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ABSTRACT

The seniors market, people 55 years of age or over, represents a growing proportion of our population, with increasing spending power. Seniors use computers and the Internet less than those in younger demographics (Australian Bureau of Statistics, 2004). This research focuses on the attitudes, perceptions and the resulting technology adoption by seniors. Not all those using computers use the Internet and it was found that seniors' behavioural intentions to use the Internet are well explained via Technology Acceptance Model constructs of perceived usefulness and perceived ease of use. The results indicated two distinct groups of seniors, segregated by differing factors. Those seniors who are male, more affluent, younger and more educated are the most frequent users of the technology. Structural equation modeling determined that this behavioural intention is driven by their perceptions of the usefulness of the technology, rather than perceived ease of use. Seniors primarily use the Internet for e-mail.

Keywords

Seniors, attitudes, perceptions, computers, internet, usefulness, ease of use, TAM, SEM, PLS

INTRODUCTION

Information Technology (IT) acceptance and use is an issue that has received considerable attention from researchers over the past few decades. Business, particularly e-business, is likely to benefit considerably from an understanding of the motivation governing technology adoption in the seniors market (also referred to as the 'grey', 'elderly', 'mature' or 'older' market).

As Internet technologies evolve and the cost of Internet access decreases, growth in access and usage is exploding (Weiser, 2000). This means that the user population is becoming highly diverse with respect to experience, skills, abilities and the reasons for using the Internet, as the technology moves away from the computer specialist or trained user. Increasingly, the Internet has become a vital tool for business, education, government and entertainment. It has also become clear that a crucial mechanism for success by business and government in these endeavours involves gaining a more precise understanding of the characteristics of the Internet user population and the primary motives driving use.

The purpose of this research is to examine seniors' perceptions and attitudes towards computers and the Internet to determine what factors may determine behavioural intent. This research endeavours to provide detailed insight into the major variations in these perceptions and attitudes that lead to varying degrees of technology adoption. Perceptions are defined as the way a person sees or interprets characteristics of an object or event. Attitudes are defined as a person's disposition (either favourable or unfavourable) toward an object or event (Klobas and Clyde, 2000). This study examines what demographic factors (such as gender, income, age and education), as well as situational variables such as experience and frequency of use, have a significant influence on seniors' technology adoption.

This area of research is important because there is currently a distinct lack of research with a focus on this segment. "Age has received very little attention in the technology acceptance literature" (Venkatesh et al, 2003). Further, due to lower fertility and mortality rates, there is mounting evidence that this demographic group currently represents the largest segment of the Australian population (Australian Bureau of Statistics (ABS), 2004) with influential purchasing power (Lumpkin & Festervand, 1988), a rapidly emerging demographic trend that needs to be addressed. The post-war baby boomers are moving from middle age into the seniors segment, hence today's social landscape is seeing significant re-contouring. This phenomenon, referred to as the *senior boom* (Schewe, 1991) is shifting the marketplace to an older composition and this trend is projected to continue to increase (Australian Bureau of Statistics, 2004), as shown in figure 1.
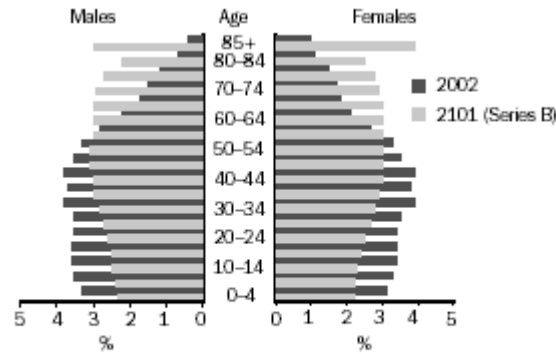
Source: Population Projections, Australia, 2002–2101
(ABS cat. no. 3222.0), 2003.

Figure 1 – The Aging Population

In view of the above, and the expectation that as the population ages, information technology will find an increasingly greater use in the home for both personal and work-related tasks, this research is motivated by the perceived need to understand the factors driving such use of this technology. The research takes on added importance when one considers the movement of work into the home, particularly for semi-retired people. The importance of this research is supported too by Venkatesh and Brown (2001), "While technology adoption in the workplace has been studied extensively, drivers of adoption in homes has been largely overlooked" (p.71). Early predictions about the adoption and use of telephones proved to be false as they became a necessity, rather than a luxury. Likewise, early assessments about the adoption and use of personal computers (PCs) in homes are quickly proving to be false (Venkatesh, 1996). "Little systematic research has been conducted to understand the determinants of adoption and diffusion of PCs in homes" (Venkatesh and Brown, 2001, p.72). The household context, given its tremendous growth as a target for implementation of technologies, is an important aspect of theorising about technology (Venkatesh and Brown, 2005).

