

High Tech versus High Touch: Visitor Responses to the Use of Technology in Tourist Attractions

PIERRE BENCKENDORFF, GIANNA MOSCARDO and LAURIE MURPHY

There are a number of current debates in the academic and management literature about the benefits and costs of introducing technology into tourist experiences. The debate is an important one for those who manage tourist attractions when making decisions about which directions to take in the development of visitor experiences. A review of the relevant literature in tourism suggests that very little attention has been paid to tourists' perceptions of, and interest in, the use of technology to create and enhance their experiences. This study sought to address this gap by surveying visitors to an Australian aquarium and asking them about their support for the adoption of various forms of exhibits. The results indicated that tourists can be grouped according to their support for the use of technology in visitor experiences and their levels of use of technology in general. A general model of tourist technology adoption is proposed and explored and implications of the results are discussed both for tourist attraction management and for future research into this phenomenon.

Keywords: cyber-tourism, high-touch/high-tech, attractions, market segments.

Tourism and Technology

The increasing availability and flexibility of many forms of technology offers a range of both opportunities and challenges in many sectors including tourism. Technology is frequently described as a key driver for increasing the mobility of tourists, and therefore, for sustaining the growth of the tourism industry (Rayman-Bacchus and Molina 2001; Chon and Singh 1995; Laws *et al.* 1998; Moscardo *et al.* 2000). Research on tourism and technology to date, however, has focussed almost exclusively on three areas: (1) information technologies; (2) the Internet; and (3) virtual reality.

Stipanuk (1993), however, has provided a more holistic framework to illustrate the roles of technology in tourism. These roles included technology as a:

- contributor to tourism growth,
- creator of the tourism experience,
- protector of the tourism experience,
- enhancer of the tourism experience,
- focal point of the tourism experience,

- tool of the tourism industry, and
- destroyer of the tourism experience.

Following Stipanuk, most research dealing with information technology and the Internet would fall into the category of 'technology as a tool of the tourism industry'. Stipanuk (1993: 267) maintained that 'there is clearly a need for a view of technology and tourism which is broader than that developed in the existing literature.' He suggested that this view should consider technological issues related to the tourism industry and the tourist, and should recognize the role of technology in the creation of tourist attractions. While this proposition is now more than a decade old, very few researchers have explored technology and tourism from this more holistic perspective. The present study aims to address this gap by exploring visitor perceptions of technology use in a regional tourist attraction.

In the broader tourism literature, Sheldon (1997) has considered the role of technology in tourism in her discussion of 'high-tech' and 'high-touch' visitors. Sheldon (1997) suggested two polar responses to technology, using a high-tech/high-touch paradigm. She proposed that some

PIERRE BENCKENDORFF is Lecturer in Tourism Programme at the School of Business, James Cook University, Townsville QLD. 4811, Australia. e-mail: Pierre.Benckendorff@jcu.edu.au

GIANNA MOSCARDO is Associate Professor at the School of Business, James Cook University, Townsville QLD. 4811, Australia. e-mail: Gianna.Moscardo@jcu.edu.au

LAURIE MURPHY is Lecturer in Tourism Programme at the School of Business, James Cook University, Townsville QLD. 4811, Australia. e-mail: Laurie.Murphy@jcu.edu.au

travellers, grouped under high-tech, would have an expectation of higher levels of automation. High-tech travellers would appreciate the application of technologies that deliver more efficient travel experiences. This market segment would seek out entertainment and attractions that use technology in the creation of the experience. Conversely, Sheldon described the high-touch market segment as 'luddites' who viewed technology as being destructive to the tourism experience. It was proposed that these travellers would seek out vacations that allowed them to escape from the modern technological world by providing more personalized human interactions. Sheldon recommended that businesses serving high-touch customers should not ignore technology, but should use it in the background to support high levels of personalized service.

The high-tech/high-touch construct suggested by Sheldon has not, however, been empirically tested. Further, alternative explanations of the high-touch/ high-tech dichotomy exist. Underhill (1999), in a discussion of shopping as a leisure pursuit, suggests that people seek high-touch leisure experiences to compensate for high-tech work places. 'We live in a tactile deprived society and shopping is one of our few chances to freely experience the material world firsthand' (Underhill 1999: 158). This argument that people seek particular types of leisure to compensate for their work experiences is an old one in the leisure literature, first proposed in 1960 by Wilensky. Wilensky argued that there were two types of leisure/work relationship — compensation and spillover. As already noted, for some people leisure acts as a compensation for work and is often very different to work. In the case of spillover, the characteristics of work are similar to leisure. That is, people seek types of leisure that are like their work experiences. A third option has also been suggested in which work and leisure are independent of each other and this is typically referred to as the segmentation model (Snir and Harpaz 2002; Kirkcaldy and Cooper 1993). While the debate continues over which of these models best explains leisure choices (Snir and Harpaz 2002), reviews consistently find evidence that all three models exist but for different types of people (Near *et al.* 1980). This research suggests that tourists who seek 'high-touch' experiences may be either 'luddites' or compensating for a high-tech work place.

