want their employees to edit the content of documents.

Only 7.1% companies use it for computer output to laser disks (COLD). COLD makes it easy for an employee to copy important documents onto disk. Since company documents are usually confidential, firms are unwilling to give employees an opportunity to share that information with others, and the ease of COLD increases the risk of that happening. Also, since most companies believe that employees should finish their work at the office rather than at home, they see no need to save documents to disk. For these companies, having COLD is not value-added, but just a waste of money.

6.1. Reliability and Validity

Factor analysis was used to reduce the number of items in each construct so as to maintain reliability and discriminant validity. Factors were extracted using the principal component method and varimax rotation. Variables were eliminated if they are not factorially pure.

On the questionnaire, there are four items for the construct *commitment to learning*; three items for *open-mindedness*, three items for *shared vision*, one item for *user satisfaction*, four items for *individual impact*, five items for *organizational impact*, one item for *management support*, three items for *communication effectiveness*, and two items for *firm size*.

All 26 items were fed into SPSS for the factor analysis. Table 2 shows the items that remained for the structural equation modeling. We discarded as factorially impure items such as “Our culture is one that does not make employee learning a top priority” in the construct of *commitment to learning*; “EDMS can enhance staff toward working more innovatively” in the construct of *individual impact*; “EDMS can enhance customer service” and “EDMS can increase the competitive advantage” in the construct of *organizational impact*; and “The internal communication is inefficient in the company” in the construct of *communication effectiveness*.

Table 2 summarizes the result of the reliability analysis of variables. It can be seen that all factors are of quite high alpha values (in italics), over 0.7. So it can be claimed that all variables are reliable. Moreover, all the measures of constructs have been used in past research and the variables are validated.

Table 2. Reliability and Factor Loadings

	Mean	Std. Dev.	Factor Loading	Reliability	AVE
<i>Commitment to Learning</i>				<i>0.87</i>	<i>0.64</i>
Managers agree that the ability to learn is the key to competitive advantage.	5.35	1.33	0.82		
The basis value of learning is a key to improvement.	5.38	1.17	0.82		
Employee learning is an investment in the company.	5.40	1.30	0.76		
<i>Open-Mindedness</i>				<i>0.81</i>	<i>0.57</i>
Our business unit places a high value on open-mindedness.	4.65	1.27	0.67		
Managers encourage employees to “think outside of the box.”	5.11	1.29	0.76		
Original ideas are highly valued in this organization.	4.65	1.41	0.83		
<i>Shared Vision</i>				<i>0.83</i>	<i>0.65</i>
There is a total agreement on vision across all levels.	4.23	1.16	0.85		
All employees are committed to the goals of this business unit.	4.34	1.09	0.75		
Employees view themselves as partners in charting the direction of the firm.	4.12	1.42	0.82		
<i>Management Support</i>				--	--
The top management actively participates in EDMS implementation	5.00	1.12	0.69		
<i>Communication Effectiveness</i>				<i>0.71</i>	<i>0.59</i>
There are many communication channels in the company.	4.80	1.28	0.74		
There are enough IT resources to help communication among the company.	4.62	1.41	0.80		
<i>Firm Size</i>				<i>0.84</i>	<i>0.59</i>
There is high level of formalization in your company.	4.75	1.84	0.80		
There are many levels of managers in your company.	4.85	1.92	0.74		
<i>User Satisfaction</i>				---	---
The end-users are satisfied with the performance of EDMS.	4.65	1.04	0.72		

Table 2. Reliability and Factor Loadings (Cont'd)

	Mean	Std. Dev.	Factor Loading	Reliability	AVE
<i>Individual Impact</i>				<i>0.84</i>	<i>0.52</i>
EDMS can enhance communication.	5.14	1.09	0.73		
EDMS can reduce the required time to handle documents.	5.31	1.18	0.71		
EDMS can immediately recall the information.	5.48	1.31	0.72		
<i>Organizational Impact</i>				<i>0.88</i>	<i>0.59</i>
EDMS can improve the profit.	4.34	1.02	0.70		
EDMS can reduce cost.	4.80	1.03	0.76		
EDMS can avoid risk.	4.17	1.40	0.83		

Average variance extracted (AVE), displayed in Table 2 in italics, reflects the average variance shared in a construct. AVE is calculated by the sum of loadings squared, divided by the number of items in the construct. AVE should be higher than 50% in order to be reliable. For the construct *commitment to learning*, $AVE = (0.82^2 + 0.82^2 + 0.76^2) / 3 = 0.64$.