BACKGROUND, RESEARCH HYPOTHESIS/QUESTIONS AND RESEARCH MODEL

The importance of attitude and its effects continues to be a major focus of theory and research in the social and behavioural sciences. Lee (1970) was one of the first researchers to conduct a nationwide survey on the North American public in this area. Morrison (1983) then continued this survey by applying the measures to Australian participants. Lee's (1970) focus was on computers and their impact. Lee found two significant belief-attitude dimensions. Computers were regarded as either "beneficial tools of mankind – helpful in science, industry, space exploration, and so forth" or as a "superhuman thinking machine that downgrades man's previously unique significance in the order of things" (p.59). Morrison (1983) then detected a distinct change in attitudes in the next decade. Australians, the subject of his study, expressed much concern for computer's adverse effects on employment and their dehumanising effects.

Dick and Burns (1999) replicated the above research, surveying students at a University in Australia, seeking their perceptions of the Internet. It was found that the Internet was viewed almost equally in a positive and negative light. It was seen simultaneously as threatening and beneficial, able to be used for evil and for essential tasks, concerning and helpful. Factors such as gender, prior use of the Internet and possession of computing skills all seemed to affect the perceptions.

Extensive research has supported the proposal that attitudes towards computers are a key determinant of their successful implementation and user acceptance (Davis et al, 1989; Igbaria et al, 1995). Computer attitudes have also been found to predict user satisfaction with computers (Treacey, 1985).

Davis (1989) and Davis et al. (1989), through the Technology Acceptance Model (TAM), found that favourable ease of use perceptions are necessary for initial acceptance, which is of course essential for adoption and continued use. TAM has received widespread acceptance particularly for its robustness and needs little further explanation here. However, Pijpers et al (2001) stated, "neither Davis (1989) nor Davis et al (1989) fully investigated the external factors in their model. Furthermore, very little research to date has looked at these external variables for their influence on usage behaviour as mediated by the belief and attitude constructs…. If usage is to improve, first and foremost the variables actually influencing the formation of beliefs in technology acceptance must be identified". As Agarwal and Prasad (1998) purport, external variables are the only

channels for influencing behaviour as the intermediate and dependent variables in TAM are hypothesised to be an internal psychological process.

Most studies concerned with the predication of behaviour from attitudinal variables have been conducted in the framework of the theory of planned behaviour (Ajzen, 1991). According to this theory, intentions to perform behaviours of different kinds can be predicted with high accuracy from attitudes toward the behaviour, subjective norms and perceived behavioural control. These intentions, together with perceptions of behavioural control, account for considerable variance in actual behaviour. Motivational perspectives have also been considered to influence human behaviour (Venkatesh and Smith, 1999; Vallerand, 1997 and Davis et al. 1992). This is supported by Moon and Kim (2001), finding that an individual's primary use of the Internet is for education, shopping, entertainment, work, communication, personal information and time wasting. So, unlike other traditional ITs, the Internet is used for both work and pleasure, thus perceived usefulness and ease of use may not fully reflect the Internet user's motives, necessitating a search for additional intrinsic motivation factors.

Gender differences in attitudes and perceptions towards computers are a focus area that has been researched extensively to date, including perceived self-efficacy, computer anxiety, liking and confidence in the use of computers. Many studies have found a male dominance in the use of computers and the Internet, however this dominance is reported to be slowly disappearing over time. Weiser (2000) found numerous gender differences in preferences for specific Internet applications. Results showed that males use the Internet mainly for entertainment and leisure, whereas women use it primarily for interpersonal communication and educational assistance. However, additional analyses showed that several gender differences were mediated by differences in age and Internet experience. In fact, experience actually using computers may be one of the most important factors in determining computer attitudes and anxiety (Bush, 1995). Accordingly it is hypothesised that age and gender will affect perceptions, use and behavioural intent – the degree to which seniors might be expected to use the computers and the Internet in future.

