

Exploring the relationships between information technology adoption and business process reengineering

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ABSTRACT

This study investigates the impacts of information technology on business process reengineering from intra- and extra-organizational perspectives. This research proposes a framework for facilitating business process reengineering efforts towards competitive organizations. The framework was tested using data from a sample of 382 chief information officers or senior information systems managers, each of whom completed a survey. The survey results indicate that organizational innovation, market pressure and competitive intensity positively affect information technology adoption, which in turn trigger changes or business process in terms of workplace, workforce and business structure.

Keywords: information technology adoption, business process reengineering, organizational innovation

Many firms engaged in business process reengineering (BPR) projects and reported success in costs saving, quality breakthrough, better customer services, time reduction and revenue increases (Davenport & Short 1990; Hammer & Champy 1993; Morris & Brandon 1993). Various experts argue that information technology (IT) is one of the enablers of BPR because technologies can help business to reinforce their competitiveness (Zuboff 1988; Shin 2006). For example, Sarkar and Singh (2006) and Ziaul, Faizul and Ken (2006) think that

electronic commerce and enterprise resource planning technologies may change business practices to re-optimize business processes, which leads to increased efficiency and improved performance. Yet, how these technologies affect business practices and business processes remain unclear. Our research objective is to study how IT adoption/diffusion (hereafter, IT adoption) shapes business reengineering process. Prior research usually focuses on one or two enterprise applications, such as electronic commerce or enterprise resource planning. Most of them

investigate critical success antecedents or factors affecting adoption of a particular IT (Nah, Zuckweiler & Lau 2003; Wymer & Regan 2005; Al-Qirim 2007; Kang, Park & Yang 2008). As Henderson and Venkatvasman (1991, 1992) and Buckby, Best and Steward (2008) argue that strategic alignment of business and IT is necessary to efficiently use IT assets to assist business management and practices, enterprises have to change organization structure and processes to functionally integrated with internal and external variables. Business value can thus be delivered. We first argue that examination of one kind of technologies will not be a good approach to studying business reengineering. It ignores the mixed effects of various ITs on BPR and misses to offer a complete picture of the relationships between IT adoption and BPR. This paper therefore investigates two common enterprise-wide applications: Resource planning and e-commerce infrastructures (ZDNet Asia 2001; Epicor Software Corporation 2008a,b) to see how technology choices affect and shape BPR. The findings will be valuable in understanding the complexity of IT adoption and predicting outcome of BPR. Second, we identify key intra-organizational factors by including the aspects of innovation that would lead to organizational changes. Third, we argue that extra-organizational factors, competition intensity, market pressure, dynamic environment, could affect IT infrastructure and BPR. Fourth, we distinguish three dimensions of business process changes: long-distance working, impacts of outsourcing to work force and organizational structure to provide insights of organizational changes. Finally, we use data from CIOs in Taiwan top 2000 corporations to test our model.

Despite the importance of effects of IT adoption on BPR, previous studies either focused on theoretical discussion of successful factors of BPR and employed a case study approach that offers concrete lessons for implementation strategies based on a specific firm's experience (e.g. Barber & Weston 1998; Orman 1998; Paper & Chang 2005; Shin 2006). They may not give a

clue of generalization. Very few studies examined impacts of IT and changes of BPR together at the firm level. Sarkar and Singh (2006) review the literature on how IT infrastructure may trigger BPR and enable innovation in management processes. Ziaul, Faizul and Ken (2006) use a case study approach to obtain insights into ERP-led change management process. However, empirical data for such a linkage is rare in academic sense and practical meaning. In doing so, this research contributes to how intra- and extra-organizational antecedents affect IT adoption, which in turn leads contemporary firms to engage in BPR. We use data from CIOs in Taiwan top 2000 corporations to test our model. The objectives of this study are to identify changes necessary for firms to make so that firms can take full advantages of BPR through IT adoption.

LITERATURE REVIEW

Business Process Reengineering and the adoption of information technologies

Business process reengineering re-optimizes business processes, which is expected to improve business performance (Hammer 1990; Goll 1992; Hammer & Champy 1993). In most BPR cases, IT plays a critical role in reshaping business practices (Orman 1998; Ahadi 2004; Attaran 2004; Akhavan, Jafari & Ali-Ahmadi 2006; Freeman 2000; Hammer 1990; Hammer & Champy 1993; Venkatraman 1991) because it facilitates firms to gather and analyze information, develop strategic visions, find the best approach for process redesign and allow collaborative teamwork (Attaran 2004; Akhavan, Jafari & Ali-Ahmadi 2006; Freeman 2000; Venkatraman 1991). By acquiring new technologies and using them in business practices, the potential advantages can be fully realized (Zmud & Apple 1992). It should be noted that this paper focuses on IT adoption from the aspects of corporate decision, not individual decision. In many cases,

firms change the organizational structure to align with the adopted technologies in order to obtain positive business performance and better operational efficiency (Kang, Park & Yang 2008).

Various research reports discovery of critical success factors or determinants of IT adoption. For example, Nah, Zuckweiler and Lau (2003) survey chief information officers from Fortune 1000 companies and identify 11 important factors that are critical to the success of Enterprise Resource Planning (ERP). Among the factors, top management support, project champion, ERP teamwork and composition, project management and change management program and culture are the most critical ones. Kang, Park and Yang (2008) investigate impacts of ERP implementation on positive business performance. They find that standardization- and centralization-based integration, which is determined by the clarity of the ER objectives, coordination and control of activities of different business units, for successful implementation of ERP. Pan and Jang (2008) discover that technology readiness, size, perceived barriers and production and operations improvements positively influence ERP adoption within the communications industry. Wymer and Regan (2005) discover that need, company's innovativeness, competitive pressure, value of EC, government pressure, reliability of EC, prior experience are factors influencing EC adoption. Al-Qirim (2007) finds that organizational readiness (cost/financial and technical resources), industry competition and government pressure are most important determinants of EC adoption in small to medium-sized enterprises. However, empirical data are missing to examine the associations between IT adoption and BPR. As limited studies have explored the relationship between IT and BPR at the corporate level, it is worthy to investigate the impacts of IT on BPR.

From the literature, BPR is consisted of three dimensions resulting from technology adoption. The first one is organizational structure changes. Using IT, the degree of centralization of decision making has been changed. By sharing and

exchanging information through IT, business units diminish the process of mediation and increase cross-unit collaboration (Teng, Grover & Fiedler 1994; Sarkar & Singh 2006; Ziaul, Faizul & Ken 2006). As a result, employees can directly report to managers and the organizational hierarchies thus become flatter (Orman 1998). IT also enhances managers' information-processing capacity (Orman 1998) and increases managers' control (Karmarkar & Vandanal 2004; Karmarkar & Mangal, 2006).