To assess discriminant validity of the measures – i.e., the degree to which items differentiate among constructs or measure distinct concepts – we examined the correlations between the measures of potentially overlapping constructs. If the items comprising a construct correlated more highly with each other than with items measuring other constructs in the model, the measure was determined to have adequate discriminant validity.

Table 3 presents the squared intercorrelations among the constructs. The squared correlations, representing the shared variance among the constructs, are found not to exceed the average variance explained. Thus, discriminant validity is justified.

6.2. Test of Between-Subjects Effects

ANOVA analysis was performed to test the relationships of control variables, including type of EDMS (Onbase, FileNet, JetForm, etc.), function of EDMS used (imaging, OCR, COLD, etc.), sex, and education level (primary school, secondary school, and tertiary education) with the hypothesized variables (learning orientation, individual impact, organizational impact, management support, communication effectiveness, and firm size) to see whether the control variables will affect our model.

Table 3. Squared Correlation Among Study Constructs

		1	2	3	4	5	6	7	8
1	Commitment to Learning	0.64							
2	Open-Mindedness	0.21	0.57						
3	Shared Vision	0.09	0.27	0.65					
4	Individual Impact	0.50	0.23	0.14	0.52				
5	Organizational Impact	0.41	0.23	0.07	0.50	0.59			
6	Management Support	0.21	0.14	0.20	0.34	0.55	0.48		
7	Communication Effectiveness	0.13	0.11	0.14	0.17	0.37	0.40	0.59	
8	Firm Size	0.16	0.03	0.05	0.23	0.32	0.27	0.22	0.59

Note: All squared correlations are significant at 0.05 level. The diagonals represent the average variance extracted.

Using ANOVA, we find that all demographic variables are not significantly related with control variables. As a result, the survey responses, which are rather homogeneous, would be mixed as a single dataset for further analyses.

6.3. Descriptive Analysis

As shown earlier in Table 2, the ratings on the individual items of *commitment to learning* are very high (all above 5.0); thus, it is perceived that employees in Hong Kong are fairly willing to learn. Certainly, the ratings align with the message of the ex-CEO of the Government of HKSAR, Mr. Tung, that people in Hong Kong need to have a mentality of life-long learning.

With regard to *open-mindedness*, organizations in Hong Kong encourage employees to voice their opinions. Thus, ratings on items in this construct are high (from 4.65 to 5.11).

Concerning *shared vision* among employees across all levels, the items are relatively lower compared with *open-mindedness* and *commitment to learning*. Though it is not easy to achieve a high level of agreement and commitment to the goals of a business, the average ratings of the items (from 4.12 to 4.34) in this aspect still support *shared vision* to a certain positive extent.

With respect to *management support*, the rating of the item, “The top management actively participates in EDMS implementation” is around 5.0, which is a high value. Thus, most sampled firms place a high priority on EDMS implementation and think this project is important.

Communication effectiveness is moderately high in the sampled firms, with average item ratings above 4.62. This finding aligns with the business environment in Hong Kong, which is very competitive and one in which firms usually respond to the market very quickly. This environment drives staffs to work and communicate more closely.

With respect to *firm size*, most companies have a formal structure with many levels of management, which is reflected in the average rating of 4.8 on the

items in this construct. Thus, the firms with EDMS implementation are rather mature and structured. Nevertheless, the responses have a relatively wide spread, as indicated in the standard deviations (both items are close to 2). Based on that, our sample represents a wide range of firms of different sizes.

Concerning *user satisfaction*, *individual impact*, and *organizational impact*, we can see that *individual impact* scores highly (all items above 5.1). Thus, EDMS affects individuals more. This is reasonable, as EDMS touches on daily operations and changes ways of handling documents. Employees may find the information flow more effective. Using an EDMS, an employee can reduce the time required to handle a document, and, furthermore, can retrieve documents in a quicker and easier way. In a less positive sense, users are still satisfied with the performance of the EDMS, and there are impacts on organizational performance.

6.4. Structural Equation Model

Structural equation modeling (SEM) was applied to study the model, which was embedded with a latent construct – learning orientation. SEM is capable of deriving the latent construct with the weighted score from respective underlying factors. Moreover, our model considers the interrelationship among *user satisfaction*, *individual impact*, and *organizational impact*; thus, SEM is a more appropriate tool to validate the overall model for this study. Our model (Model 3, in Table 4) was formulated using AMOS 5.0.

