The Influence of IT on Organizational Agility in Malaysia

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Abstract

This exploratory study examined the influence of information technology on organizational agility. Based on the well-established Technology Acceptance Model we identified the relationships between IT acceptance and usage on the ability of firms to become an agile competitor. After analyzing survey data obtained from 329 managers and executives in manufacturing firms in Malaysia the results indicated that actual technology use has the strongest direct effect on organizational agility. However, perceived usefulness and perceived ease of use of IT has indirect influence on organizational agility via actual technology use. Finally, we discussed some practical implications of the findings for Malaysian managers and IT practitioners.

Introduction

Information technology (IT) has evolved from a support tool to a competitive weapon in the strategic arsenal of business organizations. As new information technologies are developed and rapidly assimilated, it is necessary to understand these and develop guidelines for their successful implementation. IT has the potential to reduce organizational complexity by reducing the need for information intermediaries. Easy access to IT should provide the chance to reduce paper flow. But, IT often changes work patterns in organizations. Therefore, it is not surprising that, despite initial enthusiasms with IT, some employees become uneasy and reluctant to use it in their work (Zeffane & Cheek, 1995).

User participation is one frequently cited factor to overcome management information system (MIS) development failure, because it may gain user commitment, avoid resistance and ensure that user requirements are met (Lu & Wang, 1997). The importance of user participation in MIS success has been studied extensively (e.g., Barki & Hartwick, 1994; Cavaye, 1995; Hunton & Beeler, 1997). The relationships between user participation, management styles and system success are not straightforward, but complex and multi-faceted (Lu & Wang, 1997). For example, at the initiation stage of MIS growth, only people-oriented management style is suggested to promote user participation, and management styles have nothing to do with system success. At the development stage, both people-oriented and task-oriented management styles may be related to user participation and system success. At the maturity stage, management styles no longer have significant impact on user participation, but both styles are significantly correlated with system success because good social relationships and rules need to be maintained in the maturity stage. The only unconfirmed benefit of user participation is its effect on individual performance, which suggests that even though users may be content with a system that they use, system usage does not automatically translate into better job performance (Hwang & Thorn, 1999) which could eventually influence organizational performance. More research is definitely needed in this area.

Despite computer and information technologies having abilities to provide benefits to individuals and organizations, it is recognized that their potentials have yet to be fully realized due to lack of acceptance by employees (Igbaria *et al.*, 1995). User acceptance is often the pivotal factor determining the success or failure of an information system project. The goal of most organization-based information systems is to improve performance on the job (Davis, 1993). But, performance impacts are lost whenever systems are rejected by users. Lack of user acceptance has long been an impediment to the success of new information systems (Gould *et al*., 1991).

Whether IT has a positive or negative effect on the lives of individuals has been a subject of debate for many years now (Ryker & Nath, 1995). There is some indication that employees may be affected differently by IT, such as depending on their position within an organization. Dearden (1983) has argued that the job of top managers, i.e., the President and top line executives have not been affected significantly by the computer. According to Ang and Soh (1997), organizational positions are differentiated by the tasks assigned, and the nature of these tasks affect user satisfaction. Bostrom and Heinen (1977) found that computer-related technology is essentially neutral; whether its effects are positive or negative depends on the decisions that are made and on how it is used. They cite examples of computer systems that had a negative effect on the job satisfaction of supervisors and clerks; while the effects appeared to be positive for middle managers. Workers at different level have been reported to have different job satisfaction because of various computer-impact factors, such as deskilling and upgrading of job, shifting of responsibilities, and span of control (Ang & Soh, 1997). Thus, the question "Is IT acceptance driven by factors under the direct influence of managers?" has persisted as an important concern among information systems managers and researchers alike (Agarwal & Prasad, 1999).

