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IS THE TECHNOLOGY ACCEPTANCE MODEL VALID FOR ENTREPRENEURS? MODEL TESTING AND EXAMINING USAGE DETERMINANTS.

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ABSTRACT

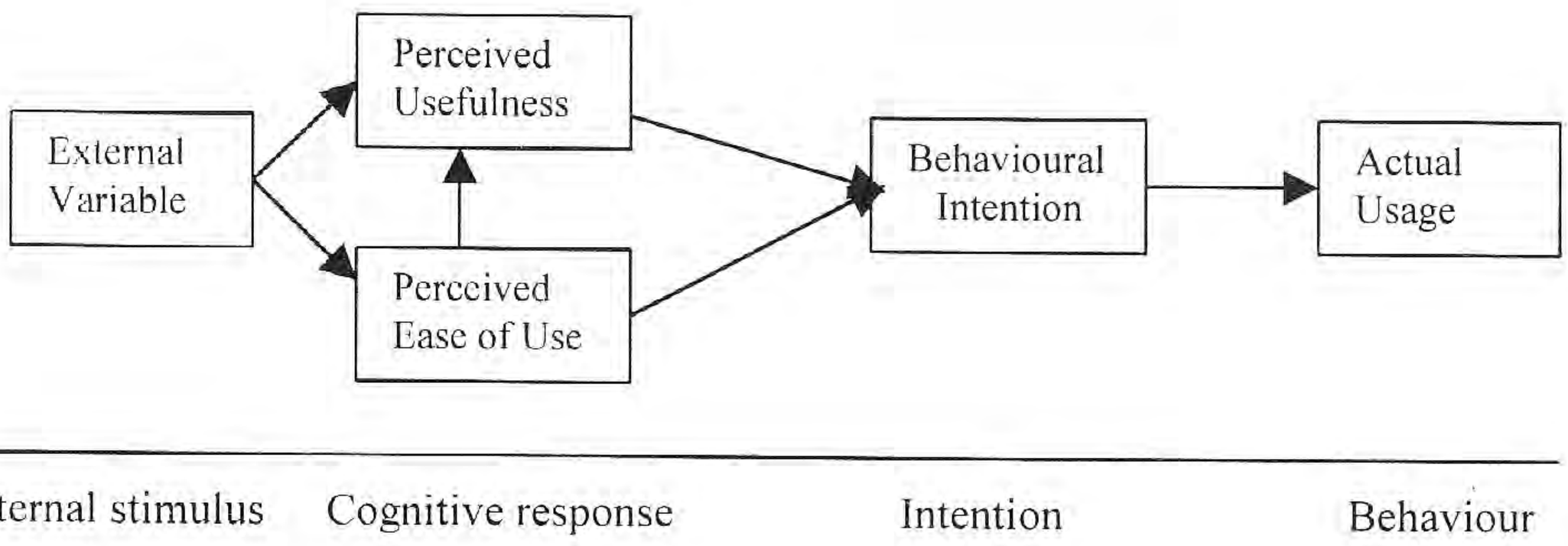
IT researchers regard Technology Acceptance model (TAM) as a powerful model for understanding technology acceptance in general. Many have claimed it is the most popular model of technology acceptance, having been used in many studies involving different user groups. But very often overlooked is the test of TAM on entrepreneurs, a distinct and important group which researchers have found to exhibit unique traits. Because of these peculiar traits, this research believes that a separate TAM study on entrepreneurs is warranted. TAM theorizes that perceived usefulness directly influences usage and perceived ease of use directly and indirectly via usefulness influences usage. This research investigates the validity of the TAM among Malaysian entrepreneurs.This is because because TAM has not been examined across cultures like Malaysia with a multi-racial and fast developing economy. The study found that IT usage was influenced directly by perceived usefulness and indirectly (via usefulness) by perceived ease of use. Contrary to TAM's postulation, there is no direct relationship between perceived ease of use and usage. Details of the research findings and their implications are discussed

INTRODUCTION

The Technology acceptance Model (TAM) has been widely used to predict user acceptance and use based on perceived usefulness and ease of use. Davis (1989), and Davis et al. (1989) developed the TAM by adapting the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980), to understand the causal chain linking external variables to IT usage intention and actual use in a workplace. TAM was developed under contract with IBM Canada Ltd. in the mid-1980s where it was used to evaluate the market potential for a variety of then-emerging PC-based applications in the area of multimedia, image processing, and pen-based computing in order to guide investments in new product development (Davis & Venkatesh 1996). Many IT studies

have replicated TAM or used TAM instrument (which has empirically proved to have high validity) extensively to investigate a range of issues in the area of user acceptance (e.g. Mathieson, 1991; Moore & Benbasat, 1991; Olfman & Bostrom, 1991; Igbaria, 1992; Trevino & Webster, 1992; Adams, Nelson and Todd, 1992; Segars & Grover, 1993; Chin & Gopal, 1993; Saga & Zmud, 1994; Venkatesh & Davis 1994; Sjazna, 1994; Igbaria et al., 1995, 1997; Chau, 1996;). MIS researchers have used TAM and TRA as a theoretical foundation to conduct research on those factors that affect the user acceptance of IT (Igbaria, 1992), although TAM has grown more popular than TRA. Figure 1 depicts Davis technology acceptance model.

Figure 1: Technology Acceptance Model (Davis et al. 1989)



Davis' list of external variables includes: objective system design characteristics, training, computer self-efficacy, user involvement in design, and the nature of the implementation process. These are theorised to influence behavioural intention to use, and actual usage, indirectly through their influence on perceived usefulness and perceived ease of use. Davis (1989, p320), defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her productivity", and perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort".