Table 4. Comparison of Fitness of Models

Model Specification	GFI	NFI	CFI	RMSEA
<u>Model 1</u> (Considering <i>Management Support</i> , <i>Communication Effectiveness</i> , and <i>Firm Size</i> only)	0.88	0.86	0.90	0.12
<u>Model 2</u> (Considering <i>Management Support</i> and <i>Learning Orientation</i> only)	0.91	0.80	0.86	0.15
<u>Model 3</u> (Considering all variables)	0.93	0.90	0.93	0.09

Note: GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; NFI = normed fit index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

In order to tackle the control variables (*communication effectiveness* and *firm size*), there are links connecting *firm size* to *management support* of IS, *communication effectiveness*, *learning orientation*, *user satisfaction*, *individual impact*, and *organizational impact*. Also, there are links pointing from *communication effectiveness* to *management support* of IS, *learning Orientation*, *user satisfaction*, *individual impact*, and *organizational impact*. To account for the effects of these controls, we also examined an alternate model (Model 2, in

Table 4) without those links. To further assess the model and the importance of *learning orientation*, we set a competing model (Model 1, in Table 4) by removing the variable of *learning orientation*.

From the statistics in Table 4, it is clear that Model 3, with control variables (the hypothetical model), is better fitted. Measures like goodness-of-fit index (GFI), normed fit index (NFI), and comparative fit index (CFI) are commonly used to measure fitness of an SEM model. For the model in this study, the GFI is 0.93, NFI is 0.90, and CFI is 0.93. All three indices are over 0.9, which shows that the model fits well.

Other than the fitness indexes, root mean square error of approximation (RMSEA) is also commonly used to measure the expected error of the model. The value of RMSEA for this model is 0.09, which less than 0.1, and is acceptable. The results of the standardized regression weights with p-value of Model 3 (our hypothetical model with control variables) are shown in Table 5.

Table 5. Regression Weights

	Standardized Estimate	p-value
H1a: User satisfaction → Individual impact	0.342	0.043
H1b: Individual impact → Organizational impact	0.485	0.007
H2a: Learning orientation → User satisfaction	0.481	0.032
H2b: Learning orientation → Individual impact	0.762	0.055
H2c: Learning orientation → Organizational impact	0.103	0.315
H3a: Management support to IS → User satisfaction	0.331	0.009
H3b: Management support to IS → Individual impact	0.398	0.012
H3c: Management support to IS → Organizational impact	0.492	0.003
Learning orientation → Shared vision	0.301	0.000
Learning orientation → Open-mindedness	0.486	0.025
Learning orientation → Commitment to learning	0.769	0.029
Communication effectiveness → Management support to IS	0.011	0.330
Communication effectiveness → Learning orientation	0.232	0.044
Communication effectiveness → User satisfaction	0.136	0.264
Communication effectiveness → Individual impact	-0.082	0.382
Communication effectiveness → Organizational impact	0.112	0.384
Firm size → Communication effectiveness	0.492	0.022
Firm size → Management support to IS	0.512	0.000
Firm size → Learning orientation	0.538	0.005
Firm size → User satisfaction	-0.238	0.118
Firm size → Individual impact	-0.006	0.965
Firm size → Organizational impact	-0.123	0.435

Significant paths of our hypothetical model are shown in Figure 3. Most of the hypotheses are found to be valid under our sample testing, and again prove the past studies on IS effectiveness. *user satisfaction* is found to significantly affect *individual impact* ($\beta = 0.34$, $p < 0.05$). For one who is happy to work with the system, performance on individual tasks is certainly improved. It is also proved that *individual impact* from using an EDMS is positively related to *organizational impact* ($\beta = 0.49$, $p < 0.01$).

