Technophobia, Gender Influences and Consumer Decision-Making for Technology-Related Products.

by

Gilbert, D., Lee-Kelley, L. and Barton, M.

Published in 'European Journal of Innovation Management',
volume 6, issue 4, pp 253-263.

Technophobia, gender influences and consumer decision-making for technology-related products

David Gilbert
Liz Lee-Kelley and
Maya Barton

The authors

David Gilbert is Professor of Marketing, **Liz Lee-Kelley** is Lecturer in E-commerce and **Maya Barton** is Researcher, all at Surrey European Management School, University of Surrey, Guildford, UK.

Keywords

Gender, Product technology, New products, Internet, Consumer behaviour

Abstract

Mobile Internet technology (MIT) is an extension of the Internet beyond the static terminal of the personal computer or television. It has been forecasted that by the end of 2005, there will be almost 500 million users of mobile m-commerce, generating more than $200 billion in revenues. Contributes to the body of knowledge on how to approach the study of MIT products. Proposes that consumer perceptions of MIT products can lead to dichotomous decision making and argues that the challenge for marketers is to harness and fit this dichotomy to the MIT product continuum through an understanding of consumer psychological and attribution factors. The overall findings indicate that technology anxiety correlates with demographic variables such as age, gender and academic qualifications. Therefore, the implications of the study are that technology product engineering and marketing should recognise the importance of: study of the psychosocial needs of technology products, human factors in engineering design which need to fit these needs; and developing product designs facilitating consumers' psychosocial needs.

Electronic access

The Emerald Research Register for this journal is available at
http://www.emeraldinsight.com/researchregister

The current issue and full text archive of this journal is available at
http://www.emeraldinsight.com/1460-1060.htm

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · pp. 253-263

· ISSN 1460-1060
DOI 10.1108/14601060310500968

Introduction

This study draws on a host of empirical works such as Brosnan's (1998) research into technophobia; Bem's studies (1974, 1977, 1981a, b) of psychological gender in connection with technophobia, Bandura's (1977a, b) social learning and self-efficacy theories, the investigation of cognitive/spatial abilities (Turkle, 1984, 1988; Turkle and Papert, 1990) and cognitive style (Witkin *et al.*, 1977), including Davis' (1986, 1989) original technology acceptance model (TAM) and the psychological factors leading to the expansion of the TAM (Brosnan, 1998). It explores attribution theory (Kelley, 1967) and an attribution process meta-analysis (Mizerski *et al.*, 1979) related to aspects of psychological acceptance of technology. The aim of such a comprehensive evaluation of the literature is to derive an approach to assessing psychological gender influences on consumer behaviour object-perception in which technology acceptance theories and attribution process theories are incorporated. While the terms relating to "technology" are capable of richer and complex technical connotations, their use in this paper will only be in the context of a computer-mediated activity. References made to a mobile Internet device (MID) will be generic in nature, e.g. "pocket computer" for a MID that may resemble a computer and/or a "wireless protocol application (WAP) phone" for a MID that may look like a phone.

Technophobia

The first US national survey in which a prevalence of negative attitudes towards new technology was evident was attributed to Lee (1970). Three decades later, a British public survey commissioned by Motorola (1996) reported that 49 per cent of the British general public did not use a computer and 43 per cent did not use any form of new technology. There also appeared to be a distinct lack of interest in the Internet as one quarter (of the 85 per cent knowing the Internet) reported a distinct lack of interest in it. Brosnan (1998) highlighted that the psychological factors such as anxiety or negative attitudes could have prevented interested individuals from utilising the new technology. Computer phobia or technophobia is a complex interplay of

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

behavioural, emotional and attitudinal components. Jay (1981, p. 47) defines it as "a resistance to talking about computers or even thinking about computers; fear or anxiety towards computers; hostile or aggressive thoughts about computers". Rosen and Maguire (1990, p. 276) characterize technophobia as "anxiety about current or future interactions with computers or computer-related technology; negative global attitudes about computers, their operation or their societal impact; and/or specific negative cognitions or self-critical internal dialogues during actual computer interactions or when contemplating future interaction".

Rosen *et al.* (1993) posit that there are three types of technophobes based on an escalating anxiety of how they would react while using a computer – the "uncomfortable users", the "cognitive computerphobes" and the "anxious computerphobes". In specific cases of consumer decision making it is likely to be anxiety aversion that results in a reduction of choice. Computer anxiety is an example of state anxiety, conceptualised as a transitory condition, which fluctuates over time. Many writers such as Dukes *et al.* (1989) and Moldafsky and Kwon (1994) have given their support to the existence of computer anxiety. Attempts to study and assess computer anxiety have resulted in measurement scales such as the computer anxiety rating scales (CARS) using Likert-type self-endorsements to rank anxiety creating items (Heinssen *et al.*, 1987). Other developments included Raub's (1981) ATC, CAS by Loyd and Gressard (1984), Maurer's (1983) CAIN and BELCAT-36 by Erickson (1987). Brosnan (1998) has shown the relationship between computer anxiety and demographic variables such as age, gender and academic qualifications should not be overlooked. However, he indicates females may not simply be less positive about computers as certain new technology items are of interest to them. He surmises that females are likely to use computers only when they have a direct and useful purpose in their lives and that there is a convergence of the notions of attitude and computer anxiety to arrive at an overall concept of technophobia. Rubin and Greene (1991) however, found that it is possible to explain apparent sex differences in personality and intelligence using psychological gender rather than biological sex.

