Association for Information Systems
AIS Electronic Library (AISeL)

ECIS 2006 Proceedings

European Conference on Information Systems (ECIS)

2006

Exploring factors that determine consumer attitude toward use of intelligent software agents

G. Maroudas
msm4gm@surrey.ac.uk

Panos Louvieris
University of Surrey, panos.louvieris@surrey.ac.uk

Exploring factors that determine consumer attitude toward use of Intelligent Software Agents

Maroudas, Gregory, University of Surrey, Guildford, GU2 7XH Surrey, UK, msm4gm@surrey.ac.uk

Louvieris, Panos, University of Surrey, Guildford, GU2 7XH Surrey, UK, Panos.Louvieris@surrey.ac.uk

Abstract

The aim of the research described in this paper is to evaluate the impact of Intelligent Software Agents (ISA) used in the on-line purchase of e-tickets, and their acceptance as a source of information service and decision assistance for customers. An empirical study was conducted using the Technology Acceptance Model (TAM) and the EC Consumer Behaviour Model in order to determine the factors affecting consumer attitude towards using ISA. The research instrument employed was a questionnaire survey among 150 postgraduate students from the School of Management at the University of Surrey, the findings demonstrate a positive view of ISA – the stronger predictors of consumer attitude towards ISA being perceived usefulness (PU), information richness (IR), customer interface (CI) and perceived trust (PT). Overall, the future of ISA at the business-to-customer (B2C) interface level is to a great extent affected by the consumers' perception of ISA usefulness and control over it. The present study's recommendations indicate a need for travel businesses to develop more intelligent electronic environments that will elicit a more positive response from the consumers if they are to be used more.

Keywords: Intelligent Software Agents (ISA), electronic commerce (EC), Consumer Behaviour, Technology Acceptance Model (TAM).

1. BACKGROUND TO THE ISA CONCEPT

Due to the broad range of activities and applications that are referred to as involving ISA, there is no universally accepted definition of the phase ISA. For the purpose of this paper, ISA was defined as an Information Technology (IT) programs that perform tasks on the user's behalf independently of direct control of the users themselves. In other words, ISA is "a *software thing that knows how to do things that you could probably do yourself if you had time*" (Cross 2003, p.176).

With the increase of public interest in the use of the Internet during the mid 1990s, businesses took on the role of the e-mediary and capitalised on this (Chen and Tan 2004). At the same time, with the advance of Information Systems (IS) it became more economically feasible for companies to employ logic-based systems such as ISA, to improve their performance and in effect the extent of services they can offer to consumers (Davis 1989). In fact, Jupiter MMXI estimates that the European online travel market will grow from its 2001 figure of £2.8 bn to £12 bn by 2006 (Mintel International, 2004). Such a shift in consumers' self-service preference for the Internet in order to book their holidays online led companies to make more travel-related information available in their websites and thus have to control an overload in EC in order to meet the information supply and demand (Rust and Lemon 2001). Trying to tackle these issues, the advances in Information and Communication Technologies (ICTs), have altered models of working and changed the basic structure from which the e-travel companies operate (Putnam 2001). On one hand, this has simplified the task of controlling information for companies, but has also turned out to be more complex and difficult.

Yet, performance gains are determined by the users' willingness to accept and use the available technologies (Davis 1989). Although it is critical for organisations operating in the e-travel market to develop systems which are able to handle the growth of electronic markets and control

the increase in complexity, companies need to create environments that can be easily accepted and used by consumers: *"not understanding your customers' motivation needs and preference can hurt"* (Kotler 2003, p.183). As a result, it is critical for researchers to better understand why people resist acceptance and use of ISA, as it will help develop practical procedures for evaluating systems, forecasting how users respond to them, and improve users' acceptance by changing the nature of systems and the methods by which they are implemented (Davis et al 1989). ISA technology is a fairly recent phenomenon, with a significant, if not evolutionary effect on EC (Maes et al 1999). Therefore, acting as a personal assistant, an ISA should have a direct impact on EC sales performance and/or labour productivity (Cross 2003).

With the specific objective to develop a model for evaluating consumer's attitude towards ISA, the present study aims to assess the impact of Intelligent Software (ISA) programs in e-travel and their acceptance as a source of information and/or decision assistance service for consumers.

2. THEORETICAL BASE OF THE PRESENT STUDY

There are many theoretical and empirical studies on the adoption process of new ICTs with either a technology-centred or a consumer-centred view (Jarvenpaa and Todd 1997), within different contexts or from different perspectives (Gatignon and Robertson 1985; Kraemer et al 1992; Wejnert 2002; Knol and Stroeken 2001). Also, a number of models have been developed in order to analyse attitude and technology acceptance; for example, Davis (1989) introduced the Technology Acceptance Model (TAM), specifically designed to investigate computer systems characteristics and their effects on consumer adoption and/or use of new ICTs.