The second one is changes of workplace. Various information and communication technologies collapse space and time constraints for people to work outside the office and engage in non-face-to-face coordination activities (Turban et al. 2002; Sarkar & Singh 2006; Ziaul, Faizul & Ken 2006). IT enables the staff to telecommunicate from home or other locations, send and receive multimedia data, exchange information, accomplish tasks by using electronic mail, teleconference and various Internet-based cooperation tools. Transportation costs can therefore be reduced (Sarkar & Singh 2006; Rock-Tenn Co. 2008).

The third one is workforce changes. IT activates series of automation in many business practices, such as supply chain management, order management, customer service management, which leads to cost drops and manpower reduction (Wymer & Regan 2005; Sarkar & Singh 2006; Ziaul, Faizul & Ken 2006). Contract out programming, network management, customer services and market research allowing firms to make alliances with organizations that are more professional or labor-intensive also lead to cost reduction (Kearney 2000; Dube Liu, Wynter & Xia 2007). Responding to automation and outsourcing, firms make radical redesign and optimize business process internally.

Factors affecting IT adoption by organizations

Potential enablers of IT adoption are selected from IS research and BPR literature. Intra-organizational factor (innovative organizational cul-

ture) and extra-organizational factors, competition intensity, market pressure, dynamic environment are included.

Innovative organizational culture

Enterprise culture determines if and how firms accomplish tasks by using the new IT (Chatterjee et al. 1992) to obtain competitive advantages and efficiency. We first turn to BPR related research and find that innovation is the most important and intrinsic culture that firms have to approach process change (Edwards & Gordon 1984: 1). If individuals in firms perceive that changes and creativity are actively encouraged, BPR tends to have greater chance to succeed (Paper 1998; Paper & Chang 2005; Bock et al. 2005). Technologies diffused more quickly and smoothly if organizational innovativeness is a firm's culture (Al-Qirim 2005, 2007). In a company that possesses organizational innovativeness, individuals are more likely to learn, share information and take reasonable risks (Bock et al. 2005). Many studies have confirmed that there is a positive association between organizational innovativeness and new technology acceptance (Premkumar & Roberts 1999; Nystorm Ramamurthy & Wilson 2002; Srinivasan Lilen & Rangaswamy 2002; Bock et al. 2005). We therefore hypothesize that organizational innovativeness positively affects firms' technology acceptance.

Market pressure

Market pressure refers to the pressure to adopt the same or similar technologies when other entrepreneurs in the industry adopt certain technologies (Premkumar & Ramamurthy 1995). According to the literature on IT adoption, the degree of market pressure is a significant determinant for firms to adopt new technology. There are two major sources of this important environmental condition: One is from pressure of industry value chain (Bouchard 1993; Pflughoeft et al. 2003; Al-Qirim 2005, 2007). According to Bouchard (1993) and Pflughoeft et al. (2003), powerful buyers and sup-

pliers on the value chain and competitors are major sources of the pressure. On the value chain, powerful buyers and suppliers often exercise market power to impose demands on their weaker buyers and suppliers to use new information technologies (Bouchard 1993; Iacovou et al. 1995; Pflughoeft et al. 2003). The other pressure comes from competitors (Pflughoeft et al. 2003; Wymer & Regan 2005; Al-Qirim 2005, 2007). New IT facilitates data processes and analysis for operation efficiency and decision making (Porter 2001). By adopting the latest information technologies, competitors may increase market responsiveness and enhance their competitive positions (Henderson & Venkatvasman 1992; Thong 1999; Al-Qirim 2005). This pressure compels enterprises to do the same fearing that doing otherwise would put them into competitive disadvantages (Raymond 1992; Cragg & King 1993; Thong 1999; Porter 2001).

Competition intensity

Competition intensity refers to the degree of market dominance by a few market players. In a more intensified competition, firms' strategies are affected by competitors, especially the dominant ones (Xu, Zhu & Gibbs 2004; Zhu, Kraemer & Xu 2006). The leader firms have competitive advantages of lower cost, financial strength, better knowledge and experience of the market, or solid distribution capabilities. Non-dominant firms have limited financial and managerial resources to compete with the dominant ones (Berry 2006). By adopting new IT, firms are able to communicate with ease and high speed. The market data can be transferred into competitive information quickly, and, costs of production, administration, service and distribution may be reduced. With advanced functionalities of the new technology, firms gain competitive advantages hoping to outperform rivals. New IT enables firms to obtain a more favorable market position (Porter & Millar 1985; Henderson & Venkatvasman 1992; Xu, Zhu & Gibbs 2004; Zhu, Kraemer & Xu 2006). In a market of high-

er intensified competition, adopting new technology is a rationale strategy to compete. It is therefore reasonable to expect a positive influence of competition intensity on IT adoption.

Dynamic environment

Business environments continuously change. They are hypercompetitive and complex. Such environments are often unpredictable and volatile (Miller & Friesen 1983; D'Aveni 1995) and therefore pose great challenges for firms to set strategies that fit environmental characteristics (Bourgeois & Eisenhardt 1988; Majumdar 2000). In such turbulent environments, firms tend to be more aware of the need to accept new technology for handling business routines, analyzing market trends and making decisions quickly and efficiently (Boyer 1999; Boyer & Lewis 2002; Anand & Ward 2004; Pavlou, 2004; Bhatt & Grover 2005) in order to keep their competitive positions (Subramanian & Nilakanta 1996; Khanna et al. 1998; Pavlou 2004). Many studies elucidate the benefits of using advanced technologies. Wooldridge and Jennings (1995) find that advanced information technologies advance effective management with autonomy (meaning the technology solves problems without users' guidance) and flexibility (meaning the technology responds quickly to user needs and task changes). The information technologies possessing cooperative ability and learning ability also offer new opportunities and assist strategic planning in a volatile environment (Fink 1994; Walden, Carlsson & Liu 2000). Zarour, Boufai-da and Seinturier (2004) and Ahn and Park (2004) discover that facing rapid changes and unpredictable situations in a dynamic environment, firms adopt EC (Zarour et al. 2004; Ahn & Park 2004) and ERP (Rothenberg & Sygldopoulos 2007) technologies to obtain flexibility and adaptability for better performance. Pavlou (2004) identifies three essences of environment dynamics: (1) customers' product preferences often change; (2) companies within the industry are sensitive to market turbulences; (3) any

change in the market is unpredictable and uncertain. He argues that dynamic environments push corporations to adopt new IT, which leads corporations to develop capabilities to build a competitive advantage.

HYPOTHESIS

Electronic commerce (Sarkar & Singh 2006) and resource planning (Ziaul, Faizul & Ken 2006) infrastructures enable organizations to re-engineer the organizational structure, workplace and manpower. By employing IT, the organization structure become flatter with efficient decision making (Teng, Grover & Fiedler 1994; Sarkar & Singh 2006; Ziaul et al. 2006) and the staff can work and cooperate by telecommunicating each other outside the office (Sarkar & Singh 2006; Ziaul et al. 2006). IT also allows organizations to function efficiently with less manpower (Wymer & Regan, 2005; Sarkar & Singh 2006; Ziaul et al. 2006). We thus develop the following hypotheses:

Hypothesis (1a)-(1b). IT adoption has significant positive impacts on organizational workplace (*IOWP*). IT technology impacts on organizational workplace is a positive function of firm's adoption on resource planning infrastructure (*RPS*) (1a) and its adoption on e-commerce infrastructure (*ECI*) (1b). In other words, the impacts of organizational workplace depend on whether a firm adopts resource planning infrastructure (1a) and e-commerce infrastructure (1b).