Gender and technology

Consensus among numerous studies is that females report higher levels of computer anxiety than males (Igbaria and Chakrabarti, 1990; Okebukola and Woda, 1993; Farina *et al.*, 1991; Brosnan and Davidson, 1996). Furthermore, Brosnan (1998) makes the proposition that apparent sex differences are due to the masculinising of technology. This has implications for the understanding of sex or psychological differences in technophobia. This is reflected by a recent survey by the American Association of University Women which found that girls possess the ability to learn and use computers but do not want to be associated with the "geeky" image of technical careers by "guys" tapping on the keyboard all day long (*The Herald Sun-Business*, 2000). This masculinising or stereotyping of roles is depicted by Chivers (1987) as common in the physical sciences and the "older" craft and technology subjects. The introduction of Information Technology in schools is yet another dividing bias towards the masculine orientation. Rosen *et al.* (1987) state that computer anxiety is definitely implicated by gender role identity.

The critical relevance in the causal factor influencing the apparent sex differences in technophobia is the concept of psychological gender. Bem's research on psychological androgyny, in which masculinity and femininity are viewed:

- as separate constructs;
- as variable phenomena rather than fixed biological entities; and
- that androgyny is associated with mental rather than physical well being, lends depth and support to the above argument.

The perceived cultural norms of femininity and masculinity, not physical or biological attributes should be the factors to consider when examining the origins of technophobia. Brosnan (1998) highlights that in contexts where technology is not masculinised, there is no apparent variance between sex and psychological differences in aversion to technology.

Some of the characteristics of masculinity (variables such as dominance, adventurousness, boldness and leadership) may be gleaned from Bem's sex-role inventory scale (BSRI (Bem, 1974, 1981a)) although this scale has attracted its share of criticisms (Eagly *et al.*, 1995; Baldwin *et al.*, 1986;

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

Lubinski *et al.*, 1983; Taylor and Hall, 1982). Bem (1981b) has subsequently developed her gender schema theory, which proposes that sex typing is a learned phenomenon mediated by cognitive processing. As such computing has developed a masculine image on par with the traditionally maculinised subjects such as mathematics, physics and engineering.

Technology psychological models

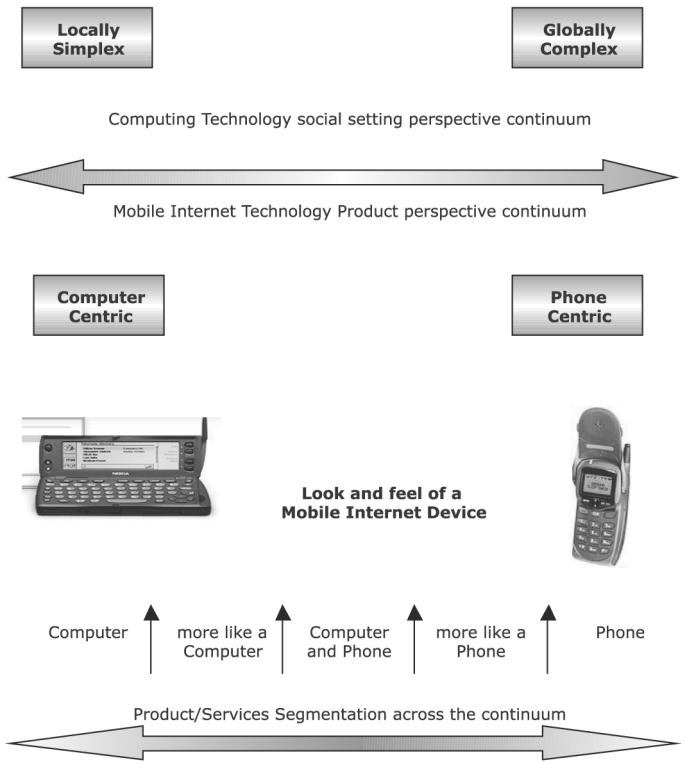
Fishbein and Ajzen's (1975) theory of reasoned action (TRA) refers to the attitude and intention to act in a certain manner by an individual. From this and the literature reviewed so far, the authors propose that, although there appears to be a correlation between the cognitive style and spatial ability of an individual and his/her reaction to environmental and social stimuli, personal experience and familiarity in what are deemed the so-called more masculine subjects such as mathematics, physics and computers could override the correlation to psychological gender. Cognitive style/spatial ability/ analytical strategies can therefore be developed and are not fixed biological entities. However, gender itself may undermine self-efficacy and hence the gaining of experience in the first place. These inter-related psychological factors affecting individuals' attitudes towards technology explicate consumer decision making in the high-tech products of the marketing arena. Psychological factors among others will have a strong influence on high-tech purchase intentions (Viardot, 1998). This is supported by Davis' (1993) TAM and Brosnan's (1998) research of psychological factors influencing TAM.