Eastin and LaRose (2000) report that self-efficacy is a potentially important factor in efforts to close the digital divide that separates experienced Internet users from novices. Prior Internet experience, outcome expectancies and Internet use were significantly and positively correlated to Internet self-efficacy judgements. Internet stress and self-disparagement were negatively related to Internet self-efficacy. McQuarrie and Iwamoto (1990) found differences in attitudes towards computers could be explained by differences in exposure. Adults who were exposed both at home and work had more positive attitudes than adults who were only exposed at one location. The majority of empirical studies that looked at the influence of demographic characteristics of adopters and non-adopters of technology have found that early adopters of innovations have more education, more income, and higher status occupations than do non-adopters (Dickerson and Gentry, 1983). It is therefore hypothesised that income and education will affect perceptions, use and behavioural intent.

Figures from the ABS support that older people are taking up Internet technology at a rapid rate, but that their use of the Internet for electronic commerce (e-commerce) activities remains quite low, with older people forming just 1% of the total of adult Internet shoppers (ABS, 2002). The main inhibiting factors for e-commerce adoption by seniors are security, the view that there is 'no need' to utilise e-commerce and the fact that they prefer to perform their activities in person. Privacy and trust have a smaller influence on this adoption.

A 1999 independent research study funded by Microsoft in conjunction with the American Society on Aging reported that over 23% of new PC buyers are over the age of 55. That was an increase of over 150% in comparison to the previous year. "Like thousands of other seniors around North America these days, Jones and Fiddler are more interested in bytes than bingo,….. For a generation that came of age when computers were the size of pick-up trucks and the typewriter ruled supreme, mastering the personal computer takes determination, persistence and a willingness to learn" (Black, 1999).

Grougiou and Wilson (2003) studied how technological advances in financial service companies are able to now make use of alternative channels such as call centres and the Internet to deliver services to their customers (i.e. referred to as "remote personal encounters", p.360). They examine the grey market's perceptions of these technologies, considering that this market consists of people who grew up in the age of face-to-face contact with service suppliers. They report the difficulties encountered by this market and the negative views that are held. They highlight the need for further research into this segment if organisations are to address the issues raised and effectively satisfy the needs of this growing market segment. They report that "senior customers are not familiar with technological advances, thus their capacity for processing information quickly and learning new tasks diminishes with age" (p.361). They also state that the seniors market is not totally homogeneous - 'silver surfers' (quite comfortable using the Internet) versus a large number of seniors who have a general aversion to technology. Again, income and education had an impact on the acceptance of technological innovations by the elderly.

Dyck, Gee and Smither (1998) report that "as the numbers of older adults increase, the need for services, agencies and caregivers to help these older adults perform their daily tasks will also increase. Researchers in the field of gerontology are increasingly looking to the rapid developments in technology to help older adults maintain their functional independence and to reduce the need for caregiving" (p.64).

The above literature suggests that the demographic characteristics of gender, age, income and education will influence seniors' behavioural intentions to use computers and the Internet as will attitudes and the TAM constructs of perceived ease of use and perceived usefulness.

This gives rise to the following research questions and model.

> RQ1: Does gender affect seniors' perceptions towards computers and the Internet, the frequency of use of these technologies and their associated intention to use?

> RQ2: Does income affect seniors' perceptions towards computers and the Internet, the frequency of use of these technologies and their associated intention to use?

> RQ3: Does age/aging affect seniors' perceptions towards computers and the Internet, the frequency of use of these technologies and their associated intention to use?

> RQ4: Does level of education affect seniors' perceptions towards computers and the Internet, the frequency of use of these technologies and their associated intention to use?