Computer Anxiety, Technophobia and Technology Acceptance

A great deal has been written about the adoption and acceptance of technology in the workplace and in educational settings. This research has emphasized concepts such as

computer anxiety, technology anxiety, and technophobia. These concepts have not been applied to leisure settings but provide a useful basis for studying responses to technology because they represent the most comprehensive efforts to determine why some people choose to use technology while others do not.

Within the information systems (IS) literature a number of authors have explored the anxiety that some people may experience when confronted with using a computer (Chu and Spire 1991; Torkzadeh and Angulo 1992). Computer anxiety is a psychological construct that measures the extent to which individuals are 'uneasy, apprehensive, or fearful about the current or future use of computers' (Igarria and Parasuraman 1989: 375). Researchers have demonstrated that computer anxiety is strongly linked with attitudes towards computers, computer self-efficacy, usage intention, usage behaviour and performance (Harrison and Ranier 1992; Brosnan 1998; Coffin and MacIntyre 1999; Vician and Brown 2002; Fagan *et al.* 2003).

The study of computer anxiety is part of a larger research stream examining the concepts of computer phobia and technophobia (Rosen and Weil 1992). Rosen *et al.* (1993) defined computer phobia as a three-dimensional construct that included (1) anxiety about present or future interactions with computers or computer-related technology; (2) negative global attitudes about computers, their operation, or their societal impact; and (3) specific negative sentiments or self-critical dialogues during actual computer interaction or when contemplating future computer interaction.

While computer anxiety and computer phobia are concerned with the adoption of computer-based technologies in work and educational settings, technophobia is a broader concept that considers why some people are overwhelmed by various technologies. A useful emerging area of research has investigated the reluctance of consumers to use technology-related products. Researchers have found that technophobia causes consumers to be less receptive to innovative technology-based products (Sinkovics *et al.* 2002).

A Model of Technology Use in Tourism

Review of the relevant literature in tourism and technology in general suggests that a number of factors are involved in the adoption of technology. These are summarized in Figure 1.

The model suggests that technology can be seen as having two main types of role in the creation and enhancement of tourist experiences. There is the technology

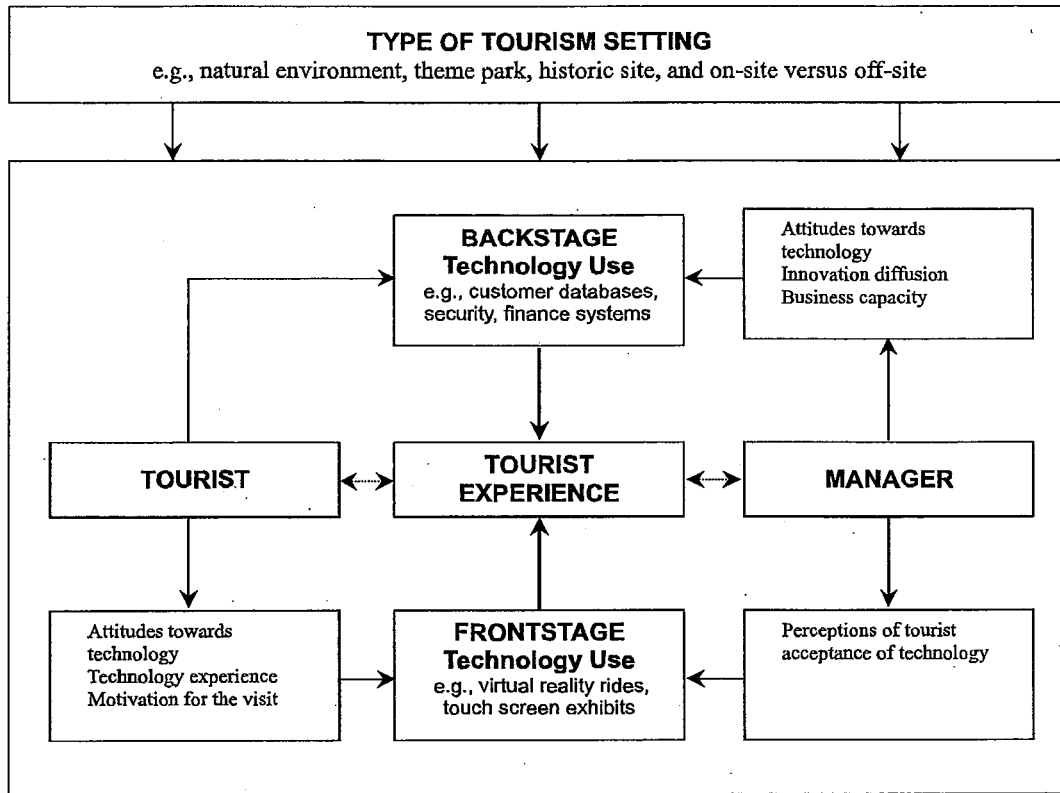


Figure 1. The Tourism Technology Adoption Model

that is used behind the scenes or backstage which is typically not immediately obvious to the visitor. Then there is the technology that is front stage and which is overtly used to create and enhance tourist experiences. The model then argues that both tourists and managers play a part in whether or not a given technology is adopted for use. In both cases the decision to adopt technology could be influenced by attitudes towards technology in general and familiarity with technology. For managers adopting backstage technology other variables such as business capacity may also intervene. In the case of front stage technology managers' concerns about the acceptability of the technology to their guests could have an impact on adoption. Finally, it is argued that the relative importance of these variables and the connections between them may vary across different types of tourist settings.