Davis' model depicts the causal relationships between system design features, perceived usefulness, perceived ease of use, attitude toward using, and actual usage. Davis hypothesises that a prospective user's attitude (in terms of perceived usefulness and perceived ease of use) towards a given system is a major determinant of whether he/she would actually use it. Helping the user perform his/her job better would appear to be key to potential usage. Davis recalls Bandura's (1977a, b) self-efficacy theory and applies that in this context arguing that self-efficacy beliefs which are essentially value judgements, are similar to the perceptions of ease of use and perceived usefulness, influencing the decision making of the potential user. "Fun" has also been suggested as an addition to Davis' TAM components of usefulness and ease of use. Brosnan (1998) regressed the three major components and surmised that there is a relationship between sex differences, perceived usefulness and task focus concluding that the perceived usefulness of technology will facilitate the achievement and focus of a task.

The literature has indicated that although there is an understanding that computers are meant to aid users to work more efficiently (Hirschheim and Newman, 1991; Winter, 1993), the expected benefits and increased productivity may not have been realised. The authors propose that the expected benefits of technology have not been universally realised owing to psychological segmentation, bringing about a disparity in relating to and communicating about the technology's effective use. The mobile Internet technology (MIT) continuum here is used to depict this variation in consumer's attitudes towards devices that carry very similar functionalities. The continuum (Figure 1) is anchored at two points:

(1) At one end is a social setting whose attitude to computers is viewed as being

Figure 1 Authors' marketing model – consumer decision making perspective continuum



European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

"locally simplex" in nature, i.e. an individual will see the computer as controllable and alterable by humans, as a tool that enables challenging extensions into otherwise normally and easily attainable realms of accomplishments.

(2) At the other end is a social setting in which computers are viewed as being "globally complex" in nature, i.e. an individual in this instance will see the computer as "incomprehensible" and external, as an autonomous entity.

From the earlier literature, it is now possible to construct a hypothetical causal relationship between masculine gender appropriateness of computers and computer look-alike and feel products with the perceived cause of anxiety affecting consumer decision making. A further influence is proposed with psychological factors significantly correlating with consumer decision-making along the MIT continuum shown in Figure 1.

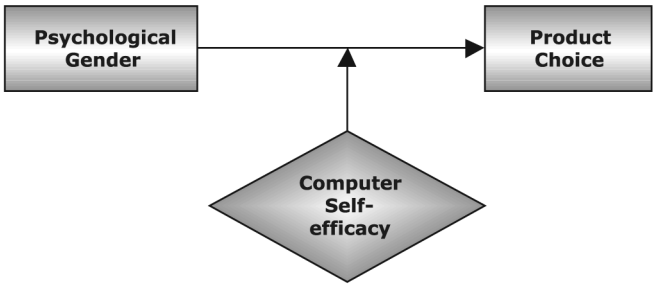
Methodology

In the case of this study the product choice provides a neat dichotomous dependent variable; hence a "two-group discriminant analysis" was chosen based on the work of Hair *et al.* (1998). As a result of questionnaire size constraint as well as the existence of extensive research on technophobia, the authors made the decision to accept technophobia as a bona fide phenomenon. The MID in the consumer's perspective would fall into two categories, a computer-centric product and a phone-centric product. The product choice was selected as the dichotomous dependent variable and the psychographic factors represented the independent variables forming the psychological profile of a specific respondent, affecting the consumer decision-making. Other factors such as attitude to computer usage formed the intermediate variables. The operationalisation of the dependent and independent variables are detailed in Figure 2.

Conjecturing the above model and utilising the literature, the authors addressed the following research questions that:

- technophobia does not correlate significantly to just the non-computer user community;

Figure 2 Research model



- feminine psychological gender will correlate significantly with technophobia;
- technophobia brought about by gender inappropriateness is moderated by perceptions of self efficacy;
- computer experience overrides psychological gender in correlating significantly with technophobia; and
- the influence of psychological factors significantly correlates with the consumer decision making along the MIT product continuum.

The continuum for the purposes of this paper is limited to a dichotomous product choice in the forms of a mobile Internet product that looks and feels like a computer and a mobile Internet product that looks and feels like a phone.

In designing the research questionnaire (see Appendix for an example questionnaire) the authors paid careful attention to the structure of the measurement scales, specifying the dependent variable to drive the two-group discriminant analysis. The psychographic independent variables were obtained by using two sets of scales and the demographic information and the product usage information providing the intermediate variables. The authors recognise that one of the main disadvantages of multivariate analysis is that the impact of measurement error and poor reliability cannot be directly seen because they are embedded in the observed variables. Therefore, rather than designing an original scale, standard scales with proven reliability and validity were employed. For example, as a basis for obtaining information from respondents on psychological gender and computer self-efficacy in consumer decision-making, statistical measurement would be in the form of multiple discriminant analysis utilising two scales, the "androgyny scales" and the "attitude to computer usage scales"

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

(Popovich *et al.*, 1987). To preserve reliability value and to encourage participation by potential respondents, scales with large battery of items were also avoided.

The measurement instrument was structured in five sections:

(1) *General demographics*.