Hostler et al (2004) consider the major characteristics of ISA to be *autonomy*, *social ability* and *adaptation*. Cross (2003) highlights four characteristics of ISA as *autonomy*, *social ability*, *reactivity* and *pro-activity*. Sturman and Wijnands' classification in Cross (2003) follow a different approach for the determining elements of ISA: *passive agents*, *active agents* and *transaction agents*. The development of ISA, is going to improve the efficiency of EC by increasing customer service and satisfaction.

According to Liang and Huang (2000) there are three motivational aspects to conducting transactions electronically for businesses. The first aspect is that Internet users represent a fast growing segment forming a potential market with considerable growth opportunities. The second aspect relates to the fact that the Internet enables global commerce on a 24/7 basis overcoming time and geographic barriers. The final aspect is that of service providers being allowed to collect customer information through the network, with customers being more likely to receive a better service. The constraint to the above is the speculation that the Internet will emerge simply as a niche distribution channel, far short of the revolution it promised just a few years ago (Zeng and Reinartz 2003). Nevertheless, the Internet is the driver for new types of value provision given its inborn characteristics (Buhalis and Licata 2002). For instance, the e-tourism industry is a good indicator of the success of commercial websites and system use is often associated with positive user attitude and user satisfaction.

Furthermore, Zeng and Reinartz (2003) pinpoint *reach* and *richness* as the two distinguishing characteristics of EC which are applied in ISA technology in two stages. The first stage pertains to ISA *richness* of product and service information contained in the virtual store's web page, in order to improve their *reach* of intended product purchase and services offer. The second stage relates to virtual purchasing activities on line via the use of an ISA which guarantees greater speed in accessing the virtual store towards product purchase, but which also is neutral and impersonal due to the neutral and impersonal character of the electronic network.

2.1 The Purchasing Decision-Making Model

Figure 1. The Purchasing Decision- Making Model
Source: Kotler, 2003:p204

This is one of the most powerful models of consumer behaviour (Chaston 2001) toward EC where one can see the role ISA can play in it. In order to understand what the manager must do to convert online searches into online buyers, Zeng and Reinartz (2003) argue that online companies must look at the buying process through the eyes of the consumers. This can be a complicated process requiring information search, alternative evaluation, negotiation for terms, order and delivery of products, and post-sales service (Liang and Huang 2000). The implementation of such a process applies to varied purchasing scenarios and decisions, but nevertheless, there is a need for some sort of technological support in any of these stages of the particular model where ISA could play a role.

2.2 EC Consumer Behaviour Model

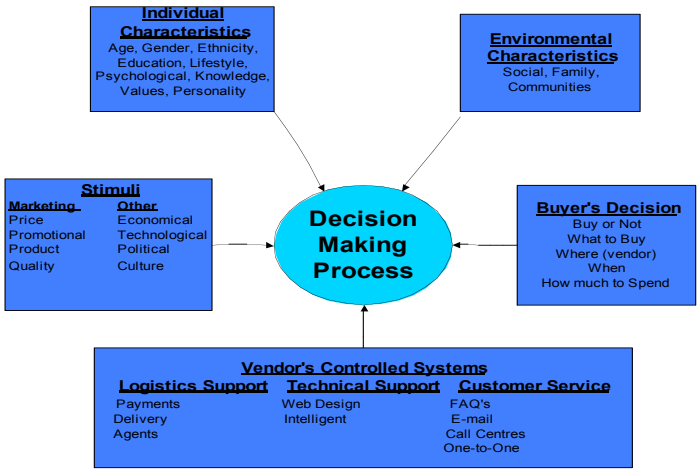

Figure 2. EC Consumer Behaviour Model
Source: Turban et al 2004: p 132

With reference in figure 2, for complex decision making, ISA has a role to assist online consumers. If the transaction involves for example the purchase of an airline ticket, the purchaser will search for information from where e-tickets may be purchased. The e-ticket type is then identified, and finally the price and availability are confirmed. ISA is well-suited to this type of activity because it seeks out the needed information which is subsequently relayed to the purchaser who will either use it as offered by ISA or take no further action. In addition, for complex decision making the ISA can make a recommendation using a set of specific criteria. In this instance, the practical benefits of the ISA are visible because it can save the user the time and physical effort involved in visiting traditional high street agents to gather the information needed (Cross 2003), as well as providing assistance to reduce the customer's decision effort.