Past research in the area of IT usage and acceptance has not gone beyond examining its impact on employees. Thus, there is a need for us to examine how IT has affected organizational performance instead of just the employees. Future competitive advantage will be driven by capabilities of business process automation and their capability to build effective linkages with suppliers and customers alike. To take advantage of opportunities, businesses will have to invest in an IT network infrastructure based on integration, inter-operability, flexibility, and, in essence, on building a foundation of open system capability. Using computer networks to channel work flow and communication with each other and in groups, can facilitate concurrency of activities and group communications to gain organizational agility. A number of definitions for agility have been suggested. The definitions generally convey the idea of speed and the changing market environment. *Agility* is a response to the challenges posed by a business environment dominated by change and uncertainty. It reflects a new mind-set on making,

selling, and buying, an openness to new forms of commercial relationships, and new measures for assessing the performance of companies and people. As pointed out by Kodish *et al*. (1995), organizational agility requires a firm to be quick in assemble its technology, employees, and management with communication infrastructure in responding to changing customer demands in a market environment of continuous and unanticipated change. Simply stated, for the purpose of this research, organizational agility is a firm's ability to generate the required information for management decision making in a turbulent environment which not only ensures its survival but also its long-term growth and expansion. Specifically, does IT play a major role of firm-wide agility enabler by helping migrate to an integrated knowledge network of systems, people and processes (Gujrati & Kumar, 1995) in order to provide information for more effective management decision making particular in a turbulent business environment of today?. Therefore, this exploratory study addressed the influence of IT on organizational agility.

The Proposed Model and Hypotheses

Figure 1 presents the structural model of the relationships between the actual use of IT and organizational agility. The model has four variables: (1) perceived ease of use, (2) perceived usefulness, (3) actual use, and (4) organizational agility. It is based on the theoretical perspectives provided by Davis and his colleagues (1989) and Rogers (1995).

Perceived usefulness is a dominant motivator of microcomputer usage and has the strongest direct effect on usage, meanwhile perceived fun is an additional motivator though its effect on usage is much smaller (Igbaria *et al*. 1996). Igbaria and his colleagues found that perceived ease of use is a key intervening variable linking the antecedent variables (such as skills, organizational support, and organizational usage) with perceived usefulness, perceived fun, and social pressure.
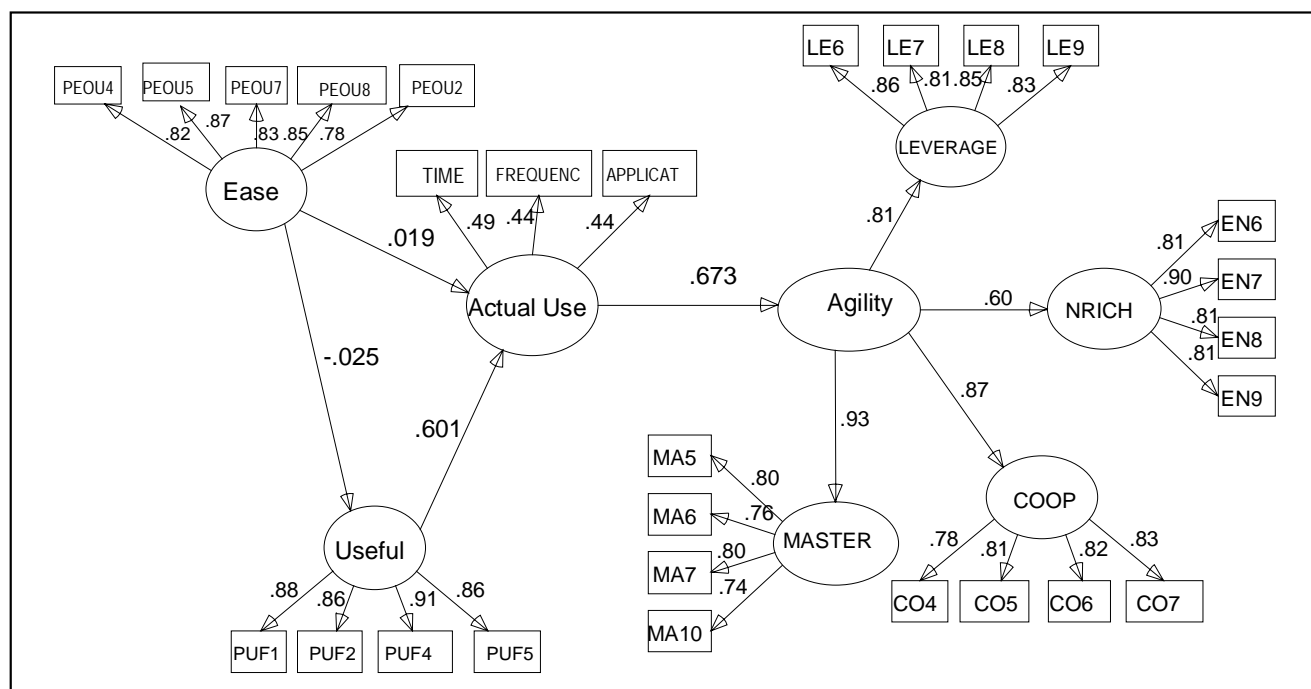

Figure 1:
The Impact of IT use on Organizational Agility: A Structural Model

Legend:
Ease = Perceived ease of use of IT; Useful = Perceived usefulness of IT; Actual use = Actual IT use; Agility = Organizational agility; LEVERAGE = Leveraging people & information; NRICH = Enriching customer; COOP = Cooperating to enhance competitiveness; MASTER = Mastering change & uncertainty.