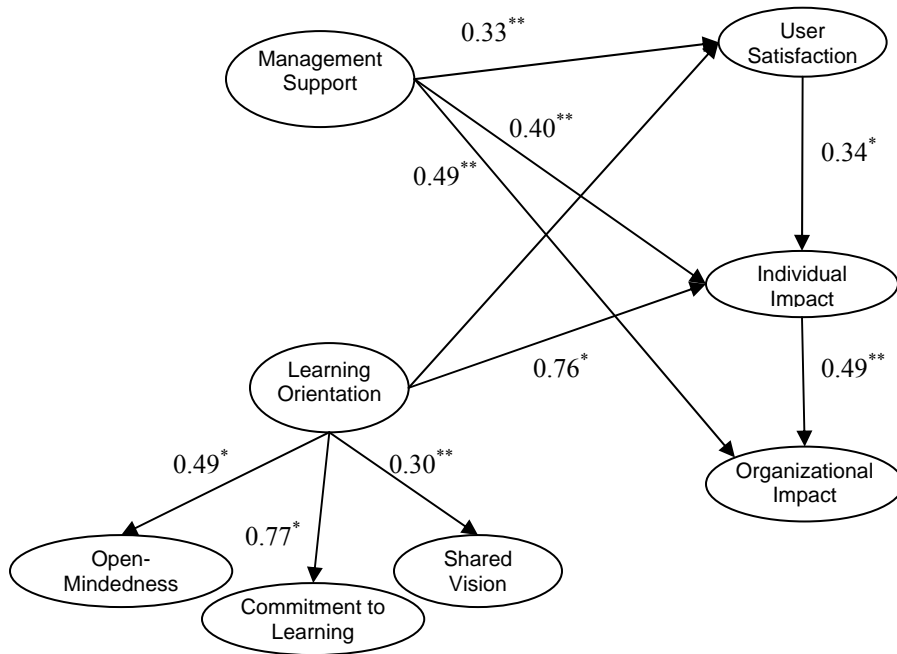


Figure 3. Standard Path Coefficients of Those Significant Paths

* for p-value < 0.05, ** for p-value < 0.01

Individual impact measures the productivity improvement of individuals. While employees' productivity increases, the *Organizational impact*, which reflects the cost and profit performance of a company, will also be better. Moreover, all of our respondents are at the managerial level, and many of them are frequent users of EDMS (36.9% of respondents use EDMS more than five times a week). The impact of EDMS on managers' performance would possibly have a greater impact on organizational performance.

Learning orientation, a latent variable of *open-mindedness* ($\beta = 0.49$, $p < 0.05$), *shared vision* ($\beta = 0.30$, $p < 0.01$), and *commitment to learning* ($\beta = 0.77$, $p < 0.05$), is positively related with EDMS effectiveness on the aspect of *user satisfaction* ($\beta = 0.48$, $p < 0.05$) and *individual impact*, significantly ($\beta = 0.76$, $p < 0.05$). As most of our respondents have tertiary education or above, they have a high learning ability. When they work in companies with a good learning culture, their learning ability on new systems like EDMS will be magnified. With better learning culture and deeper understanding of EDMS, the impact of an information system on respondents' individual tasks will be significantly enhanced. One remaining hypothesis (H2c) is not significantly supported. It supposes that there are actually no relationships among the variables. *Learning orientation* is rather an individual-based influence and will affect staff individually. Thus, its impact on the organization is plausible.

As shown in Figure 3, *management support* of EDMS positively affects *user satisfaction* ($\beta = 0.33$, $p < 0.01$). Obviously, users would be happier using EDMS if the respective supports such as user training and awards are adequate. *Management support* of EDMS also has a positive influence in terms of both *individual impact* ($\beta = 0.40$, $p < 0.01$) and *organizational impact* ($\beta = 0.49$, $p < 0.01$). It is reasonable that once management provides training and guidance in the use of an information system like EDMS, there will be more understanding of the system and improved performance of individual tasks. Eventually, organizational performance will be enhanced.

Concerning the control variables, *communication effectiveness* and *firm size*, we show that most of their influence on IS effectiveness is through intermediate constructs such as *management support* and *learning orientation*. It is found that *communication effectiveness* has an influence on *learning orientation* ($\beta = 0.23$, $p < 0.05$). It is believed that an effective communication platform can promote an organizational learning culture and, thus, *learning orientation*.

On the other hand, *firm size* has a significant impact on *management support* of EDMS ($\beta = 0.51$, $p < 0.01$). As the positive coefficient implies, the larger the organization, the more support from the top management on IS implementation. This may be due to larger firm has more resources. Large firms also have more effective communication platform ($\beta = 0.49$, $p < 0.05$) and be more considerate on their learning orientation ($\beta = 0.54$, $p < 0.01$).

Among the factors in IS effectiveness with control on communication effectiveness and firm size, we would argue that management support to EDMS is more important. Actually, an EDMS is very expensive. For example, an initial investment on EDMS such as OnBase and FileNet is about US\$25,000. For routine system implementation, some more hardware and software accessories are required and the processing cost will then be increased. Furthermore, these systems are complicated and not user friendly, thus training is needed and cost raises. Thus management support is very important in order to facilitate EDMS implementation. In addition, top management can use several strategies such as reward system and build culture and environment to enhance organizational

learning and the use of EDMS. Employees will be more satisfied and willing to use new EDMS if positive reward is given and suitable environment is developed. Nevertheless, organizational learning is still a significant factor and has influence on user satisfaction and individual impact. Thus senior executive should consider putting more resources to facilitate learning and promote the learning culture of an organization. Organizational learning does have impact on IS effectiveness.