(2) *Androgyny scales*. This section's aim is to verify if sex role typing has an influence on various aspects of behaviour. This is an important independent variable to test. The conception of masculinity and femininity as two separate orthogonal dimensions rather than as two end points of a bipolar dimension is used to test the relation between sex role typing and consumer decision making. Bem's sex-role inventory scales (BSRI (Bem, 1974) – 27 questions) was used as a guide to determine the moderation of psychological gender on the gender appropriateness behaviour of individuals in consumer decision making of technology products. Based on the BSRI, this study's androgyny scale consisted of 25 items – nine in each of the masculine, feminine and neutral categories – measured as a five-point Likert scale of strongly agree to strongly disagree. Following Pedhazur and Tetenbaum's (1979) critique of the BSRI and taking on board, Bem's (1979) reply, items considered as not relevant to this study such as "aggressive" and "yielding" were excluded.

(3) *Attitude to computer scales*. The attitudes to computer usage were adapted from Popovich *et al.* (1987) (20 questions). The scale for this study has 18 items, measured as a five-point Likert scales of strongly agree to strongly disagree. This was included as a moderating variable.

(4) *Computer, Internet and mobile consumption questions*. The aim of this section is to obtain product consumption patterns. Categorical data would be collected in particular, a measure of the respondent's computer experience; the main purpose of using computers; experience with the Internet; the main purpose of using the Internet; experience with mobile phones and the main purpose of using mobile phones.

(5) *MIT product choice questions*. This last section seeks to obtain for each of the product types (Product A = pocket-computer; product B = mobile phone), the respondent's opinion of that product type before he/she made his/her choice. The choice is for a product type and not for a particular brand. Product choice, between a MID that looks and feels like a computer or one that looks and feels like a phone forms a dichotomous dependent variable. A picture was provided for each one of the product types; the respondent was asked to describe the opinion of what the picture looked like, hence they formed an opinion of the product type before they made their choice of the product. The pictures of the MIDs are not a representation of a particular brand.

The sample consisted of 161 individuals who were selected on the basis of a convenience sample with the filter of having a minimum of some computer literacy and being from the ABC1 (middle class) groups. The product choice distribution in this sample population was 82.33 (82 choosing computer-look-alike product A and 33 choosing phone-look-alike product B) with the rest categorised under missing data, choosing neither of the choices for the MID.

The data collected were first tested for reliability using Cronbach's alpha for the following (cases with missing data were not included): feminine psychological gender (nine items): Cronbach alpha of 0.6261 representing a just acceptable reliability rating. The masculine psychological gender (nine items): Cronbach alpha of 0.6883 representing an acceptable reliability rating. A positive attitude to computer usage scale (ten items): Cronbach alpha of 0.7451 representing a robust reliability rating. A negative attitude to computer usage scale (eight items): Cronbach alpha of 0.5699 representing a weaker than normal reliability rating.

Three out of the four scales showed acceptable reliability (> 0.60) with the negative attitude to technology scale as just acceptable. The authors note that there were some negative attitude scoring within the inter-items characteristics and that these items might have affected the analysis of product choice prediction in the multiple discriminant analysis. However, given the

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

overall reliability of the data, it was decided to execute a two-tailed Pearson correlation matrix across the items on the androgyny scale, all the items on the ATCUS scale as well as product choice. Correlations between the "psych" items and "tech" items revealed an association between the psychological gender and technophobia variables, thus confirming a general tendency towards psychological gender and technophobia.

The authors selected Wilks" Lambda (Λ) as the statistic of choice for weighing up the addition or removal of variables from the analysis. The F test provides the significance of the Λ when a variable is entered or removed. The variable with the largest F (F to enter) is included. This process is repeated until there are no further variables with an F value greater than the critical minimum threshold value. At the same time, any variable which had been added earlier but which no longer contributes to maximizing the assignment of cases to the correct groups because other variables in concert have taken over its role, is removed when its F (F to remove) value drops below the critical maximum threshold value. These critical values are listed in the analysis conducted below.

An initial multiple discriminant analysis (MDA) was executed with the product choice as the dichotomous dependent variable and the "psych" and the "tech" scales as the independent variables. To eliminate any preconceived perceptions of prices affecting the choice a free coupon was offered.

Information about the data and the number of cases in each category of the grouping variable is shown in the Tables I-IV.

The number of cases for each independent variable within each level of the grouping has been edited, since in this analysis every independent variable within a particular level has the same number of cases. The edited group statistics are shown in Table II.

The number of cases in each of the groups is not equal; hence the authors have chosen to run the analysis using the discriminant analysis classifications, prior probabilities to be computed from group sizes.

A number of uses were made of MDA. Finally the real value of MDA surfaces, with the classification are shown in Tables III and IV.