Research Aims

Given that very little research has been conducted into the perceptions of tourists with regard to the use of technology in tourist settings, the major aim of the present research was

to explore whether or not the high-tech/high-touch construct described visitor perceptions of front-stage technology use. Further, the research sought to examine the relationships between the tourist variables suggested in Figure 1 and the high-tech/high-touch distinction. These aims are linked with the area of cyber-tourism, which emphasizes the use of technology to create and enhance visitor experiences.

Methodology

Subjects

The sample consisted of 356 visitors to the ReefHQ aquarium located in Townsville, Australia. The ReefHQ Aquarium boasts the largest living coral reef in Australia. The attraction was selected for this study because it offered a diverse mix of high-touch and high-tech experiences. The attraction included high-touch components such as guided tours, dive shows, animal feeding and touch-tanks, as well as technology-based exhibits such as underwater zoom cameras. 443 visitors declined to be surveyed, resulting in a response rate of 45 per cent. A demographic profile of visitors is presented in Table 1.

Table 1. Demographic Profile of Respondents

Gender (n=349)	
Male	51.9 %
Female	48.1 %
Age (n=332)	
24 and under	22.6 %
25 to 44	45.5 %
45 to 64	25.6 %
65 and over	6.3 %
Mean age	37.7
Origin	
Australia	63.7 %
United Kingdom	11.8 %
Germany	5.8 %
Netherlands	2.9 %
United States	2.9 %
Other	13.0 %

Apparatus

A self-administered questionnaire was used to collect data about each visitor. A brief description of the research was presented at the top of the questionnaire. Respondents were asked to indicate their overall satisfaction, their motives for visiting the attraction, suggestions for improving the experience, attitudes towards a range of technologies and level of experience. The suggestions for improving the experience were intended as a key indicator of preferences for a range of high-touch and high-tech exhibits and included items such as guided tours, documentaries, 3D films, touch-tanks, touch-screen computers, simulated reef experiences and live animals.

Attitudes toward technology were operationalized by developing a scale of 20 statements to assess beliefs about technology use in everyday situations. The items included ten positive and ten negative attitudes towards technology. Respondents were asked to rate their level of agreement to each statement using a five-point rating scale (1=strongly agree; 5=strongly disagree). The items are presented in Table 2 and were developed from a number of scales presented in the literature dealing with computer anxiety and technophobia (see Sinkovics *et al.* 2002). Technology experience was measured by asking respondents to indicate the frequency of use for various common technologies on a five-point scale ranging from 'once a day or more' to 'less than once a month'. The questionnaire was based on a range of well-developed instruments used in the broader tourism and technology acceptance literature and a pilot study was, therefore, not deemed to be necessary.

Table 2. Items Used to Measure Respondent Attitudes Towards Technology

<p>Technophilia items</p> <ul style="list-style-type: none"> ▪ I like playing on the computer ▪ I feel stressed if I haven't checked my e-mail within the last 12 hours. ▪ I get upset when I can't find an ATM for quick cash ▪ I feel comfortable when using computers ▪ I can't cook a meal without technological gadgets ▪ I have difficulty writing when I am not sitting in front of my computer ▪ I find SMS to be useful for communication ▪ Technology makes my life easier ▪ I find the Internet easy to use ▪ I feel comfortable when using a calculator to add a long list of numbers <p>Technophobia items</p> <ul style="list-style-type: none"> ▪ I feel some anxiety when I approach an ATM ▪ Mobile phones agitate me ▪ I think most people are better than me at using computers ▪ I get frustrated when trying to program my VCR ▪ Thinking about technology makes me nervous ▪ Computers are intimidating ▪ I resent that technology is becoming so prevalent in our daily lives ▪ I feel more confident dealing with a human teller than using online banking ▪ Machines should not handle people's money transactions ▪ I try to avoid technology whenever I can
--

Procedure

The study was conducted across several weeks during April 2004 with surveys conducted on weekdays, weekends and public holidays. Visitors were approached as they moved through the exit area of Reef HQ. Completed questionnaires were returned to the survey staff, who then offered participants a post card as a token of appreciation for their participation.

Results

The first step in the analysis was to determine the existence of a high-tech and or a high-touch group amongst the participants. A hierarchical cluster analysis (using Wards Method for binary data and squared Euclidian distance as the measure) was conducted on the responses to the question seeking interest in a range of new potential exhibits or experiences for ReefHQ. The analysis produced two clear clusters that included 95.8 per cent of all respondents. The cross-tabulation presented in Table 3 indicates the improvements selected by each of the two clusters.

Table 3. Clusters Based on Improvements Selected by Respondents

Improvements		Cluster 1 n=244	Cluster 2 n=112
<i>High-touch</i>	Live animals to view	53.7%	33.3%
	Guides to answer questions	43.5%	17.3%
	Guided tours	40.7%	16.7%
	Documentaries about the reef	37.9%	22.4%
	Touch-tanks	37.9%	29.5%
<i>High-tech</i>	Touch-screen computers with reef information	27.1%	6.4%
	3D films about the reef	24.3%	37.2%
	Hands-on interactive games	6.2%	9.6%
	Virtual reality games about the reef	5.6%	10.3%
	Simulated reef experiences (e.g. submarine trip)	5.1%	100.0%
	Holograms	4.5%	7.7%

Note: The two clusters were significantly different on all items except 'hands-on interactive games', 'touch tanks' and 'holograms' using chi-square analyses and setting $p < 0.1$.

