

THE ROLE OF INFORMATION AND
COMMUNICATIONS TECHNOLOGY IN
SUPPORTING SUSTAINABLE TOURISM: IN-
TRIP TOURISTS PERSPECTIVES

Volume 1

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Abstract

The aim of this research was to examine the factors influencing in-trip tourists' adoption of information and communications technology (ICT) tools/applications which support sustainable tourism. While ICT is a source of competitive advantage for businesses, there is limited research on how ICT can be used to support sustainable tourism development. At the same time, there has been greater consumer awareness about sustainable tourism but a challenge in translating this knowledge into action. This thesis therefore sought to explore and integrate these complementary elements.

The study adopted a sequential mixed methods approach. Phase 1 employed an e-survey among sixty-six (66) eTourism experts, while Phase 2 of the study involved thirty (30) semi-structured face-to-face interviews with leisure tourists in the city of Edinburgh. Descriptive statistics and content analysis were used to analyse Phase 1 and thematic analysis for Phase 2.

The findings from the survey demonstrated that location based services were identified amongst the main ICT applications to support sustainable tourism. Geo-caching, ambient intelligence and context aware applications were among the new or emerging applications that eTourism experts felt were likely to change the way tourists experience a destination in the future. The interviews demonstrated that social connectedness motivated the use of in-trip ICT with social media being the primary platform. Mobile value elements, personal innovativeness and perceived enjoyment were postulated as influencing use behaviour. The results also illustrated the need for destinations to mix new media with some traditional strategies based on the destination's info-structure, tourists' source markets, tourists' profiles and sources of in-trip information.

This thesis has made an original contribution to knowledge by examining the actual use of in-trip ICTs by tourists in relation to sustainable tourism. Future research needs to explore and measure how perceived enjoyment, personal innovativeness and mobile value elements influence technology use behaviour.

Keywords: ICT, eTourism, sustainable tourism, consumer technology adoption, in-trip

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Abbreviations

3G	Third Generation Mobile Telephone Network
4G	Fourth Generation Mobile Telephone Network
AJAX	Asynchronous Java Script
AR	Augmented Reality
AVL	Automated Vehicle System
B2C	Business to Consumer
BRIC	Brazil, Russia, India and China
CCM	Consumer Centric Marketing
C2B	Consumer to Business
C2C	Consumer to Consumer
C-TAM	Consumer Technology Acceptance Model
DMO	Destination Management Organisation
DMS	Destination Management System
ETAG	Edinburgh Tourism Action Group
eWOM	Electronic Word of Mouth
GHG	Green House Gas
GIS	Geographical Information System
GPS	Global Positioning System
ICT	Information and Communications Technology
IDT	Innovation of Diffusion Theory
ITS	Intelligent Transport System
LBS	Location Based Services
MAR	Mobile Augmented Reality

NFC	Near Field Communication
PBC	Perceived Behavioural Control
PDA	Personal Digital Assistant
PE	Perceived Enjoyment
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
RFID	Radio Frequency Identification
RSS	Really Simple Syndication
SMTE	Small and Medium Tourism Enterprises
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UGC	User Generated Content
UNWTO	United Nations World Tourism Organization
UTAUT	Unified Theory of Acceptance and Use of Technology
UMTS	Universal Mobile Telecommunications System
VR	Virtual Reality
Wi-Fi	Wireless Fidelity
WLAN	Wireless Local Area Network
WiMAX	Worldwide Interoperability for Microwave Access
WMO	World Metrological Organisation

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Chapter 1

Introduction

1.1 Scope of the Research

The research described in this thesis involved an exploratory study into the adoption of information and communications technology (ICT) tools/applications by domestic and international leisure tourists while on holiday, referred to throughout this thesis as in-trip leisure tourists. ICTs are the combined products and systems, which includes computers and telecommunication technologies that facilitate the processing and transmission of information. The term “in-trip” is specifically used to distinguish the use of technology during a holiday- the experiential phase from the pre-trip and post-trip phases.

The UNWTO (2008) defines tourism as a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business purposes. Netto (2009) notes that tourism is often defined based on the purpose of use- study, statistical, legislative or industrial. An issue also arises whether tourism is in fact an industry or a sector. This is in itself a statistical issue, as attempts are made to quantify the contribution made by the cluster of different industries that contribute to tourism as opposed to those entities that cater specifically to the needs of the visitor (e.g. travel agencies, accommodation). Setting aside these philosophical issues, the researcher has adopted tourism definitions based on the purpose of study; and statistical and technical boundaries.

A visitor is defined as a traveller taking a trip to a main destination outside his/her usual environment, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited (UNWTO 2008). A visitor is classified as a tourist if his/her trip includes an overnight stay. This study was specifically interested in leisure tourists given their comparatively greater impact (due to volume) on the destination than

business travellers, and also because business travellers are considered as early adopters of technology (Flouri and Buhalis 2004), their behaviours were less relevant to the aim of the research. Additionally, the factors affecting the adoption of technology by leisure travellers are distinctly different from those of business travellers, given their varied motivations for travelling (Middleton et al. 2009).

The research specifically sought to examine, given the current and emerging ICT tools/applications available in the tourism domain, if in-trip technologies could be used to support sustainable tourism initiatives at the consumer level. In order to determine what tools/applications that in-trip tourists could utilise, opinions of eTourism experts were first sought to establish the availability and capabilities of contemporary and emerging tools/applications for sustainable tourism. Once this was established, the focus turned to the dominant component of the research where the intent was to determine in-trip tourists' perspectives about sustainable tourism and ICT; and actual in-trip ICT use. Rich data obtained from interviews sought to examine the factors affecting adoption and how existing models on consumer technology behaviour could be applied to elucidate reasons for the actual use or lack thereof of ICT tools/applications by in-trip tourists.

Tourists were recruited at six (6) of the top visited attractions in Edinburgh (VisitScotland 2011). Edinburgh, as major city destination within Europe was deemed a suitable city to undertake this study, allowing the researcher to engage tourists with varying socio-demographic profiles and during different periods of high and low tourist visitation. Also, from a practical perspective, the study's geographic scope was constrained. The following sections of this chapter outline the context for the research and the rationale for undertaking research in this field.

1.2 Research Background

1.2.1 World, Regional and National Tourism

Tourism has long been established as the world's most dominant economic activity, making significant contributions to local and national economies worldwide.

Tourism is a major source of income generation, employment creation, foreign exchange earnings and wider socio-economic development. McIntosh et al. (1995) acknowledge however that tourism is by no means an “unqualified blessing,” citing several disadvantages including environmental degradation, crowding, social tensions, crime, increased labour costs, cultural dilution and low-paid seasonal employment. The massive growth of tourism since the 1950s has resulted in many countries, particularly in the developing world, being solely dependent on tourism as their main income generator. These countries are under even greater pressure to balance the costs and benefits of tourism; plan for tourism’s integrated development; and the gradual weaning of their economies to alternative economic activities have become increasingly critical (Lunberg and Lunberg 1993; Wilkinson 1997).

Over the decades travel and tourism have proven to be a resilient economic sector, despite its vulnerability to exogenous variables such as war, terrorism, social and political unrest, natural disasters, diseases (e.g. SARS and swine flu) and financial crisis. Amidst lingering uncertainty about the recovery from the global recession which commenced in 2008, international tourist arrivals exceeded the one billion mark for the first time in 2012 and international tourism receipts climbed to US\$1,030 billion (euro 740 bn) in 2011 (UNWTO 2012). The global contribution of tourism to gross domestic product was estimated to be 5 %, while the contribution to global jobs was estimated at 6-7 % in 2011 (UNWTO^a 2011; 2012). Future projections suggest that international tourist arrivals will reach 1.8 billion by 2030 and grow by an average of 43 million a year (UNWTO^b 2011). Since the 1980s, Europe (as well as the Americas) has been losing market share to emerging markets in Asia and the Pacific, Africa and the Middle East (Yeoman et al. 2006). These emerging destinations present a new allure to tourists seeking different and authentic experiences. According to UNWTO 2030 projections, most of the growth in new tourists arrivals will be experienced in Asia and the Pacific regions however, Europe will still be the global tourism leader with 41 % of the market share, down from 51 % in 2010 and 63% in 1980 (UNWTO^b 2011).

The United Kingdom (UK) classified as part of Europe (for UNWTO reporting), also relies heavily on tourism. The UK received 31.1 million overseas residents in 2012, a 1 percent increase over 2011 with visitor spend at 18.7 billion, up 4 % from the previous year (Office for National Statistics 2013). Countries within the UK include England, Wales, Northern Ireland and Scotland. The latest figures for Scotland, where this research project was conducted, revealed that tourism accounted for 10 % of national employment. Data from 2009 showed the regional market accounting for 67% of total trips however data for 2011 estimated the contribution at 85 %. Though the overseas market only account for 15 % of total trips, the contribution to visitor spend was 33 % of the total visitor spend of £4.5 billion. July to September is the preferred visitation period for both UK and overseas visitors and their main purpose of visit is holiday. See Tables 1 and 2 for the value and volume of tourism from Great Britain and overseas to Scotland, respectively. Data collected in 2011 excluded North Ireland unlike previous years where statistics covered the entire United Kingdom (VisitScotland 2011; 2012).

Table 1.1 Value and volume of tourism from Great Britain to Scotland 2011

	Spend		Nights		Trips	
	(£M)	(%)	(M)	(%)	(M)	(%)
UK						
Holidays	1740	58	25.5	56	6.57	49
Business	640	21	5.79	13	2.19	16
Visit friends & relatives	350	12	7.97	17	2.34	18
Other	288	10	3.36	14	2.27	17
Total	3018	100	45.58	100	13.36	100

Source: VisitScotland 2012; Note data collected from Great Britain excludes Northern Ireland. M ≡ Million

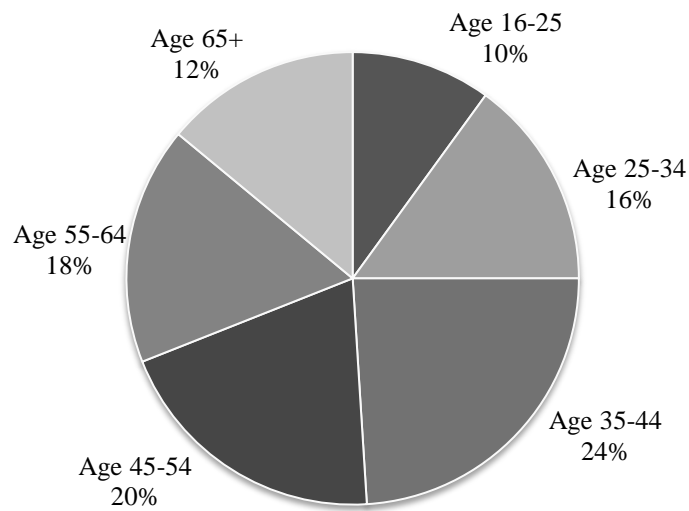
Table 1.2 Value and volume of tourism from Overseas to Scotland 2011

	Spend		Nights		Trips	
	(£M)	(%)	(M)	(%)	(M)	(%)
Overseas						
Holidays	858	57	8.18	46	1.23	53
Business	238	16	1.99	11	0.42	18
Visit friends & relatives	307	21	6.03	34	0.61	26
Study	27	2	0.64	4	0.02	1
Other	60	4	0.78	5	0.06	2
Total	1490	100	17.62	100	2.35	100

Source: VisitScotland 2012; M ≡ Million

Scotland originally became a popular tourist destination with the English when continental Europe was closed off during the Napoleonic wars (Seaton 1998). Today, the majority of UK visitors to Scotland travel by land, 66 % by car; 14 % by train; 4 % by coach; 7 % by plane and 6 % fall within the category of other modes of transportation. The majority of the overseas visitors travel by air (87%) and the rest by sea or tunnel (13%). Engagement in general sightseeing and enjoying Scottish greenery by a significant percentage of both domestic and overseas visitors reinforces the fact that the quality of the environment is the most important factor attracting tourists to Scotland (MacLellan 1998; VisitScotland 2012). While demographic data was not available for the overseas visitors, Figure 1 Demographics of UK holiday visitors to Scotland, highlight the age distribution for UK arrivals in 2011. Just under a quarter of all visitors to Scotland from the rest of the UK are in the 35-44 age group, which is only slightly more significant than the 45-54 and 55-64 age groups (20 % and 18 %, respectively). Age cohort is important to this research as

several authors have noted that age is a significant determinant of technology usage and acceptance (e.g. Morris and Venkatesh 2000; McFarland 2001).



Source: VisitScotland 2012

Figure 1.1 Demographics of Great Britain holiday visitors to Scotland in 2011

1.2.2 Edinburgh and Sustainable Tourism

VisitScotland as the lead tourism agency for Scotland is responsible for marketing the country and its tourism assets to all parts of the world (Dewar 2007). According to VisitScotland's Corporate Plan 2009-2012 (VisitScotland 2009), the organisation's main purpose is to maximize the economic benefit of tourism to Scotland with the ambition to grow tourism revenues by 50 % by 2015. Additionally, as part of Scotland's national tourism strategy, the destination aims to become one of the world's foremost tourism destinations and to be Europe's most sustainable tourism destination by:

- Increasing visitor numbers.
- Increasing the spend per visit not only on accommodation, events and visitor attractions but also on shopping, entertainment, food and drink.

- Increasing visitors' length of stay.
- Stretching the seasons and reducing peaks and troughs (VisitScotland 2009).

Edinburgh is a contemporary European city destination that has positioned itself as a hub for festivals and events. According to TripAdvisor's Traveller's Choice Best Destinations of 2011, Edinburgh was voted one of the top ten destinations in Europe (ranked 9th) and voted the second most popular destination in the UK (TripAdvisor 2011). The Edinburgh Tourism Action Group (ETAG), a partnership established between the public and private sectors to co-ordinate tourism in Edinburgh, notes in its Framework for Growth 2007-2015 (ETAG 2007) that the city's centre and waterfront will define Edinburgh's image in the twenty-first century and will be the key to its success in the future. The strategic priorities include promoting Edinburgh as a key city break, cultural and touring destination for the UK market, while attracting the key "big 5" European markets (France, Germany, Netherlands, Spain and Sweden) based on city breaks and touring. The Framework for Growth (ETAG 2007) also identifies the Brazilian, Russian, Indian and Chinese (BRIC) markets as new marketing opportunities in the future and the city will have a thrust to attract higher per capita spend visitors to ensure sustainable growth. The ETAG (2007) also recognises that Edinburgh must be responsive to changes in the global tourism market *inter alia* global mobility, environmental concerns and the rapid adoption of new communication technologies.

The ETAG's Framework for Growth 2007-2015 notes that "Edinburgh will utilise modern technology to provide information to visitors in a way that meet their needs" and its priorities for the city will include "Responding to advances in technology by applying relevant innovations to visitor information provision" (ETAG 2007 p.8). No mention of technology is made in the Sustainable Urban Tourism Strategy (ETAG 2008) and this suggests that technology is not seen as an integral component of an effective sustainable tourism strategy for Edinburgh. Destination Edinburgh Marketing Alliance (DEMA) whose "purpose is to lead and facilitate the promotion of Edinburgh using the Edinburgh Inspiring Capital Brand by bringing together public and private sector businesses and organisations" identifies five main areas of

activity: customer knowledge, public relations messaging, promotion, engagement and digital platforms. Digital platforms include the use of tools such as social media, email and websites to ensure that real time tools deliver Edinburgh's unique selling proposition (ETAG 2009).

The Sustainable Urban Tourism Strategy (ETAG 2008) highlights that the aim is to make Edinburgh "the most successful and sustainable city in Northern Europe" (p. 4) and to grow value faster than volume with a 20 % increase in visitation and a 25 % increase visitor spend per trip by 2015 (p. 3). However in recognition of the trends in the global tourism market and other strategic priorities for the city of Edinburgh, there is a need for greater alignment between the Framework for Growth and the Sustainable Urban Tourism Strategy. This alignment should also take place in the context of the patterns of technological use across tourism markets, the info-structure in the destination including Wi-Fi access, characteristics of the destination's main source markets, and national targets related to carbon dioxide emissions.

Maren Ebeling of the Scottish Natural Heritage, in an interview with Bernard Lane on implementing sustainable tourism in Scotland, emphasized that "one of the national targets in the Scottish Sustainable Development Strategy is to make Scotland the world leader in biodiversity by 2030" (Lane 2009b p. 750). Scotland had also once pitched itself to be established as the world's first carbon neutral destination in the world (ETAG 2008; Gössling 2009). Very aspirational goals are being set for Scotland in terms of achieving sustainable development. However, being designated as the first carbon neutral destination is unlikely to be realised for a number of reasons including Edinburgh's heavy dependence on air travel and given the destination's strategic aim to attract high end visitor spend from the BRIC and the "big 5" European countries (ETAG 2007; 2008). Nonetheless, the Sustainable Urban Tourism Strategy, notes that the City of Edinburgh Council's target is for a zero carbon level in the city by 2050 (ETAG 2008) and as a country the aim is to reduce carbon emissions by 80% by 2050 (Lane 2009b). However, many of the carbon emission targets will have to be revised in light of the increasing effects of climate change and current consumption patterns in the UK, including Scotland. This

is explored further in the literature review but on a positive note, Scotland has a tremendous potential to utilize renewable sources of energy.

Transportation is a key theme in the Sustainable Urban Tourism Strategy action plan where cleaner aircrafts, alternatives to air travel, improvements in the London-Scotland rail link and the use of local transportation options such as cycling, use of trams and local buses will be promoted (ETAG 2008). Tram works are currently taking place in Edinburgh, cycling is already an established transportation alternative and there are good local bus links. Reducing seasonality is also seen as critical for achieving targeted visitation and spend levels by tourists. Additionally, the Sustainable Urban Tourism Strategy (ETAG 2008) believes that basing Edinburgh positioning strategy on its natural and cultural heritage will augur well for maintaining the physical fabric of the city.

Edinburgh and the wider Scotland have set ambitious targets for achieving a number of sustainable development goals including becoming Europe's most sustainable tourism destination (VisitScotland 2009). While Edinburgh's Framework for Growth 2007-2015 (ETAG 2007) has recognised the role that technology is increasingly playing in the global tourism market, the researcher notes that technology is generally not a central theme in the national or urban sustainable tourism development discourse. As the literature review will demonstrate many scholars have highlighted the role that technology can play in enhancing a destination's sustainability (e.g. Liburd 2005; Huvila et al. 2008; Ali 2009; Touray and Jung 2010; Ali and Frew 2013). Paskaleva and Megliola (2011) have noted that ICT has a central role to play in building sustainable cities and promoting cultural heritage. Destination e-services have tremendous potential and are enriched by context-aware and placed-based approach to digital services. Paskaleva and Megliola (2011 p. 270) also note that "the need is rising for developing intelligent systems that can increase the access and use of local heritage in a sustainable way". Opportunities for ICT tools/applications for the city of Edinburgh extend beyond cultural heritage promotion but can be an excellent starting point given the city's product positioning. More specifically, current eTourism applications used by in-trip tourists can serve to

enhance economic viability, local prosperity, visitor fulfilment, community well being, physical integrity, biological diversity, resource efficiency and environmental purity of destinations. To maintain a competitive edge and become Europe's most sustainable tourism destination, Edinburgh will need to take advantage of all the opportunities that eTourism applications offer, particularly those tools/applications available on mobile and other wireless platforms.

Given Scotland's aim to permeate all of its future activities with sustainable development considerations (VisitScotland 2009), this research could potentially contribute to the destination fulfilling one of its key ambitions, where technology will not only serve to enhance visitor engagement; and support Scotland's already strong positioning for natural and cultural preservation, but also strengthen sustainable tourism initiatives in general. The researcher recognizes and emphasizes that ultimately technology alone cannot solve issues of sustainable tourism but reduced consumption, more efficient use of resources and reduced emissions will make significant contributions to sustainable tourism development (Miller and Twinning-Ward 2005).

1.2.3 The Research Problem

Several authors note that tourists are showing no real evidence about changing their behaviours despite concerns about the environment, climate change and the awareness of green house gas (GHG) emissions generated by travel (Becken 2004; Hall and Gössling 2009; McKercher et al. 2010, Miller et al. 2010; Weaver 2009). Other researchers have noted that given the ubiquitous nature of technology in travel and tourism, a real opportunity does exist to use technology in ways that improve the tourist experience; improve tourism consumption patterns; assist in the internalization of sustainability principles; and enhance sustainable development and management at the destination level (Liburd 2005; Ali 2009; Buhalis and Pistidda 2009).

Ultimately, this research will seek to explore how information and communications technology (ICT) can potentially be used to operationalize some of the aims of sustainable tourism (See Table 2.1 Aims of Sustainable Tourism) in the consumer domain. This will be achieved by examining the existing tools and applications available for use, and factors affecting current uptake of technology (or lack thereof) by in-trip tourists in the city of Edinburgh.

1.3 Overview of the Research Approach

A mixed methods approach was adopted for this study as it best served the practical nature of the research. This approach often allows for a hybrid methodology or methodological pluralism (Molina-Azorín 2011) where elements of induction and deduction are employed. A sequential less dominant-dominant design was employed for the primary data collection. A quantitative approach was employed in the less dominant phase and a qualitative approach represented the more substantive component of this study. Phase 1, a web-based survey, served to establish the contemporary and emerging applications that could potentially be used by in-trip tourists to support sustainable tourism. Phase 1 served a developmental purpose in the design and execution of Phase 2 (Molina-Azorín 2011) which involved face-to-face semi-structured interviews. These interviews were conducted with tourists during their holiday-making activities in the city of Edinburgh.

Prior to the primary data collection, the researcher engaged in an extensive, interdisciplinary review of the literature in order to define the scope of the research, research gaps, significance of the research and the main theoretical frameworks underlying the research domains. These are outlined in the literature review in Chapter 2. Secondary research also included an extensive review of several research methodologies and methods before a specific approach could be adopted that served the aim and objectives of the study. This is outlined in Chapter 3 entitled Methodology and Methods.

1.4 Delineations

The three main research domains in this study were ICT and tourism (eTourism), consumer behaviour and sustainable tourism, each of them broad areas in their own right. Technology adoption in this study is viewed solely from the perspective of the in-trip tourist- the consumer and not the organizational context. Naturally, the findings have implications for destination managers and other stakeholders in the tourism industry.

Smartphones mediate the psychological and behavioural components of the tourist's experience through information search, navigation and social networking (Wang et al. 2012; Wang and Xiang 2012). However, the researcher did not focus exclusively on mobile phones or smartphones but remained open to exploring what, if and how tourists used various technological applications and tools, excluding a digital camera. This proved to be a wise approach, as the results will demonstrate, smartphone ownership was not pervasive and while some tourists did not use their standard mobile phone or smartphone during their holiday, some of them used a tablet or laptop. Insights into the possible reasons for the lack of technology adoption or its slow uptake were garnered, given the significant number of tourists without smartphones.

There was a need to establish what tools or applications were available relative to their potential to support sustainable tourism while tourists are in the destination. Some applications while classified as travel-related applications did not directly support the aims of sustainable tourism (See Table 2.1). A good example of this would be a currency converter. The reader should also be mindful that the measurement of how each technological tool or application contributes to the aims of sustainable tourism was not an objective of the research. Technological tools were evaluated based on their relative potential to contribute the aims of sustainable tourism based on a qualitative assessment of each aim's description as set out by the United Nations Environmental Programme and the United Nations World Tourism

Organization (UNEP and UNWTO 2005). These aims are fully described in the literature review (Chapter 2).

Apart from the delineations provided in the literature review about how key concepts and theoretical constructs have been interpreted and used, the reader may refer to the glossary at Appendix H for definitions of key terms used throughout this thesis.