Perceived ease of use plays a major role in affecting the use of IT, mainly indirectly through its influence on perceived usefulness (Igbaria *et al*. 1997). They suggest that since perceived usefulness is influenced by various externally controllable factors, further research is needed to examine their relative influence on perception, beliefs, and usage.

Davis, Bagozzi and Warshaw (1992) have also found that perceived fun and perceived usefulness to be the two key determinants of behavioral intention to use. In their study, they reported that the effect of perceived ease of use on behavioral intention to use was fully mediated by perceived fun and perceived usefulness. Davis (1993) points out that perceived fun plays an important role in determining usage of computer systems. In other words, people make an effort because a task is fun and offers external rewards. Individuals accept technology because its use is fun, useful and beneficial. However, the result of a study by Venkatesh (1999) showed that manipulating the level of perceived fun has a significant impact on perceived ease of use as well as on behavioral intention to use. Thus, perceived ease of use and perceived usefulness are thought to be potentially important antecedents of IT use. Furthermore, the easier for users to understand and use IT, the more they will perceive that their productivity may be improved by it. Therefore, our first set of hypotheses were:

Hypothesis 1a: Perceived ease of use affects actual use of IT.

Hypothesis 1b: Perceived usefulness and perceived ease of use affect actual use of IT.

IT is of critical importance to the successful operation of today's business processes (Gujrati and Kumar, 1995). According to Amos and Gibson (Agility Forum, 1995), one measure of agility is the ease with which information is transmitted and disseminated within the company. This information must be absorbed and acted upon appropriately in all particular cases. Many information systems today transmit data, but the information is not acted upon because it is in a form that cannot be readily assimilated by the appropriate personnel. Amos and Gibson emphasize that information glut or overload needs to be eliminated within the agile firm. Also, Igbaria and his colleagues (1997) found that IT acceptance helps individuals to accomplish their tasks more effectively and increases their productivity and eventually their organizational profitability.

The changing nature, mode and content of work resulting from IT development implies the need to restructure organizations. IT enables organizations to be flatter while providing accessibility to information to empower workers and hence to influence organizational performance. Decision making becomes quicker and more transparent. Organizations need to capitalize on these capabilities of IT to increase competitiveness and sustain growth (Shariffadeen, 1997). Therefore, our next hypothesis was:

Hypothesis 2: Actual use of IT has a direct effect on organizational agility

Research Methodology

Sample and Procedure

The data for this study were gathered by means of a survey questionnaire administered to the Malaysian manufacturing sector which to date remains a key sector in the country's economy. Manufacturing firms are now operating in fast-moving commercial environments where unanticipated threats and opportunities are the order of the day.

A pilot study involving 20 participants from manufacturing firms was conducted to further improve the scales, to determine problems in completing the instrument and to estimate the time required to complete the questionnaire. The pilot study provided feedback on the questionnaire itself. Several aspects were reconsidered with regard to both the whole questionnaire style and specific questions. The main aspects reconsidered for the final copy of the questionnaire include: rewording of some questions and instructions, rearranging the sequence of some questions, emphasizing some words using capital letters and bold, and adopting a seven-point Likert scale.

A stratified random sample of 600 firms was drawn from the target population. Stratified random sampling involves a process of stratification or segregation, followed by random selection of subjects from each stratum (Sekaran, 2000). In this study, firms were stratified according to resource-based firms and non-resource based firms, and a stratified sample of 300 firms was taken from each stratum. A total of 600 questionnaires were distributed to subjects (managers and executives) from different departments or functional areas and at different organizational levels in each firm. 343 questionnaires were returned (57% response rate), out of which 14 were incomplete and were discarded leaving 329 as usable for data analysis.

Operational Measures of Study Variables

Respondents were required to complete the survey that included information regarding perceived usefulness, perceived ease of use, actual use of IT, and organizational agility. Most of the responses were based on the Likert (the interval scale was used here) and semantic differential scales.

