Predicting Factors affecting the Internet use in the International Marketing Applying (TAM) and (IDT)

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Introduction

There has been considerable Research into the adoption of the Internet for communication and commerce in recent years. The need to understand how and why companies utilize the Internet is important for researchers and practitioners alike. This study combines Davis' model-the Technology Acceptance Model (TAM)- and Roger's Theory- the Innovation diffusion Theory (IDT) to predict factors that affect the internet use in International marketing purposes or what we call International Internet Marketing (IIM). It makes a comprehensive review of information technology, information systems, and marketing literature to locate such factors.

The Research Problem

A number of theoretical frameworks for the rational component of IT adoption have emerged in the last ten years. These frameworks provide managers with careful reasoned arguments and enable them to better influence the evaluation, adoption and use of Internet technology (Karahanna and Straub, 1999). Moreover, recent research into information technology (IT) adoption and use has been motivated by the desire to predict factors, which lead to successful application in a marketing context (Rose and Straub, 1998). Therefore, the study of diffusion and adoption of new technologies has gained new interest after being popular during 1980s.

This new wave of interest is partly initiated by the increasing diffusion of networking technologies, such as the Internet, and the decreasing importance of geographical distances (Rose and Straub, 1998). IT was used in the 1960s to automate the back-office of companies but currently there is a shift of emphasis into the front office. This movement makes the division between front and back-offices less relevant as integrated systems increasingly remove the distinction between these two domains.

Today, these systems employ ERP (Enterprise resource Planning) at the back end and CRM (Customer Relationship Management) on the front end of a company's supply chain (Borders et al., 2001).

However, Internet marketing as a technological innovation in international companies has not been studied rigorously from the perspective of diffusion, although there are issues such as compatibility, complexity, and top management support can affect its adoption (Cooper and Zmud, 1990; Drury and Farhoomand, 1996; Eid and Trueman, 2004; Rose and Straub, 1998).

The Research Objectives

This study examines two theories that have been widely used over the past decade to assist in understanding of the IS/IT adoption and implementation processes and links them to the marketing context. Firstly, technology acceptance model (TAM) and secondly, the diffusion of innovation theory (IDT). These models offer different, though overlapping perspectives on how companies use new technologies. TAM focuses on attitudes toward using a particular IT based on perceived benefits (usefulness) and ease of use. IDT focuses on the relationship between "perceived attributes" of technology and "rate of adoption of technology".

Background and literature review

Technology Acceptance Model (TAM)

System usage is one of the basic dependent variables of information systems (DeLone and McLean, 1992). Researchers and practitioners often use the Technology Acceptance Model (TAM) to gain a better understanding of the adoption and use of information systems (Lederer, et al., 2000). It is one of the most influential research models in studies of the determinants of information systems acceptance.

Davis introduced an adoption of Theory of Reasoned Action (TRA), an especially well-researched intention model that has proven to be successful in predicting and explaining behaviour across a wide variety of domains, but the Technology Acceptance Model (TAM) was originally developed to understand the causal link between external variable and user acceptance of PC-based applications (Fenech, 1998). TAM uses TRA as a theoretical basis for specifying the causal linkages between two key beliefs: Perceived usefulness (PU), and perceived ease of use (PEU), and how these benefits relate to users' attitudes, intentions and actual computer adoption behaviour (Davis et al., 1989: 983).

