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Article

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South African Journal of Business Management

Provided in Cooperation with:

University of Stellenbosch Business School (USB), Bellville, South Africa

Suggested Citation: Kotzé, T. G.; Anderson, O.; Summerfield, K. (2016) : Technophobia: Gender differences in the adoption of high-technology consumer products, South African Journal of Business Management, ISSN 2078-5976, African Online Scientific Information Systems (AOSIS), Cape Town, Vol. 47, Iss. 1, pp. 21-28,
<https://doi.org/10.4102/sajbm.v47i1.49>

This Version is available at:

<https://hdl.handle.net/10419/218597>

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Technophobia: Gender differences in the adoption of high-technology consumer products

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The advent of technology has improved consumers' daily lives; but it has also affected some consumers, by engendering fear of complex technological products. Feelings of anxiety and fear lead to the avoidance of technology; and this fear is known as 'technophobia'. This study aims to establish whether gender differences in technophobia and the adoption of high-technology consumer products continue to exist in this digital age, or whether things have changed over time. The findings show that women are less optimistic than men; they exhibit higher levels of risk-aversion; and they have higher cognitive-processing than do men – when considering the purchases of high-technology products. The greatest challenge in stimulating the adoption of high-technology products is the perceived risk that a consumer experiences when making a purchasing decision. Although marketers tend to assume that in the modern digital age, men and women are consuming electronics in the same manner, this study shows that this is not necessarily the case; and as a new product is introduced to the market, marketers need to employ differentiating strategies, in order to target both men and women successfully.

Introduction

Technology is changing continuously, along with consumer attitudes towards technology (Style-Vision, 2004; Schumpeter, 2012). The continual introduction of new technological products, characterised by both their rapid change and extreme complexity, threatens to infuse many consumers with fear, uncertainty and doubt (Yadav, Swami & Pal, 2006).

Amongst those who fail to cope with new technologies in a healthy or positive manner, a deep paranoia or fear of the use and adoption of technology may develop. This fear, known as technophobia, has been defined as "an anxiety about present or future interactions with computers or computer-related technology; negative global attitudes about computers, their operation or societal impact, and/or specific negative cognitions during computer usage" (Hogan, 2005:59). Since sufferers of technophobia do their best to avoid contact with technology, the various causes of technophobia, and the consumer segments that are most affected by it, need to be understood (Sami & Pangannaiah, 2006).

Consumer groups face difficulties in adopting new technologies, and in enjoying their benefits. Consumers who could potentially face barriers to the acceptance of technology include the elderly and consumers of different income and educational backgrounds (Gilly, Celsi & Schau, 2012). According to Tolle (2006), the most basic form of identification with oneself is with the body being either male or female. Gender identifies a person more than any other collective identification, such as nationality, religion, race, social class or political allegiance (Tolle, 2006). Thus, in order to understand technophobia at the very basic level of

human differences, one needs to understand these differences at the most basic of levels – that of gender differences.

As gender also remains the single most important organising category for marketers, gender differences in attitude towards technology have become even more important to understand (Bain & Rice, 2006). Demographic trends relating to the adoption of technology continue to influence marketing and business strategies in the information era (Laukkanen, Sinkkonen, Kivijärvi & Laukkanen, 2007).

Gaining a better understanding of the process of how different groups of consumers embrace technology could assist marketers in developing successful programmes (Gilly *et al.*, 2012). Therefore, the main purpose of this study is to establish whether gender differences in technophobia and the adoption of high-technology consumer products continue to exist in this digital age, or whether they have changed over time.

Problem statement and objectives

Past studies on gender differences in computer-related technophobia have concluded that significant differences in levels of technophobia actually do exist, with a higher percentage of women exhibiting high to moderate levels of technophobia (Dambrot, Watkins-Malek, Silling, Marshall & Garver, 1985; Temple & Lips, 1989; Wilder, Mackie & Cooper, 1985). More recent studies conclude that while gender differences existed in the past, the 'gender gap' has now narrowed to the point where women are no longer more technophobic in terms of computer-related technologies than men; and if differences are still found, the results are mixed and varied (Broos, 2005; Rainer, Laosethakul & Astone, 2003; Ray, Sormunen & Harris, 1999).