As can be seen, respondents in cluster 1 were more likely to seek new experiences based on live animals and guides, while people in cluster 2 were much more likely to want exhibits and experiences developed using new technologies. Thus, cluster 1 was labelled high-touch and cluster 2 was labelled high-tech.

The next step in the analysis involved contrasting these two clusters on a range of other variables. Table 4 provides a summary of the demographic profiles of the two clusters. The high-touch cluster was significantly more likely to be male, to be older, to be Australian residents and significantly less likely to be visiting ReefHQ with children. No significant differences were found between the two clusters for the other types of group composition, previous visits to ReefHQ, or the different countries for overseas residents.

Table 4. Demographic Profiles of the Two Clusters

	High-touch	High-tech
Male	54%	39%
Female	46%	61%
Visiting with children	17%	26%
Australian resident	58%	68%
Overseas resident	42%	32%
Mean age	39 yrs	36 yrs

Note: The two clusters were significantly different on all of these items using chi-square analyses and independent t-tests and setting $p < 0.1$.

A series of Mann-Whitney U-tests were conducted to identify any significant differences between the two clusters

in terms of their motivation for visiting Reef HQ and their overall satisfaction with their ReefHQ experience. No significant differences were found on any of these variables.

The researchers then examined differences between the two clusters in their attitudes towards technology use in general. The 20 items related to attitudes towards technology were factor analyzed to confirm the existence of two main factors — technophilia and technophobia. The first principal components factor analysis conducted with a varimax rotation suggested that there were five factors with eigen values above 1. An examination of the scree plot for this solution indicated that the first two factors accounted for most of the variance. The factor analysis was run again setting the number of factors at two and the results are presented in Table 5.

Table 5. Results of the Factor Analysis of Attitudes Towards Technology

Attitudes toward technology	Factor1	Factor 2	Mean ^a
Eigen Value	5.2	2.4	-
% of Variance Accounted for	27.1	12.7	-
Thinking about technology makes me nervous	.83		3.7
Computers are intimidating	.78		3.9
I resent that technology becoming so prevalent in our daily lives	.70		3.4
Machines should not handle people's money transactions	.66		3.5
I think most people are better than me at using computers	.65		3.1
I find the Internet easy to use	-.61	.36	2.0
I feel more confident dealing with a human teller than using online banking	.61		3.0
I get frustrated when trying to program my VCR/DVD	.59		3.2
I feel comfortable when using computers	-.49	.46	2.3
Mobile phones agitate me	.47		3.3
Technology makes my life easier	-.43	.43	2.1
I feel comfortable when using a calculator to add a long list of numbers	-.40	.22	1.9
I feel some anxiety when I approach an ATM	.40	.35	4.1
I feel stressed if I haven't checked my email in the last 12 hours		.70	3.9
I have difficulty writing when I am not sitting in front of my computer		.62	4.1
I get upset when I can't find an ATM for quick cash		.59	3.2
I can't cook a meal without technological gadgets		.57	4.0
I like playing on the computer		.50	2.7
I find SMS useful for communication		.42	2.7

a. Mean is based on the following scale: 1=Strongly Agree, 5=Strongly Disagree

As can be seen, the results support the existence of the two main scales of technophobia and technophilia, with the exception of the item related to Automated Teller Machines (ATM) which loaded highly on both factors. It is possible that this item compounds fear of the technology associated with ATMs with concerns over dealing with a bank. This item was excluded from further analyses. The remaining items were used to construct two scales — with the first 10 items (see Table 2) added to give an overall technophilia score and items 12 through 20 added to create a score of technophobia.

Independent t-tests were conducted to test for significant differences between the high-touch and high-tech clusters on their overall scores for technophobia and technophilia. No significant differences were found. Mann-Whitney U-tests were also conducted to look for differences between the two clusters on each of the attitude items individually. A significant difference was found on only one item - 'I find the Internet easy to use' - with the high-touch cluster having a mean score of 2.0 and the high-tech respondents having a mean score of 1.9 indicating stronger agreement with this statement.

Table 6 provides a summary of the results for the two clusters for their use of six common forms of technology. Technology experience was measured by asking respondents to indicate the frequency of use for various common technologies on a five-point scale ranging from 'once a day or more' to 'less than once a month'.

