# A Roadmap to Adopting Emerging Technology in E−Business − An Empirical Study

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## *Abstract*

This study explores the firm's readiness for developing emerging technology in e−business. By proposing a framework that captures technological, financial, and human capability within the firm and includes the environmental drivers of e−business, covering from partner willingness, capability, and power to collaboration readiness, this work develops a measurement model that organizations can evaluate how ready they are for the emerging e−business technology and what they should do to improve their readiness. Three−stage technology roadmap of emerging on−demand e−business is proposed. The results show that firms' and partners' individual capability are significant value drivers when firms are under low technology level, where the automation and integration is very limited. As firms start to develop more advanced e−business technology, collaboration readiness plays a critical role to determine the success. According to the results, each technology level has its own value enablers, and firms need to develop different adoption strategies to capture the value.

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# A Roadmap to Adopting Emerging Technology in E-Business – An Empirical Study

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## BACKGROUND

As Internet dissolves the boundaries of organizations, the manufacturers turn their usual intra-enterprise activities, for example, manufacturing, distribution, and purchasing to outside support from suppliers, utilities, transportation, and other providers of goods and services that are needed to make the product. Company value chains are transformed into horizontally integrated components, each focusing on its core competencies. Such horizontal value chain is especially evident in the high-tech industry. One recent PriceWaterHouseCoopers's report (Spring 2002) found a particular OEM in the PC sector can only control 10-20 percent of its spent and the rest takes place at thousands of strategic and secondary suppliers. In other words, the whole industry structure becomes more network-connected and involves more business partners.

Facing such changes, companies are taking steps to transform into e-business to deal with the increasingly complex interactions throughout the manufacturing cycle. The basic concept of e-business is to help companies develop such capabilities as global networking, streamlining business processes, sharing information, agility in responding to the market, and intelligent decision making (Shaw 2003). Yet, how these capabilities can be embodied into the companies is still not well known. Is there any emerging technology that can help companies capture these capabilities? How can these technologies be successfully implemented? To answer these questions, we need a more systematic examination of current e-business technology development, from the identification of key technology component, to the implementation roadmap by each technology, as well as adoption and diffusion of technologies inside the individual firms and outside partnering companies. More specifically, in this study, we will focus on two critical issues: (1) identification and management of emerging

technology in e-business and (2) strategic assessment of organizational/industrial e-business adoption. Our goal is to develop a roadmap for companies better developing the emerging e-business technologies, so they are able to design their own adoption paths and predict the value outcome.

## EMERGING TECHNOLOGY IN E-BUSINESS

Competition and shortened product cycles, along with the continuously expanded globalization drive up the needs to implement e-business technologies. On the one hand, a new level of integration among technologies and business processes must be achieved in today's environment. E-business organizations shift gradually from hierarchical to market oriented organizations (Shaw 2003). In this market-oriented structure, e-business technology is no longer sufficient to automate single processes in a vacuum. In contrary, it should allow companies to manage all critical business processes in a synchronized way to achieve optimal cost and service performance. Take transportation management system (TMS) as an example. An emerging TMS approach, proposed by i2 Technologies Inc. (2004), is to integrate the transportation planning and execution process to support a "planning while executing, executing while planning" approach. Comparing with the traditional "plan than execute" framework, this real-time planning model creates new business opportunities by enabling the creation and management of fused and ad hoc processes.

On the other hand, supply chain collaboration has gone far beyond simply delivering timely information. It may integrate the decision-making processes of a company with its trading partners. Therefore, if an exception arises such as buyers canceling orders or sellers failing to meet delivery commitments, both parties can achieve a mutual resolution more easily according to a common understanding of the

supply chain policies. Intel, for example, implements a collaborative order fulfillment system to integrate its order requisition process with its suppliers. The system can automatically send purchase orders (PO) to the suppliers. Many exceptions are handled automatically and corrected before the PO is sent to the suppliers, and rejected or changed POs are automatically routed back to they initiated. At the same time, the system will also notify the suppliers the new PO, send order change and cancellation confirmation if needed. If the PO can't be fulfilled the system will automatically send a notification of PO change to Intel. Both parties not only improve the mutual communication via real-time information sharing, but also enhance their ability to handle possible production variations collaboratively in advance.