A review of the literature finds that studies into gender and technophobia remain riddled with inconsistencies and gaps. Firstly, the topic of gender is inadequately studied, with the concept of gender in the information technology sector largely lacking theorisation (Adam, Howcroft & Richardson, 2004). A major gap in the research of technophobia is that a limited amount of research has considered gender in the context of technology adoption and usage rate (Elliott & Hall, 2005). Through a review of the literature, it has been found that research has failed to apply a sound theoretical foundation of technology adoption, in order to be able to compare research results with new products that were relevant at different time periods.

Past studies have also failed to account for the changing nature of technological products, and incorporate their findings into the study of technophobia. Inconsistent research results into gender differences in technophobia could possibly be attributed to the failure of past research to integrate theories of changing product innovation and the temporal nature of technology by restricting measures of technophobia to one technology only, such as computers (Yadav *et al.*, 2006).

As this study is motivated by conflicting evidence in the literature on gender differences in technology use, adoption and anxiety, the following research objectives have been formulated:

- To determine whether men and women differ in their levels of technophobia towards high-technology consumer products at different stages of the innovation curve.
- To investigate gender differences in the adoption of new technologies based on differences in the levels of optimism towards new technologies, the willingness to take technological risks, and cognitive involvement when considering or purchasing new high-technology consumer products.

Literature review

With the sheer volume of technological introductions in past years (Autry, Grawe, Daugherty & Richey, 2010), consumers are being bombarded with technological choice. This, together with the changing economic environment and increasingly fierce competition, means that companies need to be innovative if they are to succeed. A successful product must balance three components: technology, marketing, and user experience (Gao, Porter, Wang, Fang, Zhang, Ma, Wang & Huang, 2013). The theory of adoption and diffusion of innovation is a practical framework to describe either adoption or non-adoption of new technology, and is briefly discussed below.

The theory of diffusion of innovation

Diffusion occurs within one market when information and opinions about a new technology are shared among potential users through communication channels. In this way, users

acquire a personal knowledge about new technology (Di Benedetto, 2010). The process of adoption is said to consist of five stages namely knowledge, persuasion, decision (to adopt or to reject new technology), implementation and confirmation. Non-adoption can then be defined as the final outcome of an individual process of adoption that has failed. It is argued that certain conditions such as users' personal limitations and external obstacles such as ineffective communication channels may inhibit the success of the adoption process (MacVaugh & Schiavone, 2010).

This study proposes a more theoretical look into the study of technophobia through the theory of diffusion of innovation. This theory explains the adoption of new technology products entering the mass market, and consumer reactions to these new technologies (Carr, 2004). The context for the purposes of this study will remain new, high-technology consumer goods which, based on the diffusion of innovation theory, are entering the consumer market, and which consumers normally identify as high-risk, high-involvement products which induce uncertainty and fear (Hirunyawipada & Praswan, 2006).

By refining the definitions of new technologies and technophobia, the changing nature of new technology products will be accounted for in this study. By clearly factoring in the temporality of technophobia - the fact that new technologies are 'new' one day and then 'obsolete' the next, and as such evoke different feelings of fear or confidence at different stages of the innovation curve - will provide a firm basis for accurately revealing whether the gender gap in technophobia is indeed narrowing, widening or whether it exists at all. The provision of a sound theoretical core on which to base studies of technophobia will also provide a consistent means of measuring changing gender differences in technophobia over time. The findings of this study may indeed lend itself to the argument that if women are 'technological laggards', then they will adopt technologies at a later stage of the innovation curve than men.

Technophobia among South African consumers

Early research conducted at the University of the Witwatersrand has shown that male students are more confident in computer usage than their female classmates (Galpin, Sanders, Turner & Venter, 2003). A later study done at the University of Natal found no significant differences between male and female students in their attitudes towards computers (Smith & Oosthuizen, 2006). Smith and Oosthuizen (2006) further concluded that there is an ongoing debate over the inconsistent results of technophobia research in South Africa during the past 20 years.

Based on these findings, evidence suggests that women generally have more negative attitudes towards computers than men, and that women tend to approach technology with more anxiety, fear, doubt and apprehension than men (Bain & Rice, 2006; Chiu, Lin & Tang, 2005; Coley & Burgess, 2003; Elliott & Hall, 2005; Hogan, 2005; Sami & Pangannaiah, 2006; Smith & Oosthuizen, 2006; Wolin &

Korgaonkar, 2003). This notion has led to the following hypothesis:

H₁: Women experience higher levels of technophobia towards new technology than men.