1.5 Significance of the Research

1.5.1 Prior Research

Tourism has been transformed by ICT where technology has not only been an enabler of change but an inducer of change. The travel industry thrives on information where the effective use of ICT is critical for its competitiveness and prosperity (Poon 1993; Sheldon 1997; Werthner and Klein 1999; Buhalis 2003; Buhalis and O'Connor 2005). Lamsfus et al. (2013) also note that over the last decade, in-trip ICT usage has become much quicker, smaller, more intelligent and embedded in the traveller's environment.

Yeoman et al. (2006) in their work with the Future Foundation identified technological innovation as a key driver shaping the behaviour of tomorrow's consumer. They noted at the macro-level, future tourists will increasingly be at odds between consumerism and a broader concern for societal impacts; sustainability will play an incremental role in consumer choice, giving rise to ethical consumption. Consumer's motivation to purchase will be influenced by pre-existing philosophical concerns rather than just price, quality and opportunity (Yeoman et al. 2006). Parallel to the demand for technological services and the increasing use of social media (Yoo and Gretzel 2012) is the trend on the supply side for more consumer centric marketing (CCM). CCM places the emphasis on acquiring information and understanding motivations, habits, values and attitudes that shape consumer opinions (Niininen et al. 2006). Technology facilitates much of this data tracking by monitoring and reviewing consumers' on-line viewing practices and buying habits; and through point of sale activity and surveys. The ubiquitous nature of mobile

services provide opportunities, not only, as Murphy and Schegg (2006) suggest for cross-selling and the exploitation of customer relationship management, but also the customisation of information to increase visitor satisfaction (Martin et al. 2011). Other researchers have also highlighted how specific ICT applications enhance the hedonic value of the tourist's experience (e.g. Hyun et al. 2009; Fuchs et al 2011; Dickinger and Stangl 2011).

One concern has been that in many cases awareness about the issues related to sustainability have done very little to change consumer behaviour (Swarbrooke and Horner 2007; Miller et al. 2010). A value-action gap, which is a gap between consumers' environmental beliefs and 'green' behaviour has been acknowledged in the literature (Department for Environment and Rural Affairs [Defra] 2008; Pickett-Baker and Ozaki 2008). More recently though, researchers are recognizing the potential of ICTs to support sustainable tourism (Ali 2009) and "to overcome public disempowerment and lack of understanding to support pro-environmental behaviour change" (Miller et al. 2010, p. 642). The application of ICT for sustainable tourism development however, still remains a largely under-researched area (Ali 2009). Relatedly, the factors that will affect the adoption of ICT tools/applications by travellers which are supportive of sustainable tourism is an area in need of further research, given that availability of technology does not translate into wise technological use (Minghetti and Buhalis 2010). A criticism this author makes of the contemporary literature as it relates to consumer behaviour and sustainable tourism is the focus on the environmental dimension but a more holistic approach should be adopted incorporating the social, cultural and economic dimensions. This research adopts this holistic approach and by extension seeks to demonstrate the natural fit between ICT and sustainable tourism. As highlighted earlier, technology is integral to the tourism system and many destinations are striving to be sustainable, yet significant research gaps exist, particularly with respect to technology use in the in-trip (experiential) phase. Some of these gaps are highlighted in the next section.

1.5.2 Research Gaps

There has been a proliferation of studies examining tourist's intention to use technology, the use of mobile and wireless technology; as well as, but to a lesser extent, technology acceptance behavior by tourists (Höpken et al. 2008; Tjsotheim and Fesenmaier 2008; Oh et al. 2009; Buhalis and Pistidda 2009; Garcia et al. 2009; Edwards et al. 2010). Far more has been written about technology acceptance behaviour (Bagozzi [2007] notes over 700 citations on Davis' Technology Acceptance Model) in the organisational domain (Davis 1989; Venkatesh et. al 2003; Legris et al. 2003; Bagozzi 2007; Ham et al., 2008; Chuttur 2009; Lim 2009; Fuchs et al. 2010) than in the consumer domain (Chien-Hung and Mort 2007). While a number of studies have examined technology adoption in the consumer domain, these tend to be concentrated on specific consumer goods with many studies focusing on mobile handsets (e.g. Yang and Jolly 2008; Oh et al. 2009; Fuchs et al. 2011). There have been a number of studies that have examined technology adoption in the hospitality sector (e.g. Ham et al. 2008; Lim 2009; Fuchs et al. 2010) but this still is an organisational context. Where research has examined in-trip tourists' engagement with technology some of these studies have been under the auspices of specific projects to test application prototypes (e.g. Schmidt-Belz et al. 2003; Tjostheim et al. 2004; Edwards et al. 2010) or acceptance of mobile services (e.g. Bader et al. 2012), with many trying to determine tourists' intention to use specific technologies. More recently, Neuhofer (2012) has also suggested that given the comparatively poor adoption rates of mobile services in the UK, France, Germany, Spain and Italy, more consumer-centric research is needed to establish the true value of these services to consumers. No substantive studies have made linkages between in-trip tourists, actual use of ICT and sustainable tourism.

Liburd (2005) after examining how a team of multidisciplinary scholars and stakeholders could seek to innovatively integrate sustainable tourism with a mobile communication device in the peripheral areas in Denmark noted that "clear information on products, services, and destinations that can positively orient tourists' consumption patterns and behaviour and in turn is oriented by consumer preferences

is an area of further research” (Liburd 2005 p. 116). More recently, Gretzel (2011 p.757) notes that despite the fact that ICTs have become key “elements of value generating strategies in the tourism industry, ” surprisingly, there is lack of research in the tourism literature about how ICTs mediate tourism experience. She also bemoaned the “great bias towards investigating intention to use and not enough research on actual use, use patterns, and most importantly, non-use” (Gretzel 2011, p.761).

Given the dearth of literature on the actual use of technology (as opposed to intention to use technology) by in-trip tourists and its relation to sustainable tourism, this research will make a significant contribution to the ICT and sustainable tourism domains, and add to the body of knowledge on technology adoption behaviour in the consumer domain. The thesis addresses key issues that Gretzel (2011) identified as lacking in current research- actual usage and non- use of ICT by in-trip tourists. Moreover, through the use of interviews, this research makes a significant contribution to knowledge by gaining insights into in-trip tourists’ perspectives on sustainable tourism, the sustainable tourism- ICT linkage and possible reasons for the slow rates or lack of technology adoption in the tourism domain. McCabe (2009 p. 26) notes that “... social sciences of tourism often fails in its attempt to understand tourists’ behaviour and experiences through a lack of attention to the perspective of interview respondents and the categories they use to describe themselves and others.” Additionally, the proposed mixed method study will add to the methodological literature, as “Mixed methods studies can be difficult to locate in the literature” (Creswell and Plano Clark 2011, p. 15) and mixed method sampling strategies are considered to be in their infancy (Teddlie and Yu 2007).

While tourists were the focus of this research, any research that provides insights about consumer perspectives and usage behaviour, ultimately benefits the marketing process, including product development. As the implications of the findings of this research will illustrate, destination marketers will have to create platforms for on-going engagement between themselves and consumers; and between consumers and other customers. Marketers will have to be cautious about how they allocate

resources to their various communication channels and as such this research assists decision makers by providing information about actual in-trip ICT usage, willingness/unwillingness to embrace technology and perspectives about sustainable tourism. This knowledge is also important for application developers if ICT is to bring about any behavioural change as it relates to sustainable tourism. Academia and eTourism experts also benefit from this research, and it is anticipated that the in-trip tourists by their participation in this research would have been further sensitized to sustainable tourism and the potential linkages to technology.

1.6 Research Aim and Objectives

As a result of some of the research gaps identified in the contemporary literature the main aim of this study was to:

Examine the factors influencing in-trip tourists' adoption of ICT tools/applications which support sustainable tourism in the city of Edinburgh.

The objectives were to:

1. Review the literature on sustainable tourism, eTourism and consumer technology adoption behaviour.
2. Conduct surveys of eTourism experts to identify the current and emerging ICT tools/applications that in-trip tourists can use to support sustainable tourism.
3. Conduct interviews with in-trip tourists to determine their perspectives on sustainable tourism in relation to technology.
4. Determine the actual up-take of ICT tools/applications by in-trip tourists.
5. Explore the extent to which in-trip adopted technologies support sustainable tourism.
6. Determine the gaps between available and actual use of ICT tools/applications by in-trip tourists.
7. Explore how models on technology adoption behaviour can be applied to the consumer domain for understanding the actual use of technology.

Further discussion on the research problem, aim and objectives and arising research questions are provided in Chapter 3 -Methodology and Methods.

1.7 Thesis Outline

Chapter two reviews the literature in the main research domains- outlining the definitions; debates within the area of sustainable development and sustainable tourism; the key theoretical constructs as it relates to consumer behaviour, tourist behaviour; and technology adoption in the organisational versus the consumer context. ICT tools/applications available for use in the tourism domain were also reviewed and assessed based on their contribution to the aims of sustainable tourism. This review informed the primary data collection and subsequent analysis.

Chapter three delineates the study's research design, providing the aim, objectives, philosophical foundation and the methods of data collection. The merits and demerits of the selected sequential mixed methods research design with a less dominant quantitative and more dominant qualitative component are fully discussed. The chapter also expounded upon the strategies for data analysis and ensuring the credibility or trustworthiness of the research through a validation framework for mixed methods research.

Chapter four describes the findings of the international web-based survey conducted with eTourism experts. The findings represent Phase 1 of the study – the less dominant component of the research, which served to inform the more dominant qualitative Phase 2 of the study.

Chapter five presents the findings of the dominant qualitative component of the thesis. The chapter describes the results of the semi-structured interviews conducted with in-trip leisure tourists visiting Edinburgh. It identifies the key themes determined from the iterative process of coding, reading, recoding and reduction of the qualitative data derived from the interview transcripts.

Chapter six analyses the findings of each phase relative to the aim and objectives of the study. The findings of Phases 1 and 2 are synthesized and interpreted and links to the literature and theory are examined. Implications for theory and practice are also discussed.

Chapter seven concludes with an overview of the study, its main findings and its original contribution to knowledge. The chapter closes off with a discussion on the limitations of the study and opportunities for future research.

Chapter 2

Literature Review

2.1 Introduction

It is instructive to engage in a discourse about sustainable development before discussing sustainable tourism, and more specifically, the role of information technology in supporting sustainable tourism. Sustainable tourism itself has been viewed as an application of sustainable development (Butler 1998; Liu 2003; Edgell 2006; Weaver 2006), and has been regarded by many as the only approach to the development of tourism in the future.

Firstly, this chapter will provide an overview of the dual concepts of sustainable tourism and sustainable development by tracing their introduction and later popularization; the debates about their definitions, promotion; and the application or implementation in the global context. Secondly, there is a review of the literature about the importance of ICT and its specific implications for tourism now and in the future. The links between current ICT tools/applications in the tourism domain and opportunities for promoting sustainable tourism practices are specifically examined. The aims of sustainable tourism proposed by the United Nations Environmental Programme and the World Tourism Organisation (UNEP and UNWTO 2005) provide the main backdrop for this analysis. Lastly, the chapter looks at tourist behaviour drawing on the foundational works in consumer behaviour theory, followed by the evolution of various models of technology acceptance behaviour. The latter review commences with the work on the theory of reason action (Fishbein and Ajzen 1975; Ajzen and Fishbein 1980) then moves to the highly cited technology acceptance model, TAM (Davis 1989), to alternative models of consumer technology acceptance models proposed by researchers which incorporate elements that were not originally included in the TAM.

This review was deemed critical to the exploration of how ICT could potentially be used to operationalize some of the aims of sustainable tourism in the consumer

domain by examining the existing tools and applications, and current use (or lack thereof) by in-trip tourists. The results of the review and subsequent field work sought to demonstrate how models of technology acceptance behaviour can offer insights into the actual use of technology and how this knowledge of actual consumer use could support sustainable tourism.

2.2 Laying the Foundation: Sustainable Development and Sustainable Tourism

2.2.1 Sustainable Development

The debate on sustainability between what Hall (1998) described as the economic conservationists and romantic conservationists dates back to the 1870s. This was a precursor to the merger of economic development theory and environmentalism that came in the 1900s (Hardy and Beeton 2001). The definition of sustainable development has been subject to numerous interpretations (Butler 1999). Hall (1998 p.13) described sustainable development as a ‘contested concept’ while Hunter (1997) described it as ‘malleable.’ Frazier (1997) noted that the subject of sustainable development has become a growth industry, where there are innumerable ways to understand the term; while Sharpley (2009) has commented that the most sustainable thing about the concept of sustainable development has been the academic research into it.

The 1960s and 1970s were marked by the recognition that contemporary economic models were failing and the negative ecological consequences of the current development models were increasing (Hall 1998; Hardy and Beeton 2001; Hardy et al. 2002). While several authors traced the origins of the concept of sustainable development (e.g. Butler 1998; Liu 2003; Sharpley 2009) to the International Union for the Conservation of Nature and Natural Resources’ (IUCN) 1980 *World Conservation Strategy*, Bramwell and Lane (1993) trace the origins of the concept back to 1973.

The use of the term sustainable development gained increasing currency by non-government organizations, governments and academics alike following the Brundtland Report (World Commission on Environment and Development, WCED 1987) entitled, *Our Common Future*. The report defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987 p. 23). Two key concepts were emphasized - the concept of needs, with priority being placed on the world’s poor and “the idea of limitations imposed by the state of technology and social organization on the environment’s ability to meet present and future needs” (WCED 1987 p. 43). The role of technology is an important concept in sustainable development that this researcher has observed, has largely been downplayed by the academic and professional community. Similarly, the more all-encompassing information and communications technology (which the researcher will discuss later), is still a relatively new area in the tourism literature and its use for sustainable tourism is considered an under-researched area (Ali 2009). Notably, the WCED (1987) report also included some issues related to the technological gap between the developed and developing countries, referred today as the digital divide.

While many have argued the shortcomings of the WCED report (1987) and criticized it for revisiting an old debate on the balanced use of the earth’s natural resources (Hall 1998; Butler 1998), the report was progressive in noting the role of the orientation of technological development as part of the process of change for the achievement of sustainable development by emphasizing that the:

- Amassing of knowledge and the development of technology can enhance the carrying capacity of the resource base.
- Sustainable development is a process of change where the use of resources, the channeling of investments, the orientation of technology and institutional change are all in harmony and enhance both current and future potential to meet the needs and aspirations of individuals.
- Reorientation of technology was a critical objective for environment and development policies.

- An organized effort to develop and diffuse new technologies was important for the promotion of sustainable development (WCED 1987).

Many commentators viewed definitions of sustainable development as being vague and open to multiple interpretations (Stabler 1997; Frazier 1997; Hunter 1997). Stabler (1997) considered this both a strength and a weakness, making the concept all-encompassing- facilitating adaptability and flexibility. It is this malleability that was criticized by Hunter (1997) who viewed the concept of sustainable development as being shaped by two extreme views- resource preservation or resource exploitation which he viewed as representing very strong and very weak sustainability perspectives, respectively. Today, the use, acceptance, popularization and even politicization of the term sustainable development can be considered a success, largely because of its timing (Hardy et al. 2002), and evidential of the general malaise with the economic models of the 1970s and 1980s and their negative impacts on the environment.

The focus of the Brundtland Report (WCED 1987) was on sustainable development through economic growth, strategic long-term planning, effective international co-operation, and the maintenance of the resource and productivity base on a global scale (Liburd 2010). Sharpley (2009) has suggested that the key principles underpinning sustainable development are that (i) a holistic approach is required - both environmental sustainability and development are global challenges (ii) the challenge is to achieve both intra and intergenerational equity - development should be fair and equitable for all people now and in the future; and (iii) the emphasis should be on the long-term.

2.2.2 Sustainable Tourism

Though the idea of 'eco-development' was first mooted at the 1972 United Nations Conference on Human Environment, it was not until about a decade later than the idea of a coordinated, integrated development and resource management approach was posited, and incorporated into the tourism lexicon (Hall 1998). Inskip (1991) noted that the 1982 Joint Declaration of the World Tourism Organisation (WTO)

[now known as the United Nations World Tourism Organisation, UNWTO, to distinguish it from the acronym of the World Trade Organisation] and the United Nations Environment Programme (UNEP); the 1985 Tourism Bill of Rights and Tourist Code which was adopted at the UNWTO's Sixth General Assembly, recognized that in the interest of current and future generations, social, cultural and environmental protection and enhancement were fundamental to the harmonious development of tourism. Despite these and other events and pronouncements, tourism or sustainable tourism was never mentioned in the Brundtland Report (Weaver 2006; Liburd 2010). This omission occurred in spite of tourism's importance in the 1980s and its reliance on the earth's environmental assets.

According to Liburd (2010), the relationship between sustainable development and tourism was not programmatically specified until *Agenda 21 for the Travel and Tourism Industry* was developed (World Travel & Tourism Council, World Tourism Organization, Earth Council 1995). The document outlined priority areas for action and objectives for moving the industry towards accomplishing sustainable development (Hardy et al. 2002). By the 1990s the debate on the conceptual definition of sustainable tourism had already begun and as some will argue is still evolving (Clarke 1997; Johnston and Tyrell 2005; Sharpley 2009). Contemporary definitions of sustainable tourism have been criticised as being too parochial and tourism-centric (Hunter 1997); disjointed, often flawed and with false assumptions and arguments (Liu 2003) or inward-looking and ring-fenced (Coles 2006). Bramwell and Lane (1993) proffered that there are four basic principles crucial to the concept of sustainability: holistic planning and strategy-making; the importance of preserving ecological processes; the need to protect human heritage and biodiversity and to develop in a manner where productivity could be sustained over the long term for future generations. They posited one of the earlier accepted definitions of sustainable tourism:

Sustainable tourism is a positive approach intended to reduce the tensions and friction created by the complex interactions between the tourism industry, visitors, the environment and the communities which are host to holidaymakers. It is an approach which involves working for the long-term

viability and quality of both natural and human resources. It is not anti-growth, but it acknowledges that there are limits to growth. (Bramwell and Lane 1993 p. 2)

The historical development of sustainable tourism has also been described through Jafari's (1990 cited in Hardy et al. 2002) platform model which demonstrates how the thinking about tourism, economic development and the environment all evolved sequentially as the advocacy, cautionary, adaptancy and knowledge-based platforms. The advocacy platform emerged after War World II and was dominated by proponents who supported the unbridled development of tourism, which was seen as the economic saviour that would deliver environmental, social and cultural benefits, especially among poor nations. Dissatisfaction with the advocacy platform saw it being replaced by the cautionary platform which coincided with the environmental movement of the 1960s and 1970s. Supporters of the cautionary platform criticised the negative impact of tourism on society including poor linkages with tourism and other economic sectors, wealth disparities and cultural divide between tourists and locals, high seasonality, and lack of benefits and opportunities for upward mobility of tourism employees. There was also a demand for a high level of public sector intervention in order to quell further deterioration. The adaptancy platform in the early 1980s proffered solutions for or adaptations to current forms of tourism – an 'alternative' to mass tourism which advocated for community involvement and ownership in tourism development. The final knowledge-based platform recognised that the adaptancy platform is not practical for all destinations; acknowledges positive and negative impacts of tourism; and its proponents advocate for a systematic and holistic approach to assess and manage tourism (Hardy et al. 2002; Weaver 2006).

Alternatively, Coccossis (1996) has suggested that there are four ways tourism, within the context of sustainable development, can be interpreted: a sectoral view such as the economic sustainability of tourism; an ecological view highlighting the need for ecologically sustainable tourism; a view that focuses on tourism's long-term viability; and a view of tourism as part of a strategy for sustainable development

throughout the physical and human environments. Clarke (1997) provides a useful framework comprising four positions- polar opposites, continuum, movement and convergence - which chronicles how the understanding of sustainable tourism has evolved over time. As polar opposites mass tourism was seen as bad for development, whereas sustainable tourism was viewed as good for development. The first position was rejected and the notion of a continuum between mass tourism and sustainable tourism emerged reflecting that there was a scale or continuum or as Swarbrooke (1999) described shades of sustainable and mass tourism. This position was viewed as simplistic- a micro-solution to a macro problem (Wheeller 1991) and the movement position emerged, advocating that mass tourism could be made more sustainable, with sustainable tourism being the goal, rather than the possession of an existing scale of tourism. The convergence position reflects the contemporary thinking of sustainable tourism where it is viewed as a goal that all types of tourism should strive to attain, irrespective of scale (Clarke 1997).

Undoubtedly, sustainable tourism's early foundations were anchored in the principles of environmental preservation and the fair distribution of benefits and costs (not dissimilar from the ideals of sustainable development). Achieving balance among these environmental, economic and socio-cultural dimensions are now familiarly referred to as the triple bottom line approach. However, lip-service about the role of stakeholders emerged as a serious concern among academics and practitioners alike, as they increasingly recognized that the host population was an integral part of the tourism product and their role and benefits needed to be incorporated much greater into the planning and management of tourism (Getz and Jamal 1994; Miller and Twinning-Ward 2005). Hardy and Beeton (2001) espoused that it was this stakeholder interest that differentiated sustainable tourism from maintainable tourism. The latter referring to the maintenance of the status quo by managing short-term trends and impacts. Swarbrooke (1999) noted that because of the multiplicity of stakeholders, it is no surprise that there is a real challenge in gaining consensus on what sustainable tourism means and how it can be achieved. Butler (1999 p. 11) contends that confusion and ambiguity will continue to arise if sustainable tourism is automatically viewed as tourism developed along the lines of sustainable

development and suggests, “It is unlikely, therefore, that there will ever be a totally accepted definition of sustainable tourism that is universally applied, because the very success of the term lies in the fact that it is indefinable and thus has become all things to all interested parties.”

Johnston and Tyrell (2005) recognise that an operational definition is essential in the search for sustainability but argue that trades offs are implicit, as it may be difficult to sustain all elements of the tourism industry simultaneously and in a manner that satisfies the majority, if not all the stakeholders. The researcher is also of this opinion and will adopt the view of the convergence position espoused by Clarke (1997), that is, all forms of tourism should strive to be more sustainable, regardless of the form of tourism. Sustainable tourism is not as erroneously defined by some as a type of tourism or market niche but is tourism based on the principles of sustainable development and with the objective to make all tourism more sustainable (UNEP and UNWTO 2005). Accordingly, based on the UNWTO’s definition, the researcher also subscribes to the view that sustainable tourism should:

- Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural resources and biodiversity.
- Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance.
- Ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income earning opportunities and social services to host communities, and contributing to poverty alleviation. (UNEP/WTO 2005 p. 11)

2.3 Sustainable Tourism and Climate Change

Gössling et al. (2009) suggest that climate change is one of the most relevant, if not the single most relevant issue for sustainable tourism. It is noteworthy however, that despite tourism's global economic importance, it suffered omissions from two significant international reports, first (as mentioned earlier) in the Brundtland Report (WCED 1987) and then in 1990 the First Assessment Report of the United Nations Intergovernmental Panel on Climate Change, IPCC (Scott and Becken 2010). It was not until the Davos Declaration on Climate Change (UNWTO-UNEP-WMO 2007 p. 2) that it was declared that "given tourism's importance in the global challenges of climate change and poverty reduction, there is a need to urgently adopt a range of policies which encourages truly sustainable tourism that reflects a 'quadruple bottom line' of environmental, social, economic and climate responsiveness".