2.3 Technology Acceptance Model (TAM)

Based on the attitudinal Theory of Reasoned Action (Ajzen and Fishbein 1980), TAM purports to explain the determinants of computer acceptance and usage behaviour on a general basis, and it is especially well-suited for modelling and explaining computer acceptance across a wide range of end-user computing technologies and user populations (Davis et al 1989). TAM is used to explain and predict system technology use and has proven to be highly successful in various empirical studies (Taylor and Todd 1995; Igbaria et al 1997; Karahanna et al 1999). It has also been used to study the acceptance of different Internet applications (Khalifa and Liu 2003; Venkatesh et al 2003; Van der Heijden 2004). Therefore, TAM has been chosen as the theoretical framework of this research to examine ISA and its Internet application adoption. In 2004, Chen went a step further: "the model posits that *perceived usefulness* (PU) and *perceived ease of use* (PEOU) are the primary determinants for Intelligent Software Agents (ISA) acceptance and use. Finally, according to Van der Heijden (2003), TAM is a theoretically justified model intended to explain information technology adoption. The model theorises two critical beliefs determining a user's adoption intention and actual usage of information technology (Yang 2005).

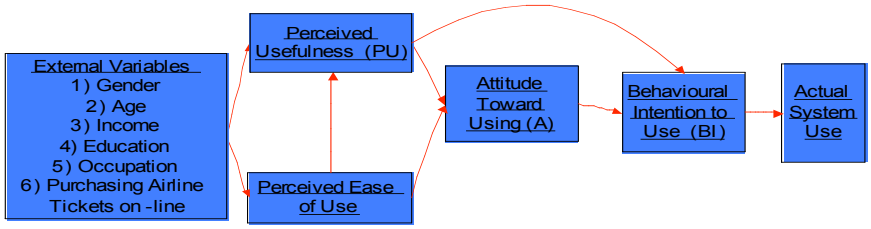

Figure 3. Base Model for Consumer Acceptance of Intelligent Software Agents
Source: Adapted from Davis et al 1989

With reference to figure 3, external variables relate to personal and environmental characteristics (Turban et al 2004), personal characteristics including age, gender, income and other demographic variables, such as higher education/income levels associated with more on-line shopping. TAM indirectly influences PEOU and PU (Legris et al 2003), where more specifically external variables have been show to influence both PU and PEOU (Benbasat and Dexter 1986; Bewley et al 1983), with PEOU also having a direct effect on PU (Benbasat and Dexter 1986). The easier a system is to interact with, the greater should be the user's sense of usefulness and personal control regarding his or her ability to carry out the sequences of behaviour needed to operate the system (Bandura 1982; Lepper 1985). Therefore, a user's attitude (A) towards using ISA will have been pre-directed by his or her PU and PEOU which form part of a person's salient beliefs (Chen and Tan 2004) and hence ISA usage will be determined by the user's behavioural intention (BI) to use, which in turn is influenced by the user's attitude toward using ISA (Bagozzi and Yi 1988).

3. PROPOSED THEORETICAL MODEL FOR ACCEPTANCE OF ISA BY CONSUMERS

Knowing that, companies need to tackle the new obstacles that may influence the users' attitude toward accepting and using an ISA system, specifically when purchasing e-travel tickets through their personal computer (Putnam 2001), it was important to determine the operative variables most likely to affect a user's attitude towards using ISA. An extensive review of the B2C literature resulted in *information richness*, *customer interface* and *perceived trust* as being the operative variables referred to earlier and the very potential "failure factors" for the acceptance of ISA by purchasers. Insight into

these operatives has led to the formation of a proposed theoretical model for the acceptance of ISA by consumers:

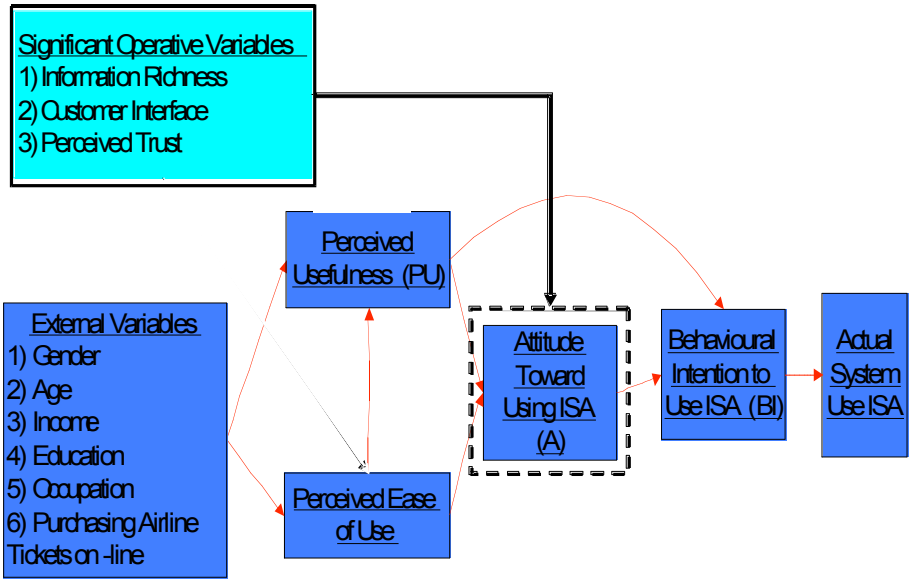

Figure 4. Proposed Model for Consumer Acceptance of Intelligent Software Agents
Source: adapted from Davies et al (1989) and Chen (2004)