The gendered bias of technology

Men's and women's beliefs, attitudes and behaviours towards technology have varied significantly in the past. According to Simon and Peppas (2005), men exhibit more positive attitudes, perceptions and interest towards technology than do women, as well as less anxiety toward new technology applications. Based on the gender social roles and the gender effects of the technology arguments raised above, the following hypothesis is proposed:

H₂: Men are more positive towards new technology than are women.

Gender differences in cognitive thinking styles

Another theory that could account for gender differences in technophobia focuses on the gender differences in cognitive thinking styles. This theory is based on the finding that the adoption of technologies is different for consumable and durable goods; and technology goods, which are characterised by high complexity, are mostly cognitive purchases (Rundle-Thiele & Bennett, 2001).

According to Kesici, Sahin and Akturk (2009), there are significant gender differences in consumers' cognitive thinking styles. Females typically score higher in cognitive thinking strategies in terms of memorisation and analytical thought processes than men; and they are, therefore, more likely to experience information overload – and to reject a technology. Interestingly, in a study comparing the genders in terms of information processing, women are reported to perceive more information and clutter in advertising than men, and engage in the advertisements more intensively than men do (Walsh & Mitchell, 2005).

It could, therefore, be deduced that women are more likely to negatively evaluate new technologies than men who apply more simple decision-making styles. This deduction is supported by studies, which conclude that women, in general, are relatively late adopters of the Internet compared to men, due to the differences in cognitive thinking, when confronted with the technology (Simon & Peppas, 2005). It is, therefore, hypothesised that:

H₃: Women experience greater cognitive involvement when purchasing high-technology products than men.

Gender differences in risk-aversion

As has been discussed, high-technology products are characterised by complex product claims and features, which infuse some consumers with fear, uncertainty and doubt. A major element of this uncertainty is that consumers do not

know whether the technology can deliver on its promises (Yadav *et al.*, 2006). According to Hendry (2000), consumers with low levels of technology readiness are more concerned about security and the associated risks of technology use. Consumer readiness can be defined as “a condition in which a consumer is prepared, and is likely to use an innovation for the first time” (Kim, Christodoulidou & Brewer, 2012:88).

Ndubisi (2006) concludes that when a product or service is new to the market, men are more willing to be the first in their social circle to adopt the new product. Women, on the other hand, prefer to adopt the product only once it has proved itself in the market. These findings are further supported by Booiij and van Praag (2009), who found that the greatest determinants of the adoption of what are normally considered risky purchases are risk and time factors. The greater the perceived risk, the more risk-averse women would be in adopting the product. Based on the preceding discussion, the following hypothesis is proposed:

H₄: Women are more risk-averse to new technology than men.

Methodology

Respondent profile, sampling and data collection

The target population for this study included men and women between the ages of 25 and 35 years who fell within the Living Standards Measure (LSM) Groups 8-10, and resided within the northern Johannesburg region of South Africa.

Firstly, the decision to limit the target population to consumers between the ages of 25 and 35 years stemmed from the theory of diffusion of innovation stating that technology adoption takes place over time. By including gender groups within a younger, narrower age range ensured that the sample under study had been exposed to the same, modern technology for more or less the same period of time. Younger consumers are also more likely to purchase technologies due to fewer spousal and dependent commitments and a great disposable income for technology purchases (Du Plessis & Rousseau, 2003). In a study conducted by Dwivedi and Lal (2007), similar results were reported indicating that the majority of early new product adopters are younger which is most likely due to their economic activity and higher disposable incomes. In yet another study, the use of new technology in hotels showed that the highest technology readiness scores obtained were from relatively young, more educated and affluent respondents (Verma, Victorino, Karniouchina & Feickert, 2007).

The second criteria for inclusion in the study was the living standards measure category. Unlike a person's gender or age, a person's living standard is far more difficult to ascertain at face value. The LSM quantifies the ownership of certain durable goods and access to certain services, to yield an overall measure of social class ranging from LSM Group 1 to 10, with Group 10 representing the highest socio-economic

class and 1 the lowest (Lamb, Hair, McDaniel, Boshoff & Terblance, 2001). According to Erasmus and Boshoff (2003), consumers in the higher LSM groups (Groups 8-10) have a far greater exposure to the purchase of technology products, and actively purchase new technology goods far more often than the lower LSM classes. For the purposes of this study, the LSM was used to measure consumer socio-economic class in order to ensure some level of purchase involvement with what are generally considered luxury technology products. A study of the LSM classification indicates that the items with the highest factor loadings which indicate asset ownership and socio-economic classes 8-10 are: hi-fi music system, computer or laptop, dishwashing machine, clothes washing machine, and electric stove. These attributes were used to screen participants in order to accurately verify the LSM group of the respondent. Screening was based on whether the respondent had answered positively to the ownership of a minimum of four of the five products or services. Only those respondents that met this requirement for definition into LSM Groups 8-10 were included in the survey. Thus, by limiting the target population of this survey to consumers who are relatively young (25-35 years) and from higher LSM groups, it was assumed that the respondents would be more aware of technology and would have more informed opinions regarding the technologies used in the survey.