Therefore, the emerging e-business technology should provide a new paradigm for supporting the integration among process, technology, and the supply chain players (including the key partners, suppliers, and customers) managing and acting upon them. This paradigm is basically a new kind of IT infrastructure that creates a modular operating environment connected by open standards, allowing companies to connect disparate systems into an interoperable and flexible infrastructure that can optimize computing resources within and across the enterprise. IBM describes such paradigm as "on-demand business" (2005), and views it as at least a $500 billion dollar potential market. The on-demand concept can potentially better integrate the people, processes, and information both within the enterprise and beyond. It also simplifies the management of resources across the network by removing technical incompatibilities and proprietary roadblocks. Thus, with this on-demand approach, the enterprise can improve information visibility and traceability, respond the customer demands quickly, and enhances the collaboration with key partners.

The emerging on-demand concept can be applied at several different levels: (1)

*the enterprise level*, where the enterprise business strategy is aligned with IT capabilities to enable a collaborative and responsive on-demand enterprise; (2) *the process level*, where the corporate value chain activities, such as design, procurement, production, logistics, and customer services, etc. can be managed in a modular way in order to quickly respond to change; (3) *the business modeling and application level*, where a business scenario including task description, resource required, and decision points is able to graphically depicted to show the core competencies that the enterprise should focus on; (4) *the capability level*, where the strategy, business modeling, process, and application are connected via a new class of methods and technologies that enables them to become more flexible to the dynamics of customers, markets, and competitors; (5) *the enabling technology level*, where the modular software components are dynamically defined, assembled, and manipulated to create the building blocks of on-demand business.

How far has the company evolved toward achieving on-demand business? Using a three-tiered approach, the table below outlines the technology roadmap of emerging on-demand business along the five axes of focus – enterprise, process, application, capability, and enabling technology. Stage one is established e-business technology, the lowest technology level. Stage two signifies the leading e-business technology, the intermediary adoption of on-demand business, and the stage three is the emerging e-business technology, the best practice of on-demand business.

At stage one, production planning and procurement is decentralized and disconnected, so the efforts may be duplicated or inefficient across the network. The applications only focus on improving the internal operation, and there is limited visibility both within and beyond the enterprise. The notification of ordering and shipping status is sent to suppliers on spreadsheet via email attachment or fax. The

logistics planning is done on decentralized basis, by distribution center or product line. There is no strategic network planning, with little shipment consolidation. Design lacks of centralized product data information. Most communication with supply chain partners is done via telephone or fax.

Table 1: Technology roadmap of emerging on-demand business

| Enterprise | Process | Stage I | Stage II | Stage III |
|---|---|---|---|---|
| **E-Business On-Demand** | **Design** | ■ Enterprise design process and control systems.<br>■ Engineering diagrams and documents management technology,<br>■ Manual data and process (Email, Fax) | ■ Collaborative Design data sharing and exchange systems.<br>■ Product definition management capability<br>■ Web-based data exchange、Workflow、Product Database | ■ Co-developing, online design collaboration;<br>■ Collaborative product definition management; Real-time change capability<br>■ Distribution shared memory platform; enterprise information integration |
| | **Procurement** | ■ Procurement data exchange systems<br>■ Electronic forms<br>■ Manual data and process (Email, Fax) | ■ e-Procurement application<br>■ Electronic ordering; automated receiving capability<br>■ EC Turkey、Web browser | ■ Strategic e-Sourcing<br>■ Optimal multi-party multi-issue negation capability<br>■ Agent-based integration、web-based bidding technology |
| | **Performance** | ■ Financial and accounting systems<br>■ Financial data analysis capability<br>■ Spreadsheet-based analysis | ■ Enterprise performance management systems<br>■ Locking backward diagnostics technology<br>■ Online analytical programming, data mining technology | ■ Supply chain performance metrics<br>■ Performance-driven business process planning and management technology<br>■ Comprehensive KPI reporting; scorecarding |
| | **Production** | ■ Material requirement planning<br>■ Capacity planning technology<br>■ Forward capacity computing | ■ Manufacturing resource planning<br>■ Single-tier available to promise capability<br>■ Some backhaul identification through manual means | ■ Advance Planning & Scheduling System<br>■ Multi-tier available to promise/ capable to promise/profitable to promise<br>■ Robust optimization algorithm |
| | **Logistics** | ■ Stock Management System; static routing decision support system<br>■ Heuristic transportation planning<br>■ Manual data and process; spreadsheet | ■ Reactive track & trace system; disintegrated transportation system<br>■ Static transportation management Tech<br>■ Local optimal algorithm | ■ Proactive track & trace systems; collaborative transportation management<br>■ Real-time Event-based Response Tech<br>■ Event model; Robust optimization algorithm |