3.1 Information Richness (IR) Customer Interface (CI) and Perceived Trust (PT)

The informational element is an important part of an ISA system (Glazer 1991). An ISA's IR plays a significant role in influencing users' decision towards accepting and using ISA as the medium to purchase e-travel tickets online. Chen (2004) defines "richness" as "*the information that enables its user to clarify ambiguity and enhance understanding of issues in a timely manner*". As the information richness theory predicts, *information richness* should be a major determinant of the users' willingness to use ISAs (Daft and Lengel 1986). The digital storefront design of virtual stores is the equivalent of the *customer interface* design for an ISA software development (Chen 2004). When customers perceived the shopping environment as pleasant and experience a moderate level of arousal, empirical tests showed the consumers spent more time, enjoyed it more and purchased more products.

Moreover, performance can greatly affect the user's perception and judgement of the look and feel of a site (Rayport and Jaworski 2001). Recent studies have found that Web sites low in usability are impeding consumers' performance and satisfaction when shopping online (Machlis 1999). Various studies suggest that the main reason why some users have not yet shopped online is their lack of trust in virtual stores (Clarke 1999; Hoffman et al 1999) Security is the most often cited barrier to the growth of e-commerce and trust is the root of the problem (Odom et al 2002). Thus, *perceived trust* should be an important element influencing consumers' attitude toward using ISA. Companies need to reduce risk and establish a level of trust between consumers and online businesses (Pavlou 2000).

4. RESEARCH METHODOLOGY

In order to achieve the research objectives and explain the benefits obtained from a particular research strategy, it is important to understand the techniques employed, their strengths, limitations and the rational for their use (Ghauri et al 1995). As already established, the objective of this explanatory research is to investigate which factors determine *consumer attitude*, as emphasised by the dotted box

in figure 4, toward using ISA systems. Based on the findings of literature review, the research model in figure 4 is proposed. The model has been modified for ISA purposes to accommodate ISA models as some new ISA variables has been identified into this paper. Therefore, based on the theoretical and empirical support from other research investigations, and as it is represented in the hypothesised model, the following hypothesis are tested.

H a_1: *The consumer's perceived usefulness of an ISA system will have a positive effect on his or her attitude toward using an ISA system.*
H b_1*: The consumer's perceived ease of use of an ISA system will have a positive effect on his or her attitude toward using an ISA system.*
H c_1*: ISA information richness will have a positive effect on consumers' attitude toward using an ISA system.*
H d_1*: Consumer's perceived trust (T) toward an ISA system will have a negative effect on his or her attitude toward using an ISA system.*
H e_1: *The customer interface of an ISA will have a positive effect on his or her attitude toward using an ISA system.*

4.1 Data Collection. The data was collected by means of a self-administrated questionnaire. The questionnaire consisted of two sections and 22 questions in total with a detailed classification of the requirements of the data. The first section included 9 questions pertaining to the respondents' personal information and the second section included 13 questions aimed at measuring the respondents' attitude toward using ISA, the strength of the factors affecting the participants' attitude toward using ISA and test whether there is a relationship between these factors and user's attitude toward ISA. A total of 150 questionnaires were collected over a period of two weeks which is comparable to other TAM studies. The questionnaire sample frame was defined by using the e-mail directory from the University of Surrey and circulating it to all MSc students from the School of Management at the University of Surrey. Students are perceived to be a powerful consumer-spending group and valuable early adopters (Spero and Stone 2004) of technologies and since the MSc students in the School of Management have an international background, most are confirmed frequent flyers. Finally, the questions themselves were closed to avoid variations in the answers. In the first part of the questionnaire, nominal scales were used to as different answers were given into different categories, while in the second part a six-point Likert scale was used (Aaker and Day 1990).

4.2 Pilot Study. To test the primary data a pilot study was run among 15 students at the University, who tested the draft questionnaire. On the scale of reliability in order to treat results with credibility (Hair, 2000), the internal consistency of the draft questionnaire was checked by using *Cronbach's alpha coefficient*; the alpha coefficient should be above .7 for the scale to be reliable (Pallant, 2002). The overall Cronbach's alpha coefficient was .**892**, thus the questionnaire was considered to have a good internal consistency and suitable for collecting the data for the main study. On the scale of validity, the standard deviation (11.122) of the population was used (Pallant, 2002). Hence, the sample size required for the main study was calculated by means of the formula: $\mathbf{N=(z*SD)^2/(E)^2}$ where, *N* represents the minimum sample, *z* is the degree of confidence required, *SD* is the standard deviation of the population (or an estimate of the SD from the pilot study) and *E* represents the plus or minus error factor allowed. Accepting an error of plus or minus 10% with a 90% confidence interval, the sample required becomes: $N=(1.65*11.122)^2/(15 * 0.10)^2 =$**150**. Thus, the appropriate sample size for this study is 150 UK university students. This size seems suitable because as most authors recommend, one should have at least 10 times as many observations as one has independent variables to test (n = 5). After checking that the final data collected met all assumptions (normality, homoscedacity, linearity etc), the *Pearson* correlation was used to further analyse the data. It was also decided to use multiple regression analysis to assess which of the correlated independent variables predicts consumer attitude towards ISA.