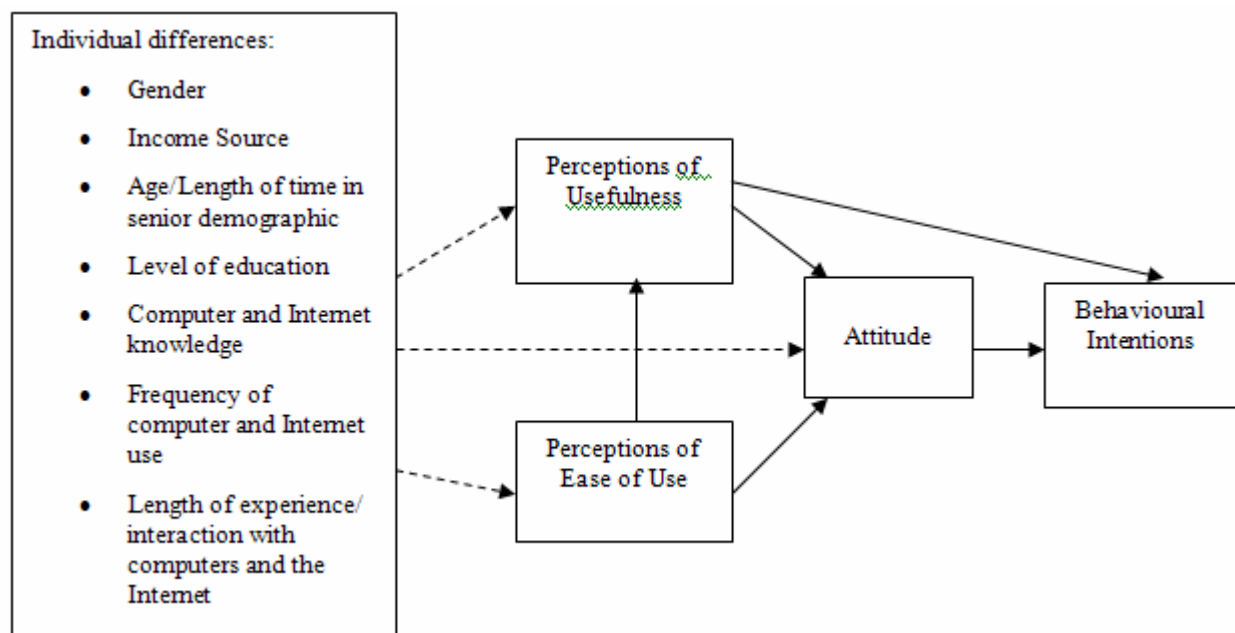> RQ5: What are the primary activities performed by seniors on the Internet?

Figure 2 – The Research Model

RESEARCH METHODOLOGY

The sample was comprised of 246 seniors, aged 55 years or over. Quantitative questionnaires were employed and were distributed at podiatry clinics and PROBUS groups (organisations for retired business and professional people), as these are centers that the senior market frequents. The survey instrument developed was based on earlier instruments used by Lee (1970), Morrison (1983), Davis (1989) and Dick and Burns (1999) and adapted to include the work done by Moon and Kim (2001). The 246 responses represented an overall response rate of 66%.

Pre-test and pilot studies of the survey instrument were conducted prior to the data collection to ensure its robustness and content validity. Reliability of the instrument was assessed by means of test-retest (all correlations significant at the .001 level), Cronbach alpha scores (all constructs rated .88 or higher) and by confirmatory factor analysis. Validity was evaluated by assessing face validity (the survey was heavily based on prior validated instruments and was pre-tested for ambiguity,

vagueness and completion time, with satisfactory results), criterion related validity (correlations for a number of related measures were obtained – all were significant at the .01 level), convergent and discriminant validity (the high Cronbach alpha scores mentioned above), and for external validity by the random and divergent nature of the sample. Overall, high reliability and validity of the research instrument was found. Further details on the instrument reliability and validity may be found in Raptis and Dick (2005).

The statistical software package SPSS was utilised to analyse the survey results. This included analysis techniques such as independent samples t-tests and regression analysis. Structural Equation Modelling (SEM) was also used to establish causal relationships among the survey constructs through the use of Partial Least Squares (PLS) software. According to Chin (1998), PLS is well suited to research that involves multiple indicators of latent variables or constructs. PLS comes to the fore when faced with a very complex model with a large number of constructs and indicators and would like to create a construct score for predictive purposes. Hence, PLS was considered to be a very useful analysis technique for this research. Descriptive statistics were used for research question 5.

The sample was evenly distributed across the demographic categories of gender, income, age and education. The implication of this even allotment is that there is no reason to suspect that the results are skewed in any particular direction, indicating a fair degree of representation of the senior demographic group. Given this distribution and the large sample size, the data was analysed via parametric techniques.

RESULTS

Computer and Internet Use

There was found to be stronger use of computers in comparison to the Internet in the seniors market. See table 1.

Technology Use Category	Computer Use (Frequency Percentage)	Internet Use (Frequency Percentage)
Do not use	14.6%	22.8%
Less than or once per week	17.1%	20.7%
Multiple times per week	29.6%	29.9%
Daily or more frequently	38.8%	26.6%

Table 1 – Frequency of Computer and Internet Use

Further, in regards to computers, most seniors either do not use this technology at all, or have been using it for quite a long time. There were a limited number of seniors who had only been using computers for two years or less. The use of the Internet saw similar results, however there were not a sizeable number of respondents who had been using the Internet for more than 10 years, further supporting the finding of greater penetration of computers than the Internet by seniors. See table 2. A significant (but relatively weak) correlation was noted between length of use and the perception of usefulness.