Stage two begins to add automation and improve communication among previously independent business units, though the communication to outside partners is still inefficient. The procurement has automated the ordering and receiving processes with key partners, but the sourcing still relies on spreadsheet-based analysis. The logistics hasn't integrated the inbound and outbound shipment planning, and the

freight management is based on static routing guides. Production has some backhaul identification through manual means. Centralized design data source is ready for access, but co-developing is still limited.

When a company achieves stage three in multiple business processes, synergies result in greater supply chain visibility and traceability, better collaborative relations with supply chain partners, and real-time enterprise/supply chain. Strategic sourcing is enabled by web-based bidding leveraging combinatorial bid optimization capability. Procurement relies on automated contract management and compliance. Logistics combines inbound and outbound planning. Robust shipment optimization technology is implemented with dynamic routing guides. Business performance management solutions go beyond simply delivering timely information and insight -- they can make proactive recommendations and provide the underlying systems to implement them. Event-based planning, re-planning, and execution become prominent.

**THEORETICAL DEVELOPMENT**

The three stages of technology development constitute the bulk of where the real work will get done to build an on-demand business. No aspect of the emerging e-business on-demand will be successfully accomplished absent significant technology innovation. Conversely, IT by itself cannot meet the challenge, as its real power is an enabling human judgment and decision making, not replacing it. Therefore, although IT is an enabler to e-business, some firms are likely to find that even when they have implemented the same IT, the outcome of their e-business development differs. There should be a set of resources and capabilities that enable the effective use of emerging e-business technology, and thus impact firms' ability to develop successful e-business strategies. However, most firms lack a clear picture regarding what these capabilities

are and how these should be built. Nor do they know whether they are ready to deploy such e-business technology. Therefore, besides identifying the critical e-business technologies, there are many implementation and managerial issues that need to be addressed, e.g., assessing the capabilities and readiness of firms and partners at applying these techniques, exploring both enablers and barriers of e-business technology adoption and diffusion, and so on.

In this paper, we investigate the readiness of firms to capture the benefits of emerging e-business technology from three perspectives. Firstly, viewing the emerging e-business technology as a technological innovation (Rogers, 1995), we examine firm's technological and organizational readiness for reaping the benefits of e-business technology from an innovation diffusion perspective. Secondly, since the success of e-business technology might be affected by the environment where it is implemented, we also incorporate influences of environment readiness factors. Thirdly, as the e-business technology development usually follows up an implementation roadmap, from the lowest technology level to the best practice benchmark. Each readiness factor may have different performance influence under different technology level. As a result, we feel it is important to study the interaction effects of the readiness factors and technology level, which allows us to further identify the enablers of technology improvement, from the current technology level to the next.

We integrate the three perspectives into a conceptual framework. The dependent variable is the value of e-business adoption, which refers to the benefits that firms can reap from the implementation of e-business technology. We examine three groups of factors influencing the value of e-business adoption:

(1) On the e-business readiness side, we choose two of the commonly studied

innovation enablers: technology readiness and organizational readiness.

(2) On the environment readiness side, we focus on three dimensions: supply chain readiness, collaboration readiness, and power.

(3) Further, five hypotheses are made to explore the influential readiness factors given certain technology level.