According to TAM (see figure: 1) the usage of IT i.e. Internet is determined by beliefs a user holds about its perceived usefulness (PU) and it's perceived ease-of-use (PEU) (Karahanna and Straub, 1999: 238). PU is defined as the degree to which a person believes that the use of a system can improve his/her performance. On the other hand, PEU is degree to which a person believes that using a particular system will be effortless. Even though, PU and PEU were significantly correlated with usage, Davis (1989) found that PU mediates the effect of PEU on usage (Karahanna and Straub, 1999: 238). In other words if someone believes that a system will improve his/her performance, he/she is more likely to accept the technology, even if it is at first difficult to use The model was shown to have good predictive validity for the use of several information technologies including E-Mail and WWW (Fenech, 1998; Gefen and Straub, 1997).
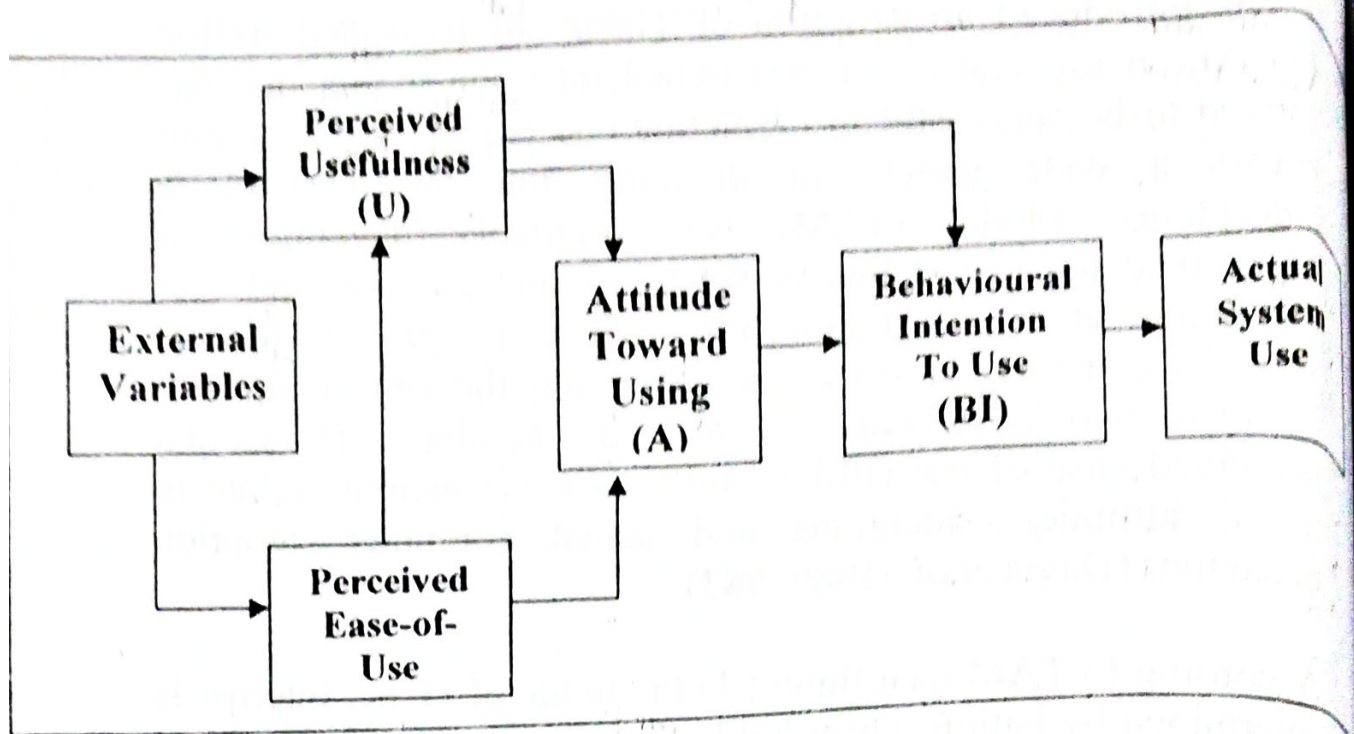
(Figure 1) Technology Acceptance Model(TAM)

Many researchers argued that usefulness is probably the strongest argument in favour of companies' use of the Internet. As the level of technology advances in the short-term future, that usefulness will increase. However, There are many factors that affect the usefulness of using the Internet for International marketing purposes (Poon and Swatman, 1998:40):

1) Industry Adoption: Widespread adoption of the Internet in the business sector (business partners and competitors).
2) Value-Chain Adoption: The effect of customer and supplier adoption of the Internet on the companies.
3) Market Scope: Market scope of the company has an effect on how much perceived benefits can be obtained by having an Internet connection.
4) Product Characteristics: Characteristics include the physical or information component, usability in electronic form, value added during the transaction

process, and customer preference between different forms of the same product and the related transaction process.