Tourism is deemed a highly climate-sensitive economic sector (UNWTO 2009) not only because of its contribution to green house gas (GHG) emissions but because the climate, and by extension the environment, form a major component of the tourism product in many destinations. As a result of climate change and climate variability the international tourism industry is likely to experience:

- direct climate impacts where the destinations will be affected by climate-dependent tourism seasons (e.g. warm weather destination or winter holiday) and the concomitant change in tourism flows;
- indirect environmental change where changes in the natural environment may be experienced (e.g. loss of biodiversity, altered agricultural production, increased natural hazards and coastal erosion);
- impacts of mitigation on tourism mobility manifested in increased cost of transportation or due to awareness and sensitization changes by tourist in their mode of transportation or the selection of a destination closer to home; and finally;
- indirect societal change impacts could have grave economic repercussions by reducing the industry's overall contribution to the global economy thereby

threatening the viability of many destinations (UNWTO-UNEP-WMO 2008).

While tourism's contribution to global carbon dioxide (CO₂) emissions in 2005 was estimated to be approximately five (5) per cent (UNWTO 2008), transport alone generated an estimated seventy-five (75) per cent of tourism-related CO₂ emissions. Forty (40) per cent of the CO₂ emissions generated by tourism's transport sub-sector was derived from a relatively small percentage of (albeit long-haul) air-based travel (Hall and Gössling 2009). This is perhaps an important statistic for destinations within the United Kingdom and of course other destinations with a substantial domestic and/or intra-regional land-locked market. Intra-regional travel is likely to increase as appeals for more alternative modes of short-haul transport gain momentum and increasingly feature as part of the mitigation strategy to reduce tourism's contribution to global warming. As a UNWTO (2009) background paper suggests, the future competitiveness of destinations may depend on their ability to capitalise on the negative climate change impact in one part of the tourism system. Additionally, tourists have a high adaptive capacity to the effects of climate change as they have the ability to adjust the place, timing and type of holiday they take in the future.

Weaver (2011 p. 13) takes a pessimistic view in terms of the current sustainable tourism and climate change discourse suggesting, "It is difficult to imagine a cause more tragic and destined to fail than climate change action." He cites several issues including divided views on adaption and mitigation; lack of the tourism's industry commitment and the unpredictability of future outcomes, and limited and unbalanced knowledge as some of the reasons for the anticipated failure and misplaced emphasis of climate change on the sustainable tourism agenda. According to Weaver (2011), a lack of concrete initiatives regarding carbon neutrality of destinations only compounds the issues of diverting attention from "traditional triple-bottom line" issues at the local level. Lane (2009a p. 28) had earlier echoed some similar concerns, perhaps not as vehemently as Weaver (2011), but suggested that, "the

wider requirements and opportunities of sustainable development may be lost in the rush to claim smaller carbon footprints.”

Scott (2011), in a response to Weaver (2011) acknowledges gaps in the climate change research, challenges with tourism forecasting techniques, rhetoric and green washing by the industry (Hall and Gössling 2009; Scott and Becken 2010; Scott 2011). However, Scott (2011) paints a more optimistic view as he argues that there is evidence that investment in climate change and tourism research is increasing and this will only serve to better inform the sustainable development of tourism in the future. Admittedly, Scott (2011) notes that emission reductions from tourism will have to come primarily from technological changes for the foreseeable future. The researcher will however, seek to address technology from a different perspective, in support of sustainable practices, using the captive audience of the in-trip tourist-relating their use of technology to their specific destination actions rather than what some tourists may view as some nebulous global phenomenon.

2.4 Tourists and Sustainable Tourism

Several authors note that tourists are showing no real evidence about changing their behaviours despite concerns about the environment, climate change and the awareness of GHS emissions generated by travel (Becken 2004, Hall and Gössling 2009; McKercher et. al 2010; Miller et. al. 2010; Weaver 2011).

As new technological innovations emerge, the challenge will be for tourism planners and managers to develop and provide opportunities for the “computer-mediated empowerment” (Hawkins 1996 cited in Buhalis 1998, p. 441) of tourists in order to realise some of the aims of sustainable tourism. The twelve aims of sustainable tourism adapted from a 2005 United Nations Environmental Programme (UNEP) and UNWTO guide are outlined in Table 2.1. A notable absence is climate change, but the guide predates much of UNWTO’s and associated partners recent work in the area of climate change. Arguably, the issue of climate change could be subsumed under the aims of resource efficiency, biological diversity and environmental purity.

Table 2.1 Aims of Sustainable Tourism

Sustainable Tourism Aim	Description
Economic viability	Ensure the viability and competitiveness of tourism destinations and enterprises.
Local prosperity	Maximize the contribution of tourism to the economic prosperity of the host destination.
Employment quality	Strengthen the number and quality of local jobs created and supported by tourism.
Social equity	Ensure the wide and fair distribution of economic and social benefits of tourism throughout the recipient community.
Visitor fulfilment	Provide a safe, satisfying and fulfilling experience for visitors.
Local control	Engage and empower communities in the planning and decision making, management, and future development of tourism in their area.
Community wellbeing	Maintain and strengthen the quality of life in local communities.
Cultural richness	Respect and enhance the historic heritage, authentic culture, traditions and distinctiveness of host communities.
Physical integrity	Maintain and enhance the quality of landscapes , both rural and urban, and avoid the degradation of the environment.
Biological diversity	Support the conservation of natural areas, habitats and wildlife, and minimize damage to them.
Resource efficiency	Minimize the use of scarce and non-renewable resources in the development and operation of tourism facilities and services.
Environmental purity	Minimize land, air and water pollution and the generation of waste by tourism enterprises and visitors.

Source: adapted from UNEP and UNWTO (2005)

Notably, there is still an environmental bias when discussing sustainable tourism despite contemporary definitions incorporating a more holistic approach that also considers the economic and socio-cultural dimensions. Even the addition of climate change to the ‘triple bottom line’ (now making it the quadruple bottom line) is naturally embedded in the environmental dimension. Perhaps this should come as no surprise considering the genesis of the concept of sustainable tourism and the fact that tourists are often attracted by the environmental attributes of the destination (Dodds et al. 2010). Many researchers therefore focus on pro-environmental behaviour when discussing consumers and sustainable tourism behaviour (Becken

2004; Dolnicar 2008; Andereck 2009; Dolnicar 2010; Dodds et. al. 2010). The results from various studies about tourists' willingness to contribute to sustainable efforts have been mixed. Many studies have been limited by questions that tend to focus on tourists' perception (e.g. Andereck 2009), willingness to pay for sustainable initiatives (e.g. Dodds et al. 2010) or intent to engage in a particular kind of behaviour but actual behaviour is not sufficiently studied. In other words, how have the espoused values or understanding of sustainable tourism translated into tangible actions? Pickett-Baker and Ozaki (2008) in their study about purchasing green products confirmed the existence of what they call an environmental value-action gap, which is a gap between consumers' environmental beliefs (concern for the environment) and 'green' behaviour or 'green' purchasing. Sharpley (2009 p. 68) notes, "despite surveys which suggest that tourists are increasingly aware of the impacts of their activities and hence, claim they adapt their behaviour accordingly, there is little empirical evidence of the adoption of such behaviour in practice."

While consumers' understanding of sustainable tourism vary, Miller et al. (2010) contend that pro-environmental behaviour cannot be achieved simply by improving awareness of the problem; real change would come if much more is done than just providing information. They suggest that social marketing and social media could be instrumental in overcoming the public's disempowerment and lack of understanding in support of behavioural changes with respect to sustainable tourism. Kotler and Armstrong (2006) define social marketing as the application of commercial marketing concepts to programmes or initiatives designed to increase the acceptability of a social cause, idea or practice among a target group. Social media utilise electronic personal communications to generate awareness and influence social change via blogs and Internet sites such as YouTube and Facebook. These websites or 'word of web' is becoming just as influential or perhaps exceeding the influence of 'word of mouth' channels (Kotler and Lee 2008).

Peeters et al. (2009) also posited social marketing as important tool for behavioural change but also suggested that apart from social marketing, de-marketing and governmental interventions were two other important additional ways of

accomplishing behavioural change in tourism. De-marketing, a term initially coined by marketing guru, Philip Kotler, could be used to subdue demand of tourism in sensitive areas (more of a demand control device than a behavioural change mechanism). According to Peeters et al. (2009 p.248), social marketing could seek to influence people to “voluntarily accept new, or reject old, or modify or abandon their behaviours for the benefit of individuals, groups, society or the environment.” Government intervention through strategic initiatives such as taxes, quotas, as well as, through social marketing could influence the type of tourism investment, visitor flows, travel modes, activities and ultimately behavioural change (Peeters et. al 2009). Miller et al. (2010) found that the most observable predictor of environmental behaviour was the participation in environmental networks which creates group norms to guide new behaviour and overcome the social dilemma of what is best for society in the long term versus what is best for the individual more immediately.

The United States has seen a growth in “conscientious consumerism” and an emerging segment of consumers who are concerned about the environment and sustainable consumption, a group called LOHAS- lifestyles of health and sustainability (Solomon et al. 2010). However, seven population segments (*See Table 2.2 UK’s Government Pro-Environmental Population Segments*) have been identified for UK consumers by the Department for Environment, Food and Rural Affairs (Defra) in a report on pro-environmental behaviour (Defra 2008). Defra’s 2008 report “pulls together evidence on public understanding, attitudes and behaviours, identifies behaviour goals, and draws conclusions on the potential for change across a range of behaviour groups” (Defra 2008 p.13). The characteristics of the seven behaviour groups or population segments while UK specific, is relevant to this research in light of the significant number of UK visitors to Scotland and by extension the city of Edinburgh. The profile of each segment specifically addresses travel behaviour and knowledge of environmental issues such as climate change and carbon footprint. Similar data was not specifically available for Europe but as highlighted earlier, a number of researchers have examined pro-environmental behaviour in other jurisdictions, at the destination level, as well as examining green buying behaviour (Gupta and Ogden 2009). Knowledge of the characteristics of the

environmentally conscious (e.g. ‘positive greens’) and those less inclined (e.g. ‘stalled starters’) are important in terms of devising the best strategies to change attitudes and behaviour. These issues are addressed in the section on consumer behaviour.

Table 2.2 UK’s Government Pro-Environmental Population Segments

Population Segment	Description/Characteristics
<p>Segment 1: Positive Greens 18% of the population (7.6 M)</p>	<p>This segment holds the most positive pro-environmental attitudes and beliefs and assess themselves as acting in more environmentally friendly ways than any other segment does. While they are likely to be doing the most to reduce their impact on the environment, there is scope for them to do more, particularly with their travel behaviours. They have the highest levels of self-reported knowledge about environmental terms, although still around a half know little or nothing about carbon footprints and offsetting. They are most likely to seek to influence friends, family and the workplace to be more environmentally friendly. They have the highest levels with household incomes of £40k and over per annum. They are the most likely to have a degree. Their profile is biased towards middle age (41-64).</p>
<p>Segment 2: Waste Watchers 12% of the population (5.1 M)</p>	<p>This segment is doing more than any other (except segment 1) to help the environment. However this behaviour is driven by an urge to avoid waste rather than seeking to reduce their environmental impact. More likely than average to be sceptical about the scale and urgency of environmental problems. Their current behaviours focus on those in the home, using a more fuel efficient car and purchasing ethical and local/national products. There is a middle age and older age bias. One third are aged 65 and over (nearly twice as likely as average), while less than a quarter are 40 and under (half as likely as average). One third are retired, and many are on low incomes (two fifths on £20k per annum or less).</p>
<p>Segment 3: Concerned consumers 14% of the population (5.7 M)</p>	<p>This segment holds broadly pro-environmental beliefs, although with less conviction than segments 1 and 2. Members of this group are particularly sympathetic to the concept of ‘climate change’, acknowledging their personal impact and see taking action as important. Their current behaviours focus on environmental behaviours in the home, and some purchasing behaviours; both of which they undertake at above average levels. In terms of travel, this group has greener attitudes to travel than most. One third are aged 30-40, and the lowest levels are aged 65 and over. One third has household incomes of £40k and above per annum and, notably, this includes the highest level of all groups with household incomes of £60k and above (nearly one fifth of the group). They are the second most likely to have a degree.</p>

Population Segment	Description/Characteristics
<p><i>Segment 4: Sideline supporters</i> 14% of the population (5.6 M)</p>	<p>This group has a generally pro-environmental worldview, although these beliefs are held relatively weakly across the board. Their green beliefs have not translated to their behaviours – this is the group where the attitude action gap is most evident. They are much more likely than the first three groups to say they have not thought about doing particular behaviours. However, low knowledge is also a barrier (for example, roughly two thirds say they know nothing about carbon footprints or offsetting). Their current behaviours are less ‘green’ than all except segments 6 and 7 on a range of pro-environmental behaviours including habitual behaviours in the home. They appear receptive though are unlikely to be proactive in acquiring information or adapting their behaviours. Members of this group span all ages, although under 30s are over-represented. They have average levels of household income and fewer than average are educated to degree level.</p>
<p><i>Segment 5: Cautious participants</i> 14% of the population (5.6M)</p>	<p>This group’s environmental worldview is close to the average for the population: members of this group tend to agree there is a pressing crisis, and that there are limits to growth. They are pessimistic about our ability to tackle climate change, but recognise their impacts. They tend to have green travel attitudes, and are particularly keen on travellers paying for the environmental damage they cause. Environmentally friendly behaviours are not a natural fit with their self-identity – with some feeling they would be embarrassed to be green. Half this group report doing only a few things or nothing pro-environmental, but three quarters say they would like to do more – the second highest proportion after segment 1. This group has a younger than average age profile, with one quarter 30 and under. They are the third most likely to have a degree after segments 1 and 3.</p>
<p><i>Segment 6: Stalled starters</i> 10% of the population (4.1M)</p>	<p>This group presents somewhat confused environmental views. Mostly the views are strongly negative: members of this group have the highest level of negative views saying climate change is too far in the future to worry about and, with segment 7, the highest levels of persons believing that the environmental crisis has been exaggerated (about half). They have the lowest levels of knowledge about environmental terms: only just over a third know more than a little about climate change, and nearly three quarters know nothing about carbon footprints. They are most likely to say that their behaviour does not contribute to climate change, and that the environment is a low priority for them personally. Their life may have a relatively low impact on the environment for other reasons, such as financial constraints. They have a lot of serious life priorities to address before they consider the environment. They are the most likely to see being green as embarrassing, while the majority of the group see being ‘green’ as an alternative lifestyle. One sixth of this group (the highest of any) say they are doing nothing to help the environment; yet despite their low levels of pro-environmental behaviour, two thirds say they are happy with</p>

Population Segment	Description/Characteristics
	<p>what they are doing and they do not want to do more. They have the lowest levels of income (nearly half are on less than £20k). They tend to be younger or older, with middle aged people under-represented. They have the lowest levels of qualifications of any group (half have none), and are the most likely not to be working.</p>
<p>Segment 7: Honestly disengaged 18% of the population (7.4 M)</p>	<p>This group's ecological worldview is predominantly shaped by a lack of interest and concern. However members of this group are also sceptical about the current environmental threat (half think it has been exaggerated). They do not see themselves as 'green' in any way, although they would not particularly care if others saw them as such. Debates about the environment and climate change do not touch their lives. Fewer than a fifth have tried reducing their car use or the number of flights they take. Of all groups, they have the highest level saying they are happy with what they are doing, and they do not want to do more to help the environment (three quarters say so). In contrast to segment 6, they are the least likely to want more information about what they could do. Notably they are the least likely to feel guilty about harming the environment. While the group spans all ages, under 30s are over-represented (comprising more than a quarter). Income levels are slightly below average and slightly fewer than average of this group have degrees.</p>

Source: Adapted from Defra (2008)

2.5 Measuring Sustainable Tourism

The quest to bring some uniformity as to what actually constitutes sustainable tourism or a sustainable product has resulted in the proliferation of a number of voluntary initiatives to encourage sustainable management and regulate green messages (Font 2002). Font and Harris (2004) have seen the various awards, manuals, guidelines, indicators and certification schemes as ways in which to operationalize sustainable tourism. Swarbrooke (1999) notes that monitoring systems and measurable performance indicators are two key issues in the implementation of sustainable tourism. McCool et al. (2001) suggest that the extent to which the goals of sustainability can be attained is largely dependent on the extent to which goals and indicators of progress are shared among key tourism stakeholders. They provide a simple definition of indicators:

Indicators are the quantitative variables measured periodically that reflect the condition of socially important issues. They also suggest the efficacy of particular actions designed to achieve attainment [sic] of specific goals. Such indicators reflect definitions of what it is that should be sustained. (McCool et al. 2001, p. 124)

While acknowledging the importance of indicators in the development of sustainable tourism, Gössling et al. (2009) highlight the fact the distinctions have not been made between relative and absolute perspectives of sustainability. In other words, if we are to use emissions as a hypothetical example, a tourism enterprise may reduce emissions by 10% by switching to solar panels resulting in the relative improvement at the organisational level of emissions but at destination level emissions may increase due to increased long-haul visitors that travel by air. Thus, in absolute terms the contribution at the global scale may be minimal or even negative. It is perhaps for this reason that a 1993 UNWTO task force set up to address indicators for tourism recognised that no single set of perfect indicators could be established; that each user will have their own ideal set of indicators dependent on their intended use and that the “indicators had to be defined in terms of serving the end use demand” (Manning 1999, p. 179).

Today, a number of international (e.g. Green Globe for travel and tourism and Blue Flag for beaches and marinas), regional (e.g. Association of Caribbean States [ACS] Sustainable Tourism Indicators for destinations in Latin America and the Caribbean) and national (Certification for Sustainable Tourism in Costa Rica [CST]) sustainable tourism indicators programmes, certification schemes or eco-labels exist with mixed levels of success. A UNWTO (2002) inventory and comparative analysis of one hundred and four (104) voluntary global eco-labels, awards and self-commitments (which are declarations of the organisation’s commitment for better social and environmental behaviour or a code of practice that is supportive of the best social and environmental behaviour) noted that voluntary initiatives for sustainable tourism were more successful where they were private and public sector partnerships. Major

challenges for voluntary sustainable tourism initiatives included financial problems, reduced interest and a poor track record of success (UNWTO 2002).

One of the more popular certification schemes which has been successful in internationalizing its brand, is Green Globe (Font and Harris 2004). Operating since 1993, Green Globe boasts of a presence in eighty-three (83) countries, serving twelve industry categories, and providing certification, training and marketing to its members. The Green Globe Standard is a collection of three hundred and thirty seven (337) compliance indicators applied to forty-one (41) individual sustainability criteria. The applicable indicators vary by type of certification, geographical area as well as local factors. The standard criteria cover sustainable management, social, economic, cultural heritage and the environment. The assessed sustainability performance of travel and tourism businesses and their related partners is based on the following international standards and agreements (Green Globe 2011):

- Global Sustainable Tourism Criteria.
- Global Partnership for Sustainable Tourism Criteria (STC Partnership).
- Baseline Criteria of the Sustainable Tourism Certification Network of the Americas.
- Agenda 21 and principles for Sustainable Development endorsed by 182 Governments at the United Nations Rio de Janeiro Earth Summit in 1992.
- International Standard Organization- ISO 9001/14001/19011.

Indicators and by extension certification schemes provide an opportunity for tourism planners and enterprises alike to be continuously engaged in the monitoring of tourism activity and thereby enhance the management and development of tourism in a sustainable manner. As the development, implementation and methodologies for sustainable tourism indicators steadily improve, success will also depend on the participation of communities in the development of monitoring programmes.

Technological development has also been recognised as an appealing way for businesses to promote sustainability (Miller and Twinning-Ward 2005; Weaver

2006). Therefore, given the overall aims of sustainable tourism, technology potentially provides an opportunity for destinations to not only improve the documentation of the monitoring system but improve performance of the key sustainable tourism indicators by for example, enhancing the overall visitor experience, minimizing damage to natural areas and enhancing the authentic culture, traditions and distinctiveness of host communities (UNWTO 2002).

While theory, planning and implementation of sustainable tourism are complementary engagements, the success of the latter will depend on an understanding of the multiple factors that affect the adoption and diffusion of ideas and the embedded systems in which all the stakeholders of tourism operate (Gössling et al. 2009). As the debate continues on the conceptual definitions, practical applications and measurement of sustainable tourism and sustainable development, perhaps the best way forward is summed up by Butler (1999 p.18) “...it is simply inappropriate in this day and age to develop destinations that do not strive to be as environmentally and socially benign as possible, and hence as close to sustainability as feasible.” It is therefore with a positive approach and recognising the consequences of inaction to improve sustainability that this research would seek to draw on the knowledge of sustainable tourism, consumer behaviour and the significance of ICT in presenting opportunities that can improve sustainability at the destination level.

2.6 Information and Communications Technology (ICT)

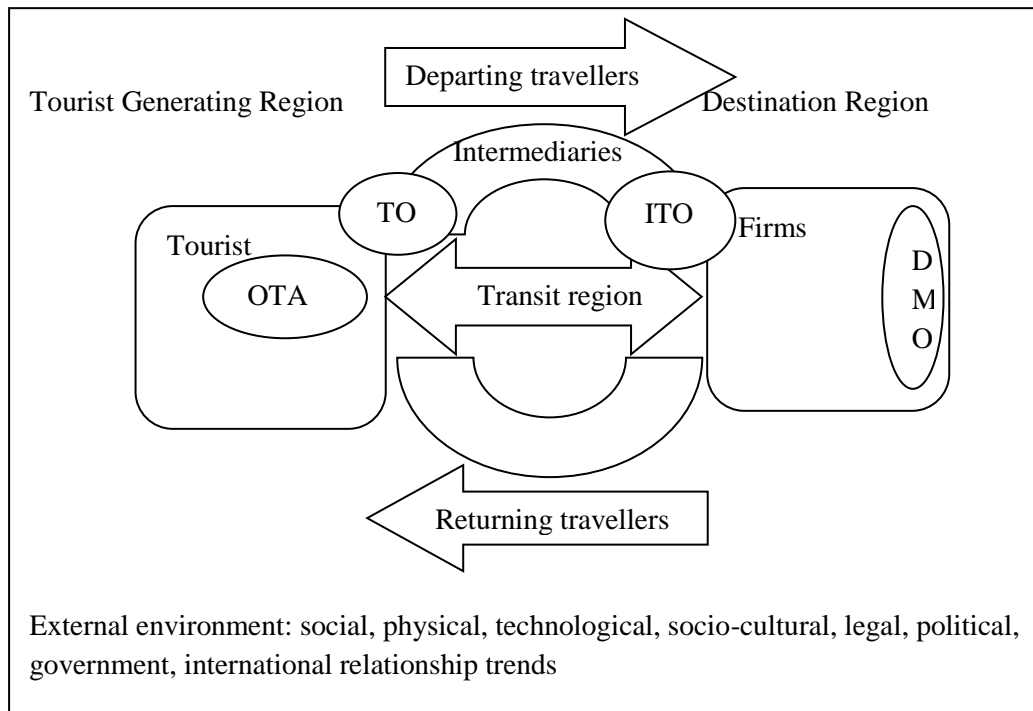
Information and communication technologies (ICTs) are technologies that aid in the electronic processing and communication of information through telephony (mobile and fixed lines), computers, broadband technologies and the related combinations of these technologies (United Nations Conference on Trade and Development 2010). ICTs have become the foundation of our knowledge-based global economy, and its importance is only expected to increase as the need for innovation in social and economic activities expand. The expansion in ICT has been driven by the liberalization of telecommunications markets and wireless technologies. Mobile

phone penetration rates have been unlike any other technology, and now represent the largest distribution platform in the world. Mobile phones allow consumers in developed and developing countries alike to access market information, banking services, weather updates, health services and more. ‘Smart’ wireless services also allow consumers to access the Internet, download music and a host of information services (World Bank 2009). Undoubtedly, information technology has had a huge impact on international trade and business process re-engineering (Buhalis 2003), a reality amplified by changing consumption patterns and the emergence of numerous businesses that have established ICTs as the cornerstone of their activities.