These factors, as well as associated hypotheses, are elaborated below.

**E-Business Readiness**

The technological characteristics (e.g. IT infrastructure, IT sophistication, IT capability) that either encourage or inhibit adoption intention has been widely examined in the innovation diffusion literature (Rogers 1995). For instance, Pare and Raymond (1991) posit that IT sophistication influences firm's level of technological expertise (e.g. level of systems integration, level of automation and standards maturity), while Premkumar and Ramamurighy (1995) indicate that IOS adoption should be accompanied by necessary IT infrastructure (e.g. hardware, software, application and network). Therefore, we posit that firms with more IT resources should be more ready to capture the benefits of e-business technology, which leads to the following hypotheses:

*H1a: Firms with greater technology readiness are more likely to have better performance*

To study the influence of organizational readiness, we draw upon the perspectives of organizational innovativeness (Damanpour 1992, Grover 1993, Wolfe 1994, Premkumar & Ramamurthy 1995, Crook & Kumar 1998). Based on their findings, organizations with financial and human resources available for IT investments are more possible to adopt successfully. In line with their perspectives, firms that have greater financial and human resources for e-business investments are

more likely to successfully implement e-business technology. Hence, we put forward the following hypothesis:

*H1b: Firms with greater financial and human resources are more ready to capture the e-business benefits*

**Environment Readiness**

Beyond the walls of the organization, supply chain readiness is recognized as significant factor to influence the diffusion process. This study defines supply chain readiness as the willingness and capability of supply chain partners to develop e-business technology. The willingness of supply chain partner reflects the extent to which the supply chain partners perceive the advantages provided by the e-business technology (Iacovou et al. 1995). The capability of supply chain partners measures the level of partners' necessary skill and staff for e-business development (Crook and Kumar 1998). Therefore, the combination of the two factors represents supply chain readiness for e-business development, which may enhance the e-business performance:

*H2a: Firms facing higher level of supply chain readiness are more likely to have better e-business performance*

Since the adoption of e-business technologies require more tight coordination and cooperation between at least two organizations (Zhu et al. 2003), whether a firm has the capability to collaborate well with its trading partners becomes important to the success of e-business (Angeles and Nath 2000). We measure the collaboration readiness in two dimensions: trust and complementarity. Based on Dwyer, Schurr, and Oh (1987), trust is defined as "the belief that a party's word or promise is reliable and the party will fulfill his/her obligations in an exchange relationship". Complementarity is defined as the compatibility in goals and technological

capabilities of alliance partners (Bensaou 1997, Dyer and Singh 1998). Thus, we expect that firms with greater collaboration readiness may perform better in developing e-business technology, as hypothesized below:

*H2b: Firms with greater collaboration readiness are more likely to have better e-business performance*

Power has long been recognized as an important factor in the adoption literature (Hart and Saunders 1998). Often the powerful companies provide software free of charge, long term incentive, risk sharing, education seminar, and cost subsidy to less power company who otherwise may not be able to justify the investment (Riggins and Mukhopadhyay 1994, Wang and Seidmann 1995). Thus, we hypothesize a positive association between power and e-business performance:

*H2c: Firms facing higher level of partner power are more likely to gain better e-business performance*

**Technology Level**

After examining the main effects of e-business readiness and environment readiness, we proceed to study the variation of significance of these readiness factors among different technology levels. That is, we want to explore how the impacts of these readiness factors on e-business performance may differ as the technology level changes. By studying these differences, we seek to capture the theoretical perspective that firms in different technology level should implement different implementation strategy, giving that some readiness factors may have higher performance impact than others in a given technology level.