Table I Multiple discriminant analysis, case processing summary

	Unweighted cases	*n*	Per cent
Valid		115	71.0
Excluded	Missing or out-of-range group codes	8	4.9
	At least one missing discriminating variable	33	20.4
	Both missing or out-of-range group codes and at least one missing discriminating variable	6	3.7
Total		47	29.0
Total		162	100.0

Table II MDA, edited group statistics table

Choice if free	Valid n
Product A	82
Product B	33
Total	115

Table III Multiple discriminant analysis, prior probabilities for groups

		Cases used in analysis	
Choice if free	**Prior**	**Unweighted**	**Weighted**
Product A	0.713	82	82.000
Product B	0.287	33	33.000
Total	1.000	115	115.000

Table IV Multiple discriminant, classification results

		Predicted group membership		
	Choice if free	**Product A**	**Product B**	**Total**
Original count	Product A	105	4	109
	Product B	30	9	39
	Ungrouped cases	10	4	14
Per cent	Product A	96.3	3.7	100.0
	Product B	76.9	23.1	100.0
	Ungrouped cases	71.4	28.6	100.0

Results and discussion

It was found that over 70 per cent of original grouped cases were correctly classified. This high percentage is very encouraging and indicates the research's relevance for praxis marketing applications. The MDA showed a clear success in discriminating between the two groups into profiles choosing Product A or Product B. It supports the authors' proposition that consumer perceptions of MIT products are dichotomous and that technology phobia correlates with demographic and psychological contexts. As such, the chosen methodology and the

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

instrument utilising discriminant analysis lend themselves particularly to predicting consumers' MIT product preferences. The robust reliability of the study's androgyny scales and attitude to computer scales augments the literature's reference to sex and psychological differences in the stereotyping of technology adoption.

Moreover, the results of the addition or removal of an independent variable in the stepwise discriminant analysis were monitored by a statistical test and the conclusion was used as a basis for the inclusion of that independent variable in the final analysis. There being only two groups in this analysis, there was only one discriminant function. It was noted that no variables appeared to have been removed in the stepwise discriminant analysis. The value for F to remove was 2.71 and for F to enter was 3.84 but none of the variables were less than the criteria set. There is therefore a clear indication that technophobia not only correlates with the non-computer users community, but there is also a distinct association between the consumer's situated psychological gender and his/her product preference. This is further reflected by the study's masculine scale items dominant in choosing the computer look alike Product A in which characteristics such as: "has leadership qualities", "masculine self-labelling", and "makes decisions easily" yielded significance levels of 0.047, 0.045 and 0.030 respectively. Furthermore, the technophobia brought about by gender inappropriateness may be moderated by perceptions of self-efficacy and that previous exposure can mediate one's psychological fear of new technology. Univariate ANOVA was used to indicate whether there is a statistically significant difference among the grouping variable means for each independent variable.

The study's overall findings support Brosnan's (1998) proposition that technology anxiety correlates with demographic variables such as age, gender and academic qualifications. Indeed, the significant relationship ($p < 0.05$) between feminine psychological gender and technophobia illustrates the general agreement (Brosnan, 1998; Campbell and McCabe, 1984) that females exhibit higher levels of computer anxiety and computer negativity than males. However, it is worth noting that individuals such as females exhibiting androgynous characteristics moderate this sex difference in attitude to technology.

Managerial implications

The literature review has focused on "technophobia" and existing research on "psychological gender" and "cognitive theory" in developing the construct of this paper. From the extensive existing research and the findings of this study, the authors conclude that technophobia does not correlate only to the non-computer user community, but rather, the main factors contributing to technophobia are found to be anxiety and negative attitude as interceded by the users' psychological gender and previous success. It has as its basis the study findings of Rubin and Greene (1991) that sex differences can be more psychological rather than biological and that psychological role identity implicates technology adoption as well as consumer decision making. Females exhibiting male androgynous qualities would appear to have a more positive attitude towards computers in general. From the literature, it is clear that technophobia emerges largely from the masculinisation of technology (Brosnan, 1998). Therefore, the importance of appreciating the differences between the psychological male and the psychological female cannot be overlooked in MIT "hardware" and "software" product design and promotion. It could be that MID products will penetrate a wider consumer base if marketed as an incremental innovation to mobile phones with the convenience of access to useful Internet source information.

Furthermore, it would appear that there exist different levels of technophobia from being "uncomfortable users" to "cognitive computerphobes" to "anxious computerphobes" (Rosen *et al.*, 1993) albeit that not all technophobes seek to avoid their source of anxiety. Hence, marketers are well advised to be willing to endorse several product designs that will meet consumers' psychosocial needs along the MIT consumer perspective continuum (MITCPC).

The authors present an exploratory approach by applying Bem's self-perception theory of radical behaviourism and self-efficacy. The implications for companies extend beyond the recognition that when a consumer buys a MID, be it a pocket

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

computer or a WAP phone, the decision is a result of perceived strong environmental causations as well as the individual's internalised experiences and attitudes. Since computer anxiety and technophobia is a transitory condition and therefore may fluctuate with time and treatment (Campbell, 1988), marketers should not ignore the implications of social learning, self-efficacy and cognitive style and spatial ability when seeking to understand the psychological attitude and behaviour of their target customers. Additionally as with the motor car industry in which some cars are deliberately designed to interest the male or female gender, perhaps it is more cost-beneficial to segment the MIT products to target and appeal to the two consumer perspectives. For example, introducing the possibility of "upgrading" along the product simplex-complex continuum may be an option to keep abreast of the morphing needs of users. After all, the literature has revealed that experience with technology such as computers, provides an antecedent to reducing the correlation between feminine gender and negative attitude to technology. This ability to design economically feasible myriad levels of relational marketing services to complement the different gender demands along the MITCPC will be a distinct competitive edge.