5. ANALYSIS OF THE RESEARCH FINIDINGS

In section A of the questionnaire, respondents were asked to provide personal characteristics to enable a sample of their demographic description. Gender-wise, 68.7% of the respondents were male and the remaining 31.3% were female. Age-wise, 60% were between 18-25 years of age and the remaining 40% were between 26-35 years of age, later being MSc students from the University of Surrey. In terms of educational background, 4% were of PhD/Post Doctoral level, 52% held Masters degrees and 44% held Batchelor degrees, while 96% were university students and 4% were in academia; the response was mostly from students as the questionnaires were sent online to their email account. With regards to income, 60.7% of the respondents held an annual income of less than £10,000; for 26% the range of income was between £20,000 to £40,000 and for 10% between £30,000 to £40,000; finally, for 2.7% of the respondents, income ranged between £40,000 to £60,000 per annum. In terms of owning a personal computer (PC), only 2.7% did not have one, the average computer ownership being 1.03 items as the School of Management provided computer facilities to cover the needs of its students. Upon being asked if they had purchased an airline ticket before online, 90.7% showed they did have this kind of experience with the remaining 9.3% never having made a purchase of this sort. The purpose to the question was to investigate the respondents' experience on the topic. The particular result revealed that students were more likely to be the first to try out a new technology due to their high education level and potential income. After presenting the characteristics of the participants, a reliability test was performed to examine the internal consistency of the scales constructed for the measurement model by computing the composite reliability. The alpha coefficients below suggest that there is a good fit between the data and the entire proposed measurement model:

Operative Variables	Items	Range	Mean	S. Deviation	Cronbach alpha coefficient
Perceived Usefulness Section B-Questions (1-4)	4	1-6	19.39	2.543	0.836
Perceived Ease of Use Section B-Questions (5-8)	4	1-6	19.01	3.103	0.887
Attitude toward using Section B-Questions (18-22)	4	1-6	11.1867	3.53579	0.791
Information Richness Section B-Questions (9-11)	3	1-6	13.99	2.051	0.773
Customer Interface Section B-Questions (12-14)	3	1-6	12.56	2.236	0.818
Perceived Trust Section B-Questions (15-17)	3	1-6	14.65	3.374	0.901

Table 2. Relaibility

5.1 Hypothesis Testing

The correlations between the factors hypothesised to impact users' attitude towards the use of ISA are shown in the following table:

Operative Variables/ Set of Hypotheses	Pearson Correlation/ Attitude toward use ISA	Sig. (2-tailed)
Ha nil: Perceived Usefulness	.694**	.000
Hb nil: Perceived Ease of Use	.520**	.000
Hc nil: Information Richness	.492**	.000
Hd nil: Perceived Trust	-.226**	.006
He nil : Customer Interface	.456**	.000

** P<.01 level (2- tailed)

Table 3. Pearson Correlation

Hypothesis Ha

According to Hypothesis Ha, convenience, time saving, and the degree to which it may improve users' decision-making were predicted to have a positive relationship with consumer's attitude toward use ISA systems. Since this hypothesis is supported by the data analysis (Sig. values were .000, p<.01) the null hypothesis is rejected, suggesting that there is a relationship between PU and the users' attitude towards using an ISA. To support this further, the high correlation coefficient (r = .694) indicates that there is a positive relationship with large strength between PU and users' attitude toward using ISA systems.

Hypothesis Hb

The Hypothesis Hb can be tested by implementing a correlation between PEOU and the *attitude towards using an ISA*. Because the Sig. Value is .000 (P<.01), the null hypothesis is rejected and it can be concluded that there is a relationship between PEOU and the attitude towards using an ISA. The correlation coefficient indicates (r = .520) that there exists a positive relationship with large strength between PEOU and attitude toward use of ISA.

Hypothesis Hc

Hypothesis HC is aimed at testing whether there is a relationship between the *users' attitude towards using ISA* and IR. The satisfaction, distribution, and clarity of product or service information were predicted to have a positive relationship with the consumers' attitude towards using ISA systems (proved to have Sig. values of .000, p<.01). Therefore, the null hypothesis is rejected, implying a relationship between IR and the users' attitude towards using an ISA system. The correlation coefficient (r = .492) indicates that there is a positive relationship with a medium strength between IR and consumers' attitude towards using ISA systems.