Finally, the target population was limited to people residing in the northern Johannesburg region of South Africa. Areas within this region included Sandton, Fourways, Cresta, Edenvale and Bryanston. These areas were selected as they remain some of the most affluent areas in Johannesburg with a greater number of people from LSM groups 8-10 residing there. The study did not include other affluent areas in other part of South Africa due to budgetary constraints.

The data for the main study were collected by means of a mall intercept survey. As the collection of data inside the malls was not permissible, permission was obtained from a Vodago store in the Cresta Mall to conduct the survey just outside the store opposite the Pick 'n Pay. To avoid the potential bias that is inherent in non-probability samples, the intercepts were conducted on different days of the week and at various times of the day. In order to provide fair representation, 100 men and 100 women were included in the study. The final realised sample included a total of 200 useable questionnaires. The majority of the 200 respondents in this study (51.5%) were aged between 25 and 29 years of age; and 48.5% of the respondents were between the ages of 30 and 35 years. The gender split of respondents comprised 50.5% females and 49.5% males.

Measurement

Technophobia

An adaptation of Parasuraman and Colby's 10-item abbreviated Technology Readiness Index (TRI) scale (Verma *et al.*, 2007) was used to measure the respondents' levels of technophobia with reference to three specific technology

products, namely: a standard desktop computer, a digital camera with quick auto focus and face detection features (DSLR camera), and home-automation technology. Home automation technology, or 'smart homes' integrates systems to control everything in the home from the lights to security to audio visual equipment with touch screens, mobile technology or intelligent controllers (Omnisol, 2008). Each respondent, therefore, answered the 10-item abbreviated TRI scale three times – once for each of the aforementioned technologies.

The scale points of the Likert scale were labelled as: (1) Strongly agree, (2) Agree, (3) Neutral, (4) Disagree, and (5) Strongly disagree.

The original version of the 10-item abbreviated TRI scale was adapted by substituting items that refer to specific technologies (i.e., to computers) with suitable, technology-neutral replacement items taken from the original 36-item TRI scale (Parasuraman, 2000).

Table 1 shows the final items used to measure respondents' technophobia levels towards the aforementioned three technologies.

Table 1: Final items used to measure respondents' technophobia towards standard desktop computers, digital cameras and home automation technology

Scale items
I can usually figure out how (technology) works without help from others.
The (technology) is often too complicated to be useful.
I feel confident using the latest (technology) technology.
(Technology) technology may fail at the worst possible time.
(Technology) technology gives people more control over their daily lives.
Learning about (technology) technology can be as rewarding as the technology itself.
In general, I am among the first in my circle of friends to acquire new (technology) technology.
(Technology) technology is usually a lot safer than people are led to believe.
I prefer to use the most advanced (technology) technology available. .
It can be risky switching to the latest (technology) technology too quickly.

Note: Respondents' levels of technophobia towards each technology were measured through separate multi-dimensional scales using the 10-items of the abbreviated TRI. This 10-item, five-point Likert scale measures the four dimensions of technophobia. All the scale points were labelled as follows; 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly disagree.

Optimism towards new technologies

The optimism sub-dimension of the original 36-item multi-dimensional TRI was used to assess a consumer's optimism towards new technologies (Parasuraman, 2000). Optimism towards new technologies was measured with five of the original 10 items in the optimism sub-dimension of Parasuraman's (2000) original 36-item TRI scale. All five items used were five-point Likert type summated rating scale statements with scale points ranging from (1) Strongly agree to (5) Strongly disagree.

Parasuraman's (2000) original 36-item TRI scale includes 10 items for the optimism sub-dimension. However, not all the items were applicable to this study, as not all the items were generic enough to adapt to different technologies. Therefore, only five technology-neutral items were selected from the optimism sub-dimension of the original TRI for inclusion in this scale. Table 2 indicates the items that were included from the original TRI to measure optimism – all of them reverse-scored. A composite score for this scale was calculated by averaging the responses in the scale.