5) Management Involvement: Management eagerness has a strong influence on Internet marketing success. (Berezai, 2000:20) stated that usefulness of the Internet has broadened from being a source of information to becoming a business tool, affecting the nature of business relationship.

However, There are many factors that can impede ease of use in international Internet marketing (IIM). Hoffman, *et al.* (1995) states that convenience of access is at the core of the adoption of any technological application and determines its ultimate success. In the context of the Internet, ease of access is a multidimensional construct and includes high-speed access (the "bandwidth" problem), ease of finding a service provider, and the diffusion of the computer hardware/software/modem bundle. The secondary barriers to ease of use are, price, and risk, as well as such factors as privacy and security. Ease of use includes issues such as the user friendliness (or not) of the software, ease of software installation, and the like. Hence, attempts to develop technology that is user friendly are as important as the development of the technology itself.

Innovation Diffusion Theory (IDT)

Recently, researchers in IS and IT have begun to rely on the theories of innovation diffusion to study implementation problems. A major focus of these studies has been how potential users' perceptions of information technology innovation influence its adoption. Innovation diffusion theory is often associated with research into technology innovation. Rogers (1983; 1995) has defined eight types of diffusion research from "earliness of knowing about innovation", and "rate of adoption in different social systems", to "opinion leadership", and "diffusion networks", "communication channel use", and "consequences of innovation" are also considered. These issues may have particular significance from a marketing perspective.

The first contribution of IDT is the innovation decision process, which starts with one's knowledge about the innovation existence and ends with the confirmation of the adoption/rejection decision. Figure 2 explains the five stages that are involved in innovation decision process developed by Rogers (1995). At the knowledge stage, users are first exposed to the innovation and gain initial understanding of it. In the second and third stages, managers move from persuasion to the decision to adopt/reject the innovation.

The fourth and final stages are implementation and use followed by the adoption/rejection decision to confirm or reserve the system from a usefulness or fitness perspective.

Knowledge → Persuasion → Decision → Implementation → Confirmation
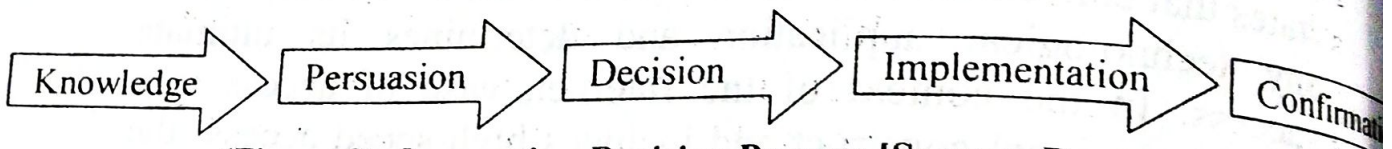
(Figure 2): Innovation Decision Process [Source: Rogers, 1983]

The second contribution of IDT is the set of innovation attributes it provides that affect the rate of adoption. The attributes include relative advantage, compatibility, complexity, trialability, visibility, and observability (Rogers, 1983). The five attributes are reported to explain 49 to 87 percent of the variance rate of adoption (Rogers, 1995).

A stream of research on innovation diffusion has been based on these attributes. They appear to have different relative importance on the adoption of innovation. For example, Cooper and Zmud (1990) found that technological complexity is a significant factor inhibiting successful implementation and task-technology compatibility is a major factor in explaining the new technology adoption. Moore and Benbasat (1991) suggest seven measurement of innovation diffusion: relative advantage, compatibility, trialability, observability, complexity, image and voluntariness of use. Each measure was needed to assess users'

perception of an IT innovation. They also developed measurement scales, which can be applied to any innovation and have been adapted in subsequent research papers (see: Moore, 1996; Karahanna and Straub, 1999).

Combining TAM and IDT

Undoubtedly, Internet marketing is a new type of end-user information system of Electronic Commerce, and EC is heavily based on telecommunication technologies (Kalakota and Whinston, 1996). However, few recent studies have adopted TAM to study the acceptance of telecommunication technologies such as E-mail and WWW (Cheung, et al., 2000; Fenech, 1998; Gefen and Straub, 1997; Lederer, et al., 2000; Lin and Lu, 2000; Moon and Kim, 2001). Chan and Swatman (2000) state that there is very little literature that discusses the process of Internet-based marketing. Therefore, researchers must start with the literature concerning more general IS/IT implementation and hope to develop a body of theory, which is more explicitly focused on the area of Internet marketing.

