WOMEN ENTREPRENEURS AND IT USAGE: THE IMPACT OF TRAITS

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In many IT studies, the system's perceived usefulness and ease of use have emerged as important factors influencing the usage of information technologies. A similar amount of work has been directed to investigating their determinants, such as organizational factors, environmental factors, demographic factors, etc., but very often overlooked are the unique traits of users or user groups. The current research adopts the technology acceptance model (TAM) in examining the relationship between IT usage, the system's usefulness and ease of use, and the entrepreneurial traits (such as innovativeness, risk-taking propensity, perseverance, and flexibility) of women entrepreneurs. The results show that perceived usefulness has influence on information technology usage. Perceived ease of use has an indirect influence (via perceived usefulness) on usage. Contrary to TAM, no significant direct relationship was found between perceived ease of use and usage. Innovativeness, risk-taking propensity, and flexibility were found to determine perceived usefulness. Perceived ease of use is determined by innovativeness, and marginally by flexibility. Important implications for theory and practice are discussed.

In the past decade, organizational investments in IT have increased significantly, with the aim of increasing users' productivity and, in turn, that of the organization. While advances in technology continue with rapidity, the use of these upcoming technologies has fallen below expectations (Jantan, Ndubisi & Ong 2003; Ndubisi & Richardson 2002; Johansen & Swigart 1996; Wiener 1993; Moore 1991) and has been identified as one of the

plausible explanations for the productivity paradox (Sichel 1997; Landauer 1995). A number of studies have shown that individuals and organisations can reap immense benefits from successful investment in technology. On the basis of these benefits, many governments have been encouraging their business communities, particularly entrepreneurs, to avail themselves of the benefits of these technological advances.

In Malaysia, the abolition of the 10% sales tax on computers, software and accessories, as well as other bold steps taken by the government in this regard, not only has helped consumers and corporate citizens to possess a computer, but also has helped to increase the marketing of computers in the nation. The extent of IT usage among women entrepreneurs (known for combining the unique traits of entrepreneurs with feminine traits) is still unclear, in view of these significant technological advances and increasing governmental investments in promoting IT usage at individual and organizational levels. Also, the determinants of usage and the role of entrepreneurial traits in IT usage deserve research attention. Clearly, understanding the factors influencing usage of technologies among this group is critical for researchers, entrepreneurs, and systems developers and vendors. This research, therefore, attempts to further our understanding of the determinants of perceived usefulness and ease of use of technologies by focusing on the traits of the entrepreneur.

THEORETICAL DEVELOPMENT

The Technology Acceptance Model

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 & 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 & Howell 1991), the Decomposed Theory of Planned Behaviour (*e.g.*, Taylor & Todd 1995), and Innovation Diffusion Theory (*e.g.*, Agarwal & Prasad 1997; Brancheau & Wetherbe 1990; Rogers 1995). Some of these studies were carried out at the individual level (*e.g.*, Agarwal & Prasad 1998), and some at the organisational level (*e.g.*, Cooper & Zmud 1990).

This study, however, focuses on the TAM, because it helps to understand the role of usefulness and ease of use in determining technology usage. TAM theorises that external variables influence behavioural intention to use, and actual usage of technologies, indirectly, through their influence on perceived usefulness and perceived ease of use. A significant body of research in IT (*e.g.*, Davis 1989; Mathieson 1991; Adams *et al.* 1992; Segars & Groover 1993; Ndubisi *et al.* 2001) has amassed support for the importance of perceived usefulness and perceived ease of use on initial user acceptance and sustained usage of technologies. Although there is a large body of research on the perceived usefulness and ease of use constructs, much of it has focused on the following determinants: organizational factors (Igbaria *et al*. 1997), environmental factors (Mathieson 1991), and system design characteristics (Davis *et al*. 1989). Very little work has been done to understand the influence of peculiar traits of users (in this case entrepreneurs). Understanding the determinant structure of these key drivers of usage is important, because it will provide opportunities to create favourable perceptions and, thus, foster entrepreneurs' acceptance and usage of IT. Davis (1989, p. 320), 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 model's 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 interventions 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 (1975) assertion (on which TAM is based) 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 toed this line of suggestion, by investigating actual or current usage as the dependent variable.

Entrepreneurial Traits

The focus on entrepreneurs is precipitated by the fact that entrepreneurs are a distinct and important IT user group. Because their businesses are small in size, most entrepreneurs are short of resources, capital, and expertise, which constrain exorbitant deployment and experimentation with sophisticated technologies. Secondly, entrepreneurs, as we shall see shortly, have been

reported, in personality and psychological research, as exhibiting unique traits that distinguish them from other users.

The traits suggested by previous empirical research as describing 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 of risks (McBer & Co. 1986); (7) low conformity (DeCarlo & Lyons 1979; Sexton & Bowman 1983, 1984); (8) aggression, support, and benevolence (DeCarlo & Lyons 1979); (9) 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 succourance (Sexton & Bowman 1984).