Hypothesis Hd

With a Sig. Value .006, (p<.01), the null hypothesis is rejected, in that PT affects consumer attitude towards using ISA. By looking at the correlation coefficient (r = -.226), there is a negative relationship with a small strength between PT and consumers' attitude towards using ISA.

Hypothesis He

Here, the hypothesis testing aimed at investigating whether the ISA Customer Interface can affect consumers' attitude toward using an ISA. Speed, reliability and usability of ISA were predicted to have a positive relationship with consumers' attitude towards using ISA. This hypothesis is supported the Sig. value obtained which is .000 (p<.01). The correlation coefficient (r = .456) indicates that there is a positive relationship with a medium strength between the Customer Interface and consumers' attitude toward using an ISA system.

5.2 Use of Multiple Regression to Interpret Output

The use of the Pearson correlation led to the conclusion that PU, PEOU and the operative variables of IR, CI and PT are significantly correlated with the consumers' attitude towards the use of ISA technology. As the next step, the investigation into how well these variables predict such attitude and which of these variables makes the best prediction. In addition the model satisfied the normality, homoscedasticity, and independence of residuals assumptions. All variables were included in the multiple regression model since the operative variables referred to above were correlated with the dependant variable of the *consumer attitude towards the use of ISA* as per the Pearson correlation tests. It was important that this correlation should not exceed the mark of .7 in order to follow the assumption of multicollinearity. The correlation between the variables ranged between .226** and .694** in this study. The five variables were able to explain 54.4% of the variance in users' attitude toward using ISA and adjusted **R^2 = 0.528, (F5, 150) = 34,371 p<0.00.**

After checking the Sig. value, p<0.05, for statistical significance, PU, IR, CI, and PT, were found to be the main significant predictors of consumer attitude towards using ISA. According to the Coefficients table below, PU makes the largest contribution (beta=.501), followed by IR (beta=.152), CI (beta=.143) and PT (beta=.117). PEOU was not a significant predictor. The multiple regression analysis supports the results of the hypothesis testing, since the predictors were also the strongest factors correlated with consumer attitude toward using ISA (except PEOU).

Model		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		Beta			Tolerance	VIF
1	(Constant)		1,933	,055		
	PU	,501	6,349	,000	,509	1,965
	PEOU	,057	,746	,457	,539	1,855
	IR	,152	2,272	,025	,707	1,415
	CI	,143	2,137	,034	,706	1,416
	PT	-,117	-2,037	,043	,958	1,044

a Dependent Variable: Attitude towards using ISAs

Table 4. Multiple Regression Model

6. DISCUSSION AND RECOMMENDATIONS

From the results of the previous section, it can be concluded that users' attitude towards using ISA is clearly affected by the proposed factors. The majority of the respondents agreed that PU, CI, IR and PT are important factors towards consumer attitude. In fact, PU was found to be the strongest related factor towards ISA. Indeed, this was the case for PU in line with previous studies, but not for PEOU. Bandura (1982) and Lepper (1985) confirm that PU gave the users a greater sense of usefulness and personal control regarding their ability to carry out the sequences of behaviour needed to operate the system. However, although PEOU was second to PU in importance concerning consumer attitude as per previously documented studies (Dexter and Todd 1986; DeSanctis and McBride 1986**;** Miller 1977), the results of the multiple regression revealed that it was not a significant predictor of consumer attitude towards ISA.

Moreover, the provision of information via internet ISA was also highlighted by the respondents as a primary factor influencing their attitude toward using the software. Through Internet interactivity, users have more product and service information available to them, making them more sophisticated about what and from whom they are purchasing. CI, the second significant operative variable, was also affecting users' attitude towards ISA positively. Customers are more inclined to purchase products and will enjoy the visit to the virtual store more within the 'right' online environment.

Finally, according to the results obtained, perceived trust was also influencing consumer attitude towards using ISA. As Pavlou (2000) states trust in a web retailer is viewed as a salient behavioural belief that directly influences consumer attitude and indirectly affects intentions for on-line transactions with web retailers.

The implications to the above findings are that the travel industry will continue to face many new opportunities and challenges based on ISA-enabled Smart eCommerce. ISA does act as a personal assistant inviting system designers to new solutions and empowering users by providing exceptional information and decision support services facilitated by unprecedented information access and communications (Cross 2003). As far as the managerial implications of the study are concerned, these are associated with strategies that can be employed to influence customer attitude and encourage them towards using ISA. This in turn may increase customers' intention to use ISA for the purchase of travel products and services online. As customer switching costs go down, the challenges of attracting, retaining, and realizing profits from customer interactions increase. Hence the findings of the study will help managers to develop strategies to encourage customers in using ISA for commercial benefits.