TAM and IDT are among the most effective theories in predicting and explaining system use, user evaluation of systems and innovation diffusion, respectively. They are chosen as the bases for predicting the adoption of the Internet in international marketing because of their solid theoretical foundation and the fact that they have been proven successful in numerous studies (see for example Antonides et al., 1999; Cooper and Zmud, 1990; Davis et al., 1989; Drury and Farhoomand, 1996; Fenech, 1998; Ghorab, 1997; Higgins and Hogan, 1999; Igbaria et al., 1997; Karahanna and Straub, 1999; Rose and Straub, 1998; Straub et al., 1995; Straub and Brenner, 1997; Teo et al., 1999; Lederer, 2000; Lin and Lu, 2000; Moon and Kim, 2001).

TAM is specifically designed to understand human behaviour in the domain of information system, and most of research projects in the recent years deal with technology innovation. Based on the more general theory of reasoned action, TAM has been tailored to explain computer usage (Rose and Straub, 1998). Lin and Lu (2000) found that TAM was able to explain behavior even in an Internet environment, accounting for 64% of the

variance in usage. Consequently, it would appear that TAM can be used to study companies' acceptance of the Internet in international marketing is a highly valid approach.

IDT, on the other hand, is a theory that has a long history of research in a great variety of disciplines including sociology, anthropology, marketing, and information system. The theory helps us to understand how and why an innovation is diffused into a social system (Rogers, 1995). IIM is considered to be innovative because it has completely altered traditional marketing practice. Since this trend is still in its infancy, a well-researched theory, such as, IDT will help us to understand the process of using the Internet in International marketing.

However, Researchers working with TAM and IDT have discovered a similar relationship between the two constructs, namely (relative advantage and complexity) on one side, and (perceived usefulness and perceived ease of use) on the other side. Moore and Benbasat (1991) stated that Davis's Technology Acceptance Theory is quite similar to the Diffusion of Innovations Model. Davis included two constructs " Perceived Usefulness" and " Perceived Ease of Use". The similarities between these constructs and Rogers perceived Relative Advantage and perceived complexity are clear.