Table 2: Description of the measurement scale used to measure optimism from the TRI Optimism sub-dimension

Scale items
I prefer to use the most advanced technology available.
Technology gives me more freedom of mobility.
I feel confident that machines will follow through with what I instructed them to do.
Learning about technology can be as rewarding as the technology itself.
I find new technologies to be mentally stimulating.

Note: Optimism was measured using a five-point Likert type summated rating scale statements. The scale points were labelled as follows; 1 = Strongly agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly disagree. All five items were reverse scored.

Willingness to take technological risks

Raju's Risk-Taker (Purchase) scale was used to assess the degree to which a consumer is willing to take a risk by trying unfamiliar new technology products (Bruner & Hensel, 1992). The scale is a seven-item, five-point Likert scale. A composite score for this scale was calculated by averaging the responses in the scale.

Cognitive involvement

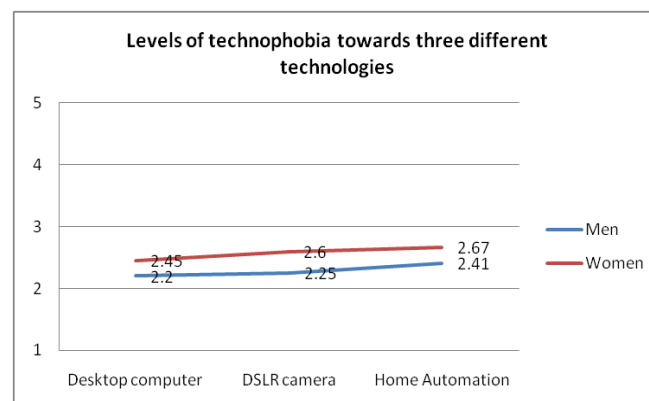
Ratchford's Involvement (Purchase-Decision) scale was used to assess the degree of cognitive involvement a consumer places on a purchase decision for a new, high-technology product (Bearden, Netemeyer & Mobley, 1993). The scale comprises a three-item, seven-point semantic differential scale. None of the items were reverse-scored. A composite score for this scale was calculated by averaging the responses in the scale. A higher overall score indicates greater cognitive

involvement when purchasing new, high-technology products.

Findings

Descriptive statistics

Figure 1 graphically portrays the mean and standard deviation scores of the male and female respondents with regard to their responses to the three different technology products: standard desktop computer, DSLR camera, and home-automation technology.



Note: Scales range from 1 (Strongly agree) to 5 (Strongly disagree). The higher the score, the higher the level of technophobia towards the technology.

Figure 1: Mean scores of men's and women's levels of technophobia towards three different technology products

As Figure 1 indicates, if the technological product is new on the market, the levels of technophobia amongst both men and women tend to increase. The results suggest that users (both men and women) exhibit higher levels of technophobia towards technologies at different stages on the diffusion curve. Interestingly though, the graph shows that the difference between the two genders is greatest in the case of DSLR cameras, even more so than home-automation technology – which is a newer technology. These results further imply that women's levels of technophobia increase when faced with new, innovative technologies.

Hypothesis testing

Hypothesis 1 focused on the gender differences in consumers' technophobia towards three specific technologies. A multivariate analysis of variance (MANOVA) was conducted to examine the differences in gender with regard to their levels of technophobia towards high-technology products. Findings showed that there was a significant effect of gender on the combined dependent variables, $F(6.74)$, $p=0.000$, partial $\eta^2=.093$.

Analysis of the dependent variables individually showed significant effects at a Bonferroni adjusted alpha level of 0.017. The results for the dependent variables are as follows: technophobia towards computers, $F(7.82)$, $p=0.006$, partial $\eta^2=0.038$; technophobia towards cameras, $F(15.27)$, $p=0.000$,

partial $\eta^2=0.072$; and technophobia towards home automation technology, $F(10.54)$, $p=0.001$, partial $\eta^2=0.051$. Females reported higher technophobia towards all three technologies (computers $M=2.57$; cameras $M=2.85$; home automation technology $M=2.74$) than males (computers $M=2.41$; cameras $M=2.62$; home automation technology $M=2.55$). The MANOVA results led to the rejection of the null hypothesis, showing that women do experience higher levels of technophobia towards new technology than do men.