Tourism has been transformed by ICT where technology has not only been an enabler of change but an inducer of change (Poon 1993; Werthner and Klein 1999; Buhalis and O’Connor 2005). The travel industry now thrives on information where the effective use of ICT is critical for its competitiveness and prosperity (Law et al. 2009). Racherla et al. (2008 p. 412) posited the notion of creating future knowledge-based destinations, where the social, economic and cultural dimensions create “well-defined knowledge and learning infrastructures that support innovative exploitation of emerging technologies”. While many scholars have pointed out the critical role that ICTs play in assuring the sustainable competitive advantage of tourism (e.g. Frew 2000; Buhalis and O’Connor 2005; Minghetti and Buhalis 2010) it is often not explicit how ICTs could enhance the social, cultural, economic and environmental dimensions of the tourism industry, in fact, Buhalis (2003) described the importance and necessity for using ICTs as a relatively new subject area in the literature. Its specific application to sustainable tourism is still evolving.

Leiper’s (2004) tourism system model is instructive in identifying the key players that will dominate the technology-tourism landscape. Leiper (2004) proffered a theoretical construct for studying tourism from a whole systems approach where there are five elements – the traveller-generating region, departing travellers, the transit route, the tourist destination region and returning travellers. These elements are influenced by the external factors of the technological, sociocultural, economic,

physical, political and legal environments. Buhalis (2003 p. 81) further developed the model (See Figure 2.1) and notes that this tourism system is dominated by ICT, which establishes “an info-space for each tourism organization and by constituting an info-structure within which the entire industry can operate.”



Source: Based on Leiper 1994; Adapted from Buhalis (2003)

Key: OTA= Outbound travel agencies; TO = tour operators; ITO= Inbound tour operators; DMO=Destination management organisations

Figure 2.1 The Tourism System

Yeoman et al. (2006) in their work with the Future Foundation identified technological innovation as a key driver shaping the behaviour of tomorrow’s consumer. They noted at the macro-level, future tourists will increasingly be at odds between consumerism and a broader concern for societal impacts; sustainability will play an incremental role in consumer choice, giving rise to ethical consumption, where the motivation to purchase will be influenced by pre-existing philosophical concerns in the consumer’s mind, rather than just price, quality and opportunity. These trends provide a fantastic opportunity to use ICT to support the sustainable development of tourism.

Butler (1999) contended that the introduction of the concept of 'sustainable development' was one factor more than any other, that had the potential to change the nature of tourism. Arguably, several other factors in today's tourism-technology landscape will influence the services provided by businesses and the kind of experiences tourist expect in the destination. It's been twenty years since Poon (1993) identified the forces driving what was then called 'new tourism'. Today's technology has since made significant leaps and bounds. As a World Bank (2009) report notes, the increase in high speed Internet access and use of mobile devices have changed the face of global commerce. PhoCusWright (2012) point to social media, cloud computing, personalization and gamification as trends affecting mobile development. The information flow is no longer uni-directional from business to consumer (B2C) but from consumer to consumer (C2C), and consumer to business (C2B). According to Ayeh et al. (2013), the hospitality and tourism industry represents one of the main domains being impacted by the Web 2.0 phenomenon and the use of consumer-generated media (detailed later on in this chapter).

2.6.1 eTourism Applications

ICT in Tourism or eTourism as it is more familiarly known, represents the digitisation of all process and/or functions in the various sub-sectors of tourism: eDestination, eTransport, eHospitality, eIntermediary, eActivity, eInformation (Buhalis 2003; Scarnota 2003 in Bauer et al. 2008). Buhalis and Law (2008) in their research on the state of eTourism research have identified three main themes: consumers and demand dimensions; technological innovation; and industry functions. They noted that the Internet is one of the most influential technologies that have impacted travellers' behaviour. In the late 1990s Sheldon (1997) had identified three ways in which electronic information could be made available to in-trip tourists: through a destination information system (DIS) typically operated by the national tourism office; an information kiosk in public places; and television-based technologies to provide in-room (hotel/home) information. Today, DISs are still prominent and growing in their capabilities, but, the availability of mobile phones with Internet capabilities and other wireless technologies have resulted in a diminished role for information kiosk and television-based technologies.

Bauer et al. (2008) suggest that consumers' growing sophistication means that contemporary eTourism applications must not only seek to provide information but should also encompass communication (e.g. email, social networking) and transaction functions (i.e. allowing consumers to make reservations and purchases). They stress the importance of information quality, and more specifically outline key aspects for preparation and presentation of information, navigational quality and content layout. These are captured in *Table 2.3 Assessing Information Quality of eTourism Applications*. These issues are of course relevant to consumers' and could determine not only the extent to which there is an uptake of specific eTourism applications, but their continued use, enjoyment and recommendation to others. Given the perceived risk in purchasing tourism services, Bauer et al. (2008) suggest that, where possible, the tourist should be able to "pre-experience" the product by testing it virtually, and then be able to exchange views on the product with other customers.

Table 2.3 Assessing Information Quality of eTourism Applications

Information Quality	Assessment Criteria
Presentation of information	Comprehensiveness Accuracy Amount of data
Navigational quality	Structure & menu guide Search function
Content Layout	Loading times Ease of location, search engine coverage, accessibility Maintenance of standards Text/ Graphics/ Media

Source: Adapted from Bauer et al. (2008)

2.7 ICT and Sustainable Tourism

Egger and Buhalis (2008 p. 331) point out that “nowadays, it would be impossible to maintain the tourism system without sophisticated ICT solutions. The dynamism of the market, ever-changing customer needs and new technological developments require and encourage the on-going developments of ICT systems.” Central to this new dynamic is the demanding, yet sophisticated consumer. The growing demand by consumers for timely and accurate information relevant to their needs is equally matched by the growing awareness of issues related to resource use and management, community access and equity. Though these are not defined by consumers as ‘sustainability issues’ per se, the environmental dimension seems to resonate more with consumers. As far as tourism is concerned, Dodds et al. (2010) suggest that it is often a destination’s environment that may initially attract a visitor and this is perhaps why expressions of concern about the environment dominate. Arguably, it depends on the destination and type of holiday. Another way to assess the environmental bias is to give credit to the success of social marketing. However, in many cases awareness about the issues related to sustainability have done very little to change consumer behaviour (Swarbrooke and Horner 2007; Miller et al. 2010).

More recently, researchers are recognizing the potential of ICT to support sustainable tourism. Seminal work by Ali (2009) identified a number of ICT-based applications that could enhance sustainable tourism. Identified tools included economic impact software; geographical information systems; weather, climate and ocean change forecasting software; destination management systems; and community informatics. However, these tools /applications looked at the opportunity of applying these technologies from the perspective of the destination management organisation (DMO). A total of sixteen (16) distinct ICT tools/applications were identified which served to address the needs by the destination management organisation for information management, tourist satisfaction, interpretation, enabling partnerships, community participation and energy consumption (Ali 2009). However, not all of the benefits that the identified technologies provide to destination management

organisations would be relevant from the in-trip tourists' perspective. This current research is more concerned with the ICT tools/applications that in-trip tourists could engage with in order to support the sustainability of the destination. As a result, opportunities for enhancing tourist satisfaction, interpretation, community participation and energy consumption are arguably possible opportunities for the destination that are relevant to the study. While community participation ultimately influences a more positive attitude to tourism and would contribute to a positive tourist experience and ultimately satisfaction levels, the tools identified (community informatics and geographical information systems) are specific to the use of the members of the host community to allow them to be involved in the planning and sustainable development of the destination. Therefore, based on the opportunities for sustainable tourism in the areas of tourist satisfaction, interpretation and energy consumption, the applicable tools for in-trip tourists include location based services, destination management systems, intelligent transport systems, wireless technology, carbon calculators and virtual reality. These are summarized in *Table 2.4 ICT-Applications/Tools Applicable to In-Trip Tourist*. A description of each of these tools follows, as well as the possible contribution (from the in-trip tourist perspective) each tool can or makes to the specific aims of sustainable tourism identified by the UNEP and UNWTO (2005) [See Table 1 Aims of Sustainable Tourism].

Table 2.4 ICT-Applications/Tools Applicable to In-Trip Tourists

Contribution to Sustainable Tourism	ICT Applications/Tools
Tourist satisfaction	Wireless technology Location based services Intelligent transport system Virtual reality Destination management system Social media
Interpretation	Location based services Virtual reality
Energy Consumption	Carbon calculators Intelligent transport system

Source: Adapted from Ali (2009)

2.7.1 Wireless technology

Wireless technologies utilise “radio waves to provide coverage in certain geographic areas [or cells]” (Buhalis and Pistidda 2009 p. 384). Flouri and Buhalis (2004) had previously used the term wireless technology to describe primarily third generation (3G) mobile networks and Wireless Local Area Networks (WLANs). However, with the rapid pace of technological development wireless technologies now extend to evolving fourth generation (4G) networks or systems and Worldwide Interoperability for Microwave Access (WiMAX). The 4G system while providing for many current 3G system features (e.g. digital, multimedia and global roaming), offers a higher bit rate to users (ranging from 10Mbps-100Mbps), global roaming access across multiple wireless networks and Internet protocol (IP) interoperability of diverse wireless and mobile networks. Future mobile services including mobile commerce (m-commerce), which will be important for DMOs, will be reliant on dependable wireless networks transmitting at bit rates higher than current 3G systems (Dekleva et al. 2007; Rissen and Soni 2009). According to Buhalis and Pistidda (2009), once WiMax is available to the mass-market it is likely to be the chief platform for providing location-aware services and consequently will be particularly important for LBS applications in tourism. Additionally, wireless technologies such as WiMax is likely to change the way DMOs make information available to tourists (Buhalis and Pistidda 2009).

Wireless technologies such as cellular or mobile telephones, personal digital assistants (PDAs), Bluetooth and Wireless Fidelity (Wi-Fi) devices are having the most influence in today’s market, with the mobile telephone being the most important wireless technology (Nickerson 2008). Mobile telephones provide a plethora of application and service opportunities owing to its ubiquity, localization awareness (facilitated by Global Positioning Systems, GPS), immediacy, personalisation (or customisation), broadcasting capabilities, portability, and identification via the SIM card (Lee and Mills 2007). Despite these favourable characteristics of mobile telephones, issues of cost for services including roaming charges; the availability of service in visiting countries, interactivity; download speed

(Flouri and Buhalis 2004), security and privacy are key areas of concern for tourists (Tjostheim et al. 2004; Pura 2005; Junglas and Watson 2008).

At a very practical level one has to consider what types of activities during the buying process and the experiential components of tourism are done on mobile devices, personal computer or both. These factors have implications for design and businesses would need to have an appreciation for user experiences on mobile sites as opposed to other sites. Ericksson (2012) found that the usage of mobile devices and personal computers among consumers can be complementary and not a case of either or. This of course will vary across markets, the speed of Internet connectivity and the proliferation of smartphone devices in said markets. PhoCusWright (2011) note that travel innovation will be shaped by social functionality as a key strategic component of e-commerce and customization.

2.7.1.1 QR Codes and Near Field Communications (NFC) Technology

Other wireless technologies, while not particularly new but may be receiving more application in the tourism domain, or the consumer domain in general, are QR Codes and Near Field Communications (NFC) technology. A QR code is a two-dimensional barcode which represents a form of mobile tagging which provides a way to easily link mobile services to a physical object (Candi et al 2010; Tan and Chang 2012). QR Codes can be created online and QR code readers can be downloaded for free on many smartphones. QR codes used in the tourism sector provide a useful source of up-to-date and quick source of in-trip information for tourist (Tan and Chang 2012). Tourists using smartphones with an installed QR code reader can scan a QR code with their mobile (e.g. at attractions, event venues, bus stops and train stations) and be immediately directed to a web link which provides the information being sought.

According to Resatsch (2010 p. 27), NFC is a technology related to Radio Frequency Identification, RFID (typically used in supply chain management, inventory control and theft reduction) and is defined as “a standardized interface technology for the

exchange of data between electronic devices such as PCs, mobile telephones and RFID tags.” Similar to the QR code, NFC technology operates through a system of mobile telephones (or other similar devices), tags or smartcards and readers. NFC phones are already available on the market but consumers may not be aware, for example, Nokia 6131 NFC was on the market in 2007 and Nokia 6212 NFC in 2008 (Resatsch 2010). According to Ozdenizci et. al. (2010), NFC is one of the promising technological innovations in the information and technology domain. Pesonen and Horster (2012) note that there is a huge potential for NFC technology in travel and tourism, as it can enable destinations to improve their service quality and marketing. They cite several examples including NFC-based travel guides, payment and ticketing systems, smart posters, navigation systems, hotel check-in systems and social applications. Due to the simplicity of NFC technology, for example no separate reader has to be downloaded like when reading QR codes, and the fact data can be passed between devices without an Internet connection makes the technology more attractive than some existing wireless technologies. However, there has generally been slow adoption and not enough devices have been created to fuel the customer demand. Nonetheless, the potential remains great as NFC technology can significantly enhance the in-trip tourist experience for real-time, in-situ information while allowing the destination to maximize its marketing through for example, mobile coupons and discounts (Pesonen and Horster 2012).

There are numerous opportunities to support sustainable tourism practices with wireless technologies owing to the added strength of Internet-enabled mobile technologies. The mobile telephone was previously highlighted as the world’s largest distribution platform (World Bank 2009) and the most important wireless technology (Nickerson 2008). Its current capabilities and superiority over traditional desktop computers (Lee and Mills 2007) offers tremendous potential to the overall aims of sustainable tourism. While there is always the temptation to concentrate on economic sustainability and by extension opportunities for local prosperity that m-commerce can provide to destinations, in terms of the broader aims of sustainable tourism, wireless technologies will indeed enhance visitor fulfilment. Tourists will be able to use their mobile telephones to make reservations and pay for services, get directions,

recommendations and receive specific information on points of interest based on their individual profile. In this regard, information management by tourism stakeholders cannot be overemphasized and it is only through innovative approaches that wireless technologies can be used as the medium through which community well being, physical integrity, cultural richness, biological diversity, resource efficiency and environmental purity of the destination can be promoted. Some of these are discussed further in the next section on location based services.

2.7.2 Location Based Services (LBS)

This section first provides an overview of LBS, examines technologies that provide localized content and how they support sustainable tourism. The section concludes with a discussion of the opportunities that LBS can offer to destinations.

2.7.2.1 Overview of LBS

Duri et al. (2001 p. 20 cited in Pura 2005) define location based services (LBS) as “services in which the location of a person or an object is used to shape or focus the application or service.” There are four main areas where the application of LBS dominates in the consumer domain: safety, navigation and tracking, transactions, and information (Barnes 2003). The primary driver for LBS in the United States (US) has been safety (Barnes 2003) however, according to Pura (2005), the pace of commercialization of LBS in the UK, France and Germany has been much slower than the US due to the low levels of awareness of such services and a lack of interesting content. More recently, Junglas and Watson (2008) have highlighted three main reasons for the slow adoption of LBS: accurate localization techniques by providers have taken much longer and have been more costly than anticipated; available services have long response times; and privacy concerns by consumers. They also underscored the distinction between location-tracking and location-aware services. Location-tracking services allow information about a user’s whereabouts to be shared by other parties other than the user, for example, companies use tracking systems for their delivery truck drivers, while location-aware services generates user

requested information to the user based on their personal location data, for example a car navigation system (Junglas and Watson 2008).

The concentration in tourism for the mobile traveller is on location aware services that can provide rich contextual information based on user preferences (Zipf and Malaka 2001). According to Ficco et al. (2010 p. 118), LBS can operate through a 'push' or a 'pull' mechanism, depending on how the position procedure begins: the 'pull' occurs when the user initiates the request for location information and 'push' occurs when "the positioning procedure is required by a network application (such as advertising-message-delivery service) and indirectly by a user (such as through a subscription...)."

Ghandour and Buhalis (2003) have noted that the creation of customer-centric applications is important for fulfilling the needs of mobile travellers and enhancing their overall experience. "Modern travellers increasingly expect to be provided with location-based, personalized, up-to-date information to improve their experience" (Egger and Buhalis 2008 p.417). Navigation and information are perhaps the most valued functionalities that LBS can provide to in-trip tourists. In the case of the service provider or DMO, LBS provide the opportunity to contextualize, localize and personalize mobile applications (Egger and Buhalis 2008).

2.7.2.2 Global Positioning Systems

Global positioning systems (GPS) enable the user to determine their current position anywhere in the world. The system is based on satellites that orbit the earth to triangulate one's position (Curran and Smith 2005). Ficco et al. (2010) note that positioning mobile devices in 3G wireless communication networks such as the Universal Mobile Telecommunications Systems (UTMS) is vital to commercial services including emergency services, location-sensitive billing, advertising, locating points of interest and more. As a stand alone device or built into contemporary electronic devices including 3G and 4G mobile devices, GPS capabilities along with Bluetooth, Wi-Fi and RFID (Ficco et al. 2010) not only allow in-trip tourists to use online mapping services, which could provide directions in

unfamiliar territory, but it also allows tourists to query services (for example accommodation or restaurants) based on their current location.

New systems such as the LOVO Lifestyle Assistant, which is considered “one of the first professional Web 2.0 applications in eTourism” (Fleischhacker 2008 p. 441) is a lifestyle-information service that builds customized profiles based on registered users (users register online for the service and build their profile/preferences specifying social and demographic characteristics) interests, moods and needs, personal character orientation (e.g. adventure), current weather conditions and importantly, their current or planned location. This innovative application was designed to be used via multiple channels: mobile devices, web-based devices and set-top-box base devices such as in-room hotel television. LOVO is also unique as content is not provided by tourism suppliers, but through consumer ratings for every recommendation. LOVO also uses web-services to provide supplementary information such as schedules for public transportation services and routing information for passenger-car traffic (Fleischhacker 2008). LOVO and emerging applications such as Rivertale’s mobile services for cruise ships, which is an interactive multimedia mobile cultural tourist guides designed for an information kiosk or a PDA (Dickinger and Zins 2008), foretell of the advanced capabilities of LBS.

2.7.2.3 Recommender Systems

Recommender systems within mobile applications serve to ensure, based on ratings, that the in-trip tourists can select the best options for experiencing a tourist attraction, restaurant or hotel, as well as the shortest route for travel, best times and best dates. Based on the widely cited definition of recommender systems proposed by Adomavicius and Tuzhilin (2005), recommender systems have been described as ‘intelligent e-commerce applications’ which suggest that such systems will naturally be developed to support commercial interests, which may not necessarily be compatible with some elements of a sustainable tourism agenda. Though not explicitly designed to support sustainability, Ricci (2010) highlights a number of

recommender systems that are knowledge based systems, and do provide options for example, walking as opposed to using some form of carbon-based transport. This allows tourists to avail themselves of more points of interest that they may otherwise miss, as non-knowledge-based recommender systems may only respond to a specific request e.g. the fastest/shortest route from point A to B.

Burke (2007) classifies recommender systems into four categories: collaborative based, content based, knowledge base and hybrid. These systems make recommendations by correlating user preferences with ratings of other users; current user preferences, historical information from previous product sessions, or a combination of these, respectively.

The growing prevalence of such intelligent applications in the tourism domain, provide travellers with the opportunity to become their own travel agents (Zanker et al. 2008), in an on-line environment where there is an overwhelming number of options available to travel consumers. As a result of information overload (Hwang et al. 2006), the significance of recommender systems is increasing, as it simultaneously offers a filtering mechanism and a decision support tool to potential consumers (Ricci 2010). Ultimately, recommender systems provide a personalized product or service recommendation based on the user's preferences and needs (Mahmood et al. 2008; Ricci 2010). Such systems or applications use various recommendation paradigms (Zanker et al. 2008) - constraint based, content-based and collaborative information filtering techniques to execute a strategy to deliver a recommendation/(s) to the user based on contextual factors in a given situation or environment. Fesenmaier et al. (2006) described recommender systems as one of the fastest growing Internet applications and as such, their use is only expected to increase in sophistication and effectiveness.

2.7.2.4 Opportunities for LBS

The combined application of LBS enhances the visitor experience, and contributes to positive worth of mouth (WoM). eWoM (through for e.g. email and social media e.g. Facebook, TripAdvisor) promotes the destination and their businesses thereby

enhancing the future prospects of the destination, including local prosperity and economic viability. A current example of how LBS can augment the visitor experience is through QR codes which allow in-trip consumers to connect physical and virtual content (Candi 2010; Tan and Chang 2012). Tan and Chang (2012) note that onsite information could influence how tourists view a destination and increase the range of information provided by a destination marketing organisation.

Undoubtedly, LBS contribute to visitor fulfilment (Ghandour and Buhalis 2003; Pura 2005). Wireless, mobile devices also underscore the value of LBS to tourists allowing them to receive context relevant and preferential information based on their own interests and/or profiles. Recommender services can also nudge tourists to take walking tours as opposed to taking a taxi, directing them away from congested sites or allowing them to make monetary contributions to conservation efforts. Many of the aims of sustainable tourism can be simultaneously attained through the provision of innovative LBS to in-trip tourists. Wang et al. (2012) note that the experiential phase (i.e. the in-trip phase) is linked to the tourist's psychological process and emotional state and smartphones provide an opportunity for tourists visiting the same destination and searching for similar information to connect in online communities- this itself enriches the travel experience and thereby contributes to visitor fulfilment.

There are however greater developmental works taking place with LBS technologies to enhance cultural richness, than in areas to directly improve physical integrity, biological diversity and environmental purity. What is needed is the requisite content as the technology is already available, but perhaps the demand does not exist and/or the opportunity or importance not recognised. LBS less directly can improve resource efficiency, environmental purity, and community wellbeing. Contributions to cultural richness is evidential in a number of LBS designed specifically for cultural tourism which leads to "... the maintenance of credibility of the touristic attraction, the quality of experience and eventually to the visitor satisfaction" (Huvila et al. 2008 p. 345). The Republic of Korea's national tourism organisation introduced a location based tourism information service, using the GPS feature of a mobile handset to provide context rich information for tourists.

Additionally, the tourism authority has developed location aware technologies to specifically enhance the cultural experience and draw tourists into historical components of their visit through story-telling and games. Similar undertakings have also occurred in Europe (PEACH-personal experience with active cultural heritage) to increase the quality of heritage appreciation; intelligent-spatial technologies in the US and Geoquest in France (Kim and Schliesser 2007), to name a few. These applications have all been geared to the cultural/historical market. Opportunities abound for technological applications to enhance the historic heritage and culture of destinations not only using LBS but also through wireless technologies such as PDAs, which can be rented to tourists by local tourism authorities [e.g. US Cities and Korea] (Kim and Schliesser 2007).

Based on the aims of sustainable tourism (UNEP and UNWTO 2005), the researcher believes that in all but a few cases, LBS, used by in-trip tourists, could be used to support sustainable tourism practices at the destination. One area in which sustainability may not be augmented by LBS is in the area of social equity. The digital divide between and within countries still exists. Low-access tourism destinations, as well as, small and medium enterprises (SMEs) which often have a lower rates of innovation diffusion than larger firms, due to *inter alia* lack of resources and skills, run the risk of being less competitive and therefore the long term economic viability of SMEs may be compromised due to slow technological uptake (Minghetti and Buhalis 2010). The opportunities for LBS in terms of the aims of employment quality, and local control are not applicable. Some may even argue that the on-line services create a diminished role for some front-line jobs in tourism while creating other job opportunities in the IT sector, which is likely to need a smaller pool of personnel than direct contact jobs. So, employment quality may improve but not necessarily in the tourism sector. Local control deals with engagement and empowerment of the local communities in tourism planning and there are other technologies (e.g. community informatics) that enable this process, not LBS. These technologies will not be explored given this study's focus on in-trip-tourists. In terms of achieving the other sustainability aims, specific additional content may need to be provided in some cases to enhance the application's

contributions to sustainability at the destination, but the technological infrastructure already exists.