This study has confirmed that both human and psychological factors are an essential component when purchasing new products. For the marketer involved in MID, it is necessary to understand the inter-relatedness of the psychological factors affecting individual attitudes and the consumers' ultimate decision to buy high-tech products. Therefore, the causal relationships between system design features, perceived usefulness, perceived ease of use and availability (e.g. size and shape of the device, access to the Internet, graphics quality and speed of access, etc.) should rest high on the agenda of mobile phones innovation. However, given the cost and pace of technological developments, corporate executives are faced with having to collaborate to compete by entering into alliances to facilitate the integration of MID with electronic businesses. As such, the enforced vertical and often horizontal cooperation within the MID industry is fast becoming the norm and brings with it "new" and additional risks in terms of profit/loss sharing, intellectual property and human capital issues. This brings with it the importance of designing acceptable and economically feasible new technology products.

The outcome for this study is the confirmation that psychological factors implicate consumer decision-making along the MIT product continuum. However, the continuum for the purpose of this paper is limited to a dichotomous product choice in the forms of a mobile-Internet product that looks and feels like a computer and a mobile-Internet product that looks and feels like a phone. An extension of the product range to include other digital personal devices will allow wider confirmation of the factors related to this paper which influence decision-making. Additional studies of technophile and psychological gender will yield further insights on how to harness and utilise the dichotomous MIT product continuum for greater competitive advantage. Therefore, mapping psychosocial implications to attribution process theory, as applied to consumer-decision-making, technology acceptance, design preferences, may provide a fruitful area of possible exploration.

References

Baldwin, A.C., Stevens, L.C., Critelli, J.W. and Russell, S. (1986), "Androgyny and sex role measurement: a personal construct approach", *Journal of Personality and Social Psychology*, Vol. 51 No. 5, pp. 1081-8.

Bandura, A. (1977a), "Self efficacy: toward a unifying theory of behavioural change", *Psychological Review*, Vol. 84, pp. 191-215.

Bandura, A. (1977b), *Social Learning Theory*, Prentice-Hall, Englewood Cliffs, NJ.

Bem, S.L. (1974), "The measurement of psychological androgyny", *Journal of Consulting and Clinical Psychology*, Vol. 42, pp. 155-62.

Bem, S.L. (1977), "On the utility of alternative procedures for assessing psychological androgyny", *Journal of Consulting and Clinical Psychology*, Vol. 45, pp. 196-205.

Bem, S.L. (1979), "Theory and measurement of androgyny: a reply to the Pedhazur-Tetenbaum and LockS Ley-Colen critiques", *Journal of Personality and Social Psychology*, Vol. 37, pp. 1047-54.

Bem, S.L. (1981a), *Bem Sex Role Inventory Professional Manual*, Consulting Psychologists Press, Palo Alto, CA.

Bem, S.L. (1981b), "Gender schema theory: a cognitive account of sex typing", *Psychological Review*, Vol. 88, pp. 354-64.

Brosnan, M. (1998), *Technophobia, The Psychological Impact of Information Technology*, Routledge, New York, NY.

Brosnan, M. and Davidson, M. (1996), "Psychological gender issues in computing", *Journal of Gender, Work and Organization*, Vol. 3 No. 1, pp. 13-25.

Campbell, N.J. (1988), "Correlates of computer anxiety of adolescent students", *Journal of Adolescent Research*, Vol. 3 No. 1, pp. 107-17.

Campbell, P. and McCabe, G. (1984), "Predicting the success of freshman in a computer science major", *Communications of the ACM*, Vol. 27, pp. 1108-13.

Chivers, G. (1987), "Information technology – girls and education: a cross-cultural review", in Davidson, M.J. and Cooper, C.L. (Eds), *Women and Information Technology*, John Wiley, London, pp. 13-32.

Davis, F.D. (1986), "A technology acceptance model for empirically testing new end-user information systems: theory and results", doctoral dissertation, Sloan School of Management, MIT, Boston, MA.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use and user acceptance of information technology", *MIS Quarterly*, Vol. 13, pp. 318-39.

Davis, F.D. (1993), "User acceptance of information technology: system characteristics, user perceptions and behavioral impacts", *International Journal of Man-Machine Studies*, Vol. 38 No. 3, pp. 475-87.

Dukes, R.L., Discenza, R. and Couger, J.D. (1989), "Convergent validity of four computer anxiety scales", *Educational and Psychological Measurement*, Vol. 49, pp. 195-203.

Eagly, A.H., Karau, S.J. and Makhijani, M.G. (1995), "Gender and the effectiveness of leaders: a meta-analysis", *Psychological Bulletin*, Vol. 11 No. 7, pp. 125-45.

Erickson, T.E. (1987), "Sex differences in student attitudes toward computers", PhD dissertation, University of California, Berkeley, CA.

Farina, F., Arce, R., Sobral, J. and Carames, R. (1991), "Predictors of anxiety towards computers", *Computers in Human Behaviour*, Vol. 7 No. 4, pp. 263-7.