TAM is acclaimed for its parsimony and predictive power which make it easy to apply in different situations. However, there have been some reservations as well. Venkatesh (2000) writes that while parsimony is TAM's strength, it is also the models important constraint. According to Venkatesh, while TAM is very powerful in helping to predict acceptance, it does not help understand and explain acceptance in ways that guide development beyond suggesting that system characteristics impact usefulness and ease of use thereby placing a limitation on the ability to meaningfully design interferences to promote acceptance. Mathieson (1991) believes that TAM is predictive but its generality does not provide sufficient understanding from the standpoint of providing system designers with the information necessary to create user acceptance of new systems. Furthermore, there has been some concern about the predictive ability of TAM. Straub et

al. (1995) questioned intention as a predictor of actual behaviour. Bentler and Speckart (1979), and Songer-Nocks, (1976) earlier disagreed with Fishbein and Ajzen's assertion that attitudes and norms can influence behaviour only indirectly through behavioural intention. Nevertheless, Venkatesh (2000) called for future research using actual usage instead of usage intention to test the TAM. Present research has towed this line of suggestion by investigating actual or current usage as the dependent variable.

Is TAM then powerless in predicting user acceptance of IT? The issue of TAM's predictive ability may not be critical given that there is a significant body of research in IS (Taylor & Todd 1995), organisational behaviour (Venkatesh & Morris, 2000), and psychology (Sheppard et al. 1988) supporting intention as a predictor of actual behaviour. Mathieson (1991) tested the validity of TAM via an experimental study on usage of spreadsheets and calculator. He compared TAM with TPB to predict an individual's intention to use an information system. The study found that both TAM and TPB predicted this well, although TAM was more general and easier to use.

Adams et al. (1992), subsequently replicated Davis' TAM in two studies. The purpose of these studies were to focus on evaluating the psychometric properties of the ease of use and the usefulness scales while examining the relationship between ease of use, usefulness and system usage. The results of the studies demonstrated reliable and valid scales for measurement of perceived ease of use and usefulness. It indicated the importance of both factors and suggested that usefulness is an important determinant of system usage. The finding is also consistent with the original TAM proposed by Davis (1989). However, Adams et al. (1992) called for more research on this model because there are limited studies in this area. They suggested that a variety of factors, such as user experience and characteristics, type or sophistication of system use, and other task characteristics might mediate the relationship among ease of use, usefulness and usage, and called for future research to be geared towards the replication, refinement and development of this model and measures to address these factors.

In turn, Igbaria (1992) agrees that Davis' TAM model provided good insights into the user acceptance of IT. Thus Igbaria went on to extend this model to include other external factors (such as individual and organisational characteristics), endogenous variables (such as computer anxiety, perceived usefulness, attitudes, behavioural intentions to use), and actual system use among managers. The purpose of Igbaria's (1992) study was to test this integrated model of user acceptance, incorporating variables found to consistently explain and predict acceptance and success of IT across studies.

The list of TAM studies and replications is a long one. In spite of these adaptations and replications, the current study is not aware of any serious work that is focussed on entrepreneurs using actual usage behaviour (for instance current usage) as a measure of IT usage. Most of the previous TAM studies have measured usage based on intention, a step that have been questioned by some researchers (e.g. Straub et al. 1995). In view of this research gap, present study aims to examine whether TAM is valid or not among

Malaysian entrepreneurs using actual usage behaviour of entrepreneurs. This is in line with Sjazna (1994) that found a direct relationship between perception and actual usage. The focus on entrepreneurs is precipitated by the researchers' belief that entrepreneurs are a distinct and important IT user group. Being small in size, most entrepreneurs are short of resources, capital, and expertise, which constrain exorbitant employment and experimentation with sophisticated technologies. Secondly, entrepreneurs have been reported in personality and psychological research as exhibiting unique traits that distinguishes them from other users. The traits suggested by empirical research which describe entrepreneurs are: (1) high need for achievement (Decarlo & Lyons, 1979; Hornaday & Aboud, 1971; among many others); (2) internal locus of control (Hornaday & Aboud, 1971; Miller, 1983); (3) high need for independence and effective leadership (DeCarlo & Lyons, 1979; Hornaday & Aboud, 1971); (4) high need for autonomy (DeCarlo & Lyons, 1979; Sexton & Bowman, 1983, 1984); (5) information processing capability (McGaffey & Christy, 1975); (6) preference for moderate level risks (McBer & Co., 1986); (7) low conformity (DeCarlo & Lyons, 1979; Sexton & Bowman, 1983, 1984); (8) aggression, support, and benevolence (Decarlo & Lyons, 1979); (9) high energy level, risk-taking, and change (Sexton & Bowman, 1983, 1984); (10) dominance, endurance, innovation, self-esteem, low anxiety level, and cognitive structure (Sexton & Bowman 1983); and (11) low interpersonal effect, social adroitness, low harm avoidance, and low succorance (Sexton & Bowman, 1984). These traits may have different implications on the validity of TAM as suggested by the literature.

THEORY AND HYPOTHESES

Several models have been developed to investigate and understand the factors affecting the acceptance of computer technology in organisations. The theoretical models employed to study user acceptance, adoption, and usage behaviour include the Theory of Reasoned Action - TRA (e.g. Fishbein & Ajzen 1975; Ajzen and Fishbein 1980), the Technology Acceptance Model – TAM (e.g. Davis 1989; Davis et al. 1989), the Theory of Planned Behaviour – TPB (e.g. Ajzen 1991; Mathieson 1991), the Model of PC Utilisation (Thompson, Higgins, and Howell 1991), the Decomposed Theory of Planned Behaviour (e.g. Taylor and Todd 1995a) and Innovation Diffusion Theory (e.g. Agarwal and Prasad 1997; Brancheau and Wetherbe 1990; Rogers 1995). Some of these studies were carried out at the individual level (e.g. Agarwal and Prasad 1998), and some at the organisational level (e.g. Cooper and Zmud 1990). Current research has focused on the TAM not only because it is simple and more popular than the rest of the models, more importantly because the research seeks to understand the relationship between perceived usefulness, perceived ease of use, and usage behaviour of Malaysian entrepreneurs. Appendix 3 shows the schema of the research constructs.