We first examine the readiness factors in low-to-medium technology level. According to Table 1, when technology level is lower, the e-business applications are simple and isolated. We can expect firms in this level do not have sufficient e-business

capability for the improvement of their operations. By collecting more financial aids and top management support, as well as enhancing technology foundations, firms might be able to adopt e-business technology, moving the technology level right upward. We theorize that technology readiness and organization readiness are more significant in low technology level when most of the business processes are manual. Therefore, we put forward the following hypotheses:

*H3a: The influence of technology readiness on e-business performance will be stronger given lower technology level.*

*H3b: The influence of organization readiness on e-business performance will be stronger given lower technology level.*

We then examine how the significance of readiness factors varies when technology level is higher. In general, firms under higher technology level are those that have implemented some system-to-system integration to support the sharing of data or process automation. Their IT capability and resources should achieve a certain level until firms can start to implement these technologies. However, firms' own e-business capability is not sufficient for developing a good supply chain collaboration practice, since for an on-demand e-business, it is necessary that all trading partners adopt compatible systems and have suitable business processes ready for the technology. Therefore, supply chain readiness enables electronic integration of information and business processes that may improve firm performance in supply chain activities. Besides supply chain readiness, successful collaboration also depends on a tight and fair partnership. Firms with a more reciprocal relationship are more likely to create highly integrate supply chains. Moreover, since the emerging e-business technology requires intensive investments that dependent trading partners may not be able to afford, the existence of a powerful partner becomes financially and

technologically significant to create customized electronic linkages and encourage the adoption. Thus, we hypothesize that the influence of supply chain readiness, collaboration readiness, and power would be strengthened when firms moves toward higher technology level:

*H3c: The influence of supply chain readiness would be strengthened given higher technology level*

*H3d: The influence of collaboration readiness would be strengthened given higher technology level*

*H3e: The influence of power would be strengthened given higher technology level*

## RESEARCH METHODOLOGY AND EMPIRICAL RESULTS

### Research Methodology

To empirically test the hypothesis formed above, we conduct a general survey in Taiwan PC industry. Supported by the E-Business Emerging Technology Research project of Institute for Information Industry and sponsored by MOEA (Ministry of Economic Affairs), Republic of China, we coordinated with six Taiwan PC firms. For each firm, a purchasing and/or engineering senior manager at the central division was first asked to select a set of suppliers under his or her responsibility. Then for each of the selected suppliers these senior managers helped identify the purchasing agent and/or engineer to whom we could send the questionnaire. The respondents were asked to answer the questions on a seven point Liker scale. The total data set constitutes a representative sample of n = 352. Among all returned questionnaires, 59 were found to be complete and usable; this represented a response rate of 16.76 percent.

Once the data is collected, factor analysis is used to identify the constructs

involved in the hypotheses. Then reliability is assessed by Cronbach's α coefficient for each of the constructs determined from the factor analysis. Afterwards, item-total correlation and optimal reliability coefficients are used to further improve the reliability (Mahmood and Soon 1991). At last, the convergent and discriminant validity of each item is examined to ensure that the items included in the model measure the construct. The final measurement model has an overall reliability of 0.943, representing good instrument validity.

Drawing upon this measurement model, we form factor scores for constructs, which were used for hypothesis testing. We conduct linear regression and ANOVA to test hypotheses formed earlier. Results of the main effects of e-business readiness and environment readiness on e-business performance are shown in Table 2, and the effects of technology level are shown in Table 3.

**Empirical Results**

The value of the adjusted $R^2$ for the measurement models is 0.593, suggesting that the readiness factors can explain more than 59.3% of the variance of e-business performance. Given in Table 2, the point estimators of regression coefficient (b value) for technology readiness, organization readiness, supply chain readiness, collaboration readiness, and power are 0.378, 0.253, 0.537, 0.272, and 0.243 respectively, which are all positive and significant. Thus we find support for all the hypotheses on readiness factors (H1a-H1b; H2a-H2c).