Perceived Usefulness. Five items adapted from Davis (1989) were used to construct the perceived usefulness scale. Appropriate modifications were made to the items to make them specifically relevant to IT usage. The items include: giving control over work, enabling quick tasks accomplishment, making work easier, overall usefulness, and supporting critical aspects of work.

Respondents were asked to indicate their agreement or disagreement with five statements using a seven-point Likert type scale ranging from (1) *Strongly Disagree* to (7) *Strongly Agree*.

Perceived Ease of Use. Perceived ease of use was measured by the six items scale developed by Davis (1989) with two more items added to the scale later by Moore and Benbasat (1991). It is a unidimensional multi-item variable. Respondents were asked to indicate the extent of agreement or disagreement with eight statements using a seven-point Likert type scale ranging from (1) *Strongly Disagree* to (7) *Strongly Agree*.

Actual System Use. Based on several studies (Igbaria, 1989; Igbaria *et al*. 1995; Lee, 1986 & Raymond, 1985), actual system use was measured by three items: actual daily use (i.e. amount of time spent using IT), frequency of IT use, and number of business tasks for which IT was used (i.e. the number of tasks involving the use of a computer was used to measure the extent to which respondents used a computer in their work).

The participants were asked to indicate the amount of time spent on the computer system per day, using a six-point scale ranging from (1) *almost never* to (6) *more than 3 hours per day*. Frequency of use was measured on a six-point scale ranging from (1) *less than once a month* to (6) *several times a day*. The number of business tasks performed by the respondents could be another indicator of IT acceptance. For the purpose of this research, nine tasks were defined and the participants were asked to indicate the extent of their use for these tasks, as reported on a seven-point scale ranging from (1) *Not use at all* to (7) *Use frequently*. Here, the number of tasks were calculated to represent another dimension of IT usage.

Organizational Agility. The questionnaire for assessing this was developed based on a self-assessment approach suggested by Goldman et al (1995). Goldman and his colleagues list 87 general questions that could be used to assess the influence of IT in making a firm to become an agile competitor. Specifically, the questions measured the contribution of IT towards their four principal dimensions of agility including: enriching the customer (17 items), cooperating to enhance competitiveness (13 items), mastering change and uncertainty (20 items), and leveraging people and information (28 items).

For this research, 78 questions were developed. These were re-phrased from the 87 questions suggested by Goldman and his colleagues, with 9 questions dropped due to their ambiguity from the firm's perception based on the pilot study. Respondents were asked to evaluate the 78 statements with a seven-point Likert scale ranging from (1) *Strongly Disagree* to (7) *Strongly Agree*. An example of the statements used was: "Use of information generated by IT enabled my organization to focus on customer satisfaction."

Data Analysis

The computer software used for analyzing data was AMOS Version 4.0. AMOS (Analysis of Moment Structures) is an easy-to-use program for visual SEM, developed by Arbuckle & Wothke (1999). SEM goes beyond traditional statistical approaches, because it can confirm relationships and even help in gaining insights into the causal nature and strength of the relationships (Bollen, 1989; Bollen and Long, 1993). Maximum likelihood estimates (MLE) of the measurement and structural models were made using AMOS. Goodness of fit was measured by the likelihood ratio chi-square (c^2), RMR, GFI, AGFI, RMSEA, NFI, TLI and CFI.

Results

The Measurement Model

Table 1 presents the results of the test of the measurement model. The composite reliabilities of the different constructs included in the model range from 0.45 to 0.93, which exceeded the recommended values in Nunnally's guidelines (Nunnally & Bernstein, 1994). The results also demonstrated satisfactory convergent and discriminant validity of the measures which are consistent with the recommendations of Fornell and Larcker (1981) since the average variance extracted for all constructs exceeded 0.50.

Table 1:
Assessment of the Measured Model

Variables	The composite reliability	Average variance explained
Perceived ease of use	0.91	0.81
Perceived usefulness	0.93	1.07
Actual use	0.45	0.51
Agility	0.54	0.84

The intercorrelations among the items measuring each construct are stronger than their correlations with the items representing other constructs (Table 2). After examining all the four entries in Table 2, the squared correlations representing the shared variance among variables were found not to exceed the average variance explained. This suggests that our constructs are distinct and unidimensional. In short, the convergent and discriminant validity of our instruments is satisfactory.