IT Usage

In this study, IT usage is measured in terms of current usage or actual usage behaviour of entrepreneurs unlike most previous research, which have measured usage based on

intention. This is one of the strengths of the current study. In line with the International Coalition of Library Consortia - ICOLC (1998); Rahmah & Arfah (1999), etc., the indicators used in enhancing the reliability of measuring the system usage in this study are: (1) Making use of a wide variety of software packages in CBIS environment (e.g. spread sheet, word processing, graphic, data processing, etc); (2) The number of job tasks performed using computer technologies for example, budgeting, planning, analysis and forecasting, etc.; (3) Frequency of system usage; and (4) Actual amount of time spent using the system at each session.

Perceptions

Perceived usefulness and perceived ease of use are the elements of perception in the study. Technology adoption (or usage) decisions have been typically characterised by a strong productivity orientation (Vankatesh and Brown, 1998). Usability has also proved to be an important force in driving usage (see Hendrickson and Collins 1996). Perceived usefulness is defined as the extent to which a person believes that using a particular technology will enhance her/his job performance while perceived ease of use is the degree to which using IT is free of effort for the user (Davis 1989). A significant body of TAM studies (e.g. Davis 1989; Mathieson 1991; Adams et al 1992; Segars & Grover 1993; Szajna 1994; Igbaria et al 1997) has shown that perceived usefulness and perceived ease of use are determinants of usage. Measures of perceived usefulness in this study are perceptions that using IT will increase productivity, improve job performance, enhance job effectiveness, and be useful in the job; and perceived ease of use are measured in terms of how clear and understandable is the interaction with system, ease of getting the system to do what is required, mental effort required to interact with the system, and ease of use of the system. Thus, it is hypothesized that:

There is a direct positive relationship between perceived usefulness and usage (Hypothesis 1).
There is a direct positive relationship between perceived ease of use and usage (Hypothesis 2a).
There is an indirect positive relationship (via usefulness) between perceived ease of use and usage (Hypothesis 2b).
There is a direct positive relationship between perceived ease of use and perceived usefulness (Hypothesis 3).
There is an indirect relationship (via ease of use) between impellers and perceived usefulness (Hypothesis 4).

Perception Drivers

This study considers the following factors as drivers of perceived usefulness and perceived ease of use: prior general computer experience, data intensity, staff support, computing training, technical support, and external influence/pressure. These drivers have been tested in past studies using intention as the dependent variable on user groups other

than entrepreneurs. Present work focuses on entrepreneurs and measures usage in terms of actual usage behaviour. It is hypothesized that these factors influence perceived usefulness and ease of use directly, and perceived usefulness indirectly via perceived ease of use.

Prior Experience

Empirical evidence suggests that attitude based on direct experience with the attitude object predicts behaviour better than attitudes formed based on indirect experience (Fazio & Zanna 1981). Prior experience has been found to be an important determinant of behaviour (Bagozzi, 1981). Ajzen and Fishbein (1980), found that experience may make low probability events more salient, thereby ensuring that they are accounted for in the formation of attitude. Taylor and Todd (1995) found a stronger link between behavioural intention and technology acceptance behaviour for the more experienced users. It is believed that entrepreneurs' prior general experience with computers will influence their perception of the usefulness and ease of use of specific systems positively.

Hypothesis 5a: The more the entrepreneur's prior experience with computers in general, the more IT is perceived to be useful.

Hypothesis 5b: The more the entrepreneur's prior experience with computers in general, the more IT is perceived to be easy to use.

Data Intensity

The volume of data generated and processed by the entrepreneur may push him/her to increase IT usage. According to Thong and Yap (1995); and Kimberly and Evanisko (1981), large amount of data and voluminous transactions are likely to act as a push factor for the organisation to adopt or use the technology that can help to streamline the operations and offer process efficiencies within the organisation. Current research suspects that the more intensive the data handled by the entrepreneur, the more he/she will perceive IT to be useful, and the less the ease of use perception. This is because all things being equal, voluminous data are generally more cumbersome to handle (with or without a technology) than lesser amount of data.

Hypothesis 6a: The greater the data intensity, the more IT is perceived to be useful.

Hypothesis 6b: The greater the data intensity, the less IT is perceived to be easy to use.

Staff Support

The influence of staff support in promoting personal computer usage has not received as much research attention as management support. Igbaria (1992), Thong and Yap. (1994), Igbaria et al. (1997) are some of the works that have studied the influence of management support on technology usage. Staff support refers to the support of both managers and non-managers, which may come in the form of accepting the system, being receptive to training, willingness to experiment with the system, and cooperation with other system users. In smaller organisations like the entrepreneurships, where the number of employees

are often small, staff support may be more crucial to the success of systems than in larger organisations where the effect of few unsupportive staff may not be significant.
Hypothesis 7a: The more supportive the employees, the more IT is perceived to be useful.
Hypothesis 7b: The more supportive the employees, the more IT is perceived to be easy to use.

Computer Training

Computer training refers to the amount of training users have received from other users or computer specialists within or outside the organisation. Similar to the findings of Raymond and Bergeron (1992), Igbaria et al. (1995 and 1997) found that personal computing training have a positive impact on perception and technology acceptance. Current research expects that entrepreneurs with computer training will find technologies useful and easy to use.
Hypothesis 8a: The more the computer training, the more IT is perceived to be useful.
Hypothesis 8b: The more the computer training, the more IT is perceived to be easy to use.

Technical Support

Technical support refers to the technical support by individuals or groups with computer knowledge who are internal or external to the firm. Its importance has been highlighted in many studies (Cragg and King 1993; Igbaria 1992, 1995, Igbaria et al. 1997). Research reports have shown that systems are more successful when there was a user computer support (Bergeron et al. 1990; Mirani and King 1994). It is supposed that positive relationships exist between technical support, perceived usefulness and perceived ease of use.
Hypothesis 9a: The more the technical support, the more IT is perceived to be useful.
Hypothesis 9b: The more the technical support, the more IT is perceived to be easy to use.