Table 2. Result of Hypothesis Testing: E-Business Readiness and Environment Readiness

| **DV=E-business Performance** | **Coefficient** | **Significance** |
|---|---|---|
| **E-business Readiness** | | |
| Technology Readiness | 0.378 | 0.000 |
| Organization Readiness | 0.253 | 0.004 |
| **Environment Readiness** | | |

| | | |
|---|---|---|
| Supply Chain Readiness | 0.537 | 0.000 |
| Collaboration Readiness | 0.272 | 0.002 |
| Power | 0.243 | 0.005 |

After testing these main effects of readiness factors, we proceed to examine the effects of technology level. We choose the method of subgroup analysis that involves dividing the sample into subgroups based on different technology level, and testing whether the means of the readiness factors differ significantly between the groups. The results are shown in Table 3. The technology readiness is a significant performance enabler both under low and high technology level, but it is more significant in the low technology level than in the high (sig. = 0.007 in low and 0.046 in high). Such a difference suggests the importance of technology readiness decreases with technology level. The ANOVA test on mean difference also turns out to be significant (sig.=0.000), which indicates that the mean of technology readiness under low technology level is statistically higher than high. Thus, we find support for hypothesis H3a. Other results in Table 3 show that the significance of organization readiness decreases with technology level and collaboration readiness increases with technology level. The associated ANOVA tests are both significant (sig.=0.000). Thus we find strong support for hypotheses H3b and H3d. However, the supply chain readiness and power readiness turn out to be more significant under low technology level than high level, lending no support to H3c and H3e.

Table 3. Results of Hypotheses Testing: The Effects of Technology Level

| **DV=E-business Performance** | **Coefficient** | **Significance** | **ANOVA** |
|---|---|---|---|
| **Technology Readiness * Technology Level** | | | |
| Technology Readiness (Low Technology Level) | 0.614 | 0.007 | 1.574 (Sig. = 0.000) |
| Technology Readiness (High Technology Level) | 0.447 | 0.046 | |
| **Organization Readiness * Technology Level** | | | |
| Organization Readiness (Low Technology Level) | 0.331 | 0.075 | 1.82 |

| | | | |
|---|---|---|---|
| Organization Readiness (High Technology Level) | 0.069 | 0.694 | (Sig. = 0.000) |
| **Supply Chain Readiness * Technology Level** | | | |
| Supply Chain Readiness (Low Technology Level) | 0.460 | 0.061 | 2.473 (Sig. = 0.000) |
| Supply Chain Readiness (High Technology Level) | 0.180 | 0.440 | |
| **Collaboration Readiness * Technology Level** | | | |
| Collaboration Readiness (Low Technology Level) | -0.074 | 0.708 | 1.789 (Sig. = 0.000) |
| Collaboration Readiness (High Technology Level) | 0.745 | 0.002 | |
| **Power * Technology Level** | | | |
| Power (Low Technology Level) | 0.213 | 0.226 | 1.588 (Sig. = 0.000) |
| Power (High Technology Level) | 0.034 | 0.884 | |

**MAJOR FINDINGS**

The analysis of the interaction effects between readiness and technology level brings to surface the practical concerns: *how to facilitate firms to induce successful e-business*. There is a need for developing a strategic roadmap for better adoption outcome. Our empirical result shows that companies have a mix of determinant conditions that decide the e-business performance given the technology level. For example, technology readiness is an important factor for firms under low technology level while collaboration readiness is more important to firms under high technology level. These findings can be simply summarized as follows.

1. *Firms' own technology and organization resources are more important to e-business success as firms are under low technology level, indicating that a high level of technology and organizational readiness is an essential condition for adopters of simple e-business technology*

The technology and organization readiness for e-business success becomes more important as technology level is lower (significance associated with technology readiness is 0.007 at low technology level and 0.046 at high technology level;

significance with organization readiness is 0.075 at low and 0.694 at high). Figure 1 shows the scatter plot of the technology readiness data from our collected sample. The three technology level is defined in Table 1. Note that all firms with low technology readiness are under low technology level and that firms with high readiness are evenly distributed from low level to high, indicating that low technology readiness is a value inhibitor of e-business only when technology level is low. This data analysis along with our statistical testing reveals that when firms initially adopt e-business, the use of e-business mainly focuses on internal operation, and thereby the firms' internal assets such as technology and financial resources become more critical to performance than relational assets (e.g. partner-specific absorptive capability) (Dyer and Singh 1998). Prior studies on EDI adoption have indicated that firms' IT, human, and financial resources are significant value contributors (Premkumar and Ramamurighy 1995). Our study further emphasizes their importance for firms at initial adoption stage.

