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ADOPTION OF INFORMATION TECHNOLOGY AND ITS RELATIVE CONTRIBUTION TO A FIRM'S AGILITY

MASLIN MASROM

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ADOPTION OF INFORMATION TECHNOLOGY AND ITS RELATIVE CONTRIBUTION TO A FIRM'S AGILITY

By

MASLIN MASROM

Thesis Submitted in Fulfilment of the Requirement for the Degree of Doctor of Philosophy in the Graduate School of Management Universiti Putra Malaysia

February 2003

UPM

DEDICATING THIS STUDY
TO MY BELOVED PARENTS, HUSBAND, CHILDREN, BROTHERS, SISTER AND THE REST OF MY FAMILY, WITHOUT WHOSE SUPPORT AND TRUST THIS STUDY COULD NEVER HAVE BEEN COMPLETED

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy.

ADOPTION OF INFORMATION TECHNOLOGY AND ITS RELATIVE CONTRIBUTION TO A FIRM'S AGILITY

By

MASLIN MASROM

February 2003

Chairman: Raduan Che Rose, Ph.D.

Faculty: Graduate School of Management

In the world of business, information technology (IT) continues to heighten competencies and ensure success of firms. But, investment in the emerging IT can lead to productivity gains only if it is accepted and effectively used. As a consequence, IT acceptance and utilization represent central concerns in recent information systems research. Therefore, the main objective of this research is to examine the influence of external variables on IT acceptance (i.e., usage), and how IT acceptance contributes to a firm's ability to be an agile competitor.

This research is an empirical attempt to investigate the influence of IT acceptance and usage on agility, based on a well-established theoretical model, that is, Technology Acceptance Model (TAM) from the management information system area. TAM was chosen as the theoretical basis (paradigm) within which an extended model was formulated. A few adaptations to this paradigm were introduced in order to make them applicable to the present context building upon, and integrating previous researches in a cumulative manner. This led to a research

and integrating previous researches in a cumulative manner. This led to a research model which was tested by a seventeen-page survey questionnaire. This research used results from a survey among 329 managers and executives in manufacturing firms in the Klang Valley, Malaysia.

A careful confirmatory factor analysis (CFA) and a reliability analysis (Cronbach's alpha coefficient) for the measure used in the survey were conducted. Correlation analysis, multiple regression analysis, and structural equation modeling (SEM) analysis using AMOS 4.0 were used as different data analysis techniques. The analysis in part gave good support for the initial model considered, but also revealed some shortcomings in the base model (TAM).

The findings from this research indicated that information quality is a dominant factor in explaining agility, followed by top management support. The results also indicated that perceived usefulness has a strong effect on actual system use. Similarly, the results also indicated that exogenous variables (independent variables) influence actual system use, particularly system characteristics, job characteristics and top management support. The results then revealed that actual system use mediated the relationships between these exogenous variables and agility. The findings have several implications for information system (IS) management practice. Thus, implications for the acceptance of IT and agility, for theory and practice that follow, and future research are also discussed.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah.

PENERIMAAN TEKNOLOGI MAKLUMAT DAN SUMBANGAN RELATIFNYA KE ATAS KEUPAYAAN SESEBUAH FIRMA BERTINDAK SEBAGAI PESAING YANG PANTAS

Oleh

MASLIN MASROM

Februari 2003

Pengerusi: **Raduan Che Rose, Ph.D.**

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Dalam dunia perniagaan, teknologi maklumat (IT) berterusan meningkatkan daya kecekapan dan memastikan kejayaan sesebuah firma. Walau bagaimanapun, pelaburan dalam IT yang wujud pada masa kini boleh membawa kepada perolehan produktiviti, hanya jika ianya diterima dan digunakan secara efektif. Akibatnya, penerimaan IT dan penggunaannya menjadi tumpuan utama dalam penyelidikan sistem maklumat masa kini. Oleh yang demikian, objektif utama penyelidikan ini adalah untuk mengkaji pengaruh pembolehubah-pembolehubah luaran terhadap penerimaan IT (iaitu, dari segi penggunaannya) dan mengkaji bagaimana penerimaan IT boleh menyumbang kepada keupayaan sesebuah firma untuk menjadi pesaing yang tangkas atau pantas.

Penyelidikan ini ialah satu usaha empirik untuk menyiasat pengaruh penerimaan IT dan penggunaannya terhadap keupayaan bertindak pantas sesebuah firma, berdasarkan model teoritikal yang sedia ada, iaitu Model Penerimaan Teknologi (TAM) dari bidang sistem maklumat pengurusan. Model TAM dipilih sebagai asas teoritikal (paradigma) yang dengannya model lanjutan seterusnya dibina. Beberapa pengubahsuaian ke atas paradigma-paradigma ini diperkenalkan dengan tujuan untuk menjadikannya boleh digunapakai dalam konteks hari ini dan menggabungkannya dengan penyelidikan yang terdahulu dalam bentuk kumulatif. Ini membawa kepada pembinaan model penyelidikan yang baru, yang diuji dengan soal selidik yang terdiri daripada tujuh belas muka surat. Penyelidikan ini menggunakan data daripada 329 orang pengurus dan eksekutif yang bekerja di firma-firma pembuatan di Lembah Klang, Malaysia.