External influence/Pressure

Present study theorizes that if external pressure (such as from customers, suppliers, the state, competitors, community, etc) is strong on the entrepreneur to adopt a new technology or increase usage of existing technologies, he/she is more likely to comply with the pressures and adopt the new technology. Julien & Raymond (1994); Thong & Yap (1995), found that as competitors, trading partners, and the whole industry is adopting the new technology, there is a strong likelihood that the firm will follow. Bearden et al. (1986) and Burnkrant and Cousineau (1975) refer to this influence as normative influence, which occurs when individuals conform to the expectations of others.
Hypothesis 10a: The greater the external influence on the entrepreneur, the more IT is perceived to be useful.
Hypothesis 10b: The greater the external influence on the entrepreneur, the more IT is perceived to be easy to use.

METHOD

Participants & Procedure

A total of one hundred and seventy-seven usable responses were received, out of two hundred and ninety-five questionnaires despatched to entrepreneurs and members of the National Association of Women Entrepreneurs of Malaysia (NAWEM) or the Entrepreneurs Development Unit of the Prime Minister's Department. These are current IT users. Respondents' profiles are as shown in table 1.

Validated items were used to measure the variables in the construct. Items grouping were done according to the respective variables under study. Although items measuring the dimensions in the construct have been tested and validated by many previous studies on IT acceptance for example, Davis et al., (1989), Raymond and Bergeron (1992), Taylor and Todd (1995), Thong and Yap (1995), Davis and Venkatesh, (1996), Igbaria et al. (1997), etc., the current study re-validated these items using factor analysis. The results show that items measuring the constructs are highly valid (see appendix 2). This was followed by a reliability analysis to evaluate the Cronbach's Alpha values for all the dimensions. The values are as follows: Usage (.86), Perceived Usefulness (.90), Perceived Ease of Use (.88), Technical support (.90), Training (.75) and Staff support (.85). All the reliability test results in this study show alpha values exceeding .60 to .70 recommended by Hair et al., (1998) as the lower limit of acceptability. This ensures that the items grouping for the respective variables are reliable under the conditions of the local survey.

Table 1: Respondents' Profile

1. By Industry Type	**Percent (%)**
Manufacturing	24.9
Wholesale/Retail	19.8
Others (e.g. oil & gas, business center, employment agency, IT & systems development, TV production, Islamic funding & auction, Sports)	14.7
Education/Consulting	12.4
Communication/transportation	10.2
Agriculture/Mining/Construction	9.6
Designing	8.5

2. By Number of Years of Establishment	**Percent (%)**
More than 5 years	68.4
3-5 years	20.9
1-2 years	9.6
Less than 1 year	1.1

3. By Number of Employees	**Percent (%)**
5-50	47.5
Below 5	25.4
51-100	12.4
Over 200	9.0
101-200	5.6

4. By Job Function	**Percent (%)**
Owner/manager	42.4
Major shareholder/manager	32.8
Minor shareholder/manager	16.9
Owner/non manager	5.6
Major shareholder/non-manager	2.3

5. By Educational Qualification	**Percent (%)**
Graduated from University	30.5
Graduated from secondary school	26.6
Vocational/Technical school	14.7
Post graduate degree	14.7
Some university	8.5
Some secondary school or less	5.1

6. By Years of Computer Experience	**Percent (%)**
6-10 years	44.6
1-5 years	44.1
11 years or more	11.3

7. By Age	**Percent (%)**
31-40 years	40.7
41-50 years	37.3
30 years or under	15.3
Over 50 years	6.8

8. By Race	**Percent (%)**
Chinese	73.4
Malay	19.8
Indian	6.8

9. By Sex	**Percent (%)**
Male	58.2
Female	41.8

RESULTS

IT Usage

It is observed that 59.88% of respondents are using 4 (one-half) out of the 8 varieties of systems presented. It is also observed that 53.11% of respondents use systems to do 5 (one-half) out of the 10 job tasks listed. A total of 68.9% of respondents use the systems on a daily basis, and 75.7% use the system for a minimum of one hour per session.

System varieties were subsequently combined into two larger groups as follows: Basic systems (which include, word processing, electronic mail, spreadsheets, graphics, and database), and Advanced systems (e.g. application packages, and programming languages). Specific job tasks were also grouped into those for administrative purposes (e.g. producing reports, letters and memos, data storage/retrieval, & communication with others), planning purposes (e.g. analyzing trends, planning/forecasting, analyzing problems/ alternatives, & making decisions), and control purposes (e.g. budgeting,

controlling & guiding activities). All the respondents use at least one basic system, and (65.5%) use a minimum of one advanced system. A computer system is used for at least one administrative task by all of the respondents, 59.9% of respondents use system for a minimum of one planning task, and 54.8% of respondents use a system for at least one control task.

These findings are important as it could serve as a benchmark for comparing results of future research on entrepreneurs in Malaysia and around the world, being the first known serious TAM study on entrepreneurs. Benchmarking on these results will provide information on whether IT usage has increased or decreased over time among Malaysian entrepreneurs as well as lend a yardstick for comparison if the future study is done on entrepreneurs in other countries.

Hypotheses Testing

The Hierarchical Multiple Regression Model (Abrams, 1999) was employed to predict the relationships in the construct. Four basic assumptions were met: (1) linearity of the phenomenon measured, (2) constant variance of the error terms (homoscedasticity), (3) independence of the error terms, and (4) normality of the error term distribution.