Earlier, Yonekura (1984) suggested the following traits: assertiveness, insistence, forward-looking, critical thinking, creativity, innovation, continuity, preparedness, responsibility, open-mindedness, etc. Burch (1986) mentioned nine salient traits, which dictated a high propensity for one to behave entrepreneurially. They are: a desire to achieve, hard work, nurturing quality, able to accept responsibilities, reward oriented, optimistic, excellence-oriented, an organiser, and money oriented. These traits influence one's self-efficacy, which Ajzen (1991) believes to influence intention and usage.

Women and IT Usage Decisions

More interestingly, the focus on women is not only because they have not been researched as substantially as male

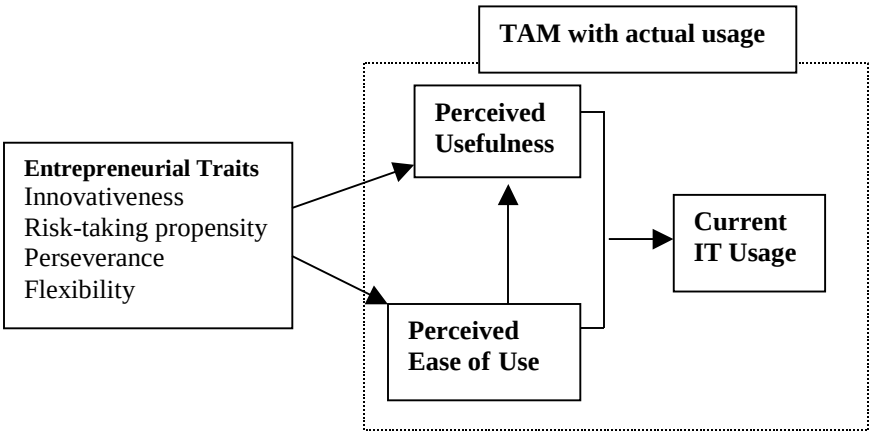
entrepreneurs, but also because research has shown that women exhibit more "feminine" traits (*e.g.*, tenderness) (Bem 1981), which distinguishes them from other user groups. The meta-analysis of Taylor and Hall (1982) suggested that these feminine traits correlate with "expressive" behaviours. There is substantial evidence in organizational behaviour and management information systems research (*e.g.*, Davis 1989; Davis *et al.* 1989; Mathieson 1991; Taylor & Todd 1995) suggesting that the key underlying cognition determining an individual's attitude toward the behaviour of adopting and using a new technology in the workplace is her/his perceptions about the usefulness of the technology. Specifically, the link between usefulness perceptions and attitude toward using a new technology has been shown to have path coefficients ranging from .50 (Davis *et al*. 1989) to .79 (Taylor & Todd 1995). Given these strong results, it could be concluded that an individual's attitude toward using a technology in the workplace reflects instrumentality and intrinsic motivation to use technology. Venkatesh *et al*. (2000) reported higher instrumentality (*i.e.*, outcome) for men and higher process orientation (ease of use/difficulty) for women as determinants of technology adoption. Their finding supports the notion of earlier research (such as Hennig & Jardim 1977; Rotter & Portugal 1969) that women tend to focus on the methods used to accomplish a task – suggesting a greater process orientation. Given the process-orientation of women and the lower levels of control (see Mirowsky & Ross 1990) generally perceived by women in the work environment, the perceived ease of use or difficulty of using technology is expected to have an important influence over their decisions to adopt or to reject a new technology (Venkatesh *et al*. 2000). Further, there is evidence to suggest that women display somewhat higher levels of computer anxiety (Bozionelos 1996; Morrow *et al*. 1986) and lower computer aptitude (Felter 1985) compared to men (Chen 1985). Both computer anxiety and

computer aptitude have been related to perceptions of effort, thus suggesting that constraints to technology use (perceived difficulty) will be more salient to women. It is implicit, therefore, that ease of use is more important than usefulness to women in technology adoption and usage if women are more interested in process than outcome. However, a body of research (DeCarlo & Lyons 1979; Hornaday & Aboud 1971) has shown that entrepreneurs have high need of achievement. Because of the achievement needs of entrepreneurs and other entrepreneurs' traits, women entrepreneurs are likely to be influenced by instrumentality in decision-making processes about a new system. Thus, the traits of women entrepreneurs may have different implications for their perception of technology usefulness and ease of use.

Research Model and Hypotheses

Figure 1 shows TAM together with the extensions proposed in this paper. Specifically, it is proposed that entrepreneurial traits

Figure 1: Modified Technology Acceptance Model



of the entrepreneur will influence usage via perceived usefulness and perceived ease of use. The entrepreneurial traits include: innovativeness, risk-taking propensity, perseverance, and flexibility.

IT Usage

In line with ICOLC (1998), the indicators used in enhancing the reliability of measuring the system usage in this study are: (1) use of a wide variety of software packages in CBIS environment (*e.g.*, spread sheet, word processing, graphic, data processing); and (2) the number of business task performed using systems, such as producing reports, letters and memos, communication with others, data storage and retrieval.