2.7.3 Virtual Reality

Another fast emerging technology being utilized in the tourism industry is virtual reality. Guttentag (2010 p. 638) defines virtual reality (VR) as “the use of a computer-generated 3D environment-called a ‘virtual environment’- that one can navigate and possibly interact with, resulting in real-time simulation of one or more of the users five senses.” Several authors have noted that the unique nature of tourism products- its intangibility, inseparability and the perceived risk in purchasing vacation experiences, makes virtual reality a powerful and important tool to enhance tourism (Cheong 1995; Cho et al. 2002; Guttentag 2010; Hyun et al. 2009). Pantano and Servidio (2011), citing their earlier work, have expressed the view that VR supports product customization, the tracking of visitors’ behaviour and enhances the visitors’ experience. They found that the interactive nature of virtual tools made VR more effective than static, traditional tourist guides. Guttentag (2010) identified six principal areas where VR technologies are used in tourism: marketing, planning and management, heritage preservation, education, accessibility, and entertainment. Hyun et al. (2009 p. 160) have suggested that a mobile-mediated virtual experience should be an important element of DMO marketing strategy which “can add the value to tourists’ pre-trip, en-route and post trip travel experiences.”

At the pre-trip planning stage a virtual tour, which Cho et al. (2002) noted is akin to having a ‘product trial’, can be a powerful marketing tool for the destination management organisation, helping to manage visitor expectations and transforming experiential attributes to searchable attributes. The prospective tourist is provided with a low cost means in which to sample the destination, dispel uncertainties and increase the desire to visit the destination (Cheong 1995). One of the more prominent on-line interactive virtual environments is Second Life. Second Life allows users to interact with each other through animated avatars. Virtual worlds of various

destinations can be experienced and even museums have duplicated themselves using the Second Life application (Guttentag 2010).

In relation to the use of VR technologies for tourism planning and management, Cheong (1995) has noted that limitations of traditional two dimensional representations of physical layouts of tourism regions can be alleviated with VR technologies. Such technologies allow tourism planners to envision the impact of site development in specific areas, address citing, and carry capacity issues including environmental impacts, and allows members of the host community to be involved in participatory planning.

Opportunities for virtual tourism or the uses of VR technologies are not only limited to the pre-trip phase or web-based technologies but are also increasingly being used in-trip. A popular application of in-trip VR technologies which aids in heritage preservation has been at museums and historical sites where human traffic needs to be minimized or where there has already been evidence of deterioration due to excessive visitation or simply due to the sensitive nature of the environment. The added benefit to heritage preservation is the use of VR technologies to address accessibility issues and provide an educational experience to sites that may have ordinarily been too fragile or dangerous. Educational opportunities are not only limited to museums and heritage areas but could also be exploited at other tourism sites. Additionally, disabled in-trip tourists can enjoy all the benefits of the tourism experience without the accessibility challenges through VR technology. The entertainment and edu-attainment value of VR technologies is evident in their wide use in museums and theme parks around the world, with in some cases, the technology itself becoming the attraction (Guttentag 2010).

Various equipment such as a head-mounted display (HMD) in the form of a helmet, goggles or glasses; hand-supported displays (HSDs) which function like binoculars; floor-supported displays (FSDs), headphones and haptic devices which are glove-like devices covering the entire arm or body, provide users with visual, auditory and tactile experiences, respectively. Research with respect to taste and smell are less

advanced but the visual and auditory components of VR appear to be the most important for tourism (Guttentag 2010).

Cheong (1995) was among the first scholars to dispel the notion that VR could be a threat to tourism with people substituting a virtual environment for an actual vacation. While the virtual environment reduces risks, saves cost and time, allows access to “unreachable areas”, eliminates the hassle of visas and airport delays etc., it is arguably limited in terms of the range experiences one can enjoy. “Travel and tourism is a social and cultural event. People visit faraway destinations not only for the novel sights, but also interact with local culture and heritage” (Cheong 1995 p. 421) of which people form an integral component. Bellotti et al. (2009), in reference to the “Travel in Europe” (TiE) project, an online 3D virtual world for European heritage, note that the technology’s intent is in no way an attempt to offer a substitute for a real visit to heritage sites but should be used to motivate real visits. They add that such technologies could be an important promotional tool for less popular regions or destinations. Qualitative research conducted in Calabria, Italy by Pantano and Servidio (2011) demonstrated that after a virtual experience, potential tourists were in fact motivated to visit a destination and make comparisons between the virtual experience and the actual one. Guttentag (2010) questioned whether VR experiences could be considered a form of tourism or entertainment, as tourism by definition involves people travelling to and staying in a destination that is outside their normal place of abode. He has noted however that “some sites could face economic challenges in the face of sufficiently sophisticated VR substitutes” (Guttentag 2010 p. 647).

Therefore, VR technologies have tremendous potential to support sustainable tourism contributing to economic viability by exploiting its use in the areas identified by Guttentag (2010) and Cheong (1995). The use of VR technologies for tourism and planning help to achieve the sustainable tourism aims of local prosperity, social equity, visitor fulfilment, local control, community well-being, physical integrity, biological diversity, resource efficiency and environmental purity. VR’s role in enhancing employment quality at the destination appears less applicable to the aims

of sustainable tourism. As a marketing tool Cho et al. (2002) emphasized that virtual tours available on the Internet provides an opportunity to increase tourists' satisfaction with the actual travel experience. In sum, VR technologies offer both the DMO and the tourist opportunities to boost sustainable tourism initiatives as the destination level and according to Bellotti et al. (2009 p. 208), "the spreading of online Virtual Reality environments and related technologies is likely to open new and important opportunities to enhance tourism, and in particularly cultural tourism given the possibility of creating compelling virtual adventures set in the context of artistic and natural beauties."

2.7.4 Augmented Reality

Azuma (1997) described augmented reality (AR) as a variation of virtual reality and outlined three characteristics of AR: (i) a combination of real and virtual (ii) interactive in real time and (iii) registered in 3-D. Olsson et al. (2013) suggest that AR relates to a broader concept of mixed reality (MR). "Mixed reality refers to the integration and merging of the real and virtual worlds where physical and virtual objects complement and interact with each other" (Olsson et al. 2013 p. 288). While virtual reality is based solely on a computer generated world, AR enhances rather than replaces the surroundings of the user by providing an overlay of real-time virtual information (Linaza et al. 2012; Yocheva 2013). Figure 2.2 provides an illustration of AR application on a mobile device, where the user points to an object of interest with her/his smartphone device and the camera output displays information about the environment. Examining the opportunities that AR provides for tourism, Yocheva et al. (2013) focused on the in-trip phase, stressing how AR enhances the tourist's experience through, *inter alia*, playfulness and entertainment, engagement, awareness, efficiency, meaningfulness and empowerment.



Figure 2.2 An Illustration of Augmented Reality on a Smartphone

A recent report by the Digital Tourism Think Tank (2013) highlighted ten AR applications that have the potential to revolutionize the way in which tourists experience a destination. Some of these are already familiar in the tourism context, such as AR browsers in the destination and museum interactivity. The more noteworthy examples include location-based AR games and the use of AR to support participatory destination management, where planned innovations can be superimposed upon the actual environment.

Olsson and Salo (2012) note from their research on mobile augmented reality (MAR) that not all MAR experiences are positive and therefore, a great deal of attention must be placed on design. Olsson et al. (2013) highlight six design characteristics for facilitating pleasurable user experiences: easy and flexible access; distinct affordances (cues must be sensitive to context); privacy and control; reactivity, relevance; and reliability. The potential of AR technologies to support the aims of sustainable tourism is very similar to the opportunities presented by VR however, even more so because of the real-time feature of AR. As such MAR can enhance visitor fulfilment, cultural richness, economic viability, local prosperity, local control, resource efficiency, biological diversity, physical integrity and environmental purity.

2.7.5 Destination Management System

Destination management organisations (DMOs) are typically the main marketing arm of local, national and regional tourism organisations providing information and promoting the destination to prospective tourists, businesses and distribution partners. Traditional services included the provision of brochures, maps and leaflets; advisory services to travellers and the travel trade; and promotion and advertising. Technology has transformed the marketing function of DMOs incorporating elements of distribution throughout all major tourism sub-sectors (e.g. hotels, events, transportation, food and beverage, attractions, etc.), public inter-agency coordination, stakeholder coordination, local level collaboration, relationship marketing, complaints handling, and supporting the overall customer experience during the pre-trip, in-trip and post-trip phases (Chung and Buhalis 2008). According to Guthrie (2004), DMOs are using ICT to develop destination management systems (DMSs) at all levels within the destination- local, sub-regional and national.

Horan and Frew (2007) proposed a comprehensive definition of destination management systems based on a Delphi study with eTourism experts:

Destination management systems are systems that consolidate and distribute a comprehensive range of tourism products through a variety of channels and platforms, generally catering to a specific region, and supporting activities of a destination management organisation within that region. DMS attempt to utilize a customer centric approach in order to manage and market the destination as a holistic entity, typically providing strong destination related information, real-time reservations, destination management tools and paying particular attention to supporting small and independent tourism suppliers (Horan and Frew 2007 p.63).

As far as the tourist is concerned, the DMO website often serves as key starting point for vacation planning, however during the in-trip phase, which is the focus of this research, Choi et al. (2007) have noted that in-trip on-line usage rates are

significantly lower than the pre-trip and post-trip stages. Some of the in-trip on-line activities of US and Canadian tourists in Choi's et al. (2007) study on DMOs websites, included sending or checking emails, weather/travel advisory, maps/driving directions, events, sending e-post cards, general travel information and information on restaurant/bars. Of course many of these activities are not the sole domain of DMS or DMO websites but could easily be provided by LBS via a mobile handset e.g. GPS for maps and driving directions; recommender systems or social media for general travel information, and information on restaurants and bars. Incidentally, Hofbauer et al. (2010) have stressed that Web 2.0 applications (e.g. social media websites such as Facebook, Twitter and YouTube) provide a diversified information presentation- combining text, video and audio content, as well as, an interactive experience. Thus, such applications provide a valuable resource of the DMO in terms of marketing, and for the tourist in terms of acquiring information.

Touray and Jung (2010) have suggested that both the DMS and geographical information systems (GIS) are important ICT applications that will facilitate the delivery of sustainable tourism by DMOs. The DMS provides a platform to augment the economic, environmental, socio-cultural structures of destinations and play key supportive role in the overall visitor experience during the pre-trip, in-trip and post-trip stages (Touray and Jung 2010). The literature does identify the important role that DMS can play in sustainable tourism development; however, its role during the in-trip phase is less significant than in the pre-trip phase. What is important are the reinforcement of key messages and the provision of critical links in the destination. These links and opportunities to promote sustainable tourism practices should not only be technological in nature but should also include front-line staff at tourist information centres and other customer-contact tourism personnel as key reinforcers. DMS are increasingly providing mobile applications on their websites and this provides an important, convenient and cost effective link between sustainable tourism practices and the in-trip tourist experience.

ICTs have certainly transformed the functionalities of DMOs through DMS that ultimately enhances the destination's competitiveness and contributes to all the aims

of sustainable tourism. The DMS supports the economic viability, local prosperity, employment quality, community well-being and the social equity of the destination and the recipient community by allowing large and small players alike to have a space in the tourism “infostructure”. Admittedly, there are still a number of challenges with small and medium tourism enterprises (SMTEs) including inadequate training, poor strategic management, lack of marketing skills and the short-term orientation of managers (Daniele and Frew 2008). However, with the increasing expectations of e-savvy travellers it will be difficult for SMTEs to survive without incorporating ICT into their business. A fulfilling visitor experience is enhanced by the informational, transactional and interactive features that DMSs provide or could potentially provide. Additionally, the aforementioned features provide opportunities to enhance the cultural richness and support the physical integrity, biological diversity, resource efficiency and environmental purity of the destination.

2.7.6 Intelligent Transport Systems

An intelligent transport system (ITS) describes the combined information technologies used to manage ground transportation and provide route information to travellers. Whilst there are a wide of array of technologies available, those most applicable to tourism include: fleet management systems, automated vehicle location systems, automated traffic management systems, traveller information systems and route guidance systems (Sheldon 1997; Daigle and Zimmerman 2004). Ericksson (2002) noted that the ITS-sector is particularly important for providing in-trip information but the technology could be made even more valuable if traffic information is combined with information about tourism services and products.

While in-trip tourists may benefit from the output of fleet-management systems and automated vehicle location systems (AVLs), they are not likely to engage with fleet management systems personally or directly. These are used by bus companies and taxi services to manage their fleet and estimate arrival and departure times, respectively. Electronic signs or bus trackers at bus stops for example, would be an

example of the AVLs in action for tourists and locals alike. Route guidance systems also referred to as in-vehicle navigational systems would also be very valuable to in-trip tourists allowing them to identify the best route for their journey. Such systems make use of a geographical information system (GIS) database which stores maps and geographical information of a given location. A computer device in the vehicle retrieves information from the GIS database in order to determine the best travelling route. Similar use of an on-board computer system provides traveller information services which gives real-time information about parking space availability, congested streets and accidents locations. According to Barrero et al. (2010), the future of ITS would be in mobile phones with Internet capability where each vehicle would have its own IP address which would create a digital environment within vehicles, vehicle-to-vehicle communication and links between vehicles and the transport infrastructure. They also note that embedded systems in ITS can promote a reduction in pollution, fuel consumption and road accidents.

Daigle and Zimmerman (2004) highlighted that one of the expected benefits of ITS technologies is their ability to contribute to the productivity and economic viability of a region, noting that the enhanced visitor experience and increase mobility would also encourage longer visitor stays. While destination managers benefit from the use of ITS as a travel-demand management tool for tourist attractions, the ITS also has the power to influence the travel decisions of tourists thereby allowing them to choose alternative days or times for their visit, thus ensuring that congested sites do not contribute to a negative tourist experience. Therefore, in terms of the aims of sustainable tourism development, ITS have the potential to contribute to the economic viability, local prosperity, visitor fulfilment, community wellbeing, physical integrity, biological diversity, resource efficiency and environmental purity of a destination.

2.7.7 Carbon Calculators

Carbon calculators offer travellers an opportunity to compensate for their carbon emissions by obtaining carbon credits which seek to offset the pollution generated

through their travel or vacation. Most of the carbon dioxide emissions (40 percent) in the tourism industry are derived from aviation (UNWTO 2009). As a result, some airlines and tour operators are increasingly offering tourists the opportunity to calculate on-line, how much carbon dioxide would be emitted from their travels, based on the miles travelled and related fuel usage of their journey. Tourists then have the option to voluntarily contribute to an off-setting project. Carbon offsetting projects are considered an investment in GHG emissions reductions and are used to invest in renewable energy, energy efficiency and reforestation (Carbon Offset Guide Australia 2011) primarily in developing countries and island economies which are most vulnerable to the impact of climate change (Gössling and Schumacher 2010). The number of voluntary carbon-offsetting schemes available in the market has caused some degree of confusion among tourists. However, the United Nations Framework Convention on Climate Change (UNFCCC) has created a Gold Standard Certified Emission Reductions programme to ensure that the projects certified have sustainable development benefits (UNWTO 2009).

There is a lot of scepticism in the market place not just about how the carbon dioxide emissions are calculated by various companies, but that the use of carbon calculators and off-setting projects creates a tendency for businesses to confer their responsibility to be more carbon efficient to the consumer (Goodwin and Walmsley 2010). The question arises whether carbon calculators demonstrates “additionality” that is, if they really help to reduce GHG emissions- does it sensitize the consumer, helps to tackle global warming or does it ease the guilt by providing a “get-out-pardon” (Goodwin and Walmsley 2010 p.16)? Additional concerns about carbon offsets highlighted by the International Institute for Environment (IIED 2008 cited in Goodwin and Walmsley 2010) are: the challenges in credit accounting which have allowed credits to be sold multiple times; that funds have not targeted the communities most vulnerable to the impact of climate change; the high transaction costs for offsets make small projects in individual communities unfeasible; and the fact that some projects have just not been sustainable.

An increasing number of destinations have touted their intention to become carbon neutral destinations, Scotland being among them (Gossling 2009) but few countries have seriously pursued this due to “political fears, lack of expertise and uncertainty regarding the costs of achieving such an objective” (Gössling and Schumacher 2010 p. 378). Scotland does have a real opportunity to reduce carbon emissions by encouraging the majority of UK visitors (66 percent) who travel by car (VisitScotland 2011) to switch to rail. However, intentions to grow the high-spend international and business tourism markets by 2015 (Edinburgh Tourism Action Group, ETAG 2008) will have to be measured against the economic benefits to be derived and the cost to the environment. Recent data also suggest that Scotland is not meeting its carbon emissions target and has to revise future projections. An increase in emissions reported in 2013, based on 2010 data, showed an increase of 6% over 2009 figures. While colder winters were partially to blame, cuts in production emissions (e.g. industrial processes) have been outweighed by carbon dioxide in the form of imported goods (Committee on Climate Change 2013). These emission trends emphasise the need for evidence-based multi-sector, public-private policy development and planning among players in tourism, transportation, the environment, agriculture and other productive sectors. There is indeed a cost to the environment and society, as richer nations seek to satisfy their consumers’ appetite for cheap imported goods, which are too often produced by workers employed under questionable labour conditions.

While carbon calculators could potentially, but indirectly assist in improving resource efficiency, biological diversity and environmental purity, this has to be supported by technological developments in the aviation industry and emission reductions by businesses and individuals. Any gains realised from resource efficiency will improve prospects for economic viability, community well-being and local prosperity of tourism destinations. The reality is that the battle with climate change would only be won through a collective response. Overall, emissions reductions will have to be achieved within the economic systems where the pollution is generated “rather than through offsets accomplished outside the system” (Gössling and Schumacher 2010 p. 390). It also appears that carbon calculators and off-setting

projects are no longer in “vogue” and this could be attributed to some of the challenges identified by Goodwin and Walmsley (2010) and improved efficiency in the transportation sector, including technological advancements in aviation.

2.7.8 Web 2.0 and Social Media

2.7.8.1 Overview

According to Xiang and Gretzel (2010), if tourism marketers want to reach customers and promote their destinations in a better way they need to respond to the paradigm shift in the distribution channel and the technological dynamic of ‘new media’. New media is a pluralistic term encompassing new ways of representing the world; new textual experiences; new relationships between users/consumers and media technologies; new experience of identity and community; new conceptions of the biological body’s relation to technological media (artificial and virtual technologies versus the real); new patterns of organisation, distribution and production (Lister et al. 2009).

Egger (2010) notes, given that tourism is very much a social activity, it is well suited for Web 2.0 approaches within the tourist’s consumption process. Web 2.0 has been the platform for the genesis of social media (Kaplan and Haenlien 2010.) Web 2.0 was preceded by Web 1.0, where in the case of the latter, consumers were not the producers of information, and communication could be described as a very inert one-to-one process (Riegner 2007). Today’s world of Web 2.0 involves ‘prosumers’ at the nucleus, that is, consumers who are also the producers (Shuen 2008; Egger 2010). The content available today on the world wide web provides for richer user experiences and interactivity that could not be possible without functionalities such as AJAX (Asynchronous Java Script), RSS (Really Simple Syndication), Adobe Flash and web services (Shuen 2008; Kaplan and Haenlein 2010). The user is no longer a passive viewer or reader but a socially engaged and active participant (Shuen 2008). According to Kaplan and Haenlien (2010 p. 61), the term User Generated Content (UGC) is used “to describe the various forms of media content that are publicly available and created by end-users.” They define social media as “a

group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content” (Kaplan and Haenli 2010 p. 61). Some popular Web 2.0 sites used in travel and tourism are summarised in Table 2.5.

Table 2.5 Web 2.0 Sites and Applications Used in Travel & Tourism

Site	Description	URL	Users
Couchsurfing	A social networking website that connects travellers with locals in the places they visit.	http://www.couchsurfing.org/	5,500,000
Instagram	Online photo sharing application with design filters.	http://www.instagram.com/	100,000,000
Facebook	The world’s largest social networking website that connects users with family, friends and businesses.	http://www.facebook.com/	1,100,000,000
Flickr	Online photo management and sharing application.	http://www.flickr.com/	87,000,000
Foursquare	Allows users to share and save information about places visited, provides personalized recommendations and opportunities for social networking.	http://www.foursquare.com/	33,000,000
TripAdvisor	The world’s largest travel website offering photo-sharing, reviews, deals and social networking.	http://www.tripadvisor.com/	57,000,000 <i>Unique visitors per month</i>
Twitter	Twitter is a real-time information network	http://www.twitter.com/	500,000,000

	that connects users to stories, ideas, opinions and news of interest. Messages/Tweets are 140 characters long and can include photos and video.		
WhatsApp	A cross-platform mobile messaging app which allows users to exchange free SMS messages, photos, audio, videos and share current location.	http://www.whatsapp.com/	200,000,000
Youtube	Video sharing website.	http://www.youtube.com/	1,000,000,000
Yelp	A location based service designed to connect people with local businesses.	http://www.yelp.com/	78,000,000

2.7.8.2 Technology, The Experience Economy and Co-creation

Related to the proliferation in the use of social media in travel is the notion of co-creation. Seminal works by Pine and Gilmore (1998) and Prahalad and Ramaswamy (2003; 2004) describe the co-creation of experience as the new source of a firm's competitive advantage which will be a key aspect of how consumers assess value in the future. Value creation shifts from solely being within the firm and along the traditional value chain to being created by the experience of each consumer, in a specific context and at a given time (Prahalad and Ramawamy 2003). According to Pine and Gilmore (1998 p. 99), "New technologies in particular, encourage, whole new genres of experience..." Neuhofer et al. (2012) suggest that co-creation provides a new benchmark of experience creation. This experience should be neither product or company centred (Binkhorst and Dekker 2009). The internet and in particular, Web 2.0 technologies, are a key vehicle for co-creation as it allows consumers to

interact with suppliers, other consumers, family and friends. Given the experiential nature of tourism and the simultaneous consumption and production of tourism services, technology mediates the co-creation process and at the same time helps to minimise risk (Etgar 2008). Within the tourism context, the experience network includes a host of travel intermediaries, accommodation, attractions and other suppliers, as well as, other consumers within the tourism domain. Increasingly this experience is being co-created via the Web 2.0 platform. Stamboulis and Skyannis (2003 p. 41) suggest that destinations need to create “a distinctive sense of involvement and belonging”. The level of customer satisfaction and the degree of customer involvement will determine whether the consumer engages with a supplier in the future. The role of the supplier is thus to ensure experiential interactions and encounters with customers are useful (Payne et al. 2008).

Chul, Miller and Roberts (2009 cited in Nusair et al. 2012) identify five categories of social network technologies from a managerial perspective- broad collaboration, broad communication, collective estimation, metadata creation and social graphing. When looking at the social web in the context of tourism, industry practitioners often use the term Travel 2.0 which includes applications and technologies such as RSS, tagging, blogs, mashups, pod casts, contextual advertising, behavioural targeting and social networking (Schmallegger and Carson 2008).

A study conducted by Gretzel and Yoo (2008) found that the majority of the leisure travel respondents (97.7 %) who used the Internet for travel planning had read other travellers’ reviews in the process of their trip planning. Increasingly travel sites are allowing users to log-in via Facebook, which makes Facebook an important gateway to travel sites, notwithstanding the fact that FaceBook Place is dedicated to the sharing of travel experiences. More recently, a study by Dwivedi et al. (2012) on the use of social media by national tourism organisations, found that among the 81 NTO’s (out of 195 countries) that used at least one social media platform, 79% used Facebook, 62% Twitter, 59% YouTube, and 26% Flickr. Despite the popularity of TripAdvsior among tourists (Xiang and Gretzel 2010) there seemed to be disconnect between what tourist use and the links provided by NTO’s internationally. Stankov’s

et al. (2010) study that looked at the use of Facebook by NTO's in Europe also found them lacking in terms of exploring the full marketing opportunities provided by Web 2.0 applications.