Before the regression results were accepted as valid, the degree of multicollinearity and its effect on the results was examined. The two-part process (condition indices and the decomposition of the coefficient variance) was employed and comparisons made with the conclusions drawn from the variance inflation factor (VIF) and tolerance values. According to Hair et al. (1998) the condition indices and VIF not exceeding threshold values of 30 and 10 respectively are most commonly used. There is no high correlation between the independent variables in the regression as all condition indices and VIF fall below the threshold values. Lastly, there was a check for outliers (i.e. cases falling at the outer ranges of the distribution). A threshold of 3 standard deviations was used, which is appropriate for our sample size of 177 (Hair et al. 1998) to identify outliers. All observations outside this range (3σ) were considered outliers and were duly dropped from the regression.

i. Perceived Usefulness, Ease of Use, Usage

The relationship between perceived usefulness, ease of use, and usage was tested and the results are as shown in table 2.

Table 2: Perceived Usefulness & Ease of Use on Usage

Perception	**Beta Coefficients**	**t-value**	**P-value**
Usefulness	.462	4.823	**.000**
Ease of Use	-.052	-.542	.588
R^2 = .183			

The coefficient of determination (R^2) for the regression is .183, indicating that 18.3 percent of the variation in IT usage is explained by perceived usefulness and ease of use. Their respective p-values of .000 and .588 for usefulness and ease of use indicates that there is a significant direct positive relationship between perceived usefulness and usage (hypothesis 1) at 1% significant level. On the other hand, no significant direct relationship exists between perceived ease of use and usage (hypothesis 2a).

Hypothesis 1: There is a direct positive relationship between perceived usefulness and usage.

Hypothesis 2a: There is a direct positive relationship between perceived ease of use and usage.

Is there an indirect relationship (through perceived usefulness) between perceived ease of use and usage? The search for an answer to this question led to another regression analysis, that hierarchically regressed ease of use (step 1), and usefulness (step 2) against usage. According to Baron and Kenney (1986, p. 1176), a variable functions as a mediator when it meets the following conditions: (a) variations in levels of the independent variable significantly account for variations in the presumed mediator, (b) variations in the mediator significantly account for variations in the dependent variable, and (c) when a and b are controlled, a previously significant relation between the independent and dependent variables is no longer significant or it is significantly decreased. If Z = dependent variable, X = Independent variable, and Y = Intervening variable,

$Z = f(X) = a+bX;$ $Y = f(X) = c+dX,$

$Z = f(Y) = e+fY;$ $Z = f(X,Y) = g+hX + jY$

Full Effect:

* $b \neq 0$
* $d \neq 0$
* $f \neq 0$ also $j \neq 0$
* $h = 0$

Partial Effect

* $b \neq 0$
* $d \neq 0$
* $f \neq 0$ also $j \neq 0$
* $h \neq 0$ but $h < b$

Table 3: Ease of Use and Usage with Perceived Usefulness mediating

Perception	Beta Coefficients without usefulness (model 1)	Beta Coefficients with usefulness (model 2)
Ease of use	.271**	-.052
	R^2 = .074	R^2 = .183

** = Significant at 1% level

The beta coefficient for model 1 is significantly higher than that of model 2. Coupled with the increase in R^2 of .109 explain the mediation effect of usefulness on the relationship between ease of use and usage. There is therefore an indirect positive relationship between perceived ease of use and usage via usefulness. There is validity for hypothesis 2b.

Hypothesis 2b: There is an indirect positive relationship (via usefulness) between perceived ease of use and usage.

ii. Perception Drivers, Ease of Use, and Perceived Usefulness

The study hypothesised the following external factors, such as: prior computer experience, staff support, technical support, computer training, data intensity, and external influence to influence perceived usefulness directly and indirectly through ease of use. The results of these relationships are presented in table 4.

Table 4: Perception Drivers, Ease of Use on Perceived Usefulness

Drivers	Beta Coefficients without ease of use (1)	Beta Coefficients with ease of use (2)
Technical Support	.416**	.257**
Prior Computer Experience	.191**	.152**
Staff Support	.144*	.074
External Pressure/Influence	.118	.059
Training	.158*	.046
Data Intensity/Volume	-.132	-.034
Ease of Use	-	.475**
	R^2 = .462	R^2 = .604

** = Significant at 1% level
* = significant at 5% level

The coefficient of determination (R^2) for the model 1 is .462, indicating that 46.2 percent of the variation in dependent variable (perceived usefulness) is explained by the independent variables (perception drivers) included in the regression. At one percent significance level, technical support, and prior computer experience, show significant direct positive relationship with perceived usefulness, while computer training and staff support significantly influence usefulness at five percent level. From model 2, it is observed that perceived ease of use has a direct positive relationship with perceived usefulness (β = .475; p-value = 0.000) at one percent significant level. These results validate and call for acceptance of hypotheses 3, 5a, 7a, 8a, and 9a.

Hypothesis 3: There is a direct positive relationship between perceived ease of use and perceived usefulness.
Hypothesis 5a: The more the entrepreneur's prior experience with computer in general, the more IT is perceived to be useful.
Hypothesis 7a: The more supportive the employees, the more IT is perceived to be useful.

Hypothesis 8a: The more the computer training, the more IT is perceived to be useful.
Hypothesis 9a: The more the technical support, the more IT is perceived to be useful.

There was no convincing evidence at five percent significant level to support the influence of external pressure and data intensity on perceived usefulness.

iii. Perception Drivers on Usefulness with Ease of Use mediating

The validity of hypothesis 4 was tested by hierarchically regressing impellers (in step 1) and ease of use (step 2) against usefulness coupled with Baron and Kenney's test of mediating effect. Perceived ease of use mediates the relationship between perception drivers and usefulness for two reasons: (1) the beta coefficients for model 1 are significantly higher than those of model 2 (Baron and Kenney, 1986), and (2) the increase in R^2 of .142 is explained by the mediation effect of ease of use. The coefficient of determination (R^2) for the model 1 regression is .462, indicating that 46.2 percent of the variation in dependent variable (perceived usefulness) is explained by the independent variables (perception impellers) included in the regression. The coefficient of determination (R^2) for the model 2 regression is .604, indicating that 60.4 percent of the variation in dependent variable (perceived usefulness) is explained by the independent variables (perception impellers) and the moderator (perceived ease of use) included in the regression. Thus, perceived ease of use mediates the relationship between perception drivers and perceived usefulness.