Hypothesis (1c)-(1d). IT adoption has significant positive impacts on organizational workforce (*IOWF*). IT technology impacts on organizational workforce is a positive function of firm's adoption on resource planning infrastructure (1c) and its adoption on e-commerce infrastructure (1d). That is, the impacts of organizational workforce depend on whether a firm adopts resource planning infrastructure (1a) and e-commerce infrastructure (1b).

Hypothesis (1e)-(1f). IT adoption has significant positive impacts on organizational structure (IOS). IT technology impacts on organizational structure is a positive function of firm's adoption on resource planning infrastructure (1e) and its adoption on e-commerce infrastructure (1f). That is, the impacts of organizational structure depend on whether a firm adopts resource planning infrastructure (1e) and e-commerce infrastructure (1f).

The literature suggest that the firm's innovative culture, market pressure, competition intensity and dynamic environment are important determinants affecting IT adoption and usage, which leads to organizational changes that allow firms to obtain a competitive advantages. Companies possessing innovative culture tend to accept EC technologies to learn, share information, conducting transactions and serve customers (Premkumar & Ramamurthy 1995; Srinivasan Lilen & Rangaswamy 2002; Al-Qirim 2005; Wymer & Regan 2005; Al-Qirim 2007). Market pressure makes firms to adopt EC technologies to respond suppliers' expectation, match competitors' market, meet customers' requirements (Premkumar & Ramamurthy 1995; Pflughoeft et al. 2003; Al-Qirim 2005, 2007; Wymer & Regan 2005). The more intense the competition is, the more likely that firms adopt EC technologies in order to obtain competitive advantages by reducing costs of production, administration, communication, service and distribution (Xu, Zhu & Gibbs 2004; Zhu, Kraemer & Xu 2006). These factors might mediate BPR through the acceptance of ERP infrastructure (Premkumar & Ramamurthy 1995, 1999; Thong 1999; Anand & Ward 2004; Zarour, Boufaida & Seinturier, 2004; Bhatt & Grover 2005; Huq Huq & Cutright 2006). In addition, several studies show that facing a dynamic environment, firms tend to adopt EC (Zarour, Boufaida & Seinturier 2004; Ahn & Park 2004) and ERP (Rothenberg & Syglidopoulos 2007) technologies. The following hypotheses are therefore proposed:

Hypothesis (2a)-(2d). A firm's IT adoption on resource planning infrastructure is a positive function of the firm's innovative culture (IC) (2a), market pressure (MP) (2b), competition intensity (CI) (2c) and dynamic environment (DE) (2d). In other words, the level of a firm's IT adoption on resource planning infrastructure depends on whether the firm has innovative culture (2a) and faces high market pressure (2b), strong competition intensity (2c) and dynamic environment (2d).

Hypothesis (2e)-(2h). A firm's IT adoption on e-commerce infrastructure is a positive function of the firm's culture (2e), market pressure (2f), competition intensity (2g) and dynamic environment (2h). In other words, the level of a firm's IT adoption on e-commerce infrastructure depends on whether the firm has innovative culture (2e) and faces high market pressure (2f), strong competition intensity (2g) and dynamic environment (2h).

Figure 1 presents the IT-BPR model proposed by this study. It assumes that intra-organizational factors, e.g. innovative culture and extra-organizational factors, e.g., market pressure, competition intensity and dynamic environments, affect IT adoption on resource planning and e-commerce infrastructure. The IT adoption then leads to reengineering on workplace, workforce and organizational structure.

The preceding theoretical arguments and our proposed model can be formally stated by the following system of simultaneous regression models.

$$IOWP = w_1 * RPI + w_2 * ECI$$

$$IOWF = w_3 * RPI + w_4 * ECI$$

$$IOS = w_5 * RPI + w_6 * ECI$$

$$RPI = w_7 * IC + w_8 * MP + w_9 * CI + w_{10} * DE$$

$$ECI = w_{11} * IC + w_{12} * MP + w_{13} * CI + w_{14} * DE$$

METHODS

Based on the preceding theories and hypotheses, this section details the subsequent constructs and

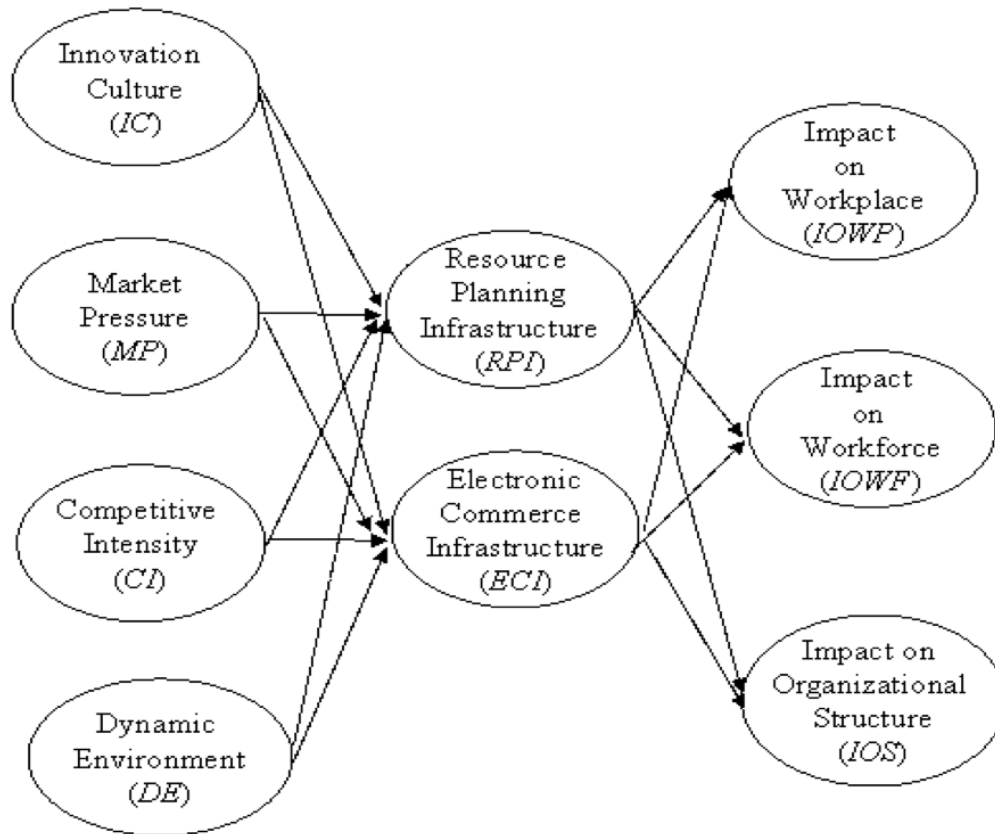


FIGURE 1: THE IT-BPR MODEL

questionnaire items and the survey settings to collect the empirical data from the senior information systems managers of organization units that make independent decisions on information and communications technologies systems.