6.5. Advice to Management

If managers want to improve an organization's performance, they should first be concerned about their employees. This is so because *user satisfaction* is positively correlated to *individual impact* and *individual impact* is positively correlated with *organizational impact*. It is proved that improving employees' performance can enhance the organization's performance.

The way to strengthen individual performance using an EDMS (*individual impact*) is to adjust the learning culture of a company (*learning orientation*) and provide more resources and participation from top management (*management support*). Strengthening management support of IS and the learning culture of an organization will significantly improve IS effectiveness.

7. CONCLUSION

With recent studies on organizational learning, which is a better surrogate for describing the learning ability of an organization, we revisited the framework behind system effectiveness and revised it with this new concept. Other than that, underlying factors such as *management support*, *communication effectiveness*, and *firm size* remain intact in our framework. We suppose that our model will help us to understand the issues of system effectiveness from a new dimension. Moreover, our survey is related to a popular system – EDMS – which will bring along new ways of handling business processes and serve as an information repository to facilitate knowledge management. Thus, another objective of this study was to evaluate the effectiveness of existing EDMS's.

From the SEM analysis, we find that *management support* has a positive impact on *user satisfaction*, individual enrichment in using an EDMS (*individual impact*), and *organizational impact*. *Learning orientation* is more on a personal basis and affects the satisfaction of those using EDMS and their job performance. Jobs are changing and, with them, the skills needed for the world of tomorrow. Learning is the key to prosperity – for each of us as individuals. The fostering of an inquiring mind and the love of learning are essential for our future success. This study demonstrates that organizational learning does have an impact on IS effectiveness and so does management support. The latter is true because it is senior executives who allocate resources, give rewards, and build culture. If CEOs want to improve the performance of their companies and employees, we suggest that they give more support to the implementation of information systems as well as the learning culture of an organization. On the other hand,

existing EDMS's are pretty well done in terms of satisfaction with respect to the user, their impact on individual work, and their impact on the organization as a whole.

REFERENCES

- Abdallah, M.H. 1996. An integrated approach for system evaluation: study result, *Information Management & Computer Security* 4(4), 10–19.
- Aladwani, A. 2002. Organizational actions, computer attitudes, and end-user satisfaction in public organizations: an empirical study, *Journal of End User Computing* 14(1), 42–49.
- Appelbaum, S., and W. Reichart. 1998. How to measure an organisation's learning ability: the facilitating factors – part II, *Journal of Workplace Learning* 10(1), 15–25.
- Argyris, C., and D. Schon. 1978. *Organizational learning: A theory of action perspective*, Reading, MA: Addison-Wesley, 2nd Edition.
- Baker, W.E., and J.M. Sinkula. 1999. The synergistic effect of market orientation and learning orientation on organizational performance, *Journal of the Academy of marketing Science* 27(4), 411–427.
- Baroudi, J., Olson, M., and Ives, B. (1986). An empirical study of the impact of user involvement on system usage and information satisfaction, *Communications Of the ACM*, 29(3), 232–238.
- Blili, S., L. Raymond, and S. Rivard. 1998. Impact of task uncertainty, end-user involvement, and competence on the success of end-user computing, *Information and Management* 33(3), 137 – 153.
- Bontis, N. 1998. Intellectual capital: an exploratory study that develops measures and models, *Management Decision* 36(2), 63–76.
- Calantone, R., T. Cavusgil, and Y. Zhao. 2002. Learning orientation, firm innovation capability, and firm performance, *Industrial Marketing Management* 31(6), 515–525.
- Carter, N.M. 1984. Computerization as a predominate technology: its influence on the structure of newspaper organizations, *Academy of Management Journal* 27, 247–270.
- Chan, Y.E., S.L. Huff, D. Barclay, and D.G. Copeland. 1997. Business strategic orientation, information systems strategic orientation and strategic alignment, *Information Systems Research* 8(2), 125–150.
- Chaston, I., B. Badger, and E. Sadler-Smith. 2001. Organizational learning style, competencies and learning systems in small UK manufacturing firms, *International Journal of Operations and Production Management* 21(11), 1417–1432.
- Collier, P., and R. Dixon. 1995. The evaluation and audit of management information systems, *Managerial Auditing Journal* 10(7), 25–32.
- Coombs, C.R., N.F. Doherty, and J. Loan-Clarke. 1999. Factors affecting the level of success of community information systems, *Journal of Management in Medicine* 13(3), 142–153.
- Davis, S.A., and B.P. Bostrom. 1993. Training end users: an experimental investigation of the roles of the computer interface and training methods, *MIS Quarterly* 17(1), 61–85.