Hypothesis 4: There is an indirect relationship (via ease of use) between perception drivers and perceived usefulness.

iv. Perception Drivers on Ease of Use

The variables studied as drivers of perceived ease of use include the following: prior computer experience, staff support, technical support, and computer training. Table 5 shows the results.

Table 5: Perception Drivers on Perceived Ease of Use

Drivers	**Beta Coefficients**	**t-value**	**p-value**
Technical support	.354	4.361	.000
Training	.183	2.458	.015
Staff support	.177	2.305	.022
External pressure	.147	2.055	.041
Prior computer experience	.084	1.307	.193
Data intensity/size	-.184	-2.555	.012
$R^2 = .387$			

The coefficient of determination (R^2) for the regression is .387, indicating that 38.7 percent of the variation in the dependent variable (i.e. ease of use) is explained by the

independent variables (i.e. perception drivers) included in the regression. Here, technical support continues to drive perceived ease of use, as did perceived usefulness at 1 percent significant level. This finding is expected because of the importance of system developers, vendors, and technicians in providing knowledge, and practical support that might enhance the perceived usefulness and ease of use of their systems. Hence, it could be said that with adequate technical support comes favourable perception of system's usefulness and case of use, which in turn leads to increased usage. Other determinants that were found to have significant relationship with perceived ease of use at 5 percent significant level are; training, staff support, external pressure, and data intensity. Training correlates with case of use. In general terms, training brings about learning and knowledge, which often helps to ease tasks; this phenomenon also applies to IT training and ease of use, which is the most likely reason why entrepreneurs with more training reported higher level of ease of use of their systems. The support of knowledgeable staffs influenced ease of use perception, so also did stakeholders influence. This is logical especially where knowledgeable staffs are willing to coach the entrepreneur, and where stakeholders are using the system and testifying of its ease of use or user friendliness. Data intensity or size is significantly negatively correlated to ease of use, indicating that the larger the amount of data handled by the entrepreneur, the less he or she will perceive the system to be easy to use. This finding makes sense because it is naturally easier to handle smaller amount of data than larger amounts even with computer systems. The list of valid hypotheses under the perception drivers and case of use relationships are as follows:

Hypothesis 6b: The more the data intensity, the less IT is perceived to be easy to use.
IIypothesis 7b: The more supportive the employees, the more IT is perceived to be easy to use.
Hypothesis 8b: The more the computer training, the more IT is perceived to be easy to use.
Hypothesis 9b: The more the technical support, the more IT is perceived to be easy to use.
Hypothesis 10b: The greater the external influence on the entrepreneur, the more IT is perceived to be easy to use.

Surprisingly, prior computer experience showed no significant relationship with perceived ease of use at 5% significant level. Possible explanations for this are (1) prior experience may help build confidence in the user but it may not make new systems easy to use, (2) both experienced and inexperienced users may have difficulties when new systems are introduced or existing systems upgraded, the only difference lying in the magnitude of the difficulty. While both groups may struggle with the additional system, it is recognize that the experienced users may be quicker to adjust to the system faster than the inexperienced ones. Although the strength of the relationship was not as strong as anticipated, the direction of the coefficients was the same as hypothesized. Hence, it is concluded that prior computer experience has a moderate impact on ease of use.

DISCUSSION

The findings of this research and their theoretical implications are discussed. Table 6 shows a summary of the findings of the study.

Table 6: Summary of Current Study

Authors	Constructs	Method	Findings
Current Study	Usage, Usefulness (U), Ease of Use (EOU), Prior computer experience (PCE), Data Intensity (DI), Staff support (SS), Computing training (CT), Technical support (TS), External Influence (EI),	Survey of Entrepreneurs	U – Usage, EOU & U mediating– Usage EOU – U, PCE, TS, EOU, & U mediating – Usage CT, EI, DI, SS, TS, & EOU mediating – Usage

Theoretical Implications

Present study has theoretical implication in that it presents convincing evidence to understand the way in which entrepreneurs adopt, use, and increase usage of information technologies. Davis' TAM has been acclaimed as the most popular model for technology acceptance in general, however, this research has found that there is no direct relationship between perceived case of use and usage -- one of the TAM's most important relationships. Albeit, TAM has been used in many studies involving different user groups and information technologies at various times, not all of the TAM's constructs applies to Malaysian entrepreneurs, therefore it is needful to apply some caveat in generalising TAM among entrepreneurs. Two possible reasons are suspected for the non-direct influence of ease of use on usage, (1) it could be that the perseverance and flexibility of entrepreneurs has watered down the effect of perceived ease of use on usage, since it is only a matter of time for difficult systems to become easy to use, and (2) ease of use may not be very important in determining continued usage as with adoption. There is a need to replicate TAM among entrepreneurs in other countries before any general conclusion is drawn on the non-direct influence of case of use on entrepreneurs' IT usage.

Is TAM then useless in predicting entrepreneurs IT usage? Current research shows many of the TAM's constructs to be valid among this user group. The study found that perceived usefulness has a direct positive relationship with IT usage, and perceived case of use has an indirect positive relationship (via usefulness) with usage. Moreover, perceived ease of use is positively directly related to perceived usefulness. These findings corroborate the findings of Davis (1989), Davis et al. (1989), and other TAM studies such as, Mathieson (1991), Adams et al. (1992), Segars and Grover (1993), Szajna (1994), Hendrickson and Collins (1996), Chau (1996), Igbaria et al. (1997), and many others. The outcome of present research validates most of the TAM constructs among Malaysian entrepreneurs except for the perceived ease of use and usage relationship.