Fishbein, M. and Ajzen, I. (1975), "A Bayesian analysis of attribution processes", *Psychological Bulletin*, Vol. 4, pp. 195-277.

Hair, J.F. Jr, Anderson, R.E., Tatham, R.L. and Black, W.C. (1998), *Multivariate Data Analysis*, 5th ed., Prentice-Hall, Englewood Cliffs, NJ.

Heinssen, R.K. Jr, Glass, C.R. and Knight, L.A. (1987), "Assessing computer anxiety: development and validation of the computer anxiety rating scales", *Computers in Human Behaviour*, Vol. 3, pp. 49-59.

(*The*) *Herald Sun-Business* (2000), "Girls leaving high-tech jobs to the boys", *The Herald Sun-Business*, 4 July.

Hirschheim, R. and Newman, M. (1991), "Symbolism and information systems development: myth, metaphor and magic", *Information Systems Research*, Vol. 2, pp. 29-62.

Igbaria, M. and Chakrabarti, A. (1990), "Computer anxiety and attitudes towards microcomputer use", *Behaviour & Information Technology*, Vol. 9 No. 3, pp. 229-41.

Jay, T. (1981), "Computerphobia – what to do about it?", *Educational Technology*, Vol. 21, pp. 47-8.

Kelley, H.H. (1967), "Attribution theory in social psychology", in Levine, D. (Ed.), *Nebraska Symposium on Motivation*, University of Nebraska Press, Lincoln, NB.

Lee, R.S. (1970), "Social attitudes and computer revolution", *Public Opinion Quarterly*, Vol. 34, pp. 53-9.

Loyd, B.H. and Gressard, L.P. (1984), "The effects of sex, age and computer experience on computer attitudes", *AEDS Journal*, Vol. 18, pp. 67-77.

Lubinski, D., Tellegan, A. and Butcher, J.N. (1983), "Masculinity, femininity and androgyny, viewed and assessed as distinct concepts", *Journal of Personality and Social Psychology*, Vol. 44, pp. 428-39.

Maurer, M.M. (1983), "Development and measurement of a measure of computer anxiety", unpublished Masters thesis, Iowa State University, Ames, IA.

Mizerski, R.W., Golden, L.L. and Kernan, J.B. (1979), "The attribution process in consumer decision making", *Journal of Consumer Research*, Vol. 6, September, pp. 123-40.

Moldafsky, N.I. and Kwon, I.W. (1994), "Attributes affecting computer aided decision making: a literature survey", *Computers in Human Behaviour*, Vol. 10 No. 3, pp. 299-323.

Motorola (1996), *The British and Technology: Prepared for the Future? The Motorola Report*, Information Society Initiative, London.

Okebukola, P. and Woda, A. (1993), "The gender factor in computer anxiety and interest among some Australian high school students", *Educational Research*, Vol. 35 No. 2, pp. 181-9.

Pedhazur, E.J. and Tetenbaum, T.J. (1979), "Bem sex-role inventory: a theoretical and methodological critique", *Journal of Personality and Social Psychology*, Vol. 37, pp. 996-1016.

Popovich, P.M., Hyde, K.R., Zakrajsek, T. and Blumer, C. (1987), "The development of the attitudes toward computer usage scales", *Educational and Psychological Measurement*, Vol. 47, pp. 261-9.

Raub, A. (1981), "Correlates of computer anxiety in college students", *University of Pennsylvania Dissertation Abstracts International*, Vol. 42 No. 4775A, doctoral dissertation.

Rosen, L.D. and Maguire, P. (1990), "Myths and realities of computerphobia: a meta-analysis", *Anxiety Research*, Vol. 3, pp. 175-91.

Rosen, L.D., Sears, D.C. and Weil, M.M. (1987), "Computerphobia behaviour", *Research Methods, Instruments and Computers*, Vol. 19, pp. 167-79.

Rosen, L.D., Sears, D.C. and Weil, M.M. (1993), "Treating technophobia: a longitudinal evaluation of the computerphobia reduction program", *Computers in Human Behaviour*, Vol. 9, pp. 27-50.

Rubin, D. and Greene, K. (1991), "Effects of biological and psychological gender, age cohort, and interviewer gender on attitudes toward gender inclusive language", *Sex Roles*, Vol. 24 No. 7-8, pp. 391-412.

Taylor, M.C. and Hall, J.A. (1982), "Psychological androgyny: a review and reformulation of theories, methods and conclusions", *Psychological Bulletin*, Vol. 92, pp. 347-66.

Turkle, S. (1984), *The Second Self: Computers and Human Spirit*, Simon & Schuster, New York, NY.

Turkle, S. (1988), "Computational reticence: why women fear the intimate machine", in Kramarae, C. (Ed.), *Technology and Women's Voices*, Routledge, London.

Turkle, S. and Papert, S. (1990), "Epistemological pluralism: styles and voices within the computer culture", *Signs*, Autumn, pp. 128-57.

Viardot, E. (1998), *Successful Marketing Strategy for High-tech Firms*, Artech House, Boston, MA.
Winter, S. (1993), "The symbolic potential of computer technology: differences among white collar workers", in DeGrosss, J.I., Bostrom, R.P. and Robey, D. (Eds), *Proceedings of the 14th International Conference on Information Systems, Orlando, Florida, 5-8, December*, pp. 331-44.
Witkin, H.A., Moore, C.A. and Raskin, E. (1977), "Role of the field-dependent and field-independent cognitive styles in academic revolution: a longitudinal study", *Journal of Educational Psychology*, No. 69, pp. 197-211.