The second hypothesis (H_2) focused on the differences between men and women as regards being positive towards new technology. After checking the assumptions of normality and homogeneity of variances, an independent-samples t-test was conducted to test for H_2 . The result of the t-test shows significant differences [$t(4.08)=1.62$, $p=0.00005$, one-tailed] in the scores for men ($M=4.04$, $SD=0.6$) and women ($M=3.67$, $SD=0.37$). Men are more positive towards new technology than women, showing support for Hypothesis 2.

Hypothesis 3 focused on the differences between men and women in their level of cognitive involvement when purchasing high-technology products. The results of the t-test indicate significant differences between the gender groups. Women ($M=5.30$, $SD=1.429$) experience greater cognitive involvement when purchasing high-technology products than do men [$M=4.64$, $SD=1.46$, $t(-3.40)=198$, $p=0.0439$, one-tailed]. Therefore, the null hypothesis is rejected in favour of Hypothesis 3.

The final hypothesis (H_4) focused on the differences between men and women in their risk-aversion towards new technology. The independent samples t-test results indicate significant differences between the two gender groups [$t(3.97)=198$, $p=0.00005$, one-tailed]. In this case, the lower mean scores for women ($M=2.52$, $SD=0.61$) show that they are less willing to take technological risks, and are thus more risk-averse to new technology than are men ($M=2.89$, $SD=0.69$).

Managerial implications

It is clear from the findings that a gender gap continues to exist and that, depending on the specific technology's diffusion, women exhibit higher levels of technophobia than men. The results from this study found that women are less optimistic than men, exhibit higher levels of risk aversion than men, and have higher cognitive-processing than men when considering technological purchases.

The strategy of targeting the more technophobic and less-optimistic women is already evident in practice through the increase in the advertising of technological products in traditionally female-targeted magazines. Most female-targeted publications now include 'technology sections' where the latest technologies are featured (Simba, 2004). By tailoring the manner in which technology is advertised and shared with the female consumer, marketers are better able to capture this more 'technophobic' consumer. Technology-related publications that continue to primarily target men may

see a decline in sales as they continue to push away a growing female audience (Simba, 2004). The advertising of technologies exacerbates the gender divide by confirming established sex role stereotypes, and managers need to learn to differentiate and cater for both genders when advertising technology products.

Increasing levels of consumer resistance are also attributed to the sheer volume of new information available in the digital era (Herbig & Kramer, 1994). Information overload has become a barrier to adoption rather than an aid in the purchase of a product (Bawden, Holtham, & Courtney, 1999). An overload of information that consumers experience could result in higher resistance from consumers. This could, in turn, influence the optimism of consumers. For example, the personal computer was initially resisted due to consumers' underlying fears of the technology when it was introduced too quickly to the market. Managers thus need to employ simpler strategies in order to help break through the messaging clutter and alleviate the information overload that the consumer is experiencing.

According to Laukkanen *et al.* (2007), communication strategies that include word-of-mouth and intense information-filled advertising, are more effective when consumers perceive a psychological risk in the product's adoption. When introducing new technology innovations, managers are encouraged to tailor their advertising, brochures, catalogues and manuals with information that reduces perceived risk for female consumers. Snoj, Korda and Mumel (2004) further recommend that managers need to concentrate on the reduction of all kinds of perceived risk, including financial, psychological, social and functional. Managers also need to understand that these perceived risks may differ between men and women. In-store assistance, displays and promotions tailored to women may go a long way in reducing risk perceptions by guiding the consumer through the purchase decision. Advertising that addresses the fears consumers may have, could also lead to less aversion.

Conclusions

In line with this study's findings, it has been said that women continue to be more technophobic than men, with levels of technophobia increasing as the technology becomes more innovative (Elliott & Hall, 2005; Kay, 2009; Yadav *et al.*, 2006). This study further confirms the importance of comparing genders on new technology. The findings of this study are congruent with past research, which argues that men are generally more positive towards new technology than women (Bovée, Voogt & Meelissen, 2005; Dobscha, 2003; Simon & Peppas, 2005).

The difference in the level of cognitive involvement between men and women when purchasing technology is also found to be significant, with women experiencing greater cognitive involvement when purchasing technology products than men do. This study confirms that women tend to more critically evaluate information on the product, and in so doing employ

greater cognitive thought processes when purchasing high-tech products.

In terms of willingness to take technological risks, the results clearly indicate that men are also more willing than women to take risks when purchasing new technology products. This study confirms that women have higher levels of uncertainty avoidance, and tend to take fewer technological risks.

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