Instrument development

Table 1 shows the detailed constructs in the proposed IT-BPR model. The items selected for the constructs in our model are mainly adapted from prior studies to ensure content validity. For example, organizational culture was evaluated in terms of organizational innovativeness, which refers to organizational encouragement for new innovations, changes and creativity. It

was operationalized using three items adapted from (Bock et al. 2005). Market pressure refers to the stress for firms to adopt IT. Three items from Pflughoeft et al. (2003) are used to assess sources of pressure: suppliers, buyers and competitors. Competition Intensity is defined as the degree to which firms are affected by competitors (Zhu, Kraemer & Xu 2006). Dynamic environment refers to unpredictability and volatility of the business environments. Three items modified from Pavlou (2004) are used to measure the instability and turbulence of the environments.

The final questionnaire, developed partially in accordance with the Business Information Technologies project¹, includes two major parts. The

¹ The Business and Information Technologies (BIT) project, lead by researchers at UCLA Anderson School of Management, investigates the impact of new information technologies on business practices and industry structure (Karmarkar & Vabdaba 2004). Special focus is on 'the Internet phenomenon' that essentially drives the rapid advances of information technologies.

first part is composed of thirty-six questions as shown in Table 1. We distinguish between two types of IT adoption: resource planning infrastructure (including Enterprise Resource Planning, Supply Chain Management, Business Intelligence, Business Process Modeling, Content Management, Customer Relationship Management) and e-commerce infrastructure (including SAN, NAS, Website and E-Commerce, Enter-

prise Instant Messaging (IM), Wireless Network Connectivity Hardware and Software such as Wi-Fi, Wireless LANs, etc., Collaboration & Portal Tools (document management, portal, collaboration, etc.). The second part contains information about the surveyed company, including size, industry type and capitals.

The first eleven items in Table 1 stand for the independent variables that measure the theoretic-

TABLE 1: DETAILED CONSTRUCTS AND QUESTIONNAIRE ITEMS

Code Name	Questions	Positive (%)	Neutral (%)	Negative (%)	Mean	SD
Internal organization factor – Innovation Culture (INC) (Cronbach's $\alpha = 0.91$)						
<i>IC₁</i>	My company encourages employees to suggest ideas for new opportunities.	79.5	14.9	5.6	3.78	0.86
<i>IC₂</i>	My company encourages employees to find new methods to perform their tasks.	69.6	22.8	7.6	3.62	0.87
<i>IC₃</i>	My company puts much value on taking risk even that turns out to be a failure.	76.3	19.3	4.4	3.77	0.85
External organization factor – Market Pressure (MP) (Cronbach's $\alpha = 0.85$)						
<i>MP1</i>	My company wants to meet customers' expectation all the time.	73.4	14.3	12.3	3.48	0.97
<i>MP2</i>	My company wants to meet suppliers' expectation all the time.	59.7	21.9	18.4	3.14	0.94
<i>MP3</i>	My company wants to catch up with competitors all the time.	72.0	13.7	14.3	3.44	0.97
External organization factor – Competitive Intensity (CI) (Cronbach's $\alpha = 0.88$)						
<i>CI₁</i>	Market is very competitive in our kind of industry.	81.9	10.2	7.9	3.86	0.87
<i>CI₂</i>	There are many competitors in our kind of industry.	71.1	14.9	14.0	3.64	0.97
External organization factor – Dynamic Environment (DE) (Cronbach's $\alpha = 0.82$)						
<i>DE₁</i>	Customers' product preference in our kind of business changes a lot over time.	50.3	19.6	30.1	3.14	1.07
<i>DE₂</i>	Our kind of industry is very sensitive to market change.	66.1	19.3	14.6	3.53	0.98
<i>DE₃</i>	Environment changes in our kind of industry are very difficult to forecast.	54.7	21.6	23.7	3.28	1.00
ICT Technology Adoption – Resource Planning Infrastructure (RPI) (Cronbach's $\alpha = 0.72$)						
<i>RPI₁</i>	Enterprise resource planning (ERP)	53.5	25.7	20.8	3.26	0.97
<i>RPI₂</i>	Business Intelligence	19.3	44.7	36.0	2.59	0.93
<i>RPI₃</i>	Content management	17.3	38.3	44.4	2.43	0.93
<i>RPI₄</i>	Supply chain management (SCM)	14.3	40.7	45.0	2.38	0.89

(Continued)

TABLE 1: DETAILED CONSTRUCTS AND QUESTIONNAIRE ITEMS (Continued)

Code Name	Questions	Positive (%)	Neutral (%)	Negative (%)	Mean	SD
ICT Technology Adoption – E-commerce Infrastructure (ECI) (Cronbach's $\alpha = 0.78$)						
<i>ECI₁</i>	Storage area networks (SAN) and network attached storage (NAS)	37.1	37.8	25.1	3.04	0.94
<i>ECI₂</i>	Wireless network connectivity hardware and software such as Wi-Fi, wireless LANS, etc.	53.8	29.2	17.0	3.34	0.92
<i>ECI₃</i>	Collaboration & portal tools (document management, portal, collaboration, etc.?)	37.1	39.8	23.1	3.05	0.93
<i>ECI₄</i>	Business process modeling	21.1	40.3	38.6	2.56	0.96
<i>ECI₅</i>	Enterprise instant management (IM)	25.4	39.8	34.8	2.69	0.98
<i>ECI₆</i>	Digital receipts	7.6	34.8	57.6	2.07	0.76
<i>ECI₇</i>	Website and e-commerce	66.7	23.1	10.2	3.59	0.79
Business Process Reform – Impacts on Workplace (IOWP) (Cronbach's $\alpha = 0.82$)						
<i>IOWP₁</i>	More employees are telecommuting.	55.2	21.1	23.7	3.23	1.03
<i>IOWP₂</i>	Use of teleconferencing is on the rise.	59.9	19.0	21.1	3.35	1.03
<i>IOWP₃</i>	The proportion of employees facing a screen is increasing.	86.8	7.9	5.3	3.98	0.70
<i>IOWP₄</i>	Collaboration between workers from the use of internet-based collaboration tools is increasing.	69.6	20.2	10.2	3.61	0.83
<i>IOWP₅</i>	The demand for intelligence in information at executive levels is increasing.	80.7	13.7	5.6	3.85	0.69
Business Process Reform – Impacts on Workforce (IOWF) (Cronbach's $\alpha = 0.60$)						
<i>IOWF₁</i>	Automation of functions is leading to workforce reductions.	27.2	49.1	23.7	3.21	0.89
<i>IOWF₂</i>	The need for IT skills at lower levels is going up	71.6	19.6	8.8	3.67	0.76
<i>IOWF₃</i>	Outsourcing is leading to workforce reductions	39.2	34.5	26.3	3.05	0.88
<i>IOWF₄</i>	Automated monitoring of workforce productivity is increasing.	70.4	24.9	4.7	3.68	0.62
<i>IOWF₅</i>	The IT function is shifting from staff to line.	50.6	33.3	16.1	3.30	0.81
<i>IOWF₆</i>	Workers need to retrain constantly to keep up with changing technologies.	91.8	5.6	2.6	4.13	0.62
Business Process Reform – Impacts on Organizational Structure (IOS) (Cronbach's $\alpha = 0.40$)						
<i>IOS₁</i>	The number of middle level managers is decreasing.	67.8	8.2	24.0	3.03	0.78
<i>IOS₂</i>	The span of control for most managers is widening.	68.7	24.3	7.0	3.70	1.24
<i>IOS₃</i>	The organization is becoming flatter.	55.0	31.0	14.0	3.42	0.78