Table 2:
Intercorrelation among Study Variables

Variables	1	2	3	4
1. Perceived ease of use	0.81			
2. Perceived usefulness	0.41	1.07		
3. Actual use	-0.03	0.41	0.51	
4. Agility	0.04	0.39	0.37	0.84

Test of the structural model

The results of the multivariate test of the structural model are presented in Table 3. The structural model as a whole explained 45 percent of the variance ($p < 0.001$) in organizational agility of the study variables.

Table 3:
Prediction of Actual use of IT and Organizational Agility

Variables	Actual use of IT	Organizational agility		
		Direct	*Indirect*	*Total*
Perceived ease of use	0.019		0.003	0.003*
Perceived usefulness	0.061*		0.405	0.405*
Actual use		0.673*		
Squared Multiple Correlations / R^2	0.361*	0.454*		

* $p < 0.001$

The results also show that the antecedent variables (i.e. perceived ease of use and perceived usefulness) explained 36 percent of the variance in actual use of IT. Consistent with our expectations, perceived ease of use and perceived usefulness affected actual use of IT, and actual use of IT is positively related to organizational agility. The data show that actual use of IT has the strongest direct effect on organizational agility ($b = 0.673$, $p < 0.001$). It should also be noted that perceived ease of use and perceived usefulness has an indirect effect

on organizational agility through actual use. The contribution of perceived usefulness to actual use of IT ($g = 0.601$) is substantially higher than the contribution of perceived ease of use ($g = 0.019$). In summary, the tests of the structural model showed that actual use of IT is an important factor affecting organizational agility. Perceived usefulness and perceived ease of use also affected organizational agility, even though its effect on organizational agility was much smaller. The results also demonstrated the importance of actual use of IT in mediating the relationship between perceived usefulness and perceived ease of use and organizational agility.

Discussion, Implications and Conclusion

The study examined the influence of information technology on organizational agility. Results indicated that IT acceptance and usage has a significant effect on organizational agility. The analysis provided strong support for the research model. In particular, the results showed the importance of examining perceived usefulness and perceived ease of use in explaining organizational agility. They also showed that organizational agility is a function of both actual use of IT and perceived usefulness and perceived ease of use of IT, which in turn showed how IT adds value to organizational performance, i.e., the ability of an organization to be an agile competitor. It should be noted that actual use of IT (an extrinsic variable) had a stronger effect on organizational agility than perceived usefulness (an intrinsic variable).

The results may suggest that actual use of IT, perceived usefulness, and perceived ease of use are indicators of organizational agility. These results are consistent with prior research (Davis, 1993; Adams *et al.*, 1992), which suggest that IT acceptance (i.e. perceived ease of use, perceived usefulness, and actual use) may produce favorable results such as in terms of organizational profitability, productivity, and effectiveness. Intuitively, this relationship makes sense since, through the use of IT, executives or managers would be able to obtain timely information which could help them make better decisions and which could then result in their organization becoming more adaptive to environmental changes and uncertainties.

The significant link between IT acceptance and organizational agility has some implications for Malaysian managers and IT practitioners. Firstly, Malaysian managers need to be aware that computer systems they implement can influence the ability of their organization to be an agile competitor. They should understand that, through the use of IT, information flow will improve drastically and they would be better able to manage knowledge which would not only help their business operations but also help their firm gain competitive advantage (Gates, 1999). IT is an essential component of a firm's *informationalizing* process where data is converted into information, knowledge, and action (Hamel and Prahalad, 2003). Secondly, Malaysian managers need to make sure that the use of IT is essential in today's business. Every effort must be taken to make sure that users, particularly executives and managers, accept and use IT in their organization. However, user acceptance would depend of their perceptions about the usefulness of IT as well as on whether IT is easy to use. As for IT practitioners, whenever they implement a new IT system, they must make sure that the system would be acceptable to users. This would require them to take proactive actions to increase user acceptability of the system in order to enhance the business impact resulting from large investments in time and money associated with introducing IT into their organization.

Before concluding, we need to point out that, since this study was an exploratory one, its main limitation is that the finding is applicable only to Malaysia or to other countries with similar business environments.

As a conclusion, the result of this study has clearly demonstrated that the use of IT by executives and managers could influence their organization's agility provided that it is well accepted and used by them. However, more research needs to be carried in order to determine whether the results were true in other countries, particularly those with different business environments than Malaysia.

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