Research Model and Hypotheses

The model for this research figure (3) is an extension of both TAM and IDT.
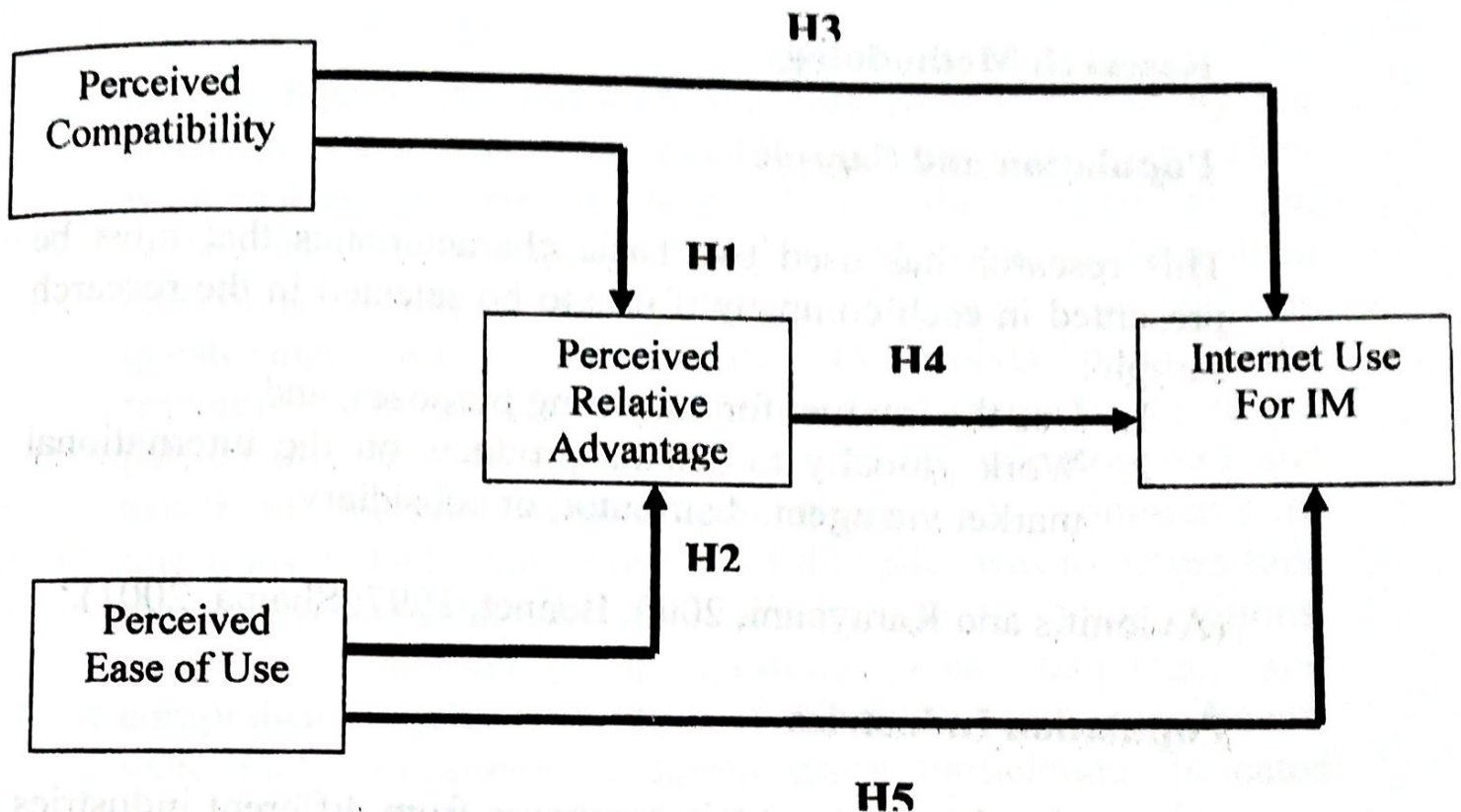
Figure3: Research Model

Because TAM and IDT are used as the baseline model, this research will verify the following relationships in the context of IIM.

H.1: There is a positive relationship between Compatibility and perceived relative advantage in the IIM context.

H.2: There is a positive relationship between Ease of Use and perceived relative advantage in the IIM context.

H.3: Use of the Internet for international marketing is dependent upon its Compatibility.

H.4: Use of the Internet for international marketing is dependent upon its Relative Advantage.

H.5: Use of the Internet for international marketing is dependent upon its Ease of Use.

Research Methodology

Population and Sample

This research has used two basic characteristics that must be presented in each company if it is to be selected in the research sample:
  1. Use the Internet for marketing purposes, and
  2. Work globally to sell its products on the international market via agent, distributor, or subsidiary.

(Avlonitis and Karayanni, 2000; Bennet, 1997; Shama, 2001).

Population Industries

This study planned to obtain responses from different industries so that generalisation of the findings could be established. Agriculture, Textile, Chemicals, Computers, and Industrial Supplies companies were selected. Finally, 250 questionnaires were sent to the selected organizations. Of the 250, a total of 161 questionnaires were returned. This included 33 returned not completed. Therefore, the number of returned completed questionnaires was 128 (including 5 unusable questionnaires, usable questionnaire = 123). Table I provides a summary of the responses' distribution and rate.

Measurement Development

In order to develop and validate the instrument, several steps were taken:

1. Development of the measure from the literature
2. Initial pre-test; and
3. Pilot test of the measure.

In this regard, the questionnaire was reviewed first by six academic researchers experienced in questionnaire design. They were asked to provide feedback on the overall design, particularly the measurement scales. Their inputs were then considered in improving the design. Following from that, the questionnaire was piloted with two IIM experts known to the researcher. The pilot took the form of an interview where the participant was first handed a copy of the questionnaire and asked to complete it and then discuss any comments or questions he had. The objective of this pilot was to assess time required to complete the questionnaire, clarity of instructions, simplicity, consistency of questions, clear language, and comprehensiveness. As a result of this pilot, some amendments were made to improve the questionnaire. Participants indicated their agreement using a five-point Likert scale.