Faktor analisis kepastian (CFA) dan analisis keboleharapan (pekali alfa Cronbach) telah digunakan untuk tujuan pengukuran dalam kajian yang dijalankan. Analisis korelasi, analisis pelbagai regresi dan analisis pemodelan persamaan berstruktur (SEM) yang menggunakan program komputer AMOS 4.0 telah digunakan sebagai teknik-teknik analisis data yang berbeza. Secara umumnya, analisis menunjukkan sokongan yang baik untuk model awal yang dipertimbangkan, tetapi ia juga memperlihatkan beberapa kelemahan dalam model asas (TAM).

Hasil penyelidikan ini menunjukkan bahawa kualiti maklumat merupakan faktor dominan dalam menerangkan perihal keupayaan sesebuah firma bertindak pantas, dan sokongan pengurusan atasan merupakan faktor kedua yang mempunyai hubungan dengan ketangkasan sesebuah firma itu tadi. Kajian ini juga mendapati persepsi kebergunaan mempunyai kesan yang kuat terhadap penggunaan IT. Hasil kajian juga mendapati pembolehubah-pembolehubah luaran (pembolehubah-pembolehubah tak bersandar) turut mempengaruhi penggunaan sebenar IT, khususnya ciri-ciri sistem, ciri-ciri tugas dan sokongan pengurusan atasan. Kajian seterusnya menunjukkan penggunaan sebenar IT menjadi perantara atau mediator kepada hubungan antara pembolehubah-pembolehubah luaran itu tadi dengan keupayaan sesebuah firma bertindak tangkas. Hasil penyelidikan ini memberi beberapa implikasi bagi amalan pengurusan sistem maklumat (IS). Implikasi-implikasi penerimaan IT dan ketangkasan sesebuah firma dari segi teori dan amalan yang boleh diambilkira dan penyelidikan masa depan juga dibincangkan dalam tesis ini.

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I certify that an Examination Committee met on 28th February 2003 to conduct the final examination of Maslin Masrom on her Doctor of Philosophy thesis entitled "Adoption of Information Technology and Its Relative Contribution to a Firm's Agility" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations, 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

Maslin

Maslin Masrom

Date: 31 st. March 2003

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LIST OF ABBREVIATIONS

AMOS	Analysis of Moment and Structure
ANOVA	Analysis of Variance
ATTITUDE	Attitude Towards Usage
CFA	Confirmatory Factor Analysis
COOP	Cooperating to Enhance the Competitiveness
EASE	Perceived Ease of Use
ENRICH	Enriching the Customer
FMM	Federation of Malaysian Manufacturers
INFOQ	Information Quality
INVOLVE	User Involvement
IS	Information System
IT	Information Technology
JOB	Job Characteristics
LEVERAGE	Levering People and Information
MASTER	Mastering Change and Uncertainty
MIS	Management Information System
MITI	Ministry of International Trade and Industry
MRA	Multiple Regression Analysis
SEM	Structural Equation Modeling
USEFUL	Perceived Usefulness
SUPPORT	Top Management Support
USAGE	Actual System Use

CHAPTER 1

INTRODUCTION

1.1 Introduction

Information technology (IT) has emerged as an essential element in developing countries like Malaysia to support the need for regular, real-time, and dependable information in business and industry. As developing countries are expanding industrially and commercially, the volumes of domestic consumption, export production and imports are growing at a very high rate. This phenomenon will create and expand the demand on the supply and use of information. As IT is a major factor in shaping the industry's characteristics within which firms compete, it is radically altering the balance of power between institutions, governments, and people by broadly disseminating important information. Recent advances and the revolution in IT are bringing significant changes to organizations unanticipated even a few years ago. The successful use of information technology depends on the technology itself and the level of expertise of the individual using the technology. The impact of IT on user productivity and user satisfaction is usually said to be an indicator of the success of computer utilization. In order to study the nature and extent of computer utilization, research in computer utilization and IT acceptance and how it contributes to a firm's competitiveness in developing countries needs to be undertaken.

1.2 Background of the Study

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 successful implementation. IT has the potential to reduce organizational complexity by reducing the need for information intermediaries. Easy access to information system should provide the chance to reduce paper flow. Computers often change work patterns. It is not surprising therefore that, despite initial enthusiasm, some employees become uneasy and reluctant to use these information systems (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 (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

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). More research is definitely needed in this area.

Computer technologies have some benefits for individuals and organizations, but, it is recognized that the potential gains are not fully realized due to some lack of acceptance (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 organizationally 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 information technology have had a positive or negative effect on the lives of an individual has been a subject of debate (Ryker & Nath, 1995). There are some indications that employees may be affected differently by information technology depending on their position within an organization. Dearden (1983) has argued that the jobs of top managers, namely, 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 cited examples of computer systems that had a negative effect on the job satisfaction of supervisory and clerical jobs; while the effects appeared to be positive for middle managers. Workers at different levels 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). Is IT acceptance driven by factors under the direct influence of managers? This question has persisted as an important concern among information systems managers and researchers alike (Agarwal & Prasad, 1999).

Future competitive advantage will be driven by capabilities of business process automations and their capability to build effective linkages with suppliers and customers alike. To take advantage of opportunities, businesses will have to invest in an information technology 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 communicate with each other and between groups, can facilitate concurrency of activities and group communications to gain agility (Gujrati & Kumar, 1995). In this case, does IT play a major role of firm-wide agility enabler by helping the firm to migrate to an integrated knowledge network of systems, people and processes? Or, in other words, is IT the catalyst to accomplish agility?