- Day, G.S. 1991. Learning about markets. Marketing Science Institute Report 91-117. Marketing Science Institute, Cambridge, MA.
- de Geus, A.P. 1988. Planning as learning, *Harvard Business Review*, March-April, 70-74.
- DeLone, W.H., and E.R. McLean. 1992. Information systems success: The quest for the dependent variable, *Information Systems Research* 3(1), 60-94.
- DeLone, W.H., and E.R. McLean. 2003. The DeLone and McLean model of information systems success: A ten-year update, *Journal of Management Information Systems* 19(4), 9.
- Dewar, R.D., and J.E. Dutton. 1986. The adoption of radical and incremental innovation: an empirical analysis, *Management Science* 32, 1422-1443.
- Dixon, N.M. 1999. *The organizational learning cycle*, 2nd edition, Gower Publishing Limited.
- Droge, C., and R. Germain. 1991. Evaluating logistics management information systems, *International Journal of Physical Distribution & Logistics Management* 21(7), 22-27.
- Dweck, C.S. 1986. Motivational processes affecting learning, *American Psychologist* 41(10), 1040 – 1048.
- Ein-Dor, P., and E. Segev. 1978. Organizational context and the success of management information systems, *Management Science* 24, 1064 –1077.
- Farrell, M., and F. Mavondo. 2004. The effect of downsizing strategy and reorientation strategy on a learning orientation, *Personnel Review* 33(4), 383–402.
- Fiol, C.M., and M.A. Lyles. 1985. Organizational learning, *Academy of Management Review* 10(4), 803-813.
- Foong, S. 1999. Effect of end-user personal and systems attributes on computer-based information system success in Malaysian SMEs, *Journal of Small Business Management* 37(3), 81 – 87.
- Fulmer, R.M., P. Gibbs, and J.B. Key. 1998. The second generation learning organizations: new tools for sustaining competitive advantage, *Organizational Dynamics* 27(2), 6 – 20.
- Galer, G., and Kees van der Heijden. 1992. The learning organization: how planners create organizational learning, *Marketing Intelligence and Planning* 10(6), 5-12.
- Gardner, W., and D. Gundersen. 1995. Information system training, usage, and satisfaction – an exploratory study of hospitality industry, *Management Communication Quarterly* 9(1), 78-114.
- Garvin, D. 2000. *Learning in Action*, Boston, MA: Harvard Business School Press.
- Gist, M.B., C. Schwoerer, and B. Rosen. 1989. Effects of alternative training methods on self-efficacy and performance in computer software training, *Journal of Applied Psychology* 74, 884 – 891.
- Gulati, R., D. Bristow, and W. Dou. 2004. The impact of personality variables, prior experience, and training on sales agents' internet utilization and performance, *Journal of Business to Business Marketing* 11(1/2), 153 – 169.
- Hagood, W., and L. Friedman. 2002. Using the balanced scorecard to measure the performance of your HR information system, *Public Personnel Management* 31(4), 543 – 557.
- Harris, E., J. Mowen, and T. Brown. 2005. Re-examining salesperson goal orientations: personality influencers, customer orientation, and work satisfaction, *Academy of Marketing Science* 33(1), 19 – 36.