Prior computer experience, Technical support, and Perceived ease of use determines IT usage indirectly via perceived usefulness. Other determinants of usage but indirectly via perceived ease of use are Training, Staff support, Data intensity, External influence, and Technical support. Prior general experience has proven to be helpful in many situations in understanding more specific issues. For entrepreneurs, prior computer general experience has shown to be helpful in forming favourable usefulness perception of their systems. This is why entrepreneurs with longer prior experience perceived IT to be useful than their less experienced colleagues. This finding confirms the findings of Bagozzi (1981), Eagley and Chaiken (1993), and Taylor and Todd (1995).

Technical support was found to determine usefulness, ease of use, and in turn usage. Generally, people tend to patronize products or shops with after sales services more than those with no sales support when they are buying technical products. In the same manner entrepreneurs who received technical support showed a more favourable perception of systems' usefulness and ease of use. They also reported higher IT usage. This finding is consistent with the findings of Bergeron et al. (1990), Igbaria (1992), Cragg and King (1993), Mirani and King (1994), Igbaria et al. (1997), and Montazemi (1996).

The effect of staff support for the deployed technology is vital to the usefulness and ease of use perception of technologies. In larger organisations, few unsupportive staff could be overlooked, but in smaller organisations the support of a technology by all employees is necessary and could result to the technology's usefulness and ease of use perception. This is especially the case with the support of employees who are computer literate and knowledgeable in the specific system. Data intensity showed an inverse relationship with perceived ease of use. Current research found that the greater the data intensity, the less IT is perceived to be easy to use by entrepreneurs. This is logical because it is easier to manage smaller amount of data than voluminous amount even with a computer technology.

Computer training is another important influence on perceived usefulness and ease of use. Because of the complexity, and delicate nature of different applications, users are often in need of training. The more of training that is available to them, the better knowledge they will gain on the specific-system's benefits and systems'-specific benefits, as well as the easier they will find the system to use, and in turn use more. Clearly, both experienced and inexperienced technology users will find a need for training whenever a new system is introduced, the only difference being in the extent to which they will require it. Several past studies have shown the importance of training as a perception driver, some of which are Raymond and Bergeron (1992), and Igbaria et al. (1995; 1997).

The influence of stakeholders proved to be a driving force in the ease of use perception of IT by entrepreneurs. This finding could be explained by the possibility that if stakeholders are using the system and have a positive testimony of its user friendliness, entrepreneurs' ease of use perception of the system may be enhanced. Present finding is in line with that of Kirby and Turner (1993), Julien and Raymond (1994), Thong and Yap (1995), and Akkeren and Cavaye (1999).

Limitations and Future Research Directions

One potential limitation of this research is the difficulty in discriminating among the ubiquitous small businesses in Malaysia, which one is entrepreneurial and which is not, and to that effect the research relied on the membership of the organisations that served as the sampling frame in determining who qualifies and who doesn't. This inclination does not guarantee an "all entrepreneurs" survey as it may exclude genuine entrepreneurs who are not members. Future research should attempt to define entrepreneurship and entrepreneur to include all who qualify.

Although current research found validity for some of TAM's constructs among Malaysian entrepreneurs, it did not for the rest. Therefore, there is no empirical evidence in this research to claim that TAM is sufficient for studying why entrepreneurs will adopt, use and increase usage of technologies. There is also a suspicion that the unique characteristics (or traits) of users could mediate (Adams et al. 1992) or moderate some of the relationships studied in the current work. Future research could be geared towards these directions.

Strengths of the Current Research

It is pertinent at this point to highlight some of the strengths of this research. Firstly, the model is based on theory grounded on existing management information system studies. Actual usage behaviour rather than usage intention is used as the dependent variable, as such, researchers (e.g. Straub et al., 1995; Bentler & Speckart, 1979; Songer-Nocks, 1976) who are doubtful about using intention to predict actual behaviour will have nothing to worry about the findings of this research and their application. Moreover, the data are based on a poll of entrepreneurs who are officially recognised as Malaysian entrepreneurs by their membership of an acknowledged entrepreneur associations or bodies. Lastly, albeit validated items were used to measure the dimensions in the construct, they were re-validated and tested for reliability via factor and reliability analyses to ensure parsimony and consistency.

CONCLUSION

While TAM is a powerful model for understanding technology acceptance in general, the validity of its constructs in predicting entrepreneurs' technology usage is not total. In as much as TAM is helpful in understanding entrepreneurs' IT usage, its sufficiency is yet to be proved empirically. It is suspected that entrepreneur's unique traits have a role to play. This work calls for an extension of the model to account for the possible influence of entrepreneurs' traits.

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Appendix 1 : Questionnaire Items

Part 1: IT Usage
System Variety, Job tasks where computer systems are applied, Usage frequency, Average time spent per session

Part 2: Perceived Usefulness
Using the system improves my job performance
Using the system in my job increases my productivity
Using the system enhances my effectiveness in my job
I find the system useful in my job

Part 3: Perceived Ease of Use
My interaction with the system is clear and understandable
I find it easy to get the system to do what I want it to do.
Interacting with the system does not require a lot of mental effort
I find the system easy to use.

Part 4: Data Intensity
I handle large volume of data

Part 5: Staff Support
My immediate subordinates are receptive and supportive of the system use in job-related work.
Non-managers are receptive and supportive of the system use in job-related work

Part 6: Technical Support
A specific person (or group) is available for assistance with system difficulties.
Specialised instruction and education on software is available to me.
Guidance is available to me in selecting hardware, software, and other equipment.