Table 6. Technology Experience of the Two Clusters

Technology experience	High Touch n=224	High tech n=112
<i>Use a computer for work*</i>		
▪ At least once a day	61%	56%
▪ Between 1 and 4 times a week	12%	23%
▪ Several times a month or less	27%	21%
<i>Use a computer for leisure</i>		
▪ At least once a day	32%	26%
▪ Between 1 and 4 times a week	40%	47%
▪ Several times a month or less	28%	27%
<i>Use the internet</i>		
▪ At least once a day	41%	35%
▪ Between 1 and 4 times a week	35%	41%
▪ Several times a month or less	24%	24%
<i>Use a mobile phone</i>		
▪ At least once a day	53%	56%
▪ Between 1 and 4 times a week	24%	27%
▪ Several times a month or less	23%	17%
<i>Use a ATM</i>		
▪ At least once a day	8%	5%
▪ Between 1 and 4 times a week	58%	65%
▪ Several times a month or less	24%	30%
<i>Use a VCR or DVD</i>		
▪ At least once a day	23%	19%
▪ Between 1 and 4 times a week	51%	58%
▪ Several times a month or less	26%	23%

* The two clusters were significantly different on this item using chi-square analyses and setting $p < 0.1$.

Chi-square analyses indicated that there was a significant difference between the two clusters for only one of these use variables — use of a computer for work. More specifically, the high-touch cluster was more likely to indicate that they used a computer at least once a day. The overall pattern of results for all six items was, however, interesting. The visitors in the high-tech cluster tended to be moderate users of all the forms of technology except for mobile phones. The high-tech respondents were more likely than the high-touch respondents to be in the middle use categories for all six items. The high-touch cluster was, however, more likely to be either very frequent users or very infrequent users of technology except for mobile phones.

These results indicate the existence of non-linear relationships between these variables and suggest the possibility of different subgroups within the high-touch and high-tech clusters. In order to explore this latter possibility it was decided to cluster the respondents according to their responses to these technology use variables. A hierarchical cluster analysis using the default SPSS (Statistical Package for Social Sciences) settings for interval data was conducted and 2, 3 and 4 cluster solutions were examined for their use of the six different technologies. The four cluster solution offered the clearest interpretation and the results of this solution for technology use are presented in Table 7.

The first cluster was labelled High-tech Use based on the percentage of the group in the more frequent use categories on all six technology use items. In direct contrast to this group was the third and smallest cluster labelled Low-tech Use. The second cluster was labelled Low Computer Use because the respondents in this group had the second highest levels of use of mobile phones, ATMs, and VCR/DVDs, but very low levels of use of the three computer items. The final group was labelled High Work Computer Use, because the majority of respondents in this group reported very frequent use of a computer at work but only moderate to low use of the other six items. These four technology use clusters were then cross-tabulated with the high-touch and high-tech clusters identified at the start of the analysis. The results of this analysis are given in Table 8.

An investigation of the pattern of results in this table reveals some interesting relationships between the type of experience sought in a tourist attraction and consistent use of technology which supports the spillover and compensation models referred to in the introduction. The majority of visitors in the high-tech cluster were also in the High Use group suggesting a general enthusiasm for technology or a 'spillover' between their everyday lives and leisure/tourism experiences. The majority of those in the high-touch group were also in the High Use category suggesting

Table 7. Technology Experience of the Four Clusters

Technology Experience	Cluster 1 n=135	Cluster 2 n=65	Cluster 3 n=35	Cluster 4 n=76
	High-tech use	Low-computer use	Low-tech use	High work computer use
<i>Use a computer for work</i>				
▪ At least once a day	85%	9%	0%	80%
▪ Between 1 and 4 times a week	14%	29%	3%	20%
▪ Several times a month or less	1%	62%	97%	0%
<i>Use a computer for leisure</i>				
▪ At least once a day	53%	8%	3%	17%
▪ Between 1 and 4 times a week	44%	46%	12%	53%
▪ Several times a month or less	3%	46%	85%	30%
<i>Use the Internet</i>				
▪ At least once a day	69%	6%	0%	32%
▪ Between 1 and 4 times a week	30%	48%	9%	52%
▪ Several times a month or less	1%	46%	91%	16%
<i>Use a mobile phone</i>				
▪ At least once a day	86%	68%	3%	20%
▪ Between 1 and 4 times a week	14%	32%	29%	36%
▪ Several times a month or less	0%	0%	68%	44%
<i>Use a ATM</i>				
▪ At least once a day	16%	0%	0%	1%
▪ Between 1 and 4 times a week	73%	69%	31%	53%
▪ Several times a month or less	11%	31%	69%	46%
<i>Use a VCR or DVD</i>				
▪ At least once a day	32%	15%	0%	8%
▪ Between 1 and 4 times a week	56%	56%	31%	58%
▪ Several times a month or less	12%	29%	69%	34%

Note: The four clusters were significantly different on all items using chi-square analyses and setting $p < 0.05$.

Table 8. Cross Tabulation of Technology Use Clusters and High-touch / High-tech Groups

Technology Experience	High-Touch	High-tech	Total
High-tech use	41%	46%	130
Low computer use	19%	23%	62
Low-tech use	12%	9%	33
High work computer use	28%	22%	74
Total	161	138	299

a 'compensation' mechanism where these respondents are seeking to balance the high use of technology in their everyday and working lives with a contrasting style in their leisure. Those visitors who fell into both the High Touch cluster and the Low Use group can be labelled as 'Luddites' with a general avoidance of technology across all aspects of their lives. By way of contrast, however, some of the Low Use group were in the High Tech cluster. For this group it is possible that leisure and tourism experiences offer an opportunity to experience technology not available in other parts of their lives.