cal constructs serving as predictors of the IT technology adoption in Figure 1.

Survey settings

The survey was sent to Chief Information Officers or senior information systems managers of

various organizations. For business organizations, questionnaires were mailed to over 2,000 companies by systematically sampling the database of the largest 5,000 corporations in Taiwan. Of all 2,000 questionnaires distributed, 342 valid questionnaires were returned, with

an effective response rate of 17.1 percent. This low response rate is not uncommon in the management area of obtaining responses from top management (Ferratt, Agarwal, Moore & Brown 1999).

Among these 342 private organizations, 'Manufacturing (38.3%)' accounts for the largest pool, followed by 'Service (28.1%)', 'Information and Communication products (12.9%)', 'Information & Communication (9.9%)', 'Mass Media (9.9%)', 'Corporate & Finance (9.9%)', and 'Others (9.4%)'. The annual revenue of these organizations range from below US\$100 million to above US\$1 billion; and they employ from fewer than 50 to more than 1,000 workers. Among these organizations, 35.5% organizations with fewer than 100 employees are categorized as small organizations and 18.7% organizations with more than 1,000 employees are large ones.

RESULTS

In addition to descriptive statistical summaries, structural equation modeling was utilized to test the integrated ETS model by software packages using SPSS and LISREL 8.3 software packages (Joreskog & Sorbom 1993). We first present the CIOs' points of view in terms of individual measurements in Table 1. We then report the overall fitness of the proposed model, followed by a discussion on the statistical results for the examined hypotheses and their discussions.

Evaluations of the individual measurements

Internal/external organization factors

Near seventy percent of our respondents think their companies encompass innovative culture by encouraging their employees to suggest ideas for new opportunities and emphasizing the value of taking risk even that turns out to be a failure. Also, they think their companies have certain degree of market pressure from customers and competitors (but not as much from their suppli-

ers) because they want to meet customers' expectation and to catch up with competitors all the time. As for the competitive intensity, more than seventy percent of our surveyed CIOs agree that they have many competitors and as a result, the market in their kind of industry is very competitive. Furthermore, they think their kind of industry is very sensitive to market change and environmental changes in their industry are not easy to forecast at all.

Business process reengineering

Overall, the proportion of employees facing a screen and using the teleconferencing is increasing. Demand for intelligence in information at executive levels is increasing significantly. Moreover, collaboration between workers from the use of internet-based collaboration tools is increasing as shown in Table 1.

Also, most (91.8%) CIOs agreed that workers and employees need to retrain constantly to keep up with changing technologies. Automated monitoring of workforce productivity is also increasing. Furthermore, the span of control for most managers is widening and the number of middle level managers is felt to be decreasing. With 55.0% of organizations agreed that their organizations are becoming flatter.

Quality of the proposed model

The first confirmatory factor analysis was performed and the results indicated a mediocre fit for the model and a moderate degree of scale reliability and convergent validity, except for some measures of business process reform. Based on the conventional procedures of structural equation modeling (Joreskog & Sorbom 1993), the path coefficients of questionnaire items $IOWP_3$ (The proportion of employees facing a screen is increasing.), $IOWP_5$ (The demand for intelligence in information at executive levels is increasing.), $IOWF_3$ (Outsourcing is leading to workforce reductions.), $IOWF_6$ (Workers need to retrain constantly to keep up with changing technologies.) in Table 1 were

very small and insignificant and thus dropped. In addition, we add the paths from *IOWP* to *IOWF* and *IOWF* to *IOS* to explore the possible interactions among them. We then conducted the second confirmatory factor analysis on our revised model.

Figure 2 shows the resulting path coefficients, standard errors and their significance for the revised model. The results suggest a marginally good fit for our revised model, with chi-square statistics $\chi^2/df = 2.11$; normed fit index (NFI) = 0.92; comparative fit index (CFI) = 0.93; and root mean square error of approximation (RMSEA) = 0.057 and an acceptable degree of scale reliability, except for impacts on workforce

(*IOWF*) and impacts on organizational structure (*IOS*), which had lower than desirable internal consistencies². Based on these criteria, our revised model in Figure 1 is acceptable in terms of its degree of fitness to the empirical data based on the 342 CIOs (or similar position). It therefore can serve as the model to examine the hypothesized relationships developed above.

Results for hypotheses testing

As indicated in Figure 2, all path coefficients in the IT-BPR model are significant, with the exception of the paths (1) from competitive intensity to resource planning infrastructure, (2) from dynamic environment to resource planning