Further reading

Bandura, A. (1997), *Self-efficacy: The Exercise of Control*, WH Freeman and Company, New York, NY.
Bem, S.L. (1975), "Sex-role adaptability: one consequence of psychological androgyny", *Journal of Personality and Social Psychology*, Vol. 33, pp. 634-43.
Bernard, L.C. (1980), "Multivariate analysis of new sex role formulations and personality", *Journal of Personality and Social Psychology*, Vol. 38, pp. 323-36.
Eagly, A.H. and Carli, L.L. (1981), "Sex of researchers and sex-typed communications as determinants of sex differences in influenceability: a meta-analysis of social influence studies", *Psychological Bulletin*, Vol. 90, pp. 1-20.
Kelley, H.H. (1971), *Attribution in Social Interaction*, General Learning Press, Morristown, NJ.
Lehman Brothers (2000), available at: http://newscnetcom/news/0-1004-200-1611107html (accessed 5 June 2000).
Ovum (2000), *Mobile E-commerce: Market Strategies*, Ovum, Burlington, MA.
Spence, J.T., Helmreich, R. and Stapp, J. (1975), "Ratings of self and peers on sex-role attributes and their relation to self-esteem and conceptions of masculinity and femininity", *Journal of Personality and Social Psychology*, Vol. 32, pp. 29-39.

Appendix. Example of questionnaire

The list of characteristics used from ATCUS was scored on a five-point Likert scales of strongly agree to strongly disagree. Listed below are the 18-item scales used in this paper:

(1) I would prefer to type on a word processor than on a typewriter.
(2) Whenever I use something that is computerised, I am afraid I will break it.
(3) I like to keep up with technological advances.
(4) I know that I will not understand how to use computers.
(5) Using a computer is too time consuming.
(6) I feel that having my own computer would help me with my job.
(7) I prefer not to learn how to use a computer.
(8) I would like to own or do own a computer.
(9) I like to play video games.
(10) I feel that the use of computers in schools will help children to learn mathematics.
(11) I prefer to use an automatic teller for most of my banking.
(12) If I had children, I would not buy them computerised toys.
(13) I have had bad experiences with computers.
(14) I would prefer to order items in a store through a computer than wait for a store clerk.
(15) I feel that the use of computers in schools will negatively affect children's reading and writing abilities.
(16) I do not like using computers because I cannot see how the work is being done.
(17) I do not feel I have control over what I do when I use a computer.
(18) I do not like to program computerized items such as VCRs and microwave ovens.

The instrument included the following questions to obtain product consumption patterns:

(1) *Experience in computers*:
- Less than six months
- Six months to less than one year.
- One year to less than 1.5 years.
- Over 1.5 years.

(2) *Main purpose of using computers*:
- For business.
- For leisure.
- For emergency.
- Other.

(3) *Experience with Internet*:
- Less than six months.
- Six months to less than one year.
- One year to less than 1.5 years.
- Over 1.5 years.

(4) *Main purpose of using Internet*:
- For business.
- For school.
- For leisure.
- Other.

(5) *Experience with mobile phones*:
- Less than six months.
- Six months to less than one year.
- One year to less than 1.5 years.
- Over 1.5 years.

European Journal of Innovation Management
Volume 6 · Number 4 · 2003 · 253-263

(6) *Main purpose of using mobile phones*:
- For business.
- For leisure.
- For emergency.
- Other.

Product A

Please place a cross mark against the statement that best suits your opinion of what the Plate 1 looks like:

[ ] Looks like a computer.
[ ] Looks more like a computer than a phone.
[ ] Looks both like a computer and a phone.
[ ] Looks more like a phone than a computer.
[ ] Looks like a phone.

Product B

Please place a cross mark against the statement that best suits your opinion of what the Plate 2 looks like.

[ ] Looks like a phone.
[ ] Looks more like a phone than a computer.
[ ] Looks both like a phone and a computer.
[ ] Looks more like a computer than a phone.
[ ] Looks like a computer.

Product preference

Please place a cross mark against the options.

In your opinion, which product appears easier to use.

[ ] Product A.
[ ] Product B.
[ ] Neither.

If you were offered a free coupon to buy either one of the above mobile Internet devices, which one would you choose?

[ ] Product A.
[ ] Product B.
[ ] Neither.

Androgyny scale items list utilised. The respondents were asked what best describes them, and the characteristics were scored on five-point Likert scales. The items were as listed in Table AI.

Table AI Androgyny scale items list

M items	F items	Neutral items
Stong personality	Soft spoken	Adaptable
Forceful	Warm	Tactful
Has leadership qualities	Tender	Moody
Self-sufficient	Gentle	Secretive
Dominant	Compassionate	Sincere
Independent	Affectionate	Theatrical
Masculine	Cheerful	Conscientious
Acts as a leader	Feminine	Conventional
Makes decisions easily	Loves children	Generous