It is difficult to draw any conclusions about the other cells in the cross-tabulation table as the study did not include any questions exploring why the respondents might have low use of computers in general or high use of computers at work only. There may be extraneous reasons for a general low use of computers, such as low socio-economic status, or occupational settings that do not require the use of computers. Similarly, a high level of computer use at work may not be an accurate measure of technology because individuals may feel obligated to use computers in order to maintain job security. Therefore, for further analysis it was decided to use only four tourist types. These types are highlighted in bold in Table 8, and labelled as follows.

- Compensation - High Touch and High-tech Use
- Luddites - High Touch and Low-tech Use
- Spillover - High Tech and High Use
- Opportunity Seeking - High Tech and Low Use

Given the low numbers in some of these groups non-parametric tests for differences were used and the analyses were considered to be exploratory and conducted to suggest directions for further research, rather than to draw major conclusions about the nature of these types of tourists.

Table 9 provides a summary demographic profile of the four tourist types. Notable features include the high percentages of females and Australian residents in the Luddite group who were also the oldest group. The Compensation group had the highest percentage of overseas visitors and were the least likely to be travelling with children. The Spillover and the Opportunity Seeking groups had similar profiles except for age with Opportunity Seeking group being older.

Table 9. Demographic Profiles of the Four Tourist Types

	Compensation n=66	Luddites n=20	Spillover n=64	Opportunity Seeking n=13
Male	52%	26%	45%	39%
Female	48%	74%	55%	61%
Australian Residents	44%	74%	69%	69%
Overseas Visitors	56%	26%	31%	31%
Visiting with children	14%	25%	31%	31%
Mean Age	33yrs	48yrs	31yrs	46yrs

Note: The four tourist types were significantly different on all items except visiting with children using chi-square analyses and Kruskal-Wallis One-way anovas and setting $p < 0.05$.

Table 10 displays the importance of various reasons for visiting ReefHQ for the four tourist types. The Compensation group gave highest importance to improving their knowledge of the reef as a reason for visiting ReefHQ, but were the lowest for seeking mental stimulation. By way of contrast, the Luddites gave the highest importance ratings of all four groups to seeking mental stimulation. The Spillover group was distinct in giving the lowest importance ratings to all four reasons listed in Table 9. The Opportunity Seekers gave the highest importance ratings to spending time with family.

Finally, attitudes towards technology and suggested future exhibits for ReefHQ were compared for the four types of tourists. Technophobia and technophilia scores were calculated based on responses to items in Table 2. The item dealing with ATMs was excluded from the technophobia score as explained previously, resulting in a score ranging between nine and 45. All ten items were used to calculate the technophilia score, resulting in a range of ten to fifty. The

Table 10. Reasons for Visiting of the Four Tourist Types

	Mean importance ratings for reasons for visiting ReefHQ			
	1=not at all important...5=very important			
	Compensation n=66	Luddites n=20	Spillover n=64	Opportunity Seeking n=13
Spend time with family	3.3	3.5	3.2	4.6
Discover new & different things	4.2	4.3	3.8	4.3
Improve knowledge of the reef	4.3	4.2	3.9	4.3
Feel mentally stimulated	3.4	4.2	3.2	3.6

Note: The four tourist types were significantly different on all items except 'visiting with children' using chi-square analyses and Kruskal-Wallis One-way anovas and setting $p < 0.05$.

Compensation and Spillover groups were very similar in their scores on both the technophilia and technophobia scales with both groups generally positive towards technology use and not very anxious about technology (see Table 11). The Luddites and the Opportunity Seekers were similar in their technophilia scores with both groups less positive about technology than the Compensation or Spillover groups. The Opportunity Seekers, however, were less anxious than the

Table 11. Technology Attitudes and Interest in New Exhibits of the Four Tourist Types

	Compensation	Luddites	Spillover	Opportunity Seeking
Mean Technophilia score ^a	19	23	18	23
Mean Technophobia score ^b	34	24	34	28
Interest in new ReefHQ exhibits				
Holograms	2%	10%	6%	31%
Simulated reef experiences	6%	5%	100%	100%
Guides to answer questions	41%	40%	14%	8%
Touch screen computers with reef information	27%	20%	6%	15%
Guided tours	32%	40%	14%	0%

Note: The four tourist types were significantly different on all items except visiting with children using chi-square analyses and Kruskal-Wallis One-way ANOVAs and setting $p < 0.05$.

- a. Technophilia score: 10 = very positive attitudes towards technology...50 = negative attitude towards technology.
- b. Technophobia score: 9 = very negative attitudes towards technology...45 = positive attitude towards technology

Luddites on the technophobia scores. Given that the Opportunity seekers were less anxious about technology, it is not surprising that they were the group most likely to seek holograms for future ReefHQ exhibits.

Discussion and Conclusions

Three main themes emerged from the pattern of results described in the previous section. These were:

1. support for the proposed high-touch/high-tech dichotomy of tourist responses to technology use in tourist attractions;
2. evidence that tourists can be segmented according to their support for the use of technology in visitor experiences and their use of technology in everyday life; and
3. support for the links proposed between tourists and their perceptions of front stage technology in the Tourism Technology Adoption Model outlined in Figure 1.