Usage Category	Length of Computer Usage (Frequency Percentage)	Length of Internet Usage (Frequency Percentage)
Do not use	13.7%	23.3%
< 1 year	3.3%	5.4%
1-2 years	6.2%	7.5%
3-5 years	17.0%	30.8%
6-10 years	17.8%	21.7%
11-15 years	15.4%	7.9%
> 15 years	26.6%	3.3%

Table 2- Length of Computer and Internet Usage

The primary uses of the Internet by seniors were found to be for e-mail and general browsing and research. See table 3.

Internet Application	*Use Weekly or More Frequently (Percentage)*	**Do Not Use (Percentage)**
E-mail	72.0%	28.0%
General Browsing and Research	62.9%	37.1%
Travel Information (airline, car rental, hotel, etc.)	54.0%	46.0%
Information (news, weather, sports, etc.)	49.6%	50.4%
Travel Reservations/Bookings	43.0%	57.0%

Table 3 – Usage of Internet Applications

The above tables are compiled from descriptive statistics and are intended to give an overview of the data and to provide an indication of the use of computers and the Internet by seniors. A more detailed analysis of the Research Questions 1 – 4 follows.

The Research Model

The PLS graph below (Figure 3) represents the research model utilised in this research. Each construct is comprised of all the variables that were utilised in the survey to measure each construct. The overall R-square achieved was .7. A very weak link between the attitude construct and behavioural intention was noted. It should be noted that the behavioural intent construct was measured by agreement with statements regarding regular future use, increasing future use and recommending the technology to others.
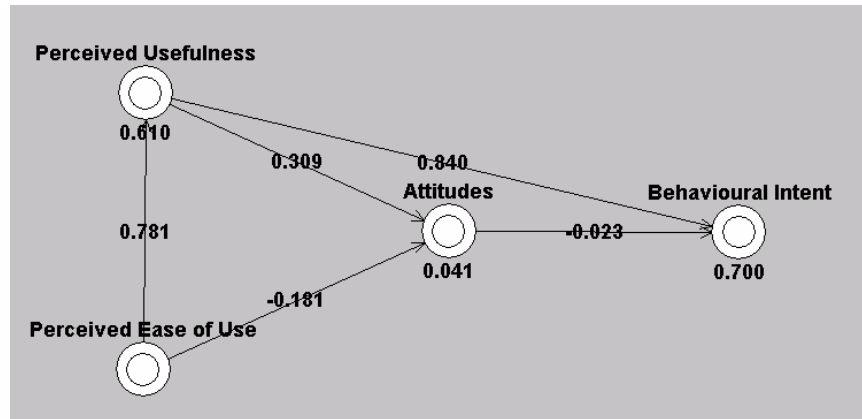

Figure 3 – The Original Research Model

However, when the number of attitude variables is reduced to only include those that were found to be significant and a link is added between perceived ease of use and behavioural intention, the R-square increases to .869. Regression analysis found that behavioural intention is being equally driven by both TAM constructs of perceived ease of use and perceived usefulness; hence the addition of this link to the model is justified – see Figure 4.
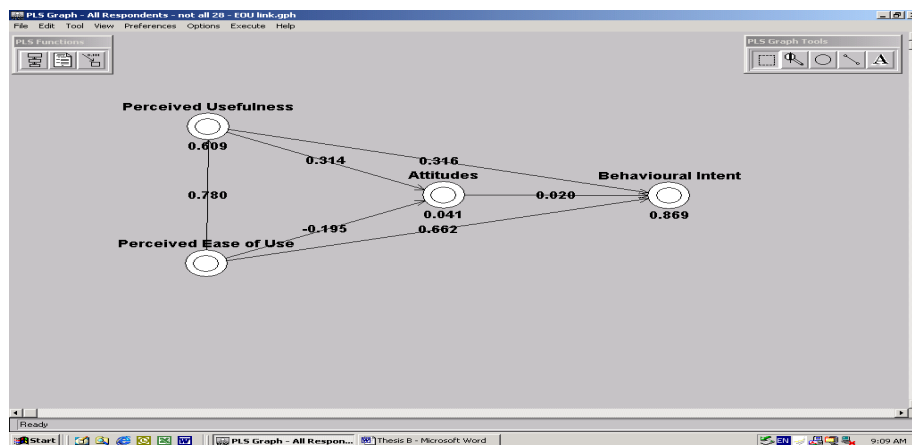

Figure 4 – Link Added Between Perceived Ease of Use and Behavioural Intention

It should be noted that when the attitude construct was removed completely from this model, the R-square did not change from .869, showing that attitudes had no effect on behavioural intention to use the Internet. Hence, greater focus needs to be given to the original TAM constructs of perceived ease of use and perceived usefulness in determining seniors' behavioural intention to use the technology.