Perceived Usefulness and Ease of Use

Perceived usefulness and perceived ease of use are the characteristics under study. 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 has shown that perceived usefulness and perceived ease of use are determinants of usage (*e.g.*, Davis 1989; Mathieson 1991; Adams *et al*. 1992; Segars & Groover 1993; Sjazna 1994; Igbaria *et al*. 1997; Richardson & Ndubisi 2004).

Technology adoption (or usage) decisions have been typically characterised by a strong productivity orientation (Venkatesh & Brown 2001). In many studies (*e.g.*, Mathieson 1991; Agarwal & Prasad 1997; Igbaria *et al*. 1997), perceived usefulness, one of the constructs related to the use-productivity contingency, has emerged as one of the strongest predictors of adoption and usage behaviour. Measures of perceived usefulness in

this study are perception that using IT will increase productivity, improve job performance, enhance job effectiveness, and be useful in the job. Perceived ease of use is measured in terms of how clear and understandable is the interaction with system, ease of getting the system to do what is required, minimum mental effort required to interact with the system, and ease of use of system. Thus, we hypothesize:

- H_1: There is a direct positive relationship between perceived usefulness and usage.
- H_2: There is a direct positive relationship between perceived ease of use and usage.
- H_3: There is an indirect positive relationship (via usefulness) between perceived ease of use and usage.
- H_4: The more IT is perceived to be easy to use, the more it will be perceived to be useful.

Traits

Review of literature shows that innovation, risk-taking propensity, perseverance or persistence, and flexibility are more common and consistently reported traits among entrepreneurs. These traits were studied further to explore their influence on perceived usefulness and perceived ease of use.

The entrepreneurial role has long been recognized as a prime source of innovation or creativity. For many entrepreneurs, the basic drive is creativity and innovation to build something out of nothing. They are always looking for something unique to fill a need or want. Thus, the more innovative the entrepreneur is, the stronger and more positive her perception of the system's usefulness will be, and in turn her IT usage, as she continues to experiment with new and better ways of solving needs. Thus, the following hypotheses are posited:

H_{5a}: More innovative entrepreneurs are more likely to perceive IT as useful.

H_{5b}: More innovative entrepreneurs are more likely to perceive IT as easy to use.

Risk here refers to the uncertainty of outcomes of an organisation's resource commitment. Entrepreneurs who are highly risk propensive are more likely to meddle with matters of uncertain outcomes; they are not too keen about enormous data collection before making decisions, because of the short decision window confronting them. On the other hand, the more risk-averse entrepreneurs are likely to collect a lot of data that might help to make outcomes more certain, and, for this reason, they will have a stronger perception of the system's usefulness. On the other hand, organisational innovations result from, among other factors, risk taking in organisations. According to Nohria and Gulati (1997) and Singh (1986), innovation can often result from successful risk taking, hence the highly risk propensive entrepreneurs will perceive the system as easy to use. Thus:

H_{6a}: The higher the risk-aversion of the entrepreneur, the more IT is perceived as useful.

H_{6b}: The lesser the risk-aversion of the entrepreneur, the more IT is perceived as useful.

Perseverance is the ability to continue doing something one believes in for an extended period, enduring difficulties, and finding a solution when facing a barrier. A CEO whose perseverance level is high keeps on working on achieving goals despite repeated failures (Kitchel 1997). Thus, the study opines that the perceived usefulness, ease of use, and subsequently usage of IT, will be greater among more persistent entrepreneurs.

H_{7a}: The greater the perseverance of the entrepreneur, the more IT is perceived as useful.

H_{7b}: The greater the perseverance of the entrepreneur, the more IT is perceived as easy to use.

Very flexible entrepreneurs, more so than the less flexible ones, are more likely to react faster to rapid technological obsolescence. Depending on the frequency of technology replacement or upgrading need, the flexible entrepreneurs may not have had enough time to interact with the current system to discover its usefulness and usability before the need to replace or upgrade arises. That being the case, they may not eventually fully perceive the usefulness and ease of use of both the preceding and successive systems. McCalman and Paton (1992) asserted that technological change, due to its dynamic impact on existing system and also its threatening image, can create many challenges for the change agent. The less flexible entrepreneurs usually do not flow with technology fads; therefore, continued usage of existing technology will help to fully perceive its usefulness and also to enhance usability. Thus, it is proposed that:

H_{8a}: The less flexible the entrepreneur, the more IT is perceived as useful.

H_{8b}: The less flexible the entrepreneur, the more IT is perceived as easy to use.

Lastly it is hypothesized as follows:

H_9: Perceived ease of use mediates the relationship between entrepreneur's traits and perceived usefulness.

METHOD

Participants and Procedure

The population under study consists of women entrepreneurs and members of the National Association of Women Entrepreneurs in Malaysia (NAWEM). These are current IT users. The list of members of the NAWEM was taken from the NAWEM's Business Directory. Entrepreneurs were surveyed using a structured questionnaire. A total of one hundred twenty-

five questionnaires were mailed out to all the members of the NAWEM and seventy-four (59.2%) usable responses were received. Respondents are engaged in various activities, from manufacturing, to sales, education, interior decoration, fashion designing, etc. Seventy-three percent of the entrepreneurs have been in business for over five years, 20.3% and 79.7% are respectively in the manufacturing and service sectors, 89.2% are employing less than one hundred staff, and 84.6% are owner-managed. A total of 58.1% of the entrepreneurs are graduates and 43.2% are forty years or below. There are more Chinese (64.9%) than Malays (32.4%) and Indians (2.7%).