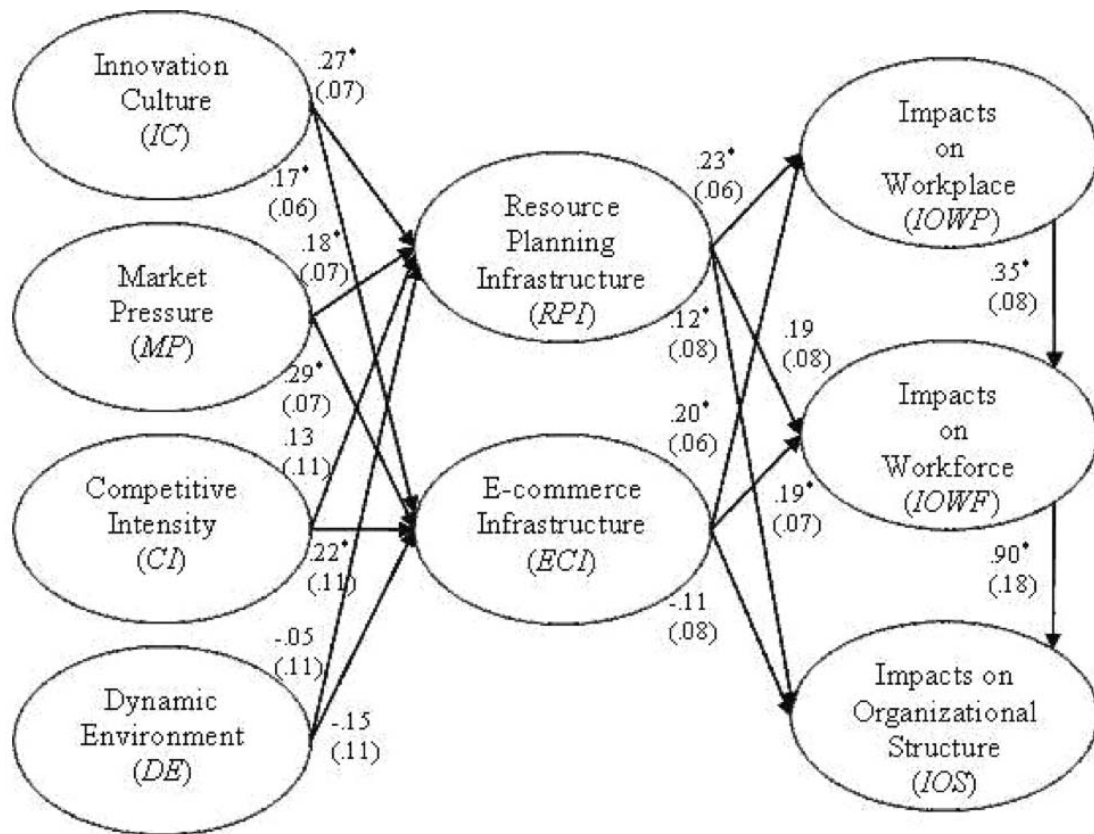


FIGURE 2: THE PATH COEFFICIENTS OF THE IT-BPR MODEL³

² According to Carmine's, & McIver (1981), the normed chi-square (χ^2/df) has an upper threshold, either 2.0 or 3.0. The chi-square value is subject to the sample size effects, the normed chi-square, however, has been shown to be somewhat unreliable (Hayduk, 1987). So researchers should always combine it with other goodness-of-fit measures (Hair, 1995).

³ Note. All numbers in Figure 2 are standardized. Standard errors are in parentheses.* $p < 0.05$.

infrastructure, (3) from dynamic environment to electronic commerce infrastructure, (4) from resource planning infrastructure to impacts on workforce and (5) from e-commerce infrastructure to impacts on organizational structure.

Determinants of business reform process

As hypothesized in the Hypotheses 1*a* and 1*e*, the IT adoption on resource planning infrastructure has significant impacts on organizational workplace and organizational structure, with the standardized path coefficients 0.23 and 0.12, respectively. As hypothesized in the Hypotheses 1*b* and 1*d*, the IT adoption on e-commerce infrastructure has significant impacts on organizational workplace and workforce, with the standardized path coefficients 0.20 and 0.19, respectively. The IT adoption on resource planning infrastructure does not reach substantial direct impacts on workforce, neither does the IT adoption on e-commerce infrastructure on the organizational structure. That is, both hypotheses 1*c* and 1*f* do not receive support. While inconsistent with some of the previous research findings, the overall results suggest that a firm's IT adoption – captured by their adoption on resource planning and e-commerce infrastructure – play an important role in affecting the firm's reform on workplace, workforce and structure.

In addition, the impacts of workplace influences on the impacts of workforce, the impacts of workforce further influences on the impacts of organizational structure with the standardized path coefficients 0.35 and 0.90 respectively. These results indicate that these three work-related impacts may have interaction mechanisms in play.

Determinants of IT adoption

Organizational innovative culture and market pressure both positively affected a firm's IT adoption on both resource planning and e-commerce infrastructure based on their standardized path coefficients (0.27, 0.18, 0.17 and 0.29, respectively) as shown in Figure 2. Thus, Hypotheses

(2*a*)-(2*b*) and Hypotheses (2*e*)-(2*f*) are clearly supported. The degree of competition intensity with the standardized path coefficients 0.20 has significant influence on a firm's IT adoption on e-commerce infrastructure (i.e. hypothesis 2*f* is supported); however, its influence on resource planning adoption is insignificant. Dynamic environment faced by a firm does not reach substantial direct influence on either the adoption of resource planning infrastructure or the adoption of e-commerce infrastructure (i.e. both hypotheses 2*d* and 2*b* are not supported).

CONCLUSION AND DISCUSSION

Most studies on BPR are either conceptual or case studies talking about success and failure factors of BPR, such as BPR strategy, use of consultants, reward systems, support of top management, training investment, a flexible management team, etc. This research further elaborates and elucidates theoretical underpinning on the relationship between BPR and IT. This paper proposes a conceptual model to examine anecdotes of BPR and the associations between BPR and IT with empirical evidence.

By investigating 342 senior information systems managers, the results conform to prior research that organizational innovativeness (Premkumar & Roberts 1999; Nystrom, Ramamurthy & Wilson 2002; Srinivasan, Lilen & Rangaswamy 2002; Bock et al. 2005) and market pressure (Premkumar & Ramamurthy 1995) positively affect the adoption of resource planning related technologies and electronic commerce related technologies. Competitive intensity (Porter & Millar 1985; Xu, Zhu & Gibbs 2004; Zhu, Kraemer & Xu 2006) positively affects the adoption of electronic commerce related technologies. Consistent with the prior research (Hammer 1990; Hammer & Champy 1993; Venkatraman 1991; Orman 1998; Freeman 2000; Ahadi 2004; Attaran 2004; Akhavan, Jafari & Ali-Ahmadi 2006), technologies facilitate firms to optimize business processes: Resource planning infrastructure has positive impacts on workplace and orga-

nizational structure but not on workforce. Electronic commerce infrastructure, on the other hand, has positive impacts on the workplace and workforce. It could be that the infrastructure facilitates trade and communication. Modification in organizational structure may not be necessary for the functionalities of trading and communication. The best practices to encourage the IT adoption, which will result in business process reengineering, would be sensitive observation and perception of demands of powerful buyers and suppliers in the value chain (Bouchard 1993; Iacovou et al. 1995; Pflughoeft et al. 2003), competitors' action (Pflughoeft et al. 2003). Nurturing organizational culture of innovativeness is another important action to boost IT adoption.

It should be noted that dynamic environment is not a significant determinant of resource planning and electronic commerce technology. This inconsistency with prior literature may be because (1) better cross-unit collaboration and information sharing through IT or (2) higher information-processing capacity of managers and increased managers' control (Teng, Grover & Fiedler 1994; Orman 1998; Karmarkar & Vandanal 2004; Sarkar & Singh 2006; Karmarkar & Mangal, 2006; Ziaul, Faizul & Ken 2006) compromise uncertainty and volatility of customers' product preferences and the market. Or, it may be that firms do not sense that the market is dynamic.