Before discussing these themes further it is important to highlight some notes of caution necessary when interpreting the results from this research. Two main issues need to be considered when reading the following discussion of results. The first is that the sample is from one type of attraction, an aquarium in a regional Australian centre, and the second is that the breakdown of the sample into four tourist types resulted in a loss of data and small sample sizes in the groups analyzed. Thus, the study should be seen as an exploratory one seeking mainly to identify potential future directions for research. Given the lack of previous academic attention to this question it is argued that an exploratory approach is an appropriate option regardless of the issues related to sample size and representativeness.

High-touch/High-tech Dichotomy

Despite the limitations noted in the previous section the present study did find clear evidence for the existence of a high-touch-high-tech dichotomy in tourists' reactions to the front stage use of technology in attractions. This supports Sheldon's (1997) argument that tourists will differ in the extent to which they want to overtly deal with technology in their leisure and holiday experiences. In all the excitement that can be generated by discussions on cyber-tourism it is important to remember that not all tourists wish to embark enthusiastically on high-tech journeys. Furthermore, the results suggest that while there are clear distinctions between high-tech and high-touch tourists, there are also some similarities between these groups in terms of their preferences for exhibits. This point is important because it infers that

attraction operators may be able to find exhibits that are equally attractive to both groups.

Segmenting Tourists Using Technology Attitudes and Use

The second major contribution of the present study was to further identify sub-groups within the high-touch and high-tech groups based on the spillover and compensation concepts from the general leisure literature. The data suggest that it is possible to segment visitors not only by their interest in the use of new technology to create and enhance tourist experiences but also by their use of technology in everyday life and their motivation to escape or experience technology in leisure. It is possible that more groups exist and this is one option to consider in future research.

Factors Related to Tourist Perceptions of Front Stage Technology Use

The exploratory analyses did suggest that the four tourist types differed in terms of their demographics, their attitudes towards technology in general, their motivations for visiting and their actual on-site behaviours. The segmentation, therefore, has value for attraction managers and these preliminary results support the variables proposed in the Tourism Technology Adoption Model proposed by the researchers in Figure 1.

The specific findings with regard to gender were interesting. No clear relationships were found between gender and interest in technology except in the case of the Luddite group, which had a very high proportion of females. This was also the oldest group and so the findings are consistent with several previous observations that have concluded that gender differences are likely to fade as technology becomes more commonplace (Matathia and Salzman 1998; North and Noyes 2002; Rainer *et al.* 2003).

This research did not explore the differences in attitudes and perceptions towards technology between members of the same travelling party. Further research is required to explore the dynamics between individuals within a travelling party to determine how individual responses may influence the overall experience. Such research might consider additional variables such as the reading level, attention span and interest level of individuals.

Implications for Tourist Attraction Management

The four tourist types differed on a number of the variables studied suggesting that they seek different experiences and have different motives and/or needs. Each attraction needs to understand the mix of visitors they currently have or hope to attract if they are to be successful

in providing a satisfactory experience. Too heavy a reliance on front-stage technology, for example, may alienate the Luddite and Compensation segments. It is also important to remember that these two groups are not the same, with one group fearful of technology and the other group seeking escape and relaxation. For the former group, the Luddites, any front stage technology use may be challenging, while for the latter group, the Compensation group, technology which does not remind them of work may be very acceptable. By way of contrast, the Opportunity Seekers are interested not only in technology but also in more intensive learning experiences. For these visitors the technology must be designed to support their educational motives and not merely as an end in itself. This is particularly true of any front-stage technology use in educational attractions such as museums and aquaria (Beck and Cable 1998).

Future Research Directions

The results of the present study offer a number of directions for future research into understanding tourist perceptions of, and attitudes towards, the use of technology in tourist attractions. Clearly, it cannot be assumed that technological innovations will always be readily accepted or sought by all tourists. Instead, a better understanding of the range of tourist perceptions of technology use and of the variables that influence their willingness to accept technology use in tourist attractions is required. This suggests two main areas for future research – more detailed analyses of market segments based on technology support and use variables and more studies of the variables that influence tourists' evaluations of technology use.

In terms of more detailed market segmentation studies it can be specifically suggested that more work is needed to develop better measures of:

- attitudes towards technology
- everyday use of technology
- interconnections between technology use in everyday life and in leisure.

Much of the existing literature on attitudes towards technology has focused on Internet and computer use in work and educational settings. Most notably, the development of a Technology Acceptance Model (TAM), has suggested that individuals adopt new technologies based on their perceived 'ease of use' and their perceived 'usefulness' (Davis 1989). The value of this model in leisure settings requires further research. More critical evaluations of existing scales and adaptations of these scales to be more relevant to tourism and leisure are required. Future researchers in this area also need to develop better ways to determine whether or not tourists fall into spillover, compensation or other types of groups.

Future research into the variables that influence tourists' acceptance of technology use could be guided by the Tourist Technology Adoption model proposed in this study as the preliminary research results suggest that the variables included in this model are likely to have significant impacts on tourist perceptions. As the model was intended to be a starting point for the development of this area, it could also be supplemented by qualitative approaches designed to generate a wider range of variables for inclusion and consideration. A key limitation of the study was that it was focused on a specific tourist attraction setting and the findings may not be applicable to other attraction settings. Conducting similar research across a range of different populations and different tourist attraction settings will be important to further develop our understanding of this area.