NTO's would do well to re-evaluate their marketing strategy given that travel blogs and other review sites like TripAdvisor are being perceived as more credible and trustworthy than traditional promotion strategies undertaken by marketing organisations (Chung and Buhalis 2008; Akehurst 2009; Del Chiappa 2011). While the online peer-to-peer communication has been increasing steadily, and several authors have noted the significance of social media, particularly in the trip planning process (Arsal et al. 2008; Chung and Buhalis 2008; Cox et al. 2009; Xiang and Gretzel 2010; Yoo and Gretzel 2012) and sharing of post-trip experience, there is no evidence of how social media promotes a destination's overall sustainability, particularly in-trip. There is some contribution to enhancing visitor fulfilment (See Table 2.1 Aims of Sustainable Tourism) and good, honest recommendations create positive eWOM and increase the likelihood that highly recommended sites or attractions continuously promote a positive visitor experience (barring service failures). This redounds to the economic viability and local prosperity of the destination. An interesting development highlighted by Akehurst (2009) is that some destinations, for example VisitFlorida, use local people to provide information on their destination blogs. Apart from the trustworthiness of the information, this strategy also serves to enhance visitor fulfilment, economic viability, community well-being and local prosperity if supported by other initiatives that contribute to the other aims of sustainable tourism.

Recently, Fotis et al. (2012) in their research on the use of social media and its impact during the three phases of the travel process have noted that there are differences in the adoption and usage of social media across tourism source markets. A Chung and Buhalis (2008) study found that information acquisition benefits had the greatest influence on the degree of participation by persons in online travel communities. Other less influential benefits were socio-psychological (identity seeking, maintenance of relationships) and hedonic (fun, amusement and

entertainment). Gretzel and Yoo (2008) and Cox et al. (2009) have also noted in their research the varied perceptions, trust levels, usage and adoption of social media across national tourism markets. Therefore, national tourism markets will need to be studied before embarking upon any social media strategy.

2.8 eTourism Applications and Sustainable Tourism

A summary of the contribution of each of the identified eTourism applications and the contributions that they currently or could potentially make to achieving the aims of sustainable tourism are summarized in Table 2.6.

Table 2.6 Summary of Potential Contribution of Key eTourism Applications to Sustainable Tourism Aims

eTourism Application	LBS	ITS	VR/AR	CC	DMS	WT	Social Media
Sustainable Tourism Aim							
Economic viability	√	√	√	√	√	√	√
Local prosperity	√	√	√	√	√	√	√
Employment quality	N/A	N/A	N/A	N/A	√	N/A	N/A
Social equity	X	X	√	N/A	√	√	N/A
Visitor fulfilment	√	√	√	√	√	√	√
Local control	N/A	N/A	√	N/A	√	N/A	N/A
Community wellbeing	√	√	√	√	√	√	√
Cultural richness	√	N/A	√	N/A	√	√	√
Physical integrity	√	√	√	√	√	√	√
Biological diversity	√	√	√	√	√	√	√
Resource efficiency	√	√	√	√	√	√	√
Environmental purity	√	√	√	√	√	√	√

Key: X≡ the technology does not contribute to sustainable tourism aims; √ ≡ the technology can contribute to sustainable tourism aims; N/A≡ Not applicable

2.9 Tourist Behaviour

Given the current research focus on in-trip tourists, it is critical to gain an appreciation for consumer behaviour theory before an understanding can be gained about the factors that affect consumer adoption of technology and the relevant acceptance models that can be applied to the tourism domain.

2.9.1 Consumer Behaviour Theory

Consumer behaviour may be defined as the process by which individuals or groups choose, use, or dispose of ideas, goods, services or experiences to satisfy needs and wants (Sheth and Krishnan 2003). There are four main categories of factors that influence consumer behaviour: psychological, personal, social and cultural factors (Kotler and Armstrong 2006). These factors and their related components are exhibited in Figure 2.3 Factors Influencing Consumer Behaviour.

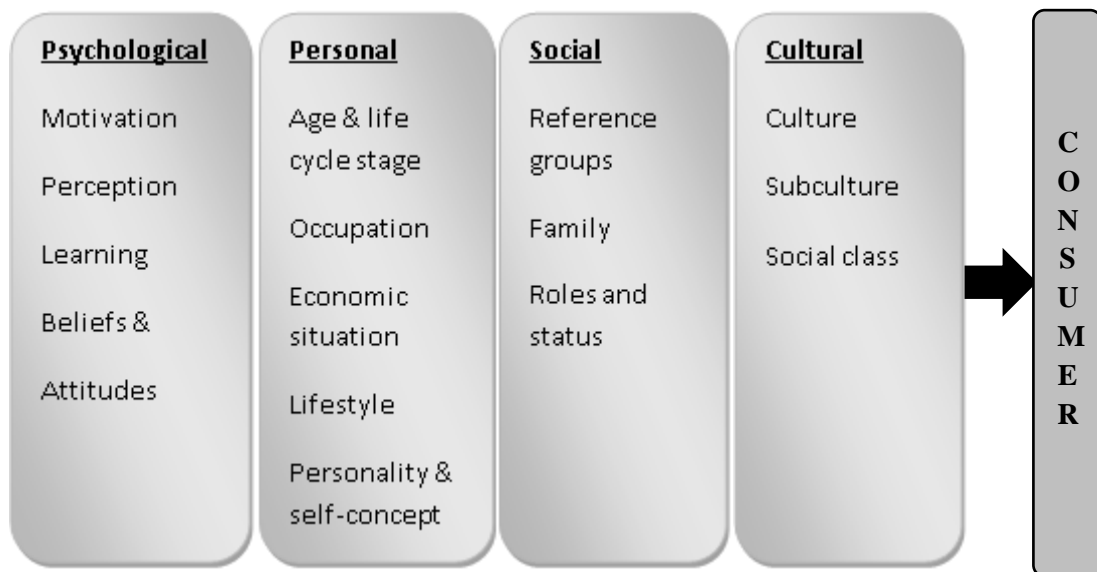


Figure 2.3 Factors Influencing Consumer Behaviour

The researcher acknowledges the contributions that each dimension (psychological, personal, social and cultural) of consumer behaviour makes to an understanding of the consumer decision-making processes. This process generally involves consumers moving through the stages of problem or need recognition to information search,

evaluation of alternatives, then purchase and finally the post-purchase experience or evaluation (Snepenger and Snepenger 1993; Blackwell et al. 2001; Sheth and Krishnan 2003; Kotler and Armstrong 2006).

Each of the four main factors which affect consumer behaviour will be addressed within this study's literature review, and of course in the subsequent analysis of the primary research, to the extent to which they are significantly associated with the research problem. Therefore, the depth of information provided for each sub-component will be based on its importance related to in-trip tourist behaviour, use of ICT tools/applications and sustainable tourism practices. It is emphasized that the level of discussion or detail provided on each sub-component of the main consumer behaviour factors (See Figure 2.3 *Factors Influencing Consumer Behaviour*) will not be comparable, as some sub-components will be more relevant to the research. The literature on consumer behaviour specific to tourism highlights the importance of attitudes, motivational factors, perception, as well as, personal, social and cultural factors in influencing vacation choices (Swarbrooke and Horner 2007). These are further addressed in the section dealing specifically with tourist behaviour theory and practices. Beliefs, attitudes and intention are dealt with in-depth and issues of learning and reference groups are addressed therein. An understanding of these issues is critical not just for understanding and predicting consumer behaviour but are also important foundational elements for models of technology adoption behaviour.

2.9.2 Attitudes, Intention and Behaviour

The concepts of beliefs, attitudes and intention while important elements in terms of the psychological factors affecting consumer behaviour, are significant concepts in their own right. Many researchers in the consumer domain are ultimately interested in what drives behaviour. The belief is that if there is an understanding of the antecedents of behaviour then this knowledge can then be harnessed to influence or change behaviour. Additionally attitudes, intention and behaviour are also important for understanding the technology acceptance models developed by Davis (1989),

Venkatesh and Davis (2000) and Venkatesh et al. (2003) which build on the key elements of intention and behaviour to predict the adoption of technology at the organisational level. These models will be discussed in a separate section of this chapter.

Two pioneers into the theory and research of understanding attitudes, intention and predicting social behaviour are Martin Fishbein and Icek Ajzen (Fishbein and Ajzen 1975; Ajzen and Fishbein 1980). They posited that a person's attitude is their negative or positive evaluation of an object. An attitude has also been described as a learned predisposition to respond in a consistently favourable or unfavourable way with regard to a given object. A person's attitude is very specific to the object at hand, which could be a person, issue, behaviour, or institution. Attitude is viewed as comprising of three components: cognitive, affective and conative (See Figure 2.4 Traditional Components of Attitude). The cognitive component deals with opinions and beliefs; the affective component deals with feelings and opinions and the conative component refers to a person's behavioural intentions or behavioural tendencies toward the attitude object (Fishbein and Ajzen 1975; Engel et al. 1995).

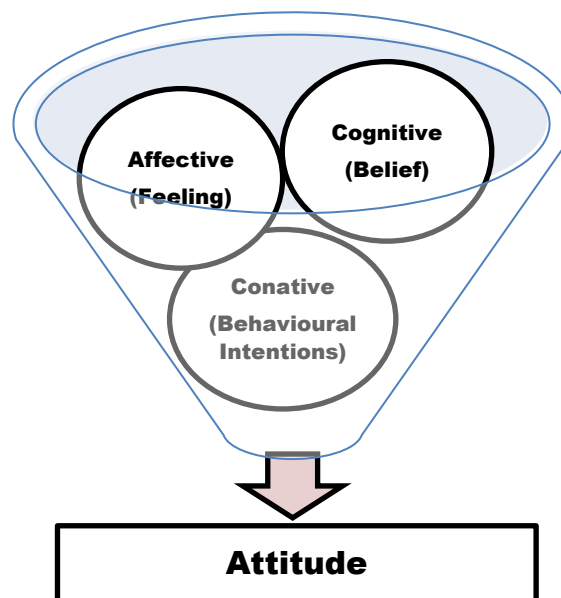


Figure 2.4 Traditional Components of Attitude

The knowledge of a person's attitude towards an object cannot predict the performance or non-performance of a behaviour, it is the person's intention to perform a particular behaviour that determines his or her attitude (Fishbein and Ajzen 1975). Based on this fundamental understanding, Ajzen and Fishbein (1980) proposed the Theory of Reasoned Action (TRA) which is based on the belief that a person's intention is determined by a personal factor and the person's perception of social pressure to perform or not perform a particular behaviour (social influence). The first determinant of intention, the personal factor, refers to the individual's own evaluation, positive or negative, of performing the behaviour (attitude toward the behaviour). The second determinant deals with perceptions of the person's significant referent others, that is, an influential person or persons whose opinions are valuable, and this is termed the subjective norm. Central to the TRA is that attitudes and subjective norms are a function of belief (Ajzen and Fishbein 1980).

According to Ajzen and Fishbein (1980 p. 41), "intention is the immediate determinant of behaviour, and when an appropriate measure of intention is obtained it will provide the most accurate prediction of behaviour." They claim that intentions should always predict behaviour, if the measure of intention corresponds to the behavioural criterion and provided that the intention has not changed prior to performance of the behaviour (Fishbein and Ajzen 1975; Ajzen and Fishbein 1980). Sarver (1983) in his critique of the TRA notes that Ajzen and Fishbein (1980) neglect the influence of the context of opportunity, which is a situation in which a person is provided with an opportunity to act in a manner consistent with his beliefs; and contextual variables which are described as unexpected events that intervene in the casual sequence of determining behaviour, that may influence a person's intention to perform or not perform a specific behaviour. In other words, despite one's intention to do something, an unforeseen event may change their behaviour. For example, while one's intention may be to stay-in for the night and watch television, an unexpected visit and an invitation from a friend who has free tickets to the finals of a football game, can quite easily result in a change in one's intended behaviour.

While there may be some merit to Sarver's (1983) argument, Ajzen and Fishbein (1980) do recognise that there are some "unforeseen circumstances" that do impinge on the predictive validity of behavioural intention. Notably, Sarver (1983) offers a hypothetical situation without empirical testing and therefore lacks validity. Conversely, a number of researchers, including the proponents of the TRA have been able to empirically demonstrate the predictive influence of intentions on behaviour.

Research does lend support to the fact that behavioural intention often predicts behaviour (but not always). The TRA deals with a person's predisposition to behave in a particular manner, that is, one's intention, not with the behaviour itself (Fishbein and Ajzen 1975). This is an important point as this research is concerned with tourists' actual behaviour with technology while on vacation (in-trip) and not their intention to engage with the technology in the future. Huffman et al. (2003 p.12) also shares Sarver's (1983) views on the limitation of the TRA noting that, "it does not account for consumer adaption to proximal contextual factors such as the set of available alternatives." This means that given other options an individual could choose to do something or behave in a manner that they did not intend. Additionally, the TRA does not provide a process model that accounts for the how and why the evaluative dimensions of the attitude structure can change (Huffman et al. 2003). The most significant feature of the TRA for researchers to note is that it is "a highly situation-specific instrument of prediction", whose prediction strength is contingent on "the most rigorously specified circumstances" (Foxhall 1998 p. 88). Ajzen and Fishbein's model predict behavioural intentions and not behaviour.

Bagozzi and Warshaw (1990) sought to include two main dimensions of attitude toward behaviour that was not included or emphasised by Ajzen and Fishbein (1980). Bagozzi and Warshaw (1990) developed the theory of trying which focused on goal directed behaviour (e.g. losing weight) and the influence of past behaviour to determine three attitudes- attitude towards success, towards failure and towards process. Research into their model has supported the fact that given a particular goal, an individual's past experience and recency of past trying will impact on consumers'

willingness to try, and therefore provides an understanding and predictability of 'trying to consume' (Schiffman et. al 2001).

Recognizing the shortcomings of the TRA, Ajzen (1991) developed the theory of planned behaviour (TPB) as an extension of the TRA. The TPB sought to address limitations pertaining to those behaviours over which people have volitional control. Volitional control refers to the extent to which a behaviour can be performed at will (Engel et al. 1995). A behavioural intention can be demonstrated only if the behaviour in question is under volitional control. The performance of most behaviour depends also on some non-motivational factors e.g. time, money, skills, and the cooperation of others. Volitional control and non-motivational factors embody an individual's actual control over the behaviour. The TPB recognised that attitude and subjective norm are determinants of behavioural intention but introduced perceived behavioural control (PBC) as an additional element which can be directly used to predict behavioural achievement or directly influence intention. PBC refers to a person's belief about how easy or difficult it would be to perform a behaviour. Where there is a belief that there is a lack of resources or opportunity to perform a given behaviour, that is, if there is low PBC, the intention to perform a behaviour is likely to be weak. Research findings have generally been supportive of the utility of the PBC as a determinant of intention and behaviour. The research also specifies that any incremental accuracy in predicting behaviour provided by PBC will vary according to the degree of volitional control one has over the behaviour (Ajzen 1991; Engel et al. 1995).

The literature on attitudes, intention and behaviour often tend to give a cursory overview of the non-motivational factors of time, money, cooperation of others and skills, but these are acutely important elements in the context of time-sensitive and budget conscious tourists. Notably however, the influence of family, friends or others (in the travelling party in the case of tourism) on decision-making process has been aptly addressed by a number of researchers (e.g. Snepenger and Snepenger 1993; Sirakaya and Woodside 2005; Therkelsen 2010) and is a key facet of the subjective norm dimension in the attitude theory and technology adoption models. The skills

factor is of some significance in the context of this research as tourists will need to have some level of skill, that is, they must already utilise information and communication technologies in their everyday lives, where moderate to intensive level of searching is conducted to acquire information and/or make purchases. PBC which evolved later into the perceived ease of use by Davis (1989) is a significant factor that will influence the use of ICT tools by in-trip tourists. Intuitively, the more user friendly the technology, the greater the likelihood that people will be willing to use it. It is unlikely that the promotion of sustainable tourism practices would be the incentive for the use of ICT. It more likely that sustainable tourism practices will become an incidental beneficiary of the use of ICT tools/applications.

Consistent with the TRA, behaviour is believed to be more highly related to behavioural intention than beliefs, feelings and attitudes (Ajzen and Fishbein 1980; Engel et al.1995; Schiffman et al. 2001). Engel et al. (1995) identified five properties of attitudes namely, valence, extremity, resistance, persistence and confidence. Valence examines whether an attitude is positive, negative or neutral; extremity refers to the varying degrees of liking or disliking; resistance is the degree to which an attitude is susceptible to change; persistence seeks to explain the longevity of attitudes- whether it erodes over time; and confidence refers to the firmness of belief in one's attitude, it is an indicator of the strength of the attitude-behaviour relationship. The less confidence held by a person the greater the likelihood of initiating a change, whereas if the attitude is held with great confidence it will be more difficult to bring about a change in an individual (Engel et al. 1995). These properties are important in the context of this research as it will be important in devising or proposing strategies to change attitude and ultimately behaviour as it relates to the use of in-trip technologies that are supportive of sustainable tourism. While some tourists may not have knowledge about the specific tools or applications available they may have formed a particular attitude towards sustainable tourism development. Moreover, as noted by Engel et al. (1995) attitudes can even be formed in the absence of actual experience with an object, so even without full knowledge of terminology, there maybe an attitude to a dimension of sustainable tourism.

2.9.3 Attitude Formation and Strategies for Change

After defining attitudes and its relationship with behaviour, the question arises how can attitudes be changed in order to modify behaviour? In order to employ any strategies to change attitudes one must first understand how attitudes are formed. According to Mowen (1995), attitudes are directly formed via two mechanisms: through behavioural learning processes and through a mere exposure phenomenon. He cites three types of behavioural learning theories: classical conditioning, operant conditioning and observational learning. Several other researchers (for example, Assael 1998; Schiffman et al. 2001; Solomon et al. 2010) use a different learning theory typology based on two schools of thought with respect to consumer learning- the behaviourist school and the cognitive school.

According to Assael (1998), the behaviourist school makes the association between an individual's response and their exposure to a given stimuli. They are two types of learning theories proposed by the behaviourists: classical conditioning and instrumental conditioning. Classical conditioning occurs over a period of time as an individual becomes exposed to a stimulus, for example, an advertisement with a sporting personality which conjures up a positive feeling and through repetition, the consumer begins to form an association with their positive feelings and the advertised product. Expressed more simply, consumers learn through association.

Instrumental or operant conditioning provides a description of how consumer habits are formed based on their evaluation of the stimulus that provides the greatest level of satisfaction. Under instrumental conditioning the individual has control over the response and learns by trial-and-error. It is this form of conditioning that provides a better explanation than classical conditioning for complex goal-directed activities of consumers. If the response to a stimulus, for example, using a specific product is satisfactory then the purchase and use is likely to be repeated and results in positive reinforcement. Negative reinforcement would occur if the product experience was unpleasant or negative but at the same time encourage a specific behaviour for example, losing one's wallet while on holiday could encourage the purchase of travellers' cheques in the future. If a learned response is not reinforced then it

becomes extinct as consumers no longer make the connection between the stimulus and the response. Additionally, due to a lack of use and the passage of time consumers could simply forget about a product (Assael 1998; Schiffman et al. 2001). These are important elements for the continued use of specific types of technologies by in-trip tourists in a destination, as ultimately, it is the destination's communication strategies that will initially create awareness, encourage uptake and reinforce use. However, critics of instrumental learning theory highlight that a significant amount of learning takes place without negative or positive reinforcement. Much of what consumers learn occurs through modelling or observational learning (also called vicarious learning) -by watching others and imitating their behaviours. According to Engel et al. (1995), vicarious learning is a special type of learning involving both behavioural or cognitive learning theories and is the form of learning that underlies much of today's advertising. Other critics argue that instrumentalists confuse learning with performance behaviour and place high value on environmental manipulation at the expense of cognitive processes that comes with learning as a result of consumer's thinking and problem solving (Schiffman et al. 2001).

Researchers in the cognitive school focus on mental processes (including memory-retention, retrieval and recall) to explain cognitive learning including how consumers learn information and problem solving (Engel et al. 1995). Cognitive ability determines consumers capacity to utilise product information and as Schiffman et al. (2001) note, in the case of technical information, consumers with greater cognitive ability will tend to acquire more information, are able to have greater recall and therefore advertising messages have greater impact on purchase decisions.

If how consumers learn affect their attitude formation, then, this knowledge would be instrumental in devising strategies for changing attitudes. This researcher believes that this knowledge about attitude formation is acutely important not only as far as sustainable tourism is concerned but also in cases where there is resistance to technology or slow rates of technological adoption (discussed later in the chapter). According to Solomon et al. (2010), before any attempt is made to change an attitude

it is important to understand “why an attitude is held?” additionally, they note that while attitudes can serve more than one function, one attitude often dominates. Solomon et al. (2010) have also highlighted some key functions of attitude which would determine how strongly individuals will hold on to an attitude and how open they are to change.

The utilitarian function of an attitude is associated with reward and punishment. In the consumer context, there will be a positive attitude to a product based on the utility or use the product provides, therefore, the product’s benefit provides the reward. This utilitarian function is quite similar to perceived usefulness as a key variable used by researchers (Davis 1989; Venkatesh and Davis 2000; Venkatesh et al. 2003) in predicting the intention to adopt technology, albeit in an organisational context. Usefulness in the organisational context relates to employees willingness to adopt a new system based on the new technology’s ability to enhance their job performance. This is very much related to the reward and punishment associated with the utilitarian function. By the same token consumers’ assessment of utility or usefulness has everything to do with the value placed on the benefit gained from using a particular product or technology. The value expressive functions of an attitude are those that form part of one’s social identity- it is an expression of one’s self-concept. The ego-defensive function of an attitude represents the protective shield against internal feelings or external threats. The final function of attitudes, the knowledge function results from “a need for order, structure or meaning” (Solomon et al. 2010 p. 276). In sum therefore, an attitude is held based on the benefit, level of social identity, order and security it provides.

Engel et al. (1995 p. 387-8) note that, “Understanding the relative importance of attitudes and subjective norms in determining intentions and ultimately behaviour can prove quite useful in devising effective behavioural influence strategies”. Three strategies proposed by Engel et al. (1995) for changing attitudes come from multi-attribute model perspective. One of the more extensively used multi-attribute model is the Fishbein multi-attribute model which proposes that attitude toward a product (or object) is based on the summed set of beliefs about the product’s characteristics

or attributes weighted by the evaluation of these attributes (Blackwell et al. 2001). It is symbolically represented as follows:

$$A_o = \sum_{i=1}^n b_i e_i$$

A_o = attitude toward the object

b_i = the strength of the belief that the object has attribute i

e_i = the evaluation of attribute i

n = the number of salient or important attributes

Alternatively, the ideal-point multi-attribute model specifically examines consumers attitudes toward a product as opposed to the attributes of a product or object used in the Fishbein model. Symbolically the ideal-point model is represented as follows:

$$A_p = \sum_{i=1}^n W_i | I_i - X_i |$$

A_p = attitude toward the product

W_i = the importance of attribute i

I_i = the “ideal” performance attribute on attribute i

X_i = the belief about the product’s actual performance on attribute i

n = the number of salient attributes

According to the model, a favourable attitude would be how close a product’s rating is to the consumer’s rating of where the ideal product or a particular attribute would fall on a given scale (Blackwell et al. 2001) Therefore, it is how a product or its attributes measure up in the minds of the consumers.