Predictors

The design of the questionnaire basically takes the approach of Davis *et al*. (1989), which has been adapted by many other researchers (such as Venkatesh & Davis 1996, Igbaria et al. 1995, 1997, etc.), but, in this study, includes modifications to capture the hypothesised effect of entrepreneurial traits.

Part 1 measures the actual system usage with two indicators, the number of computer supported business tasks performed and the number of different software applications used (see Table 1). These indicators were adapted from ICOLC (1998). The coefficient α of 0.83 indicates high reliability of measures.

Parts 2 and 3 respectively measure perceived usefulness and perceived ease of use. Perceived usefulness indicators are improvement in job performance, increase in productivity, enhancement of job effectiveness, and system usefulness in the job. Indicators of perceived ease of use include clear and understandable interaction with system, system compliance to commands, minimal mental effort in interacting with the system, and finding the system easy to use. These indicators are similar to that used by Davis *et al*. (1989), Ndubisi *et al*. (2001) and, more recently, Richardson and Ndubisi (2004), and their respective

inter-item reliability achieved in this study are α = .90 for perceived usefulness and α = .88 for perceived ease of use.

Part 4 measures the traits of the entrepreneur. Entrepreneurial traits in this study include innovativeness, risk-taking propensity, persistence/perseverance, and flexibility. Indicators measuring these entrepreneurial traits were adapted from Kitchel (1997) and Harper (1996). The measures are reliable with the following α values: innovativeness (.92), risk-taking propensity (.83), perseverance (.70), and flexibility (.82).

Part 5 measures the demographic variable, using single items, such as age, educational background and job function of the respondent, and the profile of the organisation, such as primary business activity, period of establishment, number of employees in the organisation, and prior computer experience.

For parts 2 through 4, respondents were asked to indicate the extent of agreement and disagreement on a five-point Likert scale ranging from (1) "strongly disagree" to (5) "strongly agree."

Hypotheses Testing

The hierarchical multiple regression model (Abrams 1999) was employed to analyse the relationships hypothesized. The predictor variables (*i.e.*, the independent and the intervening variables) were entered into the model in different stages. The hierarchical regression is employed so that the increase in R^2 corresponding to the inclusion of each category of predictor variables and the unique variance in IT usage explained by the predictor categories could be examined. The R^2 for all sets can be analysed into increments in the proportion of Y variance due to addition of each new sets of predictor variables to those higher in the hierarchy. These increments in R^2 are squared multiple semi-partial correlation coefficients. The following general hierarchical model equation for four sets in alphabetical hierarchical order was adopted from Cohen and Cohen (1975):

$$R_Y^2._{TUVW} = R_Y^2._T + R_Y^2._{(U \cdot T)} + R_Y^2._{(V \cdot TU)} + R_Y^2._{(W \cdot TUV)}$$

Using this general formula, each term in the right hand side of the equation is the coefficient of determination at each stage of introduction of a set of predictor variable in the regression.

$R_Y^2._T$ - represents the coefficient of determination for the set of variables introduced in stage 1.

$R_Y^2._{(U \cdot T)}$ - represents the coefficient of determination for the set of variables in stage 2.

$R_Y^2._{(V \cdot TU)}$ - represents the coefficient of determination for the set of variables used in stage 3.

$R_Y^2._{(W \cdot TUV)}$ - represents the coefficient of determination for the set of variables added in stage 4.

When doing hierarchical regression, one must look at the significance level, beta coefficients, etc. associated with each variable or a set of variables at the step in which the variable or set of variables was entered. The results of the regression analyses are presented in the following section.

The mediator effect of perceived usefulness was measured based on Baron and Kenney (1986). According to Baron and Kenney (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,

$Z = f(X) = a+bX$ (1) $Y = f(X) = c+dX$ (2)
$Z = f(Y) = e+fY$ (3) $Z = f(X,Y) = g+hX+jY$ (4)

Full Effect:		Partial Effect:	
* $b \neq 0$		* $b \neq 0$	
* $d \neq 0$		* $d \neq 0$	
* $f \neq 0$	also $j \neq 0$	* $f \neq 0$	also $j \neq 0$
* $h = 0$		* $h \neq 0$	but $h < b$

RESULTS

IT Usage

Table 1 shows the percentage of respondents using each variety of system and the job task where the system is applied. It is observed that 59.5% of respondents are using a minimum of four out of the seven varieties of systems presented, and 54.1% are using a system for at least five out of the ten job tasks.