Demographic Groupings

Returning now to the specific research questions addressed in this study, independent samples t-tests found that those seniors who are male, more affluent, younger and more educated had higher behavioural intentions to use the Internet. PLS-graph path analysis was utilised to further examine the differences between seniors' gender, income, age and education and the effects on the resulting behavioural intention to adopt the Internet. Standard t-statistic criteria (>1.645, significant at 0.05 level) were applied in assessing the significant level of PLS estimates. The following results were found:

Influenced by Perceived Usefulness	t-statistic	Influenced by Perceived Ease of Use	t-statistic
Males	1.206	Females	1.206
More Affluent **	2.073	Less Affluent **	2.061
Younger (equal with perceived ease of use)	0.401	Older	0.327
More Educated	1.326	Less Educated	1.373

**Difference significant at .01

Table 4 – Influences on Behavioural Intention to Use the Internet

This shows that for those seniors who have stronger behavioural intentions toward Internet use, this is being driven by their perceptions of the usefulness of the Internet. Whereas, for those seniors with a weaker behavioural intention to use the Internet, this is being driven by their perceptions of the ease of use of the Internet.

To calculate the significant difference between these demographic groups, re-sampling procedures were utilised to assess the significance of the PLS parameter estimates. The bootstrap option was utilised (500 cases). The only significant difference was found for affluence, although two others (gender and education) were trending towards significance.

Overall, as a result of PLS analysis, we can conclude that the effect of attitudes in the overall research model is negligible, due to its weak correlation with behavioural intention. Greater focus should be given to the relationship between the TAM constructs of perceived ease of use and perceived usefulness on behavioural intention of seniors to use the Internet.

DISCUSSION AND CONCLUSION

The results indicate that a number of seniors who do in fact use a computer, are not necessarily using it for online activities. Further, in regards to computers, most seniors either do not use this technology at all, or have been using it for quite a long time. There were a limited number of seniors who had only been using computers for two years or less. The use of the Internet saw similar results, however there were not a sizeable number of respondents who had been using the Internet for more than 10 years, further supporting the finding of a greater penetration of computers than the Internet in the senior demographic. This finding must however take into consideration the fact that computers have been in existence for a significantly longer period of time than the Internet.

The distinct use of the Internet for e-mail is an area that groups such as the government could capitalise on in order to communicate with seniors. In particular, the cost-effectiveness of e-mail in communicating with seniors should be considered.

Overall, the demographic characteristics of gender, income, age and education played a significant mediating role in the research model. Those seniors who are male, more affluent, younger and more highly educated had more positive perceptions of the usefulness and ease of use of computers and the Internet, greater frequency of use of the technology and stronger behavioural intentions to use the technology. One of the main contributions of this study is that each of these demographic groups' behavioural intention to use the Internet is more strongly influenced by their perceptions of the usefulness of the technology, rather than their perceived ease of use. As a result, professionals interested in targeting these particular technology savvy seniors need to ensure that the Internet continually appears useful and lesser focus is required on its ease of use.

However, for females, those less affluent, older and less educated, the focus needs to be given to these seniors' perceived ease of use of the Internet. Overall, this segregation of the senior demographic is most strongly determined by income.

Nonetheless, one must consider that computers and the cost of Internet access is getting cheaper over time. Hence, it is possible that the effect of income on usage will decrease over time as more seniors will be able to afford to have a computer and the Internet in their home. Further work is required in this area; such research could address the influence of ease of use on the attraction of the technology.