Part 7: External Influence/Pressure
People who influence my behaviour think that I should use the system

Part 8: Computing Training
Extent of computer training in the following systems:
Operating systems (e.g. Windows 95)
Spreadsheets (e.g. Excel, Lotus 123)
Word processing (e.g. MS-Word)
Application packages (e.g. accounting, Stock control)

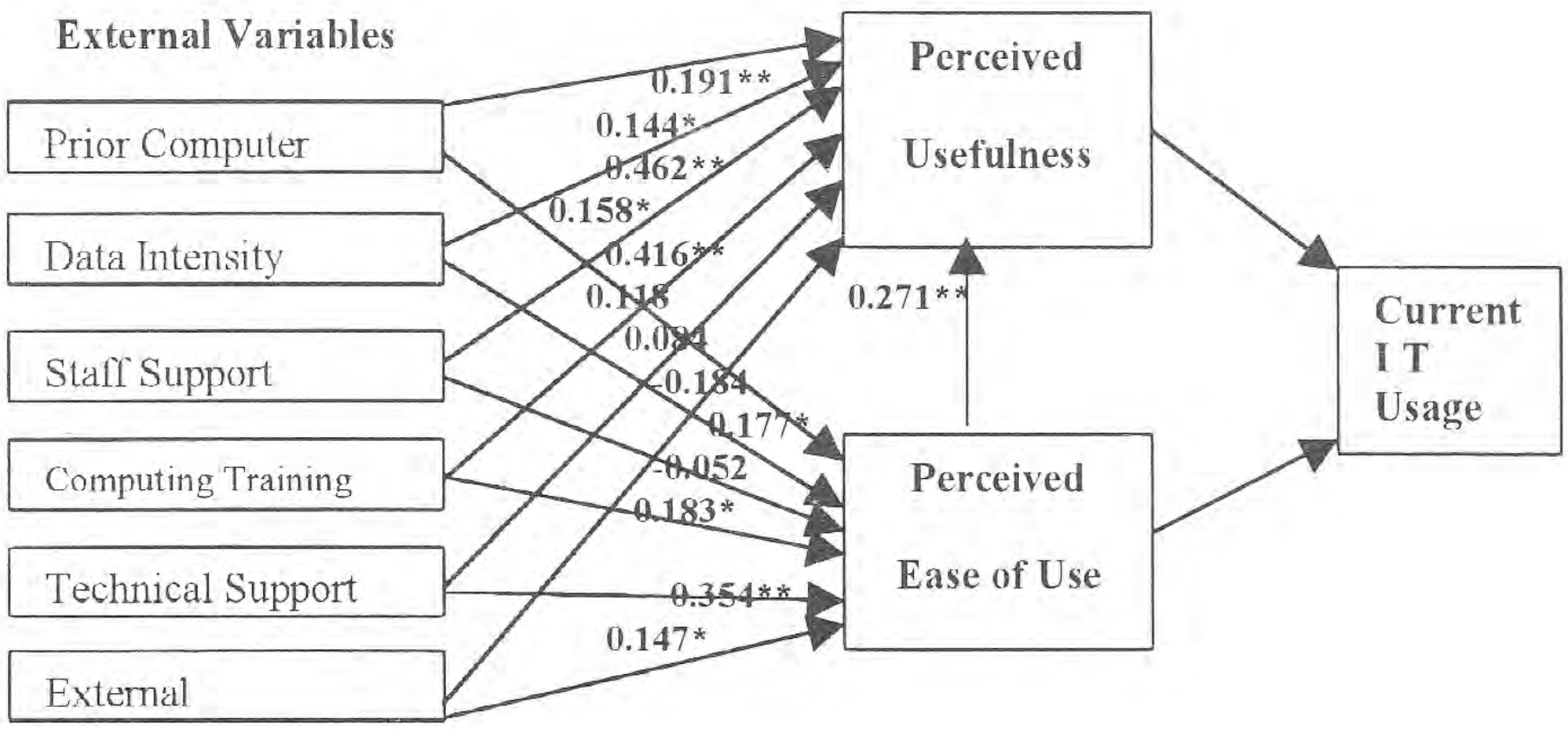
Part 9: Prior Computer Experience
Number of years of general computer experience

Note: Parts 2 to 8 were measured on 5-point Likert scale.

Appendix 2: Rotated Factors and Item Loadings – Oblique Method

Items	Factors								Communalities
	1	2	3	4	5	6	7	8	
U1	**.952**	.045	.049	.001	-.033	.041	-.020	-.030	.902
U2	**.739**	-.112	.016	-.136	.166	.152	-.020	-.034	.809
U3	**.805**	.059	.034	-.077	.074	-.059	.025	.043	.852
U4	**.466**	.088	-.098	-.109	.231	-.224	.263	.172	.763
SS1	.100	**.856**	-.056	-.034	-.005	-.100	.128	.049	.875
SS2	.009	**.832**	-.066	-.149	.217	.091	-.061	-.165	.828
CT1	-.017	.141	**.801**	-.152	.065	.044	-.003	-.058	.807
CT2	-.049	.033	**.941**	.105	.044	.049	.025	-.028	.944
CT3	-.059	-.103	**.806**	-.201	.230	-.071	.075	.002	.838
CT4	.252	.016	**.697**	.157	-.107	.096	.055	.108	.691
TS1	.107	.007	-.017	**-.857**	-.033	.041	.030	.096	.864
TS2	.037	-.002	.122	**-.865**	.036	.068	-.104	.019	.880
TS3	.083	.244	.107	**-.669**	-.064	-.071	.122	.143	.833
D1	.063	.002	.226	-.061	**.643**	.257	.058	-.130	.646
EOU1	.095	.222	-.035	.075	.027	**.685**	-.055	.031	.733
EOU2	-.012	-.002	-.002	-.084	-.221	**.763**	-.012	.109	.790
EOU3	.072	-.002	-.018	.149	.055	**.796**	.125	-.061	.706
EOU4	.027	.106	.169	.007	.073	**.842**	-.039	.034	.857
PCE	-.045	-.008	.046	.035	-.001	.096	**.984**	-.055	.960
EI	-.033	-.016	-.046	-.126	.114	.047	-.053	**.925**	.945

Appendix 3: Schema of the Modified Technology Acceptance Model



** = Significance at 1% Level

* = Significance at 5% Level