Table 1: IT Usage

System Variety	Percentage of respondents using	Specific Job Tasks	Percentage of respondents using
Word processing	100	Letters and memos	87.8
Electronic mail	73.0	Producing report	77.0
Application Packages	56.8	Communication with others	66.2
Graphics	41.9	Data storage/retrieval	62.2
Spreadsheets	40.5	Budgeting	48.6
Databases	40.5	Controlling & guiding activities	47.3
Programming Languages	31.1	Planning/forecasting	44.6
		Making decisions	43.2
		Analyzing trends	41.9
		Analyzing problems/alternatives	24.3

Mean Differences in IT Usage

For each of the IT usage measures, response frequencies and means for the values were calculated. This method of assessing importance using frequency counts has been recently employed in IS research (see Webster 1998); the descriptive statistics (means) of the values of the measures provide additional richness that is not available with frequencies. Table 2 shows the profiles of respondents.

Table 2: Mean IT Usage and Demography

Demography	**Sub-demography**	**Percentage of respondents**	**Mean IT Usage**
Primary activity	Manufacturing	20.3	9.4667
	Service	79.7	9.5085
Years of business establishment	5 years or less	27.0	9.7500
	Over 5 years	73.0	9.4074
Years of computer experience	5 years or less	47.3	6.6286
	6-10 years	50.0	**11.8649***
	11 years or more	2.7	**16.0000 ***
No. of employees	Below 5	41.9	7.4516
	5 – 100	47.3	9.7429
	101 or more	10.8	**16.3750 ***
Job function	Full owner-manager	39.2	11.0345
	Part owner-manager	55.4	8.4878
	Owner-non-manager	5.4	8.7500
Education	Non-graduate	41.9	6.0645
	Graduate	58.1	**11.9767 ***
Age	40 years or less	43.2	**11.1875 ***
	41 years or more	56.8	8.2143
Race	Malay	32.4	7.0833
	Chinese	64.9	**10.6875 ***
	Indian	2.7	10.0000

* Mean difference is significant at the .05 level

Using T-Test and ANOVA analysis, it was found that mean IT usage is significantly higher for entrepreneurs with 6 to 10 years

or 11 years or more of general computer experience than for those with 5 years or less (F-value = 15.269, p-value = .000); higher for larger entrepreneurships (employing 101 or more workers) than smaller ones (those employing below 5 or between 5 and 100 workers) (F-value = 12.772, p-value = .000); higher for graduate entrepreneurs than non-graduates (t-value = -5.717, p-value = .000); entrepreneurs below middle age (40 years or less) than for middle-agers and over (41 years or more) (t-value = 2.602, p-value = .011); and higher for Chinese than for Malays and Indians (F-value = 4.300, p-value = .017).

Usage Pattern

System variety was subsequently combined into two larger groups as follows: Basic Systems (which include word processing, electronic mail, spreadsheets, graphics, and databases), and Advanced Systems (*e.g.*, application packages and programming languages). Specific job tasks were grouped into those for administrative purposes (such as producing reports, letters and memos, data storage/retrieval, and communication with others), planning purposes (*e.g.*, analyzing trends, planning/forecasting, analyzing problems/alternatives, and making decisions), and control purposes (*e.g.*, budgeting, controlling and guiding activities). All the respondents are using at least one basic system, and 58.1% of respondents are using a minimum of one advanced system. A computer system is in use for at least one administrative task by all respondents, while 59.5% of respondents are using a system for a minimum of one planning or control task.

Perceived Usefulness and Perceived Ease of Use

The result of perceived usefulness of systems shows that 94.5% of respondents strongly agree or agree that the system is useful in their job, while 96% strongly agree or agree that the system improves their job performance, increases their

productivity, or enhances their job effectiveness. Concerning ease of use of systems, 87.8% of respondents strongly agree or agree that system interaction is clear and understandable, 78.4% strongly agree or agree that it is easy to get the system to do what is wanted, 96% strongly agree or agree that interaction with the system does not require a lot of mental effort, and 89.2% strongly agree or agree that the system is easy to use. The mean and standard deviation of perceived usefulness are respectively 17.66 and 1.96, while those of perceived ease of use are 16.93 and 2.43. On the whole, respondents find the system useful and easy to use. Thus there is a favourable perception of the system's characteristics.

Verification of Relationships

1. Perceived Usefulness, Ease of Use, and IT Usage

Table 3 summarizes the regression analysis for hypotheses H_1 and H_2. Their respective p-values of .000 and .506 for usefulness and ease of use indicate that there is a significant direct positive relationship between perceived usefulness and usage (hypothesis H_1) at 1% significant level. On the other hand, no significant direct relationship exists between perceived ease of use and usage (hypothesis H_2).

Table 3: Perceived Usefulness, Perceived Ease of Use and IT Usage

Perception	**Beta coefficients**	**t-value**	**p-value**
Usefulness	.510	5.442	.000
Ease of Use	-.062	-.666	.506

$R^2 = .219$

Is there an indirect relationship (through perceived usefulness) between perceived ease of use and usage? Baron and Kenney's (1986) statement of the conditions under which a

variable functions as a mediator is set forth on page 124 above. Table 4 shows the result of the test for the mediator effect of perceived usefulness in the relationship between ease of use and usage.