Based on the multi-attribute model perspective, three ways of changing attitudes are by: (1) changing beliefs, (2) changing attribute importance, and (3) changing ideal points (Engel et al. 1995). If consumers have misconceptions about products then strategies will have to be employed to align beliefs in accordance with the facts that hold true about a product. If consumers’ held beliefs are in fact true then the product

or its attributes would need to be changed, so that beliefs are ultimately changed. In the case of changing attributes in order to alter attitude, one can either increase or decrease an attribute's importance or add an attribute. However, it has been noted that changing the salience of an attribute is more difficult to achieve than changing beliefs. Finally, changing ideal points involves modifying consumer preferences about the look of each attribute on their ideal product (Engel et al. 1995).

There is general support for the fact that attitude-behaviour inconsistency exists for environmental products (Gupta and Ogden 2009) and this is reinforced by the Defra (2008) report (cited in an earlier section of this thesis), and the descriptions of some of the population segments where, in spite of a positive attitude towards caring for the environment, there isn't always a commensurate behaviour to demonstrate the expressed concern. Gupta and Ogden (2009 p. 378) noted that "the predictive ability of attitude in the domain of environmental consumerism has been debatable." They note that this predictive failure may be due in part to measurement specificity, that is, some researchers have not focused on a specific attitude-behaviour measurement. Attempts to generalize on environmental attitudes have not yielded consistent results therefore, the focus should be on a specific environmental issue. Personal and situational factors also account for the inconsistencies in the relationship between attitudes and behaviour (Gupta and Ogden 2009).

This research is centred around three main themes namely, ICT, sustainable tourism and tourists (consumers). The link between ICT and sustainable tourism from the consumer's perspective underscores the main focus. One element of the study is therefore about how ICT tools and applications can perhaps support ideas that are pro-society (incorporating the right balance between the socio-economic, cultural, biophysical and climate dimensions of sustainability). Therefore, tourists may need to adapt or adopt a new idea about using technology to support sustainable tourism initiatives while on holiday. As suggested in an earlier section, social media and social marketing could be very instrumental in encouraging behavioural change as it relates to sustainable tourism initiatives (Peeters et al. 2009; Miller et al. 2010), since awareness levels have not translated into demonstrable positive activities by tourists.

Technological tools/applications could potentially help to if not close, at least narrow the value-action gap (Pickett-Baker and Ozaki 2008).

Kotler and Roberto (1989) noted that at the societal level, a successful strategy for change is contingent on the readiness state of the market and depends on the cause, change agent, target adopter, communication channel and the change strategy. The change in attitude that will result in the change in behaviour as it relates to ICT and sustainable tourism for in-trip tourists will encompass two of the three main societal marketing products: an idea (about sustainability) and a practice (engaging with ICT tools or applications at the destination level that are supportive of the quadruple bottom-line). One could be tempted to classify the ICT tool as the third type of societal market product (tangible object) but this could be quite controversial if this in itself is societal good, some may argue the related hardware and its use pose health and environmental hazards. Therefore, to avoid this debate and detraction from what the research seeks to accomplish, the researcher has opted to focus on the idea and practice as the only two societal goods.

Given that for this study, the target adopter is the in-trip tourist, there are number of factors that were mentioned earlier that could inhibit a change in attitude and behaviour. These inhibitors include skills, time and opportunity (Ajzen and Fishbein 1980; Kotler and Roberto 1989). While at the destination level, lack of adequate skills are more challenging to readily address, contemporary ICT tools/applications available on mobile telephones are usually quite user-friendly. Destination marketers can take advantage of the inseparability characteristic (that is, the product and service are rendered simultaneously) of tourism by exploiting opportunities that in-trip tourists provide. At the destination level, marketers have a very captive audience, and can maximize their creativity and flexibility through multiple opportunities for communication with in-trip tourists using available technologies. Some of the same strategies employed with consumer goods can also be used at the destination level for tourism products to promote specific practices and change beliefs. These include “premium” offers which are products offered for free or a nominal cost, product demonstrations, contest and sweepstakes (Kotler and Lee 2008). Therefore, despite

the complexities of behaviour, attitudes and beliefs, changing attitudes and ultimately behaviour is not an insurmountable task.

2.9.4 Tourist behaviour theory and practice

The pioneering models of consumer behaviour developed from the 1950s up to the 1980s were referred to as the “grand models” of consumer behaviour. Names like Howard and Sheth; Nicosia; Engel, Kollat and Blackwell; and Lilien and Kotler are often cited among the main protagonist of the era (Sirakaya and Woodside 2005; Swarbrooke and Horner 2007; Bowen and Clarke 2009). These earlier models were designed for tangible products and therefore challenges arose with their applicability to tourism. These “grand models” did not encapsulate the intangibility, inseparability, perishability and heterogeneity characteristics of services (Bowen and Clarke 2009). Additionally, most of the models conceptualised decision-making as a simple or linear input-output process (Swarbrooke and Horner 2007; Smallman and Moore 2010). Nonetheless, the “grand models” laid the foundation for contemporary models of tourist behaviour.

The characteristics of tourism are critical for understanding tourism behaviour theory and practice since the intangible and experiential nature of services result in tourists dealing with outcomes that are unknown (Sirakaya and Woodside 2005). Decisions in the tourism domain are typically complex and often not routinized like everyday consumer goods. A decision to purchase a vacation involves high consumer involvement and a high perceived level of risk (Bowen and Clarke 2009). Using Middleton et al. (2009) PIECE acronym, consumers typically go through the following decision making stages (as noted earlier): problem recognition, information search, evaluation of alternatives, choice of purchase and evaluation of post-purchase experience. Petr (2009) suggests that in today’s technological world and the new opportunities presented by web and mobile technologies, the tourist’s decision making process could be translated into: pre-trip information search; evaluation of alternatives; booking, ordering and purchase; delivery of tickets; in-trip consumption and information search; and post-consumption.

The 'PIECE' process (Middleton et al. 2009) is determined by key motivators and determinants. Motivators are those factors which drive a particular purchase decision. Typical tourism motivators are physical (e.g. relaxation), cultural (e.g. experience new cultures), emotional (e.g. romance, adventure, escapism), status (e.g. fashionability or exclusivity of a destination), personal development (e.g. increasing knowledge) and personal (e.g. visiting friends and relatives). Determinants refer to the personal and external factors that ultimately determine behaviour. Personal factors include attitudes and perceptions; experience (e.g. previous holidays), knowledge (of destinations) and circumstances (e.g. disposable income). External determinants are based on forces outside an individual's scope of control and include the geo-political environment, media influences, the marketing activities of the tourism industry, views of friends and relatives, economic, social and technological factors. Personal and external determinants of tourist behaviour vary according to each tourists' personality and lifestyle (Swarbrooke and Horner 2007).

Woodside et al. (2007) take an alternative stance, suggesting that consumers' decision to engage in travel activities can occur with or without rational thinking. It is not necessarily a 'long-winded' process involving the evaluation of multiple alternatives. Rather, the decision to travel is based on an individual's macro-system, micro-system and causal history, where "choices are created spontaneously as a result of subconscious heuristic processing, not as a result of the calculated pursuit of previously existing goals or preferences" (Woodside et al. 2007 p. 17). They do acknowledge however, that environmental, economic and social factors influence the consumer's decision to travel or not travel.

Fodness and Murray (1998) propose that tourist information search strategies comprise three main dimensions: *spatial* that is, search activities being based on internal (one's memory) or external sources (e.g. media, friends); *temporal* referring to the timing of the search activity; and *operational*, dealing with the sources used in one's search and the effectiveness for problem resolution and decision making. Though focused on trip planning, these three dimensions (spatial, temporal and operational) of the tourism information search strategy could potentially be applied

to the in-trip tourists context and more specifically how in-trip tourist engage with technological applications for problem solving.

Extensive literature has been published about the tourist decision making process with a concentration by many scholars on information search behaviour before the trip (e.g. Snepenger and Snepenger 1993; Fodness and Murray 1998; Gursory and McCleary 2004). Since this research focuses on in-trip tourists, the pre-purchase search, evaluation of alternatives and purchase has already taken place. Therefore, the current research concentration is on the in-trip consumption and information search or alternatively, on the last stage of the PIECE process –evaluation of post-purchase experience (Middleton et al. 2009). The literature is sparse in terms of the decision processes in-trip. Scholarly works have concentrated on information search related to destination choice (Choi et al. 2007; Lee et al. 2007; Smallman and Moore 2010) but there have been some insights into the typical activities that tourists engage during their trip (Choi et al. 2007) however, these are often destination specific. Choi et al. (2007 p.63) noted that, “Very limited research has been found to explore different information needs across the complete course of a tourism experience, i.e. pre-trip, on-site destination and post-trip.” In-trip decisions are regarded as secondary decisions that are tentative and flexible in nature. Given the tentative and flexible nature of in-trip decisions, opportunities do exist to use ICT tools/applications in ways that could serve some of the aims of sustainable tourism. For example, an immediate benefit to the destination and the consumer is the satisfaction that the use of ICT applications provides, thus fulfilling the sustainable tourism aim of visitor fulfilment which redounds to positive word of mouth. The ability to fulfil real-time information needs from the direct contact with businesses or through friends and relatives via social media also enhances local prosperity and cultural richness (two additional aims of sustainable tourism).

As a result of the weaknesses cited in the literature, there is much support for the predominantly qualitative approach of this current study as it relates to tourists in-trip behaviour. Smallman and Moore (2010 p. 417) posited that tourists’ decision-making does not lend itself to the conventions of the grand models, suggesting that rich data

(qualitative data) provides the researcher with the opportunity to “narrate emergent actions and activities by which tourists’ decision making unfolds”. They advocate for a complex approach that allows for rationality and irrationality, where the focus is on what it is the tourist does, rather than what information they do it with. Swarbrooke and Horner (2007) cited several shortcomings of the current research in consumer behaviour in tourism, including undeveloped techniques for gathering the perceptions of tourists, the absence of knowledge about how the behaviour of tourists relates to how they consume other products; and the lack of reliable empirical data on the determinants and motivations of tourism behaviour. They advocate for the development of more sophisticated techniques for gathering qualitative data in consumer behaviour research in tourism. It is not surprising therefore, that there is a gap in the literature that examines in-trip tourist perspectives and behaviour as it relates to ICT and sustainable tourism practices.

2.9.5 Diffusion of Innovations

According to Rogers (1986; 1995), the study of the adoption and implementation of the new communication technologies can best be understood by applying the theory of the diffusion of innovations. An innovation, from a marketing perspective is a product, service, idea or practice that is perceived new in the eyes of a social system. This innovation could be a technological change, use of new materials, a new practice or even a new brand (Foxhall et al. 1998). The Innovation Diffusion Theory (IDT) describes the spread or diffusion of a new product, service or idea over time through a social system. Several researchers have emphasised the distinction between the diffusion process and the adoption process. The diffusion process is a macro-process concerned with the spread of a new product or new technology at the industry level (or wider consuming public), while the adoption process deals with the behavioural aspects of the adopting individual, and is therefore a more micro level process (Lim 2009; Fuchs et al. 2010). This research with its emphasis on in-trip tourists is more interested in the micro-level process of adoption but acknowledges that the diffusion process is important to the overall theory of the diffusion of innovations.

The focus of the adoption process is the stages through which an individual consumer goes through in arriving at a decision whether to try, not try, to continue or discontinue using a new product. The adoption process is defined by five stages before a decision is made to adopt or purchase a new product or to reject it: (1) awareness; (2) interest; (3) evaluation; (4) trial; and (5) adoption or rejection. The main benefit of this process is that it provides a framework for marketers in determining which types of information sources provide the best avenue for influencing the consumer's decision. For example, impersonal mass media sources create initial product awareness but as the consumer progresses through the other stages, interpersonal sources such as friends and family become increasingly important (Schiffman et al. 2001).

While a useful construct, the adoption process is not without its limitations. Schiffman et al. (2001) note that the process does not adequately take into account that the recognition of a need may precede awareness; rejection may occur after trial; and as it relates to tourism, trial comes after and is therefore is not accounted for in the model; and the fact that evaluation is a continuous process and does not occur only before trial. These limitations are addressed by the innovation decision process which is also a five stage process but demonstrates the consumer moving from:

- (1) Knowledge- the stage at which consumer is exposed to an innovation and gains some appreciation for how it functions.
- (2) Persuasion- the stage at which an attitude (positive or negative) is formed by the consumer towards the innovation.
- (3) Decision- the stage at which a choice is made by the consumer whether to adopt or reject the innovation.
- (4) Implementation- the stage at which the consumer uses the innovation.
- (5) Confirmation- the stage at which the consumer seeks affirmation of the innovation decision and at this point can reverse his or her decision if exposed to a message that plants doubt or conflicts with previous information (Rogers 1995; Schiffman et al. 2001).

While offering a perspective more in line with the realities of the market, the innovation decision process is not enough to inform the design of strategies for consumers to adopt innovations, whether technological or otherwise. Kotler and Armstrong (2006) noted that there are great differences among individuals in terms of their readiness to try new products. There are the “consumption pioneers” or innovators, the first 2.5 per cent of the market who are among the first purchasers of a new product or service, followed by the early adopters (13.5 per cent of the market), early majority (34 per cent of the market), later majority (34 per cent of the market) and finally the laggards (16 per cent of the market), the last group to adopt a new product (Rogers 2003 cited in Kotler and Armstrong 2006).

There are several factors that distinguish consumer innovators from the late adopters or non-adopters and these factors will ultimately determine the best communication strategies that the marketer should employ. Kotler and Armstrong (2006) note, for example, that innovators are venturesome; early adopters are opinion leaders and often guided by respect; early majority adopt new ideas before the average person but are deliberate in nature; late majority are sceptical; and laggards are generally suspicious of changes and are tradition bound. Foxhall et al. (1998) highlight five general characteristics on which innovators often differ from late adopters: purchase and consumption patterns, socioeconomic status, personal traits, perceptions of new products and, social affiliations and behaviour.

Rogers (1986 p. 118) note that, “Most individuals evaluate an innovation that they are considering adopting, not on the basis of scientific research of experts, but through the subjective evaluations of near-peers who have previously adopted the innovation”. Mick and Fournier (1998 p. 140) argued that Rogers’ diffusion of innovation theory which examines three technology outcomes: anticipated versus unanticipated, direct versus indirect, desirable versus undesirables, are too broad and do not adequately account for the “specific content and pressures of the cultural contradictions of technology.” Eight technology paradoxes of consumer reaction to technology (Mick and Fournier 1998) are addressed later in this thesis. Mick and Fournier (1998) also asserted that Rogers diffusion paradigm is biased toward the

manufacturer (source bias); assumes new technology is always beneficial (positivity bias); and does not examine what motivates people to adopt innovation at different stages of diffusion.

Additionally, the adoption of a particular innovation is contingent on the consumers' perception of the innovations' or new product's *relative advantage* compared to existing products; *compatibility* with the prospective consumers' values and experiences; *complexity* which is related to how difficult or easy it is to use or understand the innovation; *trialability* which refers to the degree to which the innovation is capable of being tried on a limited basis; and *observability* (communicability) which refers to the degree to which the product's benefits or attributes can be observed or described by potential consumers (Rogers 1986; Schiffman et al. 2001; Kotler and Armstrong 2006). These contributions seem to be aligned with earlier work by Agarwal and Prasad (1998) regarding personal innovativeness in information technology (PIIT), which they defined as an individual's willingness to try out any new information technology. They argued that PIIT influenced technology behaviour through beliefs and perception.

2.9.6 Innovation resistance

One of the major reasons for market failure of innovations is consumer resistance (Ram and Sheth 1989). Schiffman et al. (2001) suggested that cultural, situational and social factors affect innovation resistance. Oreg (2003 cited in Swilley 2010) found that an individual's personality including inability to control changes, close-mindedness and refusal to change, stress over change, low tolerance for the adjustment phase of change, dislike for novelty and reluctance to give up old habits accounted for resistance to change. Swilley (2010) however argued that resistance to change is different from innovation resistance as the former is not limited to technology, but change in general. Ram and Sheth (1989) categorised innovation resistance into functional and psychological barriers. Psychological barriers stem from the need to cling to tradition or image barriers. Functional barriers include usage, value and risk barriers (Ram and Sheth 1989). Sources of usage and value

barriers will be addressed in the following section on consumer technology adoption behaviour which looks at the technology acceptance models (Davis 1989; Venkatesh and Davis 2000; Venkatesh et al. 2003). Ram and Sheth (1989) specifically highlighted four risk barriers: physical, economic, performance uncertainty and social risk. In today's context and in relation to eTourism applications, resistance is more likely to stem from economic risk barriers and performance uncertainty as none of the identified technologies are like to cause harm (physical risk) or cause any time of social ostracism (social risk). Schiffman et al. (2001 p. 493) have highlighted that the extent of consumer resistance is determined by the product characteristics of an innovation- consumer resistance "increases when perceived relative advantage, perceived compatibility, trialability and communicability are low, and perceived complexity is high. With services, particularly, resistance to change also comes from the cost and disruption of change."

2.9.7 Consumer technology adoption behaviour

Swilley (2010) noted that many researchers have used the technology acceptance model (TAM) to examine consumers' attitudes and beliefs pertaining to a specific technology. She adds that the TAM has been adopted as the model to predict the potential use of Internet technologies, information systems technology and mobile technologies. Chuttur (2009 p. 13) also cites extensive support for the application of the TAM, noting that many studies in several countries conducted in laboratories, field research and web surveys; and utilising a mix of participants have all "found significant statistical results for the high influence of perceived usefulness on behavioural intention to use a specific system."

The TAM was developed by Davis (1989) after investigating the variables that would influence a person's behaviour to use a specific technology. While the investigation was notably confined to the organisational context, the research focused on two theoretical constructs, perceived usefulness (PU) and perceived ease of use (PEOU), which were theorized to be fundamental determinants of system use. Davis (1989) posited that people tend to use or not use an application to the extent they

believe it will help them perform their job better. This variable was referred to as PU which is defined as the extent to which a person believes that using a particular system would enhance their job performance. Davis (1989) further proposed that, even if potential users believe that a given application is useful, they may, at the same time believe that the system is too hard to use and that the performance benefits of usage are outweighed by the effort of using the application. Therefore, usefulness was theorized to be influenced by PEOU, that is, the extent to which a person believes that using a particular system would be free of effort. A major conclusion of this initial research was that PU was a strong correlate of user acceptance. The results were consistent with the ease of use–usefulness-usage chain of causality. It was stressed that PU and PEOU are people’s subjective evaluation of performance and effort, respectively, and do not necessarily reflect objective reality (Davis 1989).

Support for the TAM was demonstrated by many empirical studies which typically explained 40 per cent of the variance in usage intentions and behaviour (Venkatesh and Davis 2000). Notably, in some cases models such as the TRA and TPB provided a better explanation of participants’ intention to use a specific application, however, the simplicity of the TAM and its ease of implementation made it more attractive than the TRA or the TPB (Chuttur 2009). Therefore, the TAM became a robust and parsimonious model for predicting user acceptance but was not without its limitations. Venkatesh and Davis (2000) extended TAM which became TAM2 to account for the effect of changes over time on PU and usage intention, with increasing user experience with a specific system. The additional theoretical constructs of TAM2 incorporated social influence processes and cognitive instrumental processes. According to TAM2 the three interrelated social forces impacting an individual’s decision to accept or reject a new system include subjective norm, voluntariness and image. Job relevance, output quality, result demonstrability and PEOU were theorized as the four cognitive instrumental determinants of PU (Venkatesh and Davis 2000).

The results of the four longitudinal studies conducted to test TAM2 showed “that subjective norm exerts a significant direct effect on usage intention over and above

perceived usefulness and perceived ease of use for mandatory (but not voluntary) systems” (Venkatesh and Davis 2000 p. 198). Other social influences related to image and status to improve job performance also influence PU. There was also support for the cognitive instrumental determinants with TAM2. Assessments of a system’s usefulness were found to be affected by a person’s cognitive matching of the goals of their job with the consequences of system use. Also, user perceptions of result demonstrability and ease of use were found to be significant. While the results of the study did not show support for social influence processes remaining significant over time, the effects of cognitive instrumental processes were found to remain significant over time (Venkatesh and Davis 2000).

Following on from the research by Venkatesh and Davis (2000), Venkatesh et al. (2003) sought to synthesise eight key competing user acceptance models that could explain intentions to use technology by creating a unified theory of acceptance and use of technology (UTAUT). These models include the TAM, TRA, TPB, a combined TAM and TPB (C-TAM-TPB), IDT, motivational model (MM), model of PC utilization and (MPCU) and social cognitive theory (SCT). Some of the aforementioned models (TRA, TPB, IDT and TAM) were discussed earlier in this review when behavioural theories were addressed. Based on their comparative analysis, Venkatesh et al. (2003) sought to address five main limitations or criticisms of the eight models, and justifications for their proposed unified theory. These limitations included the technology studied, the participants involved, the timing of measurement, the nature of measurement and the voluntary versus mandatory context (Venkatesh et. al. 2003).

One of the key criticisms has been that the technologies studied were not management relevant as they did not match the complexities and sophisticated technologies of real life organisational contexts (Venkatesh et al. 2003; Legris et. al. 2003). Legris et al. (2003) also note that information system implementation is not independent of organisational dynamics, a fact not considered under the TAM. While some models were in fact tested in the organizational context, in three of the studies, tests were conducted in academic settings using students (TRA, TAM, TPB) which

brought issues of generalizability into question. Legris et al. (2003) have also cited the use of students as a major limitation of the TAM. Issues of validity and reliability were also brought into question as the test for seven of the models with the exception of Davis' TAM (1989), examined technologies that were already familiar to the individuals at the time of measurement. Most of the tests of the eight models were conducted well after the participants' acceptance or rejection decision rather than during the active adoption decision-making process. Venkatesh and Davis (2000) and Legris et al. (2003) have also cited the use of self-reporting as a major limitation of the TAM and the extended TAM (TAM2). The use of cross sectional studies and in between subject comparisons were also cited as limitations, particularly as the proposed UTAUT aimed to track participants through various stages of experience with a new technology and compares all models on all participants. Finally, while previous models had been largely tested in a mandatory situation, the UTAUT sought to examine the implications for technology acceptance in both voluntary and mandatory contexts (Venkatesh et al. 2003).

Based on the proposed UTAUT model, four constructs were theorised to have significant role as direct determinants of user acceptance and usage behaviour: performance expectancy, effort expectancy, social influence, and facilitating conditions. Notably, attitude toward using technology, self efficacy and anxiety were not theorised to be direct determinants of intention. Performance expectancy referred to an individual's belief that using the system will assist him/her in achieving some gains in job performance. Performance expectancy was deemed to be the strongest predictor of intention and was a significant construct in voluntary and mandatory settings however, age and gender were found to be moderating variables (Venkatesh et al. 2003). Work previously done by McFarland (2001) demonstrated that age was the largest determinant of technology usage and its acceptance. Younger workers and males therefore showed greater likelihood of technology adoption than their respective counterparts. More recently, research conducted in the US by YouGov showed, for example, that mobile web use is heaviest among males and young adults who typically tend to be the early adopters (New Media Trend Watch 2011).

Effort expectancy was very much related to the ease of use discussed in TAM (Davis 1989), TAM2 (Venkatesh and Davis 2000) and the IDT (Rogers 1986) and is defined by how easy or difficult an individual deems the proposed system. Venkatesh et al. (2003) proposed that effort expectancy will be most salient for women, especially those who are older and with minimal system experience. It should be noted that much of the gender differences cited were attributed more to the socialisation of the two genders and had nothing to do with any natural ability of either gender in the technology domain.