- Hasan, B. 2006. Effectiveness of computer training: the role of multilevel computer self-efficacy, *Journal of Organizational and End User Computing* 18(1), 50–69.
- Hendry, C., M.B. Arthur, and A.M. Jones. 1995. *Strategy through People*, London: Routledge.
- Henry, J., and R. Stone. 1994. A structural equation model of end-user satisfaction with a computer based medical information system, *Information Resources Management Journal* 7(3), 21 – 34.
- Hill, R. 1996. A measure of the learning organization, *Industrial and Commercial Training* 28(1), 19-25.
- Huber, G.P. 1991. Organizational learning: the contributing processes and the literatures, *Organization Science* 2(1), 88-115.
- Igarbaria, M. 1993. User acceptance of microcomputer technology: an empirical study, *Omega* 21(1), 73 – 90.
- Ives, B., and M. Olson. 1984. User involvement and MIS success: a review of the research, *Management Science* 30(5), 586–603.
- Kanungo S., S. Duda, and Y. Srinivas. 1999. A structured model for evaluating information systems effectiveness, *System Research and Behavioral Science* 16, 495–518.
- Khalil, O., and M. Elkordy. 1997. The relationship of some personal and situational factors to IS effectiveness: empirical evidence from Egypt, *Journal of Global Information Management* 5(2), 22–35.
- Lam, Y.L. 2001. Toward re-conceptualizing organizational learning: a multidimensional interpretation, *International Journal of Educational Management* 15(5), 212-219.
- Lees, J. 1987. Successful development of small business information systems, *Journal of Systems Management* 38(9), 32–39.
- Leonard-Barton, D. 1992. Core capabilities and core rigidities: a paradox in managing new product development, *Strategic Management Journal* 13, 111–125.
- Levitt, B., and J.G. March. 1988. Organizational learning, *Annual Review of Sociology* 14, 319-340.
- Lewis, K. 2004. Knowledge and performance in knowledge-worker teams: a longitudinal study of transactive memory systems, *Management Science* 50(11), 1519–1534.
- Lindley, E., and F. Wheeler. 2001. Using the learning square, *The Learning Organization*, 8(3/4), 114-123.
- Locke, E.A., and D.M. Schweiger. 1979. Participation in decision making: one more look, *Research in Organizational Behavior* 1, 265 – 339.
- Lubbe, S., and D. Remenyi. 1999. Management of information technology evaluation – the development of a management thesis, *Logistics Information Management* 12(1/2), 145-156.
- Lucas, H.C. 1975. Performance and the use of an information system, *Management Science* 21, 908 – 919.
- Mahmood, M.A., L. Hall, and D.L. Swanberg. 2001. Factors affecting information technology usage: a meta-analysis of the empirical literature, *Journal of Organizational Computing and Electronic Commerce* 11(2), 107-130.
- March, J.G. 1991. Exploring exploitation in organizational learning, *Organization Science* 2(1), 71 – 87.
- Mawhinney, C.H., and A.L. Lederer. 1990. A study of personal computer utilization by managers, *Information and Management* 18(5), 243 – 253.
- McDonald, R.E. 2002. *Knowledge Entrepreneurship: Linking Organizational Learning and Innovation*, Ph.D. dissertation, University of Connecticut.

- Meyer, A.D., and J.B. Goes. 1988. Organizational assimilation of innovation: a multilevel contextual analysis, *Academy of Management Journal* 31, 897 – 923.
- Moingeon, B., and A. Edmonson. 1996. *Organizational learning and competitive advantage*, Thousand Oaks, CA: Sage.
- Montazami, A.R. 1987. Factors affecting information satisfaction in the context of small business environment, *MIS Quarterly* 12(2), 239–256.
- Nelson, R., E. Whitener, and H. Philcox. 1995. The assessment of end-user training needs, *Association for Computing Machinery, Communications of ACM* 38(7), 27–39.
- Nevis, E., A. DiBella, and J. Gould. 1995. Understanding organizational learning systems, *Sloan Management Review* 36(2), 73 – 85.
- Nickell, G.S., and P. Sendo. 1986. The impact of attitudes and experience on small business computer use, *American Journal of Small Business* 10(4), 37–48.
- Nystrom, R.C., and W. Starbuck. 1984. To avoid organizational crises, unlearn, *Organizational Dynamics* 13, 53-65.
- Ortiz de Guinea, A., H. Kelley, and M.G. Hunter. 2005. Information systems effectiveness in small businesses: extending a Singaporean model in Canada, *Journal of Global Information Management* 13(3), 55-80.
- Pedler, M., J.D. Burgoyne, and T. Boydell. 1991. *The Learning Company*, London: McGraw Hill.
- Phofl, H.C., and W. Zollner. 1987. Organization for logistics: the contingency approach, *International Journal of Physical Distribution & Materials Management* 17(1), 3-16.
- Porac, J.F., and T. Howard T. 1990. Taxonomic mental models in competitor definition, *Academy of Management Review* 15(2), 224-240.
- Porter, M.E. 1996. What is strategy? *Harvard Business Review* 74(6), 61–78.
- Raymond, L. 1985. Organizational characteristics and MIS success in the context of small business, *MIS Quarterly* 9(1), 37-52.
- Remenyi, D., and M. Sherwood-Smith. 1999. Maximize information systems value by continuous participative evaluation, *Logistics Information Management* 12(1/2), 14-31.
- Rivard, S., and S.L. Huff. 1984. User developed applications: evaluation of success from the DP department perspective, *MIS Quarterly* 8(1), 39-50.
- Robbins, S.P. 1990. *Organization Theory: Structure, Design and Applications*, Englewood Cliffs, NJ: Prentice Hall.
- Romm, C.T., N. Pliskin, and W.D. Rifkin. 1996. Diffusion of E-mail: an organisational learning perspective, *Information and Management* 31(1), 37-47.
- Salaway. 1987. An organizational learning approach to information systems development, *MIS Quarterly* 11(2), 245-264.
- Sambrook, S., and J. Stewart. 2000. Factors influencing learning in European learning oriented organizations: issues for management, *Journal of European Industrial* 24(3/4), 209- 221.
- Seddon, P. 1997. A respecification and extension of the DeLone and McLean model of IS success, *Information System Research* 8(3), 240 – 253.
- Senge, P.M. 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*, New York: Doubleday.
- Senge, P.M. 1992. Mental models. *Planning Review* 20(44), 4-10.