Table 4: Perceived Ease of Use and IT Usage (via Perceived Usefulness)

Perception	**Beta coefficients without usefulness (model 1)**	**Beta coefficients with usefulness (model 2)**
Ease of Use	.294**	-.062
Usefulness	–	.510**
	R^2 = .087	R^2 = .219

** = Significance at .01 level

The beta coefficient for model 1 is significantly higher than that of model 2. Coupled with the increase in R^2 of .132, this explains 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. In other words, usefulness fully mediates the relationship between ease of use and usage. These results present significant evidence to accept hypothesis H_3.

2. Entrepreneurial Traits, Perceived Ease of Use, and Perceived Usefulness

Table 5 shows that there is significant evidence at the 1% level supporting hypotheses H_4, H_{5a}, H_{6a}, and H_{8a}.

The validity of hypothesis H_9 was tested by hierarchically regressing traits (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 & Kenney 1986), and (2) the increase in R^2 of .414

is explained by the mediation effect of ease of use. The coefficient of determination (R^2) for the model 1 regression is .316, indicating that 31.6 percent of the variation in perceived usefulness is explained by the independent variables (Traits) included in the regression. The coefficient of determination (R^2) for model 2 regression is .730, indicating that 73.0 percent of the variation is explained by the independent variables (Traits) and the mediator (perceived ease of use) included in the regression. Thus, perceived ease of use mediates the relationship between innovativeness, perseverance, and flexibility on one hand, and perceived usefulness on the other.

Table 5: Perceived Ease of Use and Perceived Usefulness

Drivers	**t-value**	**p-value**
Innovativeness	.5.677	.000
Risk-taking propensity	-5.270	.000
Perseverance	.1.242	.219
Flexibility	-2.644	.010
Ease of Use	.10.046	.000
R^2 = .730		

Table 6: Traits on Perceived Usefulness (with ease of use mediating)

Traits	**Beta coefficients without ease of use (model 1)**	**Beta coefficients with ease of use (model 2)**
Innovativeness	1.130**	1.044**
Risk-taking propensity	-.166	-.609**
Perseverance	.270	.207
Flexibility	-.890**	-.490*
Ease of Use	-	.717**
	R^2 = .316	R^2 = .730

** = Significance at .01 level
* = Significance at .05 level

3. Entrepreneurial Traits and Perceived Ease of Use

Table 7, which summarizes the regression analysis for hypotheses H_{5b} to H_{8b}, shows that H_{6a} (less risk-keen entrepreneurs are more likely to perceive IT as easy to use) is significantly valid at the 1% level. Flexibility is marginally inversely correlated with perceived ease of use (H_{7b}). The direction of this relationship is as predicted in the hypothesis.

Table 7: Entrepreneurial Traits on Perceived Ease of Use

Drivers	**t-value**	**p-value**
Innovativeness	.390	.698
Risk-taking propensity	-3.483	.001
Perseverance	.294	.769
Flexibility	-1.832	.071
R^2 = .198		

DISCUSSION

The Malaysian women entrepreneurs are increasingly using information and communication technologies as compared to their counterparts in other developing world. In a study by the Center for Women's Business Research (formerly called National Foundation for Women Business Owners) (Garca *et al.* 1998), it is reported that 64% (as compared to Kuala Lumpur's 100%) of the total number of women entrepreneurs in Mexico City use computer technology in their business, of whom only 14% have local area networks and more sophisticated systems. In another survey by the same Center, completed by women business owners from 14 countries (Australia, Canada, Côte d'Ivoire, Ethiopia, Ghana, Italy, Malta, Mexico, Namibia, Paraguay, Senegal, South Africa, Uganda, and the United States), it was found that technology is playing an important role in the growth and development of women-owned businesses internationally (Peacock 1998). The

study shows that 83% of the women that participated in the surveys currently use computers in their business, 51% have used the Internet, and 26% have home pages for their businesses. These figures, in juxtaposition with the Malaysian case, are comparatively low. Regarding the barriers to the use of technology in their firms, women business owners from Mexico, Brazil, and Argentina listed the following: cost of hardware and software, difficulty of keeping the systems serviced, or upgraded, and lack of information or training about how to use technology. As compared to Malaysia, where the government has provided a number of financial cushions to technology-adopting small businesses and individuals especially actively involved in the IT literacy campaign and enhancement of computer usage, the magnitude of the impact of these barriers is less.

In Malaysia, the increased use of information technology (as compared to many developing nations) is the result of several factors. The mass production of computer parts has pushed the price of these products down to a very affordable level. This decline in cost has an effect of allowing even smaller firms or organisations and homes to use new technologies for their daily needs. Moreover, the abolition of the 10% sales tax on computers, software and accessories in Malaysia has not only helped consumers to possess computers, but also increased the marketing of computers in the nation.

Another important factor in IT adoption and usage is training. The Malaysian government encourages firms to send their workers for training, by providing tax incentives to reduce the cost of training to firms especially the small ones. The Human Resource Development Fund (HRDF) provides disbursements for ICT-based training with emphasis on the smaller firms. In addition, new apprenticeship schemes in areas related to ICT are available. Even the rural areas with no conventional means of access are

being given Internet access through satellite communication, especially the VSAT technology.