While the use of ISA is reported to offer great benefits (Conway and Koehler, 2000), previous electronic market researchers have taken either a technology-cantered or a consumer centred view (Jarvenpaa and Todd 1997). Even if this has been useful, in the future electronic market researchers should look more deeply into the level of consumer acceptance and the use of new technologies (Chen and Tan 2004). This research has addressed a gap by providing an ISA TAM which gives reasonable insights into the factors that determine consumer attitude and usage of ISA. Moreover, managers may use the research instrument together with the Multiple Regression Model to evaluate individual

consumer's attitude, and hence their predisposition towards using ISAs to support their decision making.

The success of ISA lies mainly with the PU of the system. Therefore, designers should propose systems that are easier for users to interact with, provide a sense of usefulness and personal control regarding the users' ability to carry out the sequences of behaviour needed to operate the system. The result showed that once ISA systems offered convenience whereby customers could feel confident about the time spent on products and decision-making, they promised a positive shift of consumer attitude towards the agents (Hostler et al 2004).

Moreover, security and trust were identified as the main obstacles for consumer attitude toward using ISA. Hence, web sites should be well implemented in terms of security systems to protect the consumer. As B2C payments are almost exclusive via credit card and since consumers' trust toward online transactions is a sensitive issue, a site that is not trusted might suffer from low sales which will eventually affect long-term success and the effort to win the loyalty of potential customers. Keeping the contents of a website updated, secure and controlled are challenges that e-organisations need to prioritise.

Finally, CI plays an important role in attitude. Travel organisations should continue to invest in the development of advance features, such as menus, icons, mice and touch screens, which are specifically intended to enhance usability (Bewley et al 1983). The overall conclusion of this study for ECommerce managers is that organizations, armed with a better understanding of the consumer attitude toward using ISA, will drive ISA to new levels of acceptability.

The findings and managerial implications presented above were based on real-world data, but recognisable limitations do arise out of the present study: a) the limited resources and data collection methods, as the sample size was not big enough and hence cannot be considered representative for the whole population of students in the UK; b) the majority of the respondents were between 18-25 years old, with an average income of less than £10,000 pounds per annum and for that reason, the results can not be generalized. Although this investigation concentrated on a student population, which is a significant market, this research can be undertaken for other product-market segments in order to draw on a broader base of consumers and provide a more representative sample size of the population. Such efforts will result in a better understanding of this aspect of consumer attitude towards using ISA, to the benefit of both consumer theory and management practice that may inevitably embrace ISA technologies for business benefit.

References

Aaker, D. A., and Day G., S. (1990) 'Marketing Research', 4th edition, New York, John Wiley and Sons.

Ajzen, I., and Fishbein, M., (1980), Understanding Attitudes and Predicting Social Behaviour, Prentice-Hall, Englewood Cliffs, N.J.

Bagozzi, R. P., and Yi. Y., (1988), 'On the Evaluation of Structural Equation Models', *Journal of the Academy of Marketing Science*, 16(1) , pp. 74-94.

Bandura, A., (1982), 'Self-Efficacy Mechanism in Human Agency', *American Psychologist*, **37**(2), pp 122-147.

Benbasat, I., and Dexter, A.S. (1986), 'An Investigation of the Effectiveness of Color and Graphical Presentation under Varying Time Constraints', *MIS Quarterly* , **10**(1), pp 59-84.

Bewley, W. L., Roberts, T. L., Schoit, D., and Verplank, W. L. (1983), 'Human Factors Testing in the Design of Xerox's 8010 "Star" Office Workstation', Human Factors in Computing Systems, ACM, pp72-77.

Buhalis, D., and Licata, M.C. (2002), 'The future eToursm intermediaries', *Tourism Management*, **23**, p207-220.

Chaston, I., (2001), 'e-Marketing Strategy', Berkshire, McGraw-Hill.