- Serafeimidis, V., and S. Smithson. 1999. Rethinking the approaches to information systems investment evaluation, *Logistics Information Management* 12(1/2), 94-107.
- Shaw, N., J. Lee-Partidge, and J. Ang. 2003. Understanding the hidden dissatisfaction of users toward end-user computing, *Journal of End User Computing* 15(2), 1-22.
- Shaw, R.B., and D.T. Perkins. 1991. Teaching organizations to learn, *Organization Development Journal* 9, 1 – 12.
- Sinkula, J.M. 1994. Market information processing and organizational learning, *Journal of Marketing* 58, 35-45.
- Sinkula, J.M., W. Baker, and G.T. Noordewier. 1997. A framework for market-based organizational learning: linking values - knowledge and behavior. *Journal of the Academy of Marketing Science* 25 305-318.
- Slater, S.F., and J.C. Narver. 1994. Does competitive environment moderate the market orientation-performance relationship? *Journal of Marketing* 58, 46-55.
- Smeds. 1997. Organizational learning and innovation through tailored simulation games: two process re-engineering case studies. *Knowledge and Process Management* 4(1), 22-33.
- Smith, K.A., S.P. Vasudevan, and M.R. Tanniru. 1996. Organizational learning and resource-based theory: an integrative model, *Journal of Organizational Change Management* 9(6), 41-53.
- Stata, R. 1989. Organizational learning – The key to management innovation, *Sloan Management Review* 30(3), 63-74.
- Sujan, H., A. Barton, Weitz, and K. Nirmayla. 1994. Learning orientation, working smart and effective selling, *Journal of Marketing* 58, 39–52.
- Teare, R.E. 1998. Developing a curriculum for organizational learning, Part II, *Journal of Workplace Learning* 10(2), 95-121.
- Teo, H.H., C.Y. Tan, and K.K. Wei. 1997. Organizational transformation using electronic data interchange: the case of TradeNet in Singapore, *Journal of Management Information Systems* 13(4), 139–165.
- Tobin, D.R. 1993. *Re-Educating the Corporation: Foundations for the Learning Organization*, Essex Junction, VT: Oliver Wright.
- Torkzadeh, G., and W. Doll. 1993. The place and value of documentation in end-user computing, *Information and Management* 24(3), 147–158.
- Torkzadeh, G., and D.J. Dwyer. 1994. A path analytic study of determinants of information system usage, *Omega* 22(4), 339–349.
- Vallen, J.J. 1985. *Check in - check out: principles of effective front office management*, Dubuque, IA: W.C. Brown Publishers.
- Vandewalle, D., and L.L. Cummings. 1997. A test of the influence of goal orientation on the feedback seeking process, *Journal of Applied Psychology* 82(3), 390–400.
- Vermetten, Y.J., H.G. Lodewijks, and J.D. Vermunt. 2001. The role of personality traits and goal orientations in strategy use, *Contemporary Educational Psychology* 26, 149–170.
- Yaverbaum, G., and J. Nosek. 1992. Effects of information system education and training on user satisfaction, *Information and Management* 22(4), 217–226.
- Zantout, H., and F. Marir. 1999. Document management systems from current capabilities towards intelligent information retrieval: an overview. *International Journal of Information Management* 19, 471-484.
- Zeffane, R., and B. Cheek. 1993. Profiles and correlates of computer usage: a study of the Australian telecommunications industry, *Computers in Industry* 22, 53–69.

ABOUT THE AUTHOR

Vincent Cho is an associate professor in the Department of Management and Marketing at Hong Kong Polytechnic University. He obtained his Ph.D. from the Hong Kong Science and Technology University. His teaching interests are MIS, e-commerce, and IT strategies. His research interests include technology adoption, data mining, and expert systems. He has published in *Information & Management*, *Knowledge and Information Systems*, *Journal of Computer Information Systems*, *Expert Systems*, *Tourism Management*, and *Annals of Tourism Research*.