This paper makes three contributions to the BPR literature. First, it provides empirical evidence to examine impacts of dynamic environments, dynamic capabilities and information technology adoption on business process reengineering. Prior research on this topic usually focused on BPR theoretical discussion and implementation strategies based on a specific firm's experience. What has been largely missing is development of empirical evidence of generalization. This paper contributes to BPR literature by offering some insights and exploring BPR generalization. Second, though the positive impacts of IT on BPR have been reported in a

limited way, related intra- and extra-organizational factors have been neglected. This paper brought together insights from management literature and tested impacts of organizational innovation, market pressure, competitive intensity and dynamic environments on IT adoption. Lastly, research usually focuses on one or two enterprise application, such as KM or ERP and lack in offering a complete picture of the relationships between IT adoption and BPR. The findings will be valuable in understanding the complexity of various IT adoption and predicting outcome of BPR.

Despite all the care given to this study, there are several limitations of the present study that should be noted and addressed in any future research. First of all, the impact of changes in perception, with regard to the adoption of a new technology, has not been investigated in this research over any significant period of time. It is therefore recommended that further research should be undertaken to examine whether, with increasing experience over time, there is any reduction in the strength of the factors influencing technology adoption and BPR. Secondly, some researchers argued that IT infrastructure not only makes BPR possible, they are also interdependent to the extent that decision of the IT infrastructure constituents is dependent on the information requirements for the new business processes and BPR alternatives is determined by IT capabilities (Attaran 2004; Akhavan, Jafari & Ali-Ahmadi 2006). Further examination of this interdependency may help firms to develop better BPR implementation strategies. Finally, this paper does not cover impacts of external forces on the organizational adoption of new generation of technologies. Further investigation on the impacts should be carried on to see the driving forces for a corporate to upgrade their IT.

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References

- Ahn HJ and Park SJ (2004) A flexible transaction framework for dynamic collaboration of agents – with an online travel application, *International Journal of Cooperative Information Systems* 13(4): 487-520.
- Ahadi HR (2004) An examination of the role of organizational enablers in business process reengineering and the impact of information technology, *Information Resources Management Journal* 17(4): 1-19.
- Akhavan P, Jafari M and Ali-Ahmadi AR (2006) Exploring the interdependency between reengineering and information technology by developing a conceptual model, *Business Process Management Journal* 12(4): 517-534.
- Al-Qirim N (2005) An empirical investigation of an e-commerce adoption-capability model in small businesses in New Zealand, *Electronic Markets* 15(4): 418-37.
- Al-Qirim N (2007) A research trilogy into e-commerce adoption in small businesses in New Zealand, *Electronic Markets* 17(4): 263-285.
- Anand G and Ward PT (2004) Fit, flexibility and performance in manufacturing: Copying with dynamic environments, *Production and Operations Management* 13(4): 369-385.
- Attaran M (2004) Exploring the relationship between information technology and business process reengineering, *Information Management* 41(5): 585-596.
- Barber MI and Weston RH (1998) Scoping study on business process reengineering: Towards successful IT application, *International Journal of Production Research* 36(3): 575-601.
- Berry H (2006) Leaders, laggards and the pursuit of foreign knowledge, *Strategic Management Journal* 27(2): 151-168.
- Bhatt GD and Grover V (2005) Types of information technology capabilities and their role in competitive advantage: An empirical study, *Journal of Management Information Systems* 22(2): 253-277.
- Bock GW, Zmud RW, Kim YG and Lee JN (2005) Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces and organizational climate, *MIS Quarterly* 29(1): 87-111.
- Bouchard L (1993) Decision criteria in the adoption of EDI. In DeGross JL, Bostrom RP, Robey D (Eds). *Proceedings of the Fourteenth Annual International Conference on Information Systems*. Orlando, FL, 365-376.
- Bourgeois III LJ and Eisenhardt KM (1988) Strategic decision processes in high velocity environments: Four cases in the microcomputer industry, *Management Science* 34(7): 816-835.
- Boyer KK (1999) Evolutionary patterns of flexible automation and performance: a longitudinal study, *Management Science* 45(6): 824-842.
- Boyer KK and Lewis MW (2002) Competitive priorities: Investigating the need for trade-offs in operations strategy, *Production and Operations Management* 11(1): 9-20.
- Buckby S, Best P and Steward J (2008) The current state of information technology governance literature. In Cater-Steel A (Ed.). *Information Technology Governance and Service Management: Frameworks and Adaptations*, University of Southern Queensland, Australia.
- Carmine E and McIver J (1981) Analyzing models with unobserved variables: Analysis of covariance structures. In Bohmstedt GW and Borgatta EF (Eds), *Social Measurement: Current Issues*. Sage, Beverly Hills CA.
- Chatterjee S, Lubatkin MH, Schweiger DM and Weber Y (1992) Cultural difference and shareholder value in related mergers: Linking equity and human capital, *Strategic Management* 13(5): 319-334.
- Cragg PB and King M (1993) Small-firm computing: Motivators and inhibitors, *MIS Quarterly* 17(1): 47-59.
- D'Aveni RA (1995) Coping with hypercompetition: Utilizing the new 7's framework, *Academy of Management Executive* 9(3): 45-57.
- Davenport T and Short J (1990) The new industrial engineering: Information technology and business process redesign, *Sloan Management Review* 31(4): 11-27.
- Dube P, Liu Z, Wynter L and Xia C (2007) Competitive equilibrium in e-commerce: Pricing and outsourcing, *Computer and Operations Research* 34(12): 3541-3559.
- Edwards K and Gordon TJ (1984) *Characterization of Innovations Introduced on the U.S. Market in 1982*. Report Prepared for the U.S. Small Business Administration. The Futures Group, Washington DC.
- Epicor Software Corporation (2008a) *The 2007 ERP in Manufacturing Benchmark Report*. Epicor Software Corporation, Press Release, May, retrieved at July 14, 2008, available at <http://resources.ecommercetimes.com/ecommercetimes/search/browse/1529/1529.jsp>