Analysis and Results

This section presents the statistics and analytic results of the research model and hypotheses.

Scale reliability and descriptive statistics
Detailed descriptive statistics relating to the Responding Organisations and Respondents are shown in Table (II).

The reliability of all constructs was assessed by the Cronbach alpha reliability coefficient (Cronbach, 1951). These coefficients

are represented for each of the constructs in Table (III). Cronbach's alpha range, from 0.8550 for perceived compatibility to 0.9487 for Internet: perceived relative advantage, exceeded Nunnally's standards for research (Nunally, 1978).

Table (IV) demonstrate the interrelation among all constructs. The bi-variate relationships indicate that all the variables were significantly correlated with each other.

Hypothesis testing

The data were analysed using path analysis. Path analysis is a multivariate analytical methodology for empirically examining sets of relationships in the form of linear causal models (Duncan, 1986; Li, 1975).

In the regression analysis, we checked the problem of independent variables. Variance Inflation Factor (VIF) for the all independent was less than 10, indicating that we did not have any significant problems with any of the independent variables (Neter et al, 1990). Besides, the correlation between independent variables are all less than 0.8 (Emory and Cooper, 1991). Furthermore, the scatter plots of the standardised residuals by the standardised predicted scores were also examined to verify the assumption of linearity.
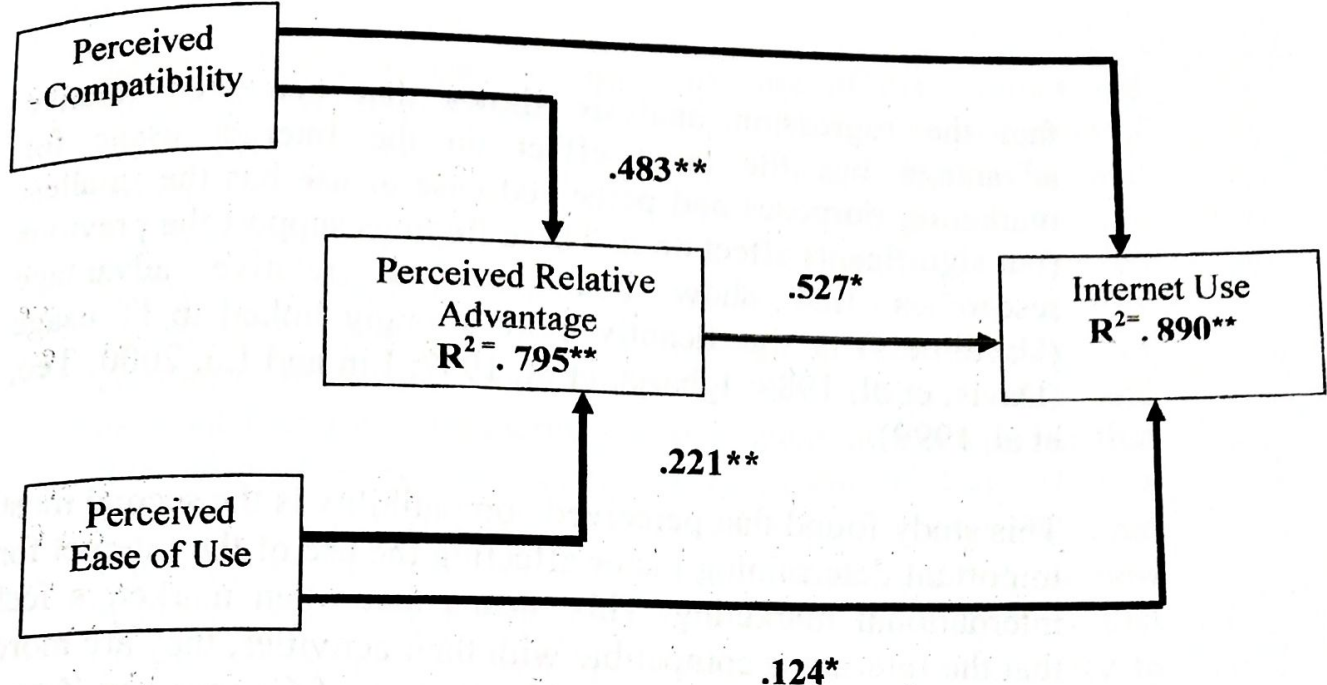
*Significant at 0.01, *Significant at 0.05*