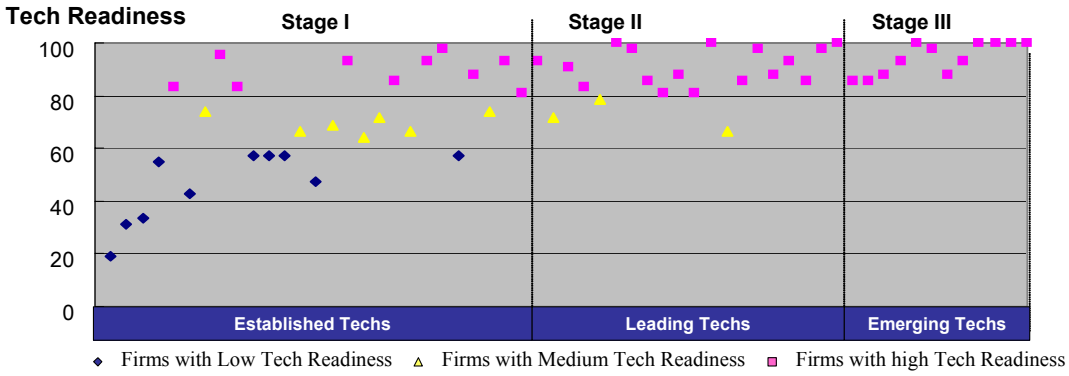


Figure 1. Scatter Plot of Technology Readiness

2. *Supply chain readiness and power facilitate e-business value only when firms are under low technology level, which highlights the significance of partner willingness, capability, and power at the initial adoption stage.*

As shown in Table 3, the significance of supply chain readiness and power decreases with the technology level (mean difference between the two levels are

significant for both factors; sig.=0.000). Figure 2 is the scatter plot of the power data. Similar as technology readiness, partner power plays a more important role in determining the performance of Stage I. Partner readiness and power has been investigated in a lot of IOS adoption (Saunders and Clark 1992). Our work extends the previous research by asserting that these factors are especially important when firms are under low technology level, but not so important while the firms want to extend their current technology level to a more advanced e-business IT. The reason is probably because the on-demand e-business needs to be implemented under shared governance, where trust rather than power dependence becomes an especially important factor. Thereby a too powerful and capable partner may become a barrier for advanced e-business IT adoption.

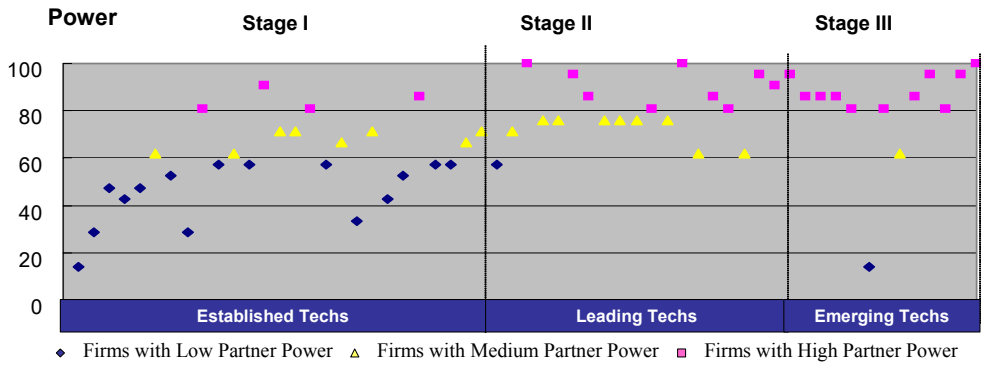


Figure 2. Scatter Plot of Partner Power

3. *Firms with greater collaboration readiness are more able to have better performance of emerging e-business IT, which suggests that relationship quality is more important than firm's and partner's individual capability on facilitating the adoption of emerging e-business technology*

As shown in Table 3, the impact of collaboration readiness on performance is stronger for firms under high technology level (coef.=0.745, sig.=0.002) than for firms under lower technology level (coef.=-0.074, sig.=0.708), with the mean difference being

statistically significant (Sig. of ANOVA=0.000). According to the scatter plot of collaboration readiness data (Figure 3), we find a similar result: firms with high collaboration readiness are more able to implement emerging e-business IT. Firms must have good relationship before adopting any e-business, but our result indicates that the relationship quality, in terms of trust and complementarity becomes even more influential as the e-business technology become akin to on-demand. This finding seems to suggest that the significance of trust and complementarity on e-business performance increases with the collaboration level of the technology, and as a result, high collaboration readiness can facilitate the adoption of on-demand e-business.