- Epicor Software Corporation (2008b) *The Seven Megatrends of Professional Services*, Press Release, May, retrieved at July 14, 2008, available at <http://resources.ecommercetimes.com/ecommercetimes/search/browse/1529/1529.jsp>
- Ferratt TW, Agarwal R, Moore JE and Brown CV (1999) Observations from 'the front': IT executives on practices to recruit and retain information technology professionals, in Prasad J (Ed.) *Proceedings of the 1999 ACM SIGCPR Conference*. ACM Press, New York.
- Fink D (1994) Information system planning in a volatile environment, *Long Range Planning* 27(6): 107-114.
- Freeman R (2000) *The IT consultant: A commonsense framework for managing the client relationship*. Jossey-Bass Publications, San Francisco CA.
- Goll EO (1992) Let's debunk the myths and misconceptions about reengineering, *APICS The Performance Advantage* December: 29-32.
- Hair JF (Ed) (1995) *Multivariate data analysis with readings*. Prentice Hall, Englewood Cliffs NJ.
- Hammer M (1990) Reengineering work: Don't automate, obliterate, *Harvard Business Review* 68(4): 104-112.
- Hammer M and Champy J (1993) *Reengineering the corporation: A manifesto for business revolution*. HarperCollins, London.
- Hayduk LA (1987) *Structural Equation modeling with LISREL*. Johns Hopkins University Press, Baltimore MD.
- Henderson JC and Venkatraman N (1991) Understanding strategic alignment. *Business Quarterly*, 55(3): 72.
- Henderson JC and Venkatraman N (1992) Strategic alignment: A model for organizational transformation through information technology, in Kochan TA and Useem M (Eds), *Transforming Organizations*, Oxford University Press, New York: 97-117.
- Huq Z, Huq F and Cutright K (2006) BPR through ERP: Avoiding change management pitfalls, *Journal of Change Management* 6(1): 67-85.
- Iacovou CL, Benbasat I and Dexter AS (1995) Electronic data interchange and small organizations: Adoption and impact of technology, *MIS Quarterly* 19(4): 465-485.
- Joreskog KG and Sorbom D (1993) *LISREL8: A guide to the program and application*. SPSS INC, Chicago IL.
- Kang S, Park JH and Yang HD (2008) ERP alignment for positive business performance: Evidence from Korea's ERP market, *Journal of Computer Information Systems* 48(4): 25-38.
- Karmarkar US and Vandana M (2004) *The business and information technologies survey, Annual report 2003-2004*. Available at: <http://www.anderson.ucla.edu/documents/areas/ctr/bit/Annualreport.pdf>
- Karmarkar US and Mangal V (Eds) (2006) *The UCLA business and information technologies (BIT)*. UCLA, CA.
- Kearney T (2000) Why outsourcing is in, *Strategic Finance* 81(7): 34-39.
- Khanna T, Gultai R and Nohria N (1998) The dynamics of learning alliances: Competition, cooperation and relative scope, *Strategic Management Journal* 19(3): 193-210.
- Majumdar SK (2000) Sluggish giants, sticky cultures and dynamic capability transformation, *Journal of Business Venturing* 15(1): 59-78.
- Miller DP and Friesen H (1983) Strategy making and environment: The third link, *Strategic Management Journal* 4(3): 221-235.
- Morris D and Brandon J (1993) *Re-engineering your business*, McGraw-Hill, New York.
- Nah, FFH, Zuckweiler KM and Lau JLS (2003). ERP implementation: Chief information officers' perception of critical success factors, *International Journal of Human-Computer Interaction*, 16(1), 5-22.
- Nystorm PC, Ramamurthy K and Wilson AL (2002) Organizational context, climate and innovativeness: Adoption of imaging technology, *Journal of Engineering and Technology Management* 19(3-4): 221-247.
- Orman LV (1998) A model management approach to business process reengineering, *Journal of Management Information Systems* 15(1): 187-212.
- Paper D (1998) Business process reengineering and improvement: A comparison of US and Japanese firms, *Knowledge and Process Management* 5(3): 185-191.
- Paper D and Chang RD (2005) The state of business process reengineering: A search for success factors, *Total Quality Management* 16(1): 121-133.
- Pavlou PA (2004) *IT-enabled dynamic capabilities in the new product development: Building a competitive advantage in the turbulent environments*, Doctoral Dissertation, University of Southern California.
- Pflughoeft K, Ramamurthy K, Soofi ES, Yasai-Ardekani M and Zahedi FM (2003) Multiple conceptualization of small business web use and benefit, *Decision Science* 34(3): 467-512.
- Porter M and Millar V (1985) How information gives you competitive advantage, *Harvard Business Review* 63(4): 149-60.

- Porter ME (2001) Strategy and the Internet, *Harvard Business Review* 79(March): 63–78.
- Premkumar G and Ramamurthy K (1995) The role of interorganizational and organizational factors on the decision mode for adoption of interorganizational systems, *Decision Science* 26(3): 303–336.
- Premkumar G and Roberts M (1999) Adoption of new information technologies in rural small business, *The International Journal of Management Science* 27(4): 467–484.
- Raymond L (1992) Computerization as a factor in the development of young entrepreneurs, *International Small Business Journal* 11(1): 23–34.
- Rhim H, Park KT and Kim HI (2006) Impacts of information and communication technology adoption on business practices and performances: An exploratory study, in Uday S & Shin I (2006) Adoption of enterprise application software and firm performance, *Small Business Economics* 26(3): 241–256.
- Rock-Tenn Co. (2008) Saving millions in transportation costs, *Supply & Demand Chain Executive* 9(3): 46–47.
- Rothenberg S and Zyglidopoulos SC (2007) Determinants of environmental innovation adoption in the printing industry: the importance of task environment, *Business Strategy & the Environment* 16(1): 39–49.
- Sarkar AN and Jagjit S (2006) E-enabled BPR applications in industries banking and cooperative sector, *Journal of Management Research* 6(1): 18–34.
- Srinivasan R, Lilen G and Rangaswamy A (2002) Technological opportunism and radical technology adoption: An application to e-business, *Journal of Marketing* 66(3): 47–60.
- Subramaian A and Nilakanta S (1996) Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations and measures of organizational performance, *International Journal of Management Science* 24(6): 631–647.
- Teng JTC, Grover V and Fiedler KD (1994) Business process reengineering: Charting a strategic path for the information age, *California Management Review* 36(3): 9–31.
- Thong JYL (1999) An integrated model of information systems adoption in small businesses, *Journal of Management Information Systems* 15(4): 187–214.
- Turban E, King D, Lee J, Warkentin M and Chung MH (2002) *Electronic commerce: A managerial perspective*, Prentice Hall, Upper Saddle River NJ.
- Venkatraman N (1991) *IT-induced business reconfiguration, the corporation of the 1990s: Information technology and organization transformation*, Oxford University Press, New York.
- Walden P, Carlsson C and Liu S (2000) Industry foresight with intelligent agents, *Human System Management* 19(3): 169–181.
- Wooldridge MJ and Jennings NR (1995) Intelligent agents: Theory and practice, *The Knowledge Engineering Review* 10(2): 115–152.
- Wymer S and Regan E (2005) Factors influencing e-commerce adoption and use by small and medium businesses, *Electronic Markets* 15(4): 438–53.
- Xu S, Zhu K and Gibbs JL (2004) Global technology, local adoption: A cross-country investigation of internet adoption by companies in the United States and China, *Electronic Markets* 14(1): 13–24.
- Zarour N, Boufaida M and Seinturier L (2004) A negotiation framework for organizational information systems, *International Journal of Information Technology and Decision Making* 3(2): 213–238.
- ZDNet Asia (2001) E-commerce hits ERP. *ZDNet Asia news*, July 4, retrieved July 30, 2008, available at <http://www.zdnetasia.com/news/software/0,39044164,23130067,00.htm>
- Zhu D, Kraemer KL and Xu S (2006) The process of innovation assimilation by firms in different countries: A technology diffusion perspective on e-business, *Management Science* 52(10): 1557–1576.
- Zmud RW and Apple LE (1992) Measuring Technology Incorporation/Infusion, *Journal of Product Innovation Management* 9(2): 148–155.
- Zuboff S (1988) *In the age of the smart machine: The future of work and power*, Heinemann, Oxford.

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