Chen, L., and Tan, J. (2004), 'Technology Adaptation in E-commerce: Key Determinants of Virtual Stores Acceptance', European Management Journal, 22(1), pp.74-86.
Conway, D.G., and Koehler, G.J. (2000), 'Interface agent: caveat mercator in electronic commerce', Decision Support Systems, 27(4), pp 355-366.
Cross, S.R., (2003), 'Agency, Contract and Intelligent Software Agents', *International Review of Law Computers and Technology*, 17(2), pp175-189.
Daft, R. L., and Lengel, R. H. (1986), 'Organizational information requirements, media richness and structural design', *Management Science*, **32** (5), pp 554-571.
Davis, F.D., (1989), 'Perceived usefulness, perceived ease of use and user acceptance of information technology', MIS Quarterly 13(3), pp319-340.
Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989), 'User Acceptance of Computer Technology: A Comparison of Two Theoretical Models', *Management Science,* **35**(8), pp. 982–1003
Gatignon, H., and Robertson, T. S. (1985), 'A propositional inventory for new diffusion research', Journal of Consumer Research, 11, pp 849-867.
Ghauri, P., et al. (1995), *Research methods in Business Studies: a practical Guide* Prentice Hall Europe, Essex.
Glazer, R., (1991), 'Marketing in an Information-intensive Environment: Strategic Implications of Knowledge as an Asset,' *Journal of Marketing*, 55 pp 1-19.
Hair J. F., (2000) Marketing Research: A Practical Approach for the New Millennium, U.S.A, McGraw Hill.
Hoffman, D. L., Novak, T. P. and Peralta, M, (1999) 'Building consumer trust online', *Communications of the ACM*, **42** (4) pp 80-85.
Hostler, R. E., Yonn, V. Y., and Guimaraes, T. (2004), 'Assessing the impact of Internet agent on end users' performance', *Decision Support Systems*.
Igbaria, M., Zinatelli, N., Cragg, P., and Cavaye, A. L. M. (1997), 'Personal computing acceptance factors in small firms:a structural equation model', *MIS Quarterly*, 12(3), pp 279-305.
Jarvenpaa, S. L., and Todd, P.A. (1997), 'Consumer reactions tp electronic shopping on the world wide wed', International Journal of Electronic Commerce', 1(2), pp 59-88.
Karahanna, E., Straub, D.W., and Chervany, N.L. (1999), 'Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs', *MIS Quarterly*, **23** (2), pp 183-213.
Khalifa, M., and Liu, V. (2003), 'Determinants of Satisfaction at Different Adoption Stages of Internet-Based Services', *Journal of the Association for Information Systems*, **4**(5), pp 206-232.
Kotler P., (2003), Marketing Management, 11ed, New Jersey, Pearson Education Inc.
Kraemer, K. L., Gurbaxani, V., and King, J. L. (1992), 'Economic development, government policy, and the diffusion of computing in Asia-Pacific countries', Public Administrative Review, 52(2), pp 146-156.
Legris, P., Ingham, J., and Collerette, P. (2003), 'Why do people use information technology? A critical review of the technology acceptance model.' *Information and Management*, **40**, pp 191-204.
Lepper, M. R., (1985), 'Microcomputers in Education: Motivational and Social Issues', *American Psychologist*, **40**, pp 1-18.
Liang, T. P., and Huang, J. S. (2000),'A framework for applying intelligent agents to support electronic trading', *Decision Support Syst*em, **28**, pp305-317.
Louvieris, P., Driver, J., and Powell-Perry, J. (2003), 'Managing customer behaviour dynamics in the multi-channel e-business environment: Enhancing customer relationship capita in the global hotel industry', Journal of Vacation Marketing, 9(2), p164-173.
Machlis, S., (1999), 'Online Shoppers Want On-time Delivery,' Computerworld, 33(10), pp 43.
Maes, P., Guttman R. H., and Moukas, A. G. (1999), 'Agents That Buy and Sell', Communications of the ACM, 42(3), pp 81-87.
Miller, L. H., (1977), 'A study in Man-Machine Interaction', National Computer Conference, pp 409-421.

Mintel International (May, 2004), 'e-Travel in Europe', Internet: http/reports.mintel.com. Accessed on: 02/05/2005.

Odom M.D., Kumar A.,Saunders L., (2002), 'Web Assurance Seals: How and Why They Influence Consumer's Decisions', Journal of Information Systems, **16**(2), p 231.

Pallant, J. (2002) 'SPSS Survival Guide', Open University Press: Berkshire.

Pavlou P., (2000), 'What drives electronic commerce? 'A theory of planned behaviour perspective', Academy of Management Proceeding, pA1.

Putnam L., (2001), 'Distance Teamwork', Online, 25(2), p54.

Rayport, J. F., and Jaworski, B. J. (2001), e-Commerce, New York, McGraw-Hill International Edition.

Spero, I., and Stone, M. (2004) 'Agents of Change: How Young consumers are changing the World of Marketing', *Qualitative Market Research: An International Journal*, **7**(2), pp. 153-159.

Taylor, S., and Todd, P. (1995), 'Assessing IT Usage: The Rolw of Prior Experience', *MIS Quarterly*, **19**(4), pp 561-570.

Van der Heijden, H., (2004), 'User acceptance of hedonic information systems', *MIS Quarterly*, **28**(4), pp 695-704.

Venkatesh, V., Morris, M., Davis, G. B., and Davis, F. D., (2003), 'User Acceptance of Information Technology: Toward a Unified View', *MIS Quarterly,* **27**(3), pp 425-478.

Wejnert, B., (2002), 'Integrating models of diffusion of innovations: A conceptual framework', Annual Review Sociology, 28, pp297-326.

Yang, K. C. C., (2005), 'Exploring factors affecting the adoption of mobile commerce in Singapore', *Telematics and information*, **22**, pp 257-277.

Zeng, M., and Reinartz, W. (2003), 'Beyond Online Search: The Road to Profitability' *California Management Review*, **45**(2), p107.