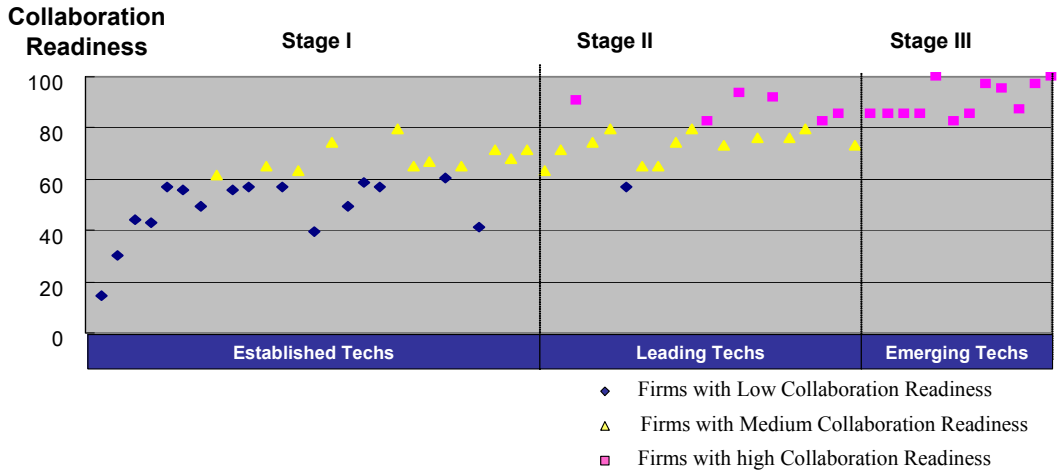


Figure 3. Scatter Plot of Collaboration Readiness

## MANAGERIAL IMPLICATIONS

Our study offers several implications for managers. Firstly, our conceptual model provides a systematic framework that managers can use to assess their firm's readiness for realizing e-business benefits, and further to develop a roadmap for adopting the emerging e-business technology. This framework covers a series of e-business requirements that need to be taken into consideration within the firm, and includes supply chain and collaboration conditions describing the environmental needs of developing emerging e-business IT. Those specific factors indicate the

measures of firm readiness for emerging e-business. Managers can now measure the readiness for current and future e-business development and how they must enhance internal technology and organizational capabilities and the investment in partnerships to improve e-business performance. Our study also captures the stages of e-business development from manual processes to on-demand business. While each stage retains its focus on certain enablers, this study clearly reveals the roadmap for emerging technology in e-business.

Secondly, our results suggest that firms must pay attention to their technological, financial, and human capability for improving e-business performance. These capabilities become even more important as firms are at the initial stage of e-business adoption, where most processes are at low integration level and full of manual work. This should encourage top managers to start developing a financial and human plan to allocate resources and supportive IT infrastructure to handle the associated sophistication. IT promotion and training also need to be considered to offer knowledge for system integration, standards development, and process automation as well as to overcome possible IT resistance.

Thirdly, the results point that partner's willingness, capability, and power is significant driver for e-business adoption, suggesting that business managers can provide promotion programs to enhance partner willingness, subsidies such as training, on-site assistance, and financial resources to improve partner capability, as these are key avenues to improve supply chain readiness for e-business. Such initiatives, combined with the appropriate exercise of market power, will offer firms better chance to the success of e-business. Our results also highlight the critical role of collaboration readiness as the firm starts to implement more advanced e-business IT.

Firms must improve the trust and peer interest and choose the partners who are more complimentary in processes, technologies, and cultures.

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