Regarding the technology acceptance model, this research reveals that there is validity for most of TAM constructs among Malaysian women entrepreneurs. Despite some non-significant effects, the role of perceived usefulness in technology usage behaviour is crucial. The findings show that Malaysian women entrepreneurs' usage of IT is driven directly by their perception of the system's usefulness and indirectly (via perceived usefulness) by perceived ease of use. It is further revealed that the more they perceive the system to be easy to use, the more they will see it as useful. Hence, perceived usefulness is robust in determining technology usage. These findings are consistent with those of Davis (1989), Adams *et al*. (1992), Hendrickson and Collins (1996), Igbaria *et al*. (1997), and Ndubisi *et al*. (2003).

Further, contrary to TAM postulation, perceived ease of use has no direct relationship with technology usage. Ease of use has no direct role in determining IT usage, but is influential only when entrepreneurs consider easy to use systems as useful. This finding could possibly be explained in three parts. First, TAM and all its replications and adaptations in small and medium-scale businesses were carried out in the developed nations, namely Australia (Akkeren & Cavaye 1999), New Zealand (Igbaria *et al*. 1997), USA (Montazemi & Cameron 1996; Raymond & Bergeron 1992), etc., and all of these studies show that ease of use is a significant factor. The present work, which is the first TAM test in a developing economy that the author is aware of, shows that ease of use is not important directly in determining usage, but indirectly, via perceived usefulness. A plausible explanation of this finding could be differences in the level of development of nations, which may have effect on the ease of use – usage relationship. For the developed nations, the level of technology is higher and rivalry among systems developers is also stronger, so that users'

evaluation of systems will no longer be on basic usefulness alone, but also on user friendliness and other secondary yardsticks. In the less developed nations, however, with fewer choices and very little competition, users may not bother to seek for ease of use or may even consider user friendliness an indulgence. For them, finding an affordable, useful system may suffice, hence the non-significance of ease of use perceptions. More research in the less developed nations is needed to further verify this claim.

Second, as women entrepreneurs continue to experiment with new systems, it is also a plausible explanation that it is only a matter of time for the system to become easy to use. Last, it was documented by Davis *et al*. (1989) that, in the earliest stages of technology introduction, ease of use may be a strong factor for adoption, but sustained usage decision may not be influenced by ease of use as user experience increases. The robustness of perceived usefulness as a determinant of usage is supported by the entrepreneurs theory of production (Harper 1996). The theory suggests that entrepreneurs will identify and use technologies that will result in improved processes, products, and services. It is observed among entrepreneurs that IT usage will be sustained or even increased as long as the system brings benefits to the organisation, irrespective of the system's difficulty or usability. This is one of the reasons why technology usage decisions have been typically characterised by a strong productivity orientation (Venkatesh & Brown 2001).

Understanding the antecedents of perception will help to create a favourable environment for usage enhancement. It is found that perceived usefulness is directly influenced by innovativeness and flexibility, and indirectly, via perceived ease of use, by innovativeness, risk-taking propensity, and flexibility. Innovativeness, risk-taking propensity and flexibility have strong influence on perceived usefulness directly or indirectly, while perseverance has not, albeit the direction of the beta coefficient is

as predicted in the hypothesis. It was found that entrepreneurs who are highly innovative perceive the system as useful and in turn use more. Highly innovative entrepreneurs are notably seeking for new and innovative ways to solve needs; they are also producing and trying out new ideas, as well as acting to diversify business, products or services into new fields. Thus, technologies that will aid in consummating these goals are deemed useful. Flexibility is another determinant of usefulness, directly and indirectly, via ease of use. These are inverse relationships, which suggests that entrepreneurs who do not switch systems frequently are more likely to perceive the current system as useful.

Perceived ease of use is significantly and marginally influenced by risk-taking propensity and flexibility, respectively. There is a positive relationship between risk-taking propensity and ease of use. This finding is logical and in line with Nohria and Gulati (1977) and Singh (1986), who had earlier found that innovation can often result from successful risk-taking. Because of the complexity and the delicate nature of different applications, it takes an entrepreneur who is very willing to take the risk to experiment with the technology, in order to be able to find it easy to use. On the other hand, the relationship between flexibility and perceived ease of use is negative. Similarly, entrepreneurs who do not switch systems too frequently will perceive the system as easy to use, because they will eventually overcome any problems in implementation as they continue to adopt.

As to policy, the Malaysian government is concerned to create and develop quality, resilient and successful entrepreneurs, who are competitive in all potential growth sectors of the economy. Apart from the forms of government support in the area of technology listed above, other measures were undertaken specifically to facilitate the involvement of more women in business, through the provision of easy access to capital. The Women Entrepreneurs Fund was established in 1998 with an

allocation of (Malaysian Ringgit) RM10 million. In the same period, a total of 12 projects amounting to RM9.5 million was approved under the fund. Through the Small Entrepreneur Fund, a total of about 6,000 women entrepreneurs obtained loans amounting to RM65 million. Training programs, seminars, and workshops on motivation, leadership and entrepreneur development, as well as online network called WIMNET,[1] which provides database search facilities to business women around the world, are some of the efforts the Malaysian government initiated to support an increasing number of successful women entrepreneurs in Malaysia. Women entrepreneurs in many less developed nations can only yearn for such privileges, which have positively affected the extent of IT usage among the Malaysian women entrepreneurs.