As a result of these findings, a revised research model should be created (Figure 5), in which the attitude construct is removed and a link is added between perceived ease of use and behavioural intention. Hence, a primary contribution of this study is not only the inconsequential effect of attitudes on seniors' behavioural intention to use the Internet, but also the finding that individual differences (such as gender, age, income and education) play a large mediating influence in this model, with a greater influence on behavioural intention to use the Internet than attitudes towards this technology. Note that the R^2 figure and path co-efficients in Figure 5 refer to the full data set.
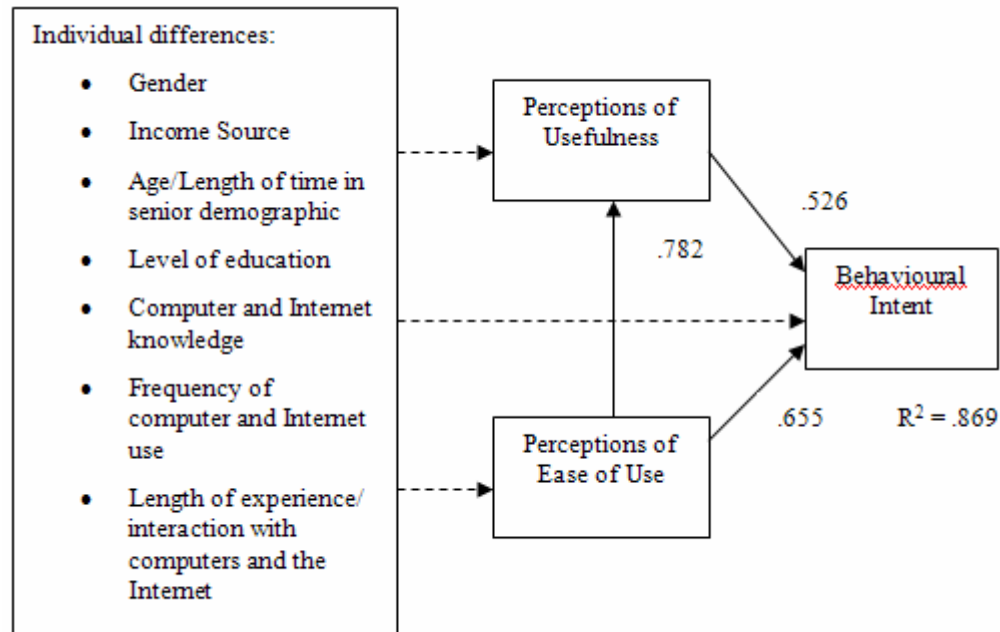

Figure 5 – Revised Research Model

This study has limitations. The measures used are self-reported which gives rise to the possibility of bias and a halo effect. In addition the perceptions and attitudes are dynamic, not static and therefore the study may not fully capture the complexity and the periodicity of the adoption and usage process. Finally the data was collected from metropolitan Sydney and it may be that this restricts generalisability to a larger population and although the response rate (66%) was high, the possibility of response bias was not evaluated. Nevertheless, the high R^2 values achieved in all the models and the robust validation measures give considerable weight to the results obtained.

Overall, the seniors market has substantial buying power and high levels of expectations from services and products. Hence, the areas addressed in this research must be considered when targeting and interacting with the senior demographic in order to positively influence their perceived usefulness and perceived ease of use of computers and the Internet that will encourage future technology adoption.

ACKNOWLEDGMENTS

REFERENCES

1. Agarwal, R. and Prasad, J. (1998) "The antecedents and consequents of user perceptions information technology adoption" *Decision Support Systems* Vol. 22, No. 1, pp. 15-29

2. Ajzen, I. (1991) The theory of planned behaviour, *Organisational Behavior and Human Decision Processes,* Vol. 50, pp. 179-211

3. Australian Bureau of Statistics (2004) 2. Australian Social Trends: Population – Scenarios for Australia's aging population, www.abs.gov.au [accessed: 18/01/2005]

4. Australian Bureau of Statistics (2002) 8147.0 Use of the Internet by Householders, Australia www.abs.gov.au [accessed: 18/01/2005]

5. Black, G (1999) "Seniors are Getting in Touch with Technology" Microsoft Corporation http://www.microsoft.com/windows98/usingwindows/internet/articles/903Mar/seniors.asp [accessed 23/2/05]

6. Bush, T. (1995) Attitudes toward computers, *Journal of Educational Computing Research,* Vol. 12, No. 2, pp. 147-158

7. Chin, W.W. (1998) The partial least squares approach to structural equation modelling. In: George A. Marcoulides, (Ed.) *Modern Methods for Business Research*, pp. 295-336. New Jersey; Mahwah; London: Lawrence Erlbaum Associates

8. Davis, F.D. (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly,* Vol. 13, No. 3, pp. 319-338

9. Davis, F.D., Bagozzi, R.P., and Warshaw, P.R. (1989) User acceptance of computer technology: a comparison of two theoretical models, *Management Science,* Vol. 35, No. 8, pp. 982-1002