(Figure 4) Internet use: path analysis

Many researchers recommended calculating the overall impact of variables on Internet use (Bryman and Cramer, 2001). Calculating the direct and indirect effect of each variable would do this. The following table (Table V) shows direct, indirect and total effects of all variables.

In terms of goodness-of-fit indicators, the model account for 89% of the variance in the use of the Internet by companies.

Figure (4) shows the regression results from testing the determinants of Internet use. compatibility H3 (Path coefficient=0.226 P< 0.05), Relative advantage H4 (Path coefficient=0.527 P< 0.01), and ease of use H5 (Path coefficient=0.124 P< 0.01) are all positively related to the use of the Internet for marketing. Compatibility H1 (Path coefficient=0.483 P< 0.01) and ease of use H2 (Path coefficient=0.221 P< 0.01) are positively related to relative advantage.

Discussion

International companies use of the Internet is significantly affected by their perception about Relative Advantage (Usefulness), Compatibility and Ease of Use respectively. In

fact the regression analysis shows that perceived relative advantage has the large effect on the Internet usage for marketing purposes and perceived ease of use has the smallest (but significant) effect on it. These findings support the previous researches that show that perceived relative advantage (Usefulness) is significantly more strongly linked to IT usage (Davis, et al, 1989; Igbaria, et al, 1997; Lin and Lu, 2000; Teo, et al, 1999).

This study found that perceived compatibility is the second most important determining factor affecting the use of the Internet for international marketing. This means that when marketers feel that the Internet is compatible with their activities, they are more likely to use it. This supports the finding of Cooper and Zmud (1990) about the necessity that a technology be compatible with the organisation and its tasks. We also find that the effect of perceived compatibility is mediated by perceived relative advantage (usefulness). Therefore, the more combatable the Internet application is, the greater the relative advantage (usefulness) perceived by marketers, which, in turn, increases the Internet usage for marketing purposes.

On the other hand, perceived ease of use had a less significant effect on Internet usage than perceived relative advantage and perceived compatibility. Therefore, to encourage Internet usage, top management should promote the Internet's relative advantage (usefulness) more than its ease of use. The results of our study further support previous findings in that the effect of perceived ease of use is mediated by perceived relative advantage (Usefulness) (Davis, 1989; Davis et al, 1989; Lin and Lu, 2000). That is to say, the less complex the Internet application is, the more relative advantage it is perceived by marketers to do their marketing activities, which, in turn, increase the usage of the Internet for marketing purposes.

This result is consistent with previous studies. For instance, Chan and Swatman (2000); Berezai (2000); Poon and Jevons (1997); Skinner, (1999) agreed that Internet marketing is driven by the never-ending needs of customers to look for better

services and products. Competitors' use of the Internet and response to customers also has a strong effect on the adoption of the Internet for marketing purposes (Skinner, (1999). Chan and Swatman (2000:81) found that IT developments are also forcing organisations to be up-to-date in their use of advanced technologies regarding delivery of speedy and high quality information, as well as facilitating greater degrees of communication and integration across business units and external partners. The increasing awareness of the benefits that International companies can obtain from using the Internet are a key driver as well (Berezai, 2000:31). Changes in organisational strategy may involve some Internet uses to bring about the new business desires. The organisation may set up a strategy that broadened the use of existing electronic trading technology to include the Internet as an alternative medium to bring about the new business desires (Chan and Swatman, 2000:77). Reducing costs by substituting the Internet for other communications channels with vendors, customers, information providers, and business partners may be a driver for many companies to use the Internet (Cronin, 1996a: 21)

Academic Implications

Based on TAM and IDT, this study proposes factors that affect the use of the Internet for international marketing activities. It thus helps researchers understand the relationships between relative advantage (usefulness), ease of use and compatibility, and the adoption of the Internet by International companies. It confirms that the use of the Internet depends on the perceptions of marketers about its usefulness, ease of use and compatibility. It also helps to understand the predictors of relative advantage of the Internet.