IMPLICATIONS

This research has several key theoretical and practical contributions and implications. The study found validity for some of the TAM constructs among women entrepreneurs in Malaysia, as well as grounds to justify the extensions to TAM as proposed in this paper – entrepreneurial traits as determinants of perception. It is expected that perceived ease of use will have a direct influence on usage. Interestingly, and somewhat contrary to TAM itself, ease of use is not a significant factor among women entrepreneurs. From a theoretical standpoint, this represents an important contribution, because the basic model underlying technology usage of women entrepreneurs appears to be significantly different from what is specified by TAM. Further, this finding also queries the process-orientation of women and the lower levels of control (Mirowsky & Ross 1990; Venkatesh *et al*. 2000), which suggests

[1] http://www.wimnet.org.my/.

that the perceived ease of use or difficulty of using technology is expected to have an important influence over their decisions to adopt or reject a new technology.

Further, the suggestion by Venkatesh *et al.* (2000) that constraints to technology use (perceived difficulty) will be more salient to women, which was based on the evidence suggesting that women display somewhat higher levels of computer anxiety (Bozionelos 1996; Morrow *et al*. 1986) and lower computer aptitude (Felter 1985) compared to men (Chen 1985), was also challenged seriously by the findings of this research. Women entrepreneurs are influenced more by outcomes (usefulness) than by process ease (usability) in their IT usage decisions. As a matter of fact, ease of use is important only where easy to use systems are considered useful systems. The drive to succeed, limited choice of applications and vendors characterizing many businesses in developing economies, added to hard work or perseverance of entrepreneurs – especially in developing nations, where nothing comes easy – explains why ease of use may not be very important in technology adoption among entrepreneurs in Malaysia and, by extension, in other developing nations, especially when the system is considered useful.

With the growing number of women entrepreneurs, the current work brings to the forefront the need for a better understanding of the determinant structure of their IT usage behaviour. In advanced economies, such as America, women entrepreneurs are realizing the gains of technology adoption even more than their male counterparts. The Center for Women's Business Research found that women entrepreneurs differ significantly from their men counterparts in valuing the Internet's capability to open up a wider range of business opportunities (40% of women compared to 27% of men) and the increased flexibility of time and schedule it affords them (39% of women compared to 27% of men) (Peacock 2001). Thus, sensitivity to the determinants

unveiled in this study will help in creating a favourable environment for system development and marketing. For example, system developers and vendors should recognize the need to emphasize productivity-enhancement factors, such as usefulness, which is more important to women entrepreneurs. They should also ensure that this emphasis does not come at the expense of other factors, such as user friendliness, because entrepreneurs will, ceteris paribus, deem an easy to use system to be a useful system. Similarly, marketing professionals may also capitalize on these findings by designing advertising campaigns, which appeal to productivity-enhancement and usability, thereby giving women entrepreneurs something to admire about the technology.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

One potential limitation of this research is the determination of who is or not a woman entrepreneur. Because it is difficult for this study to discriminate, among the ubiquitous women-owned small businesses in Malaysia, which one is entrepreneurial and which is not, the study relied on the membership of the national association in determining who qualifies and who doesn't. This inclination may not guarantee an "all entrepreneurs" survey. Future research should include all who qualify, whether or not they belong to a particular association.

The research deliberately focused on only women entrepreneurs, because of the small amount of research in this sector, as compared to their male counterparts. Future research may be geared towards a comparative study of male and female entrepreneurs in Malaysia, to examine whether there are any differences in their IT usage and usage drivers.

STRENGTHS OF THE CURRENT RESEARCH

Some of the strengths of this research are highlighted. Firstly, the data are based on a poll of entrepreneurs who are officially recognised as Malaysian entrepreneurs by their membership of the national association of women entrepreneurs in Malaysia (NAWEM). Secondly, the model is based on theory grounded on existing management information system studies. Moreover, actual IT usage was used rather than usage intention (as a predictor of usage behaviour), which has been questioned by Straub *et al*. (1995), Bentler and Speckart (1979), and Songer-Nocks (1976).

CONCLUSIONS

Albeit the TAM is an effective model for understanding technology acceptance in general, nevertheless, some caveat needs to be exercised to avoid over-estimating the importance of a perceived ease of use construct. Additionally, the influence of innovativeness, risk-taking propensity, and flexibility on perception cannot be overlooked. Treatment of these traits as determinants of perception produces a more apposite model for understanding women entrepreneurs' technology acceptance, and also shows how perceptions are formed.

Finally, entrepreneurial traits are potential keys to understanding why women entrepreneurs will adopt, use, and increase usage of any technology. As a result, entrepreneur's technology acceptance theories and models should not overlook innovativeness, risk-taking propensity, and flexibility as important shapers of perception, while at the same time not over-estimating the importance of perceived ease of use in determining technology usage.

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