References

- BECK, L. and CABLE, T. (1998). *Interpretation for the 21st Century*. Champaign. Sagamore.
- BROSNAN, M. (1998). *Technophobia: The Psychological Impact of Information Technology*. New York. Routledge.
- CHON, K. and SINGH, A. (1995). Marketing Resorts to 2000: Review of Trends in the USA. *Tourism Management* 16(6): 463-469.
- CHU, P. C. and SPIRES, E. E. (1991). Validating the Computer Anxiety Rating Scale: Effects of Cognitive Style and Computer Courses on Computer Anxiety. *Computers in Human Behavior* 7: 7-21.
- COFFIN, R. J. and MACINTYRE, P. D. (1999). Motivational Influences on Computer-Related Affective States. *Computers in Human Behaviour* 15: 149-569.
- DAVIS, F. (1989). Perceived Usefulness: Perceived Ease of Use and User Acceptance of Information Technology. *MIS Quarterly* 13(3): 319-340.
- FAGAN, M. H., NEILL, S. and WOOLDRIDGE, B. R. (2003). An Empirical Investigation into the Relationship Between Computer Self-Efficacy, Anxiety, Experience, Support and Usage. *The Journal of Computer Information Systems* 44(2): 95-104.
- HARRISON, A. W. and RANIER, R. K. (1992). An Examination of the Factor Structures and Concurrent Validities for the Computer Attitude Scale: The Computer Anxiety Rating Scale and the Computer Self-Efficacy Scale. *Educational and Psychological Measurement* 52(3): 735-746.
- IGBARIA, M. and PARASURAMAN, S. (1989). A Path Analytic Study of Individual Characteristics: Computer Anxiety and Attitudes Toward Microcomputers. *Journal of Management* 15(3): 373-388.

- KIRKCALDY, B. D. and COOPER, C. L. (1993). The Relationship Between Work Stress and Leisure Style: British and German Managers. *Human Relations* 46(5): 669-681.
- LAWS, E., FAULKNER, B. and MOSCARDI, G. (1998). Embracing and Managing Change in Tourism: International Case Studies. In Laws, E., Faulkner, B. and Moscardo, G. (Eds.) *Embracing and Managing Change in Tourism*. London. Routledge: 1-10.
- MATATHIA, I. and SALZMAN, M. (1998). *Next: Trends for the Future*. Sydney. MacMillan.
- MOSCARDI, G., FAULKNER, B. and LAWS, E. (2000). Introduction: Moving Ahead and Looking Back. In Faulkner, B., Moscardo, G. and Laws, E. (Eds.) *Tourism in the 21st Century: Lessons from Experience*. London. Continuum: xviii-xxxii.
- NEAR, J. P., RICE, R. W. and HUNT, R. G. (1980). The Relationship Between Work and Non-work Domains: A Review of Empirical Research. *Academy of Management Review* 5(3): 415-429.
- NORTH, A. S. and NOYES, J. M. (2002). Gender Influences on Children's Computer Attitudes and Cognitions. *Computers in Human Behavior* 18: 135-150.
- RAINER, R. K., LAOSETHAKUL, K. and ASTONE, M. K. (2003). Are Gender Perceptions of Computing Changing Over Time? *The Journal of Computer Information Systems* 43(4): 108-114.
- RAYMAN-BACCHUS, L. and MOLINA, A. (2001). Internet-based Tourism Services: Business Issues and Trends. *Futures* 33(7): 589-609.
- ROSEN, L. D. and WEIL, M. M. (1992). *Measuring Technophobia*. Orange, CA. Byte Back.
- ROSEN, L. D., SEARS, D. C. and WEIL, M. M. (1993). Treating Technophobia: A Longitudinal Evaluation of the Computerphobia Reduction Program. *Computers in Human Behavior* 9: 27-50.
- SHELDON, P. J. (1997). *Tourism Information Technology*. Wallingford. CAB International.
- SINKOVICS, R. R., STOTTINGER, B., SCHLEGELMILCH, B. B. and RAM, S. (2002). Reluctance to Use Technology-related Products: Development of a Technophobia Scale. *Thunderbird International Business Review* 44(4): 477-494.
- SNIR, R. and HARPAN, I. (2002). Work-leisure Relations: Leisure Orientation and the Meaning of Work. *Journal of Leisure Research* 34(2): 178-203.
- STIPANUK, D. M. (1993). Tourism and Technology: Interactions and Implications. *Tourism Management* 14(4): 267-278.
- TORKZADEH, G. and ANGULO, I. E. (1992). The Concept and Correlates of Computer Anxiety. *Behaviour Information Technology* 11(2): 99-108.
- UNDERHILL, P. (1999). *Why We Buy: The Science of Shopping*. New York. Simon and Schuster.
- VICIAN, C. and BROWN, L. R. (2002). Investigating Computer Anxiety and Communication Apprehension as Performance Antecedents in a Computing-intensive Learning Environment. *Journal of Computer Information Systems* 42(2): 51-57.
- WILENKSY, H. L. (1960). Work, Careers and Social Integration. *International Social Science Journal* 12: 543-560.

Submitted: September 29, 2004

Accepted: March 30, 2005