Managerial Implications

This study has potential for managerial application in the adoption and use of the Internet for marketing purposes. By confirming the IT theories (TAM and IDT) in the field of Internet Marketing, it suggests that companies should provide usefulness, compatibility and ease of use for their Web sites to encourage their customer to revisit their sites. It also suggests both specific factors and items that companies might emphasise

when they create their Web sites. These factors could be useful for both Web site managers and Web site developers in companies that encourage employees to use specific applications of the Internet (especially Intranet). Those developers and manager should consider these factors on the design of such application if they are to improve those applications and guarantee a wide use of them.

Recommendations for Future Research

By combining TAM and IDT, the study provides a new instrument tailored to the Internet. On one hand, future researchers could use this instrument for assessing the adoption of all types of Internet applications such as; Business-to-Customer, Business-to- Administration, Consumer-to-Administration. On the other hand, this instrument could stimulate future researchers to develop better instrument for assessing those characteristics of the Internet. Alternative wording of the items might be tried. With further refinement of the Internet-specific items, greater variance explained might be achieved.

Conclusions

Understanding the theoretical determinants of the use of the Internet by international companies is an important step. The research has extended both TAM and IDT in an attempt to improve their ability to predict use of the Internet by International companies. However, understanding the key constructs in TAM and IDT namely perceived relative advantage (usefulness), perceived ease of use and perceived compatibility is crucial to understand the adoption of the Internet by International companies. Therefore, this study represents one such step by testing these constructs and proposing and empirically testing the antecedents of these constructs in the field of Internet marketing. The results revealed a number of areas for future research.

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Table 1: Survey response summary

Total number of questionnaires distributed	250
Number of completed and returned questionnaires	128
Unreachable companies	9
Declined participation	24
Response rate	51.2 %

Table II: Characteristics of the sample

Measure	Items	Frequency	Percent
Age	Under 30 yrs	23	18.7
	31-40yrs	41	33.3
	41-50 yrs	30	24.4
	51-60 yrs	26	21.1
	More than 60 yrs	3	2.4
Position	Marketing manager	68	55.3
	Sales manager	32	26.0
	Export manager	11	8.9
	IT manager	12	9.8
Participation	No	27	22.0
	Yes	96	78.0
Number of employees	Less than 100	55	44.7
	100-500	46	37.4
	501-1000	16	13.0
	More than 1000	6	4.9
Years of Internet use	Less than 2 yrs	22	17.9
	2-3 yrs	29	23.6
	3-4 yrs	34	27.6
	More than 4.00 yrs	38	30.9
Type of industry	Agriculture	14	11.4
	Chemical and Allied Products	16	13
	Computers	40	32.5
	Industrial Supplies	41	33.3
	Textile	12	9.8

Table III: Measure of constructs

Constructs	Number of Items	Mean	Standard Deviation	Alpha
Internet: perceived ease of use	7	3.8103	.7201	.8938
Internet: perceived relative advantage	9	3.8879	.8162	.9487
Internet: perceived compatibility	7	3.8042	.6979	.8550
Internet use for marketing purposes	7	3.9512	.7285	.8754

Table IV: Correlation matrix

	Perceived ease of use	Perceived relative advantage	Perceived compatibility	Internet use for marketing purposes
Perceived ease of use	1.000			
Perceived relative advantage	.734**	1.000		
Perceived compatibility	.729**	.764**	1.000	
Internet use for marketing purposes	.757**	.622**	.714**	1.000

** Correlation is significant at the 0.01 level (2-tailed).

Table V: Direct, indirect and total effect of different constructs on Internet use

Dependent Variables	Internet Use for IM		
	Direct Effect	Indirect Effect	Total Effect
Internet: perceived ease of use	0.124	0.116	0.240
Internet: perceived relative advantage	0.527	0.000	0.527
Internet: perceived compatibility	0.226	0.254	0.480