10. Davis, F.D., Bagozzi, R.P., and Warshaw, P.R. (1992) Extrinsic and intrinsic motivation to use computers in the workplace, *Journal of Applied Social Psychology,* Vol. 22, No. 14, pp. 1111-1132

11. Dick, G.N. and Burns, O.M. (1999) "Perceptions of the Internet: How important is who you are and what you know?" *Proceedings of the International Academy for Information Management Conference*

12. Dickerson, M.D. and Gentry, J.W. (1983) Characteristics of adopters and non-adopters of home computers, *Journal of Consumer Research,* Vol. 10, pp. 225-235

13. Dyck, J.L., Gee, N.R. and Smither, J.A. (1998) The changing construct of computer anxiety for younger and older adults, *Computers in Human Behaviour,* Vol. 14, No. 1, pp. 61-77

14. Eastin, M.S. and LaRose, R. (2000) Internet self-efficacy and psychology of the digital divide, *Journal of Computer Mediated Communications,* Vol. 6, No. 1

15. Grougiou, V. and Wilson, A. (2003) Financial service call centres: problems encountered by the grey market, *Journal of Financial Services Marketing,* Vol. 7, No. 4, pp. 360-368

16. Igbaria, M., Guimaraes, T. and Davis, G.B. (1995) Testing the determinants of microcomputer usage via a structural equation model, *Journal of Management Information Systems,* Vol 11, No. 4, pp. 87-114

17. Klobas, J.E. and Clyde, L.A. (2000) Adults learning to use the internet: a longitudinal study of attitudes and other factors associated with intended internet use, *Library and Information Science Research,* Vol. 22, No. 1, pp. 5-34

18. Lee, R. (1970) Social attitudes and the computer revolution, *Public Opinion Q*. 34, pp. 53-59

19. Lumpkin, J.R. and Festervand, T.A. (1988) Purchase information sources of the elderly, *Journal of Advertising Research,* December 1987/January 1988, pp. 31-44

20. McQuarrie, E.F. and Iwamoto, K. (1990) Public opinion toward computers as a function of exposure, *Social Science Computer Review,* Vol. 8, No. 2, pp. 221-233

21. Moon, J.W. and Kim, Y.G. (2001) Extending the TAM for a world-wide-web context, *Information & Management,* Vol. 38, pp. 217-230

22. Morrison, P.R. (1983) A survey of attitudes toward computers, *Communications of the ACM,* Vol. 26, No. 12, pp. 1051-1057

23. Pijpers, G.G.M., Bemelmans, T.M.A, Heemstra, F.J. and Van Montfort, K.A.G.M. (2001) Senior executives' use of information technology, *Information and Software Technology,* Vol. 43, pp. 959-971

24. Raptis M. E. and Dick G. N (2005) The Rise of the Silver Surfer: a Preliminary Study of Computers and the Internet as Providers of Information and Communications to Seniors *Proceedings of the International Conference on Informatics Education & Research*, Las Vegas, December.

25. Schewe, C.D. (1991) Strategically positioning your way into the aging marketplace, *Business Horizons,* May-June 1991

26. Treacy, M. (1985) An empirical examination of a casual model of user information satisfaction, Proceedings of the 6th International Conference on Information Systems, Indianapolis, IN, pp. 285-287

27. Vallerand, R.J. (1997) Toward a hierarchical model of intrinsic and extrinsic motivation, *Advances in Experimental Social Psychology,* 27, pp. 271-360

28. Venkatesh, A. (1996) Computers and other interactive technologies for the home, *Communications of the ACM,* Vol. 39, No. 12, pp. 47-54

29. Venkatesh, V. and Brown, S.A. (2001) A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges, *MIS Quarterly,* Vol. 25, No. 1, pp. 71-102

30. Venkatesh, V. and Smith, R.H. (1999) Creation of favourable user perceptions: exploring the role of intrinsic motivation, *MIS Quarterly,* Vol. 23, No. 2, pp. 239-260/June

31. Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003) User acceptance of information technology: toward a unified view, *MIS Quarterly,* Vol. 27, No. 3, pp. 425-478

32. Venkatesh, V. and Brown, S.A. (2005) Model of adoption of technology in households: a baseline model test and extension incorporating household life cycle, *MIS Quarterly* Vol. 29, No. 3, pp. 399-426

33. Weiser, E.B. (2000) "Gender differences in internet use patterns and internet application preferences: a two-sample compassion" *CyberPsychology & Behavior* Vol. 3, No. 2, pp. 167-178