Social influence is comparable to subjective norm discussed earlier and is defined as the importance an individual's referent group or important others attached to using the system (being investigated). In support of the work done by Venkatesh and Davis (2000), it was found that none of the social influence constructs were significant in voluntary contexts only in mandatory settings. It was also suggested that social influences were more likely to have a direct effect on intention, while in the voluntary context, social influences were influential in determining an individual's perception about the technology in question. Situations where technology or system use was mandatory, social influence appeared to be important only in the early stages of individual experience with the technology, with its role diminishing over time and eventually becoming non-significant with sustained usage (Venkatesh and Davis 2000). Therefore, under the UTAUT it was suggested that women tended to be influenced by subjective norms, that is, the influence of others and consequently, social influence tended to be more significant when forming an intention to use new technology. Similarly, social influence was found to be more salient among older workers (Venkatesh et al. 2003).

Facilitating conditions are the organizational and technical infrastructure which an individual believes exist to support system use. According to Venkatesh et al. (2003), facilitating conditions encapsulates concepts discussed under PBC posited by Ajzen (1991) and compatibility under the IDT ((Rogers 1986; Schiffman et al. 2001; Kotler and Armstrong 2006). When both performance expectancy constructs and effort expectancy constructs are present, facilitating conditions are not significant in

predicting intention. The empirical results also indicate that facilitating conditions do have a direct influence on usage beyond that explained by behavioural intentions alone. Thus, when moderated by experience and age, facilitating conditions will have a significant influence on usage behaviour.

Confirming much of the work of previous scholars (for example, Fishbein and Ajzen 1975; Ajzen and Fishbein 1980; Davis 1989; Venkatesh and Davis 2000), under the UTUAT it was predicted that behavioural intention will have a significant positive influence on an individual's use of technology. Performance expectancy, effort expectancy, and social influence were put forward as direct determinants of intention to use technology, while usage behaviour was considered to be directly determined by intention and facilitating conditions. Experience, gender, age and voluntariness were key moderating variables within the UTAUT model which, according to Venkatesh et al. (2003) retained the parsimony of previous models while advancing cumulative theory.

One of the successes of the UTAUT has been its ability to explain 70 per cent of the variance of intention to use a technological system (Venkatesh et al. 2003), compared to the 40 per cent of system usage levels with the TAM (Venkatesh and Davis 2000; Legris et al. 2007). A mixed method study conducted by Rasinger et al. (2007 p. 183) utilised the UTAUT "to explain intentions to use mobile information services to support individual information search strategies during a trip." While acknowledging the limitations of the TAM, for example, including its application to job context and little importance being paid to "fun of use", Rasinger et al. (2007) included this and other variables, e.g. trust, to the determinants of behavioural intention to use mobile systems in the tourism domain. Chtourou and Souiden (2010 p. 340) in their study of consumers' adoption of mobile devices in Canada and France also found that "the impact of usefulness on attitude is mediated by fun". The application of the UTAUT in the Rasinger et al. (2007) study was not fully explored as the research focus was on the behavioural intention to use specific functions of mobile information services in tourism. What was noteworthy is the application of the UTAUT to the consumer domain and more specifically, tourism.

Bagozzi (2007 p. 245) has been very critical of Venkatesh et al. (2003) proposed UTAUT and the study of technology adoption and acceptance in general, noting that “knowledge is becoming increasingly fragmented with little coherent integration” and suggesting that what is in fact “needed is a unified theory about how the many splinters of knowledge cohere and explain decision making.” While commending the thoughtful presentation of the UTAUT (Venkatesh et al. 2003), Bagozzi (2007) argues that few of the independent variables are generic or universal and more predictors were likely to be unearthed. Much of the criticism surrounding technology adoption or acceptance or even rejection is rooted, according to Bagozzi (2007), in two critical gaps of the TAM. The first gap deals with the intention-behaviour linkage espoused by the TAM (Davis 1989), the TRA (Ajzen and Fishbein 1980) and TPB (Ajzen 1991). Three issues related to this first gap is that all of the three aforementioned models treat behaviour as a terminal goal rather than a means to more fundamental goals; the models also de-emphasise the possible gap in time between intention formation and action initiative (intention-behaviour gap); and emphasis has been placed on trying to adopt or acquire technology, not on behaviour only (Bagozzi 2007). The second gap identified in the TAM is between individuals’ reactions to using information and intentions. Bagozzi (2007) argues that an individual’s accepted PU and positive attitude toward a technology are not sufficient reasons to compel action, since an individual may still explicitly decide not to act despite a favourable assessment of a technology. Additionally, Bagozzi (2007 p. 264) questions how the TAM (Davis 1989), the TRA (Ajzen and Fishbein 1980) and the TPB (Ajzen 1991), given an individual’s multiple reasons to act or not, can be “reconciled and transformed into a decision or intention to act.”

Bagozzi (2007) also cites several other shortcomings of technology acceptance research including group, cultural or social aspects of technology acceptance; the role of emotions; and self regulatory processes in decision making. Bagozzi (2007) proposed a “technology user acceptance decision making core” that includes a common core of basic processes and variables that approach some level of universal application. This proposed decision making core makes goal-directed behaviour the focal point for user acceptance where the individual moves from goal desire → goal

intention → action desire → action intention, which is likely to occur in most user acceptance contexts. Since, not all decision making processes are deterministic (as suggested by TAM), Bagozzi (2007) argues that self- regulation moderates the effect of desires on intentions, thus allowing an individual to exercise some control over their desires and intention with the possibility of reformulating one's intention and to act differently.

Chuttur (2009 p. 17) notes that while there are several studies in support of TAM, scepticism exists among several researchers about “the application and theoretical accuracy of the model.” Like Bagozzi (2007), Chuttur (2009) suggest that perhaps the research on TAM has in fact reached a saturation point and new models would need to overcome some of TAM's inherent weaknesses, while exploiting its strengths.

2.9.8 Alternative Approaches to Technology Adoption Behaviour

Relative to studies conducted on technology acceptance in the organisational context, published works in the consumer domain have been sparse (Mick and Fournier 1998; Chien-Hung and Mort 2007). The proliferation and ubiquitous nature of ICT has resulted in an increased interest in consumer technology adoption within recent years (Baron et al. 2006). A significant focus of the research in the consumer domain is its emphasis on the use of technology strictly on a voluntary basis (as opposed to job-related mandatory contexts). This point is acutely significant for research in the tourism domain, as technologies used by in-trip leisure tourists will seek to satisfy hedonic needs and utilitarian functions (Chien-Hung and Mort 2007).

Mick and Fournier (1998) identified eight technology paradoxes of consumer reaction to technology namely, control/chaos, new/obsolete, competence/incompetence, efficiency/inefficiency, fulfils/create needs, assimilation/isolation, engaging/disengaging. The technology paradoxes serve to illustrate that consumers can simultaneously experience positive and negative feelings. Each of these eight paradoxes is described in the *Table 2.7 Technology*

Paradoxes. Mick and Fournier (1989) also identified four broad coping strategies for managing these technology paradoxes: pre-acquisition avoidance strategies (ignore/refuse/delay); pre-acquisition confrontative strategies (pretest/buying heuristics/extended decision making/ extended warranty or maintenance contract); consumption avoidance strategies (neglect/abandonment/distancing); and consumption confrontative strategies (accommodation/ partnering/ mastering). While this work preceded the research done on the extended versions of the TAM (Venkatesh and Davis 2000; Venkatesh et al. 2003), it was a very insightful investigation into consumers' perspectives, meanings, and experiences in relation to a range of technological products (Mick and Fournier 1998). This current study seeks to similarly explore consumers' perspectives as it relates to tourism ICT tools/applications of in-trip tourists. Mick and Fournier's (1998) study sought to tap into the emotional side of technology adoption, an important aspect that Bagozzi (2007) noted was lacking in technology acceptance models.

Research by Chtourou and Souiden (2010) also demonstrated the importance of emotional motivators on consumers' adoption of technological products. They found that, consistent with a study by Bruner and Kumar (2005), consumers perceive that the fun aspect of a device was an important antecedent affecting consumers' attitude toward the use of the product. The product for their study was the mobile device. Citing earlier studies, Yang and Jolly (2008) also acknowledged perceived fun was an important antecedent in the use of technology by consumers and that the easier technology is to use, the greater is the perceived fun to use it.

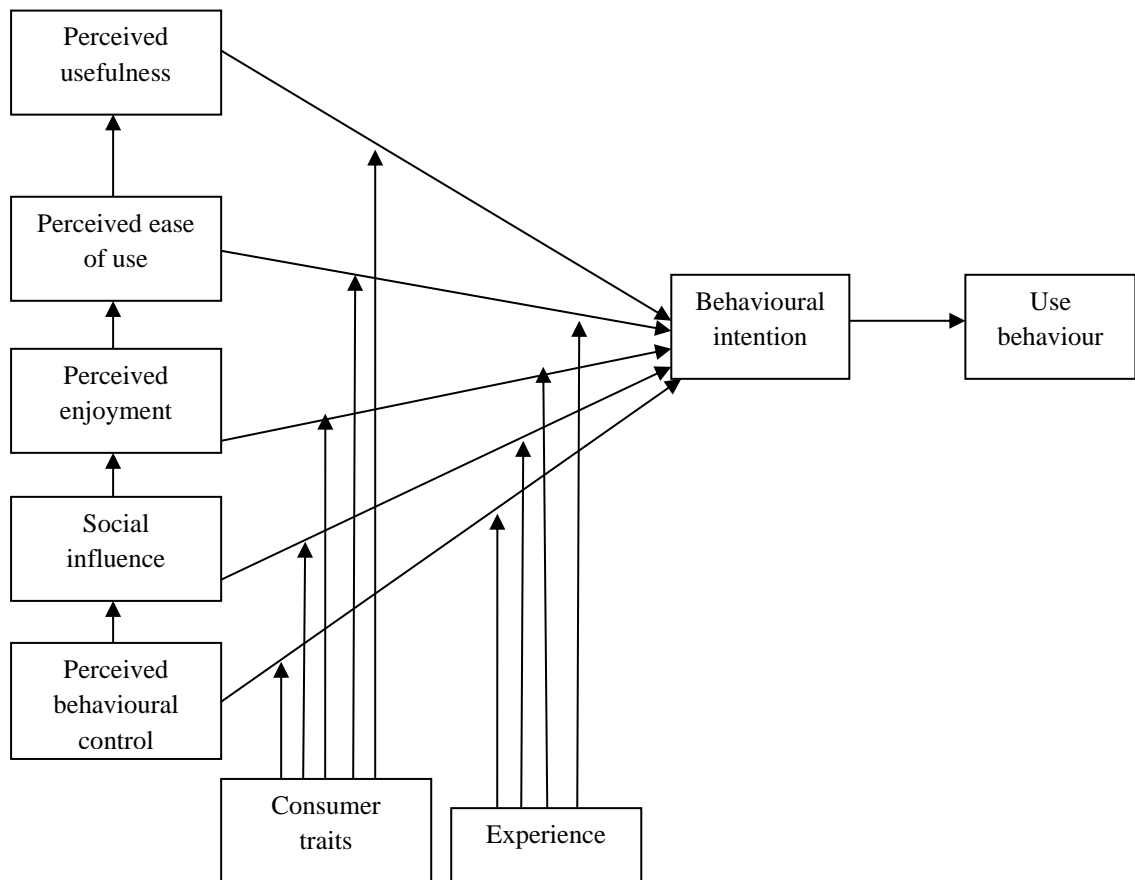
Table 2.7 Technology Paradoxes

Paradox	Description
Control/ chaos	Technology can facilitate order or it can lead to upheaval.
Freedom/ enslavement	Technology can facilitate independence or it can lead to more restrictive behaviour.
New/obsolete	New technologies can provide the user with the most recently developed benefits of scientific knowledge but new technologies can also be soon outmoded as they reach the market place.
Competence/incompetence	Technology can result in feelings of intelligence/efficacy but can also lead to feelings of unintelligence/ineptitude .
Efficiency/inefficiency	Technology can facilitate less time spent on certain activities and can lead to more time spent on certain activities.
Fulfils/creates needs	Technology can facilitate the fulfilment of desire, and it can also contribute to the awareness of unrealized needs or desires.
Assimilation/isolation	Technology can facilitate human togetherness, but also lead to human separation.
Engaging/disengaging	Technology can facilitate involvement or activity and it can lead to disconnection or passivity.

Source: Mick and Fournier (1998)

Baron et al. (2006) found that only six of Mick and Fournier's (1998) technology paradoxes were applicable to technology based services (e.g. email), distinct from technology based products. Therefore, "control/chaos" and "new/obsolete" were not deemed to be applicable paradoxes for technology based services. Baron et al. (2006 p. 112) posited that the "theory available to explain and predict consumer acceptance of technological innovation, especially information and communication technology" is unsurprisingly limited due to the lack of inclusion of the social and cultural context of the process. Additionally, much of the application of the TAM in the consumer domain has been limited to acceptance or non acceptance of e-commerce or the world-wide web. Bouwman et al. (2011) have also criticised the TAM model for its inability to account for the social context, limited explanation of user intentions, lack of consideration for the consumer context (as opposed to the workplace) and the hedonic factor. The social context and the hedonic element are central to studying the adoption of technology in a tourism context. Another recent study by Fuchs et al. (2011) in their quest to extend Venkatesh's et al. (2003) UTAUT model included *inter alia* hedonic quality, information quality, trust and costs as predictors of behavioural intention to use mobile information services in a tourism context. Fuchs et al. (2011) viewed costs as particularly important, as the monetary costs in traditional models were not as important in the corporate setting as it would be, they argued, in the consumer domain. Notably, however, their study was focused on intention and not actual use.

Based on the reviews of Perea y Monsuwé et al. (2004) and Pedersen et al. (2002), Baron et al. (2006) proposed a Consumer TAM (C-TAM), which is an adaptation of the UTAUT (Venkatesh et al. 2003). The Consumer TAM is depicted below in Figure 2.5 A Consumer Technology Acceptance Model.



Source: Baron, Patterson and Harris (2006)

Figure 2.5 A Consumer Technology Acceptance Model

The key differences of the proposed C-TAM when compared with the UTAUT are as follows:

- Perceived enjoyment is an additional determinant of behavioural intention.
- Facilitating conditions is replaced by perceived behavioural control.
- The voluntary/mandatory distinction is omitted, as in the consumer domain all contexts are deemed voluntary, therefore voluntariness is redundant.
- Consumer traits have been included as a moderator that reflect demographic factors (e.g. age and gender), as well as, personality characteristics (e.g. self efficacy and need for interaction).

Baron et al. (2006 p. 128) have argued that measurement of the variables in TAM and extensions of the TAM “have been constrained by a methodological straightjacket,” due to a reliance on simplistic items of measurement and “meta-theoretical assumptions that demand approaches that are consistent with previous research, and the development of parsimonious models.” They note that previous measurements ignore the technology paradoxes, and advocate that the development of theory associated with perceived enjoyment, PU and PEOU should not be confined by the existing quantitative models of technology, and draw more on the theory from studies of consumer practices (Baron et al. 2006). The TAM and adaptations of the TAM were designed to measure dimensions related to tasks execution and job performance, which are not applicable to the consumer domain and in particular, for in-trip leisure tourists whose use should ideally incorporate elements of fun, as well as, ease of use and usefulness. According to Abad et al. (2010), research on technology acceptance in the job context often emphasises the utilitarian aspect of information systems, however in leisure settings hedonic systems differ in terms of the relative importance of perceptual factors, such as PU, perceived enjoyment (PE), and PEOU in forming behavioural intentions. They note that empirical evidence suggest that in hedonic contexts, PE has a stronger impact on behavioural intention.

The works of Chtourou and Souiden (2010) and Baron et al. (2006) in the consumer technology adoption domain were different from research previously undertaken. Firstly, their research tapped into the emotional aspects of technology adoption. Secondly, their research utilized actual consumers of the particular technology rather than focusing on users who intend to use a system. Finally, their studies used qualitative approaches, which arguably could account for the remaining 30 per cent of variances unexplained by the advocates of the numerous quantitative TAM-based studies (Baron et al. 2006). Therefore, in light of these weaknesses in the literature, the current study has utilised a mixed–method approach with a dominant qualitative component. The approach seeks to acquire in-trip leisure tourists’ perspectives of ICT tools/applications that support sustainable tourism, and the extent to which they

are actually using any of the available ICT tools or applications during their vacation and the factors influencing use or non use.

While drawing on the work of Baron et al. (2006), Chien-Hung and Mort (2007) have argued that inhibitory factors must also be considered when trying to gain an understanding of consumer technology adoption in a voluntary context. Notably, their work also focused on adoption intention rather than actual use of technology but they identified three factors that were important in the “consumer technology adoption and general consumer domain”- technology readiness, perceived risk and perceived value (Chien-Hung and Mort 2007 p. 356).

Based on the work of Parasuraman (2000), Chien-Hung and Mort (2007) defined technology readiness (TR) as people’s inclination to embrace and use new technologies for achieving goals at work and in home life. Four dimensions of TR were identified optimism and innovativeness (motivators) and discomfort and insecurity (inhibitors). Perceived risk (PR), though, not well defined in the literature was assessed to be a subjective factor, where an individual would evaluate what they had to lose from engaging with the new technology. PR included seven dimensions of risk: performance risk, financial risk, time risk, psychological risk, social risk, privacy risk and overall risk (Featherman and Pavlou 2003). Perceived value draws from marketing theory and may be defined as the consumer’s evaluation of the difference between all the benefits and all the cost of a product or service, relative to those of competing offers (Kotler and Armstrong 2006). Therefore the perceived value of a new technology is relative to that of alternative technologies that may exist in the market. The findings of Chien-Hung and Mort (2007 p. 364) suggest that “TR and PR have inhibitory effects while TR and PV are driving forces on consumers’ intentions of use toward alternative consumer technology.” It is re-emphasised that Chien-Hung and Mort’s (2007) study focused on intention and not actual use, nonetheless the inhibitors and motivators are considered important factors for this current study’s purpose to acquire insights into in-trip tourists’ perspectives on the use of ICT tools/applications to support sustainable tourism.

While the work of Baron et al. (2006) was significant as it related specifically to consumer adoption of technology in the consumer domain, Eriksson and Strandvik (2009), building on the work of Anckar and D’Incau (2002) looked specifically at the possible determinants affecting mobile tourism services. Eriksson and Strandvik (2009) used the TAM and the UTAUT to identify possible determinants for intended or actual use of mobile tourism services. They identified the following: value, ease of use, risk, social influence and tourist characteristics (which include demographic variables [gender, age], experience of mobile services, travel experience, destination experience, type of travel, personal innovativeness and user device readiness). Eriksson and Strandvik (2009) not only focused on intention but actual usage and detailed specific tourist traits that impact intention or actual usage of mobile services. Anckar and D’Incau (2002) posited that the value of a mobile service is assessed based on time critical arrangements, spontaneous needs, entertainment needs, efficiency ambitions and mobile situations. Time critical arrangements refer to applications for situations where immediacy is desirable e.g. receive alerts of a change in schedule while on tour. Spontaneous needs are driven by events, e.g. find a suitable restaurant while wandering around. Entertainment needs, can be by design or to kill time while travelling on the bus or train for example. Efficiency ambitions target productivity e.g. using dead spots during travel to optimize time usage, while mobile situations refer to applications that are of value only through a mobile medium e.g. localization services (Anckar and d’Incau 2002; Eriksson and Strandvik 2009). Apart from individual tourist characteristics, the other elements identified by Eriksson and Strandvik (2009) were no different from what previous researchers have described as it relates to risk, ease of use, social influence and personal innovativeness.

Therefore, in gaining an insight into in-trip leisure tourists perspectives, this research draws on the works of Chtourou and Souiden (2010); Baron et al. (2006) and Chien-Hung and Mort (2007) who have notably taken qualitative approaches to understand consumers’ technology adoption behaviour. Their works have been grounded in examining numerous studies of technology adoption behaviour, the majority of which have been quantitative (Baron et al. 2006), and consumer behaviour, that

began with the works of Ajzen and Fishbein (1975) and followed on by many scholars including Davis' (1989) TAM and Venkatesh's et al. (2003) UTAUT. The additional constructs posited by Eriksson and Strandvik's (2009) though not empirically verified provide useful insights into advancing qualitative work in the technology adoption domain, that focuses on actual usage. The works of these scholars are important as theoretical constructs are important to developing a good research design. As Richards (2005 p. 25) notes, while the goal of research is to learn from the data "...researchers don't have empty minds" and even the qualitative research design considers what is already known and builds into the research design the ways this knowledge will be used and tested. This research has sought to do exactly this as will be demonstrated in the chapters covering the methodology and methods, findings and analysis (Chapters 3-6).

2.10 Conclusion

This chapter provided an extensive review of the literature in the key research domains that were deemed relevant to this study. It sought to demonstrate how existing in-trip ICT tools and applications available to leisure tourists could potentially be used to support the aims of sustainable tourism. The review examined the definitions and debates on sustainable tourism; sustainable tourism development and identified the aims of sustainable tourism. The twelve aims of sustainable tourism provided the framework for assessing the in-trip ICT tools that could best support sustainable tourism development. The literature on consumer behaviour, tourist behaviour, technology adoption and resistance were thoroughly examined with a view to understanding the core factors influencing actual usage behaviour. The literature review ultimately informed the research design and the analysis of the data.

Chapter 3

Methodology and Methods

3.1 Introduction

The preceding chapters- the introduction and the literature review, provided the rationale for undertaking research in the specific area, the significance of the study and a critical assessment of existing technologies that contribute or could potentially contribute to the aims of sustainable tourism. The literature review also unearthed several theoretical constructs that could contribute to an understanding of the factors affecting the actual up-take of technologies by in-trip tourists. It was highlighted in Chapter 2 that in order to develop a good research design, the researcher must establish what is already known about the subject matter. Even in grounded theory, the approach to theory development is not a vacuous undertaking, with notable differences between the Glaserian and Straussian approaches. The former approach advocates for theory generation and the latter, theory verification (Grbich 2013). The TAM (Davis 1989) proved to be the most cited model but was limited in a number of ways including its specificity to the organizational context and focus on intention to use rather than actual use or adoption. After the review it was determined that several constructs specific to the consumer domain would be more applicable to this research, the most prominent of these being Baron's et al. (2006) Consumer TAM. Additionally, with more specificity to ICT use behaviour by tourists, constructs posited by Anckar and D'Incau (2002); and Eriksson and Strandvik (2009) were also deemed to be valuable.

According to Krippendorff (2004), the purpose of methodology is to allow the researcher to plan and logically conceptualise the composition and protocols of research methods; to evaluate the merits of individual techniques; and to assess how selected research designs contribute to knowledge. This chapter has sought to do just that. The first section of the chapter details the research aim and objectives, and the research questions the study sought to address. This is followed by a discussion on the philosophical foundation (methodology) underpinning the study and details on the procedures used to conduct the investigation.

3.2 Research Aim and Objectives

The establishment of the main themes associated with the topic of interest, the resulting gaps unearthed in the literature and the significant contribution this investigation could make to existing knowledge, led to the main aim of this study, which was to:

Examine the factors influencing in-trip tourists' adoption of ICT tools/applications which support sustainable tourism in the city of Edinburgh.

Embedded in this singular aim was the need to establish practices in the destination that contribute to sustainability in general, and establish links between sustainable tourism and the current use of ICT tools/applications by in-trip tourists at a destination. Therefore, the main intent of the study was supported by the following objectives:

1. Review the literature on sustainable tourism, eTourism and consumer technology adoption behaviour.
2. Conduct surveys of eTourism experts to identify the current and emerging ICT tools/applications that in-trip tourists can use to support sustainable tourism.
3. Conduct interviews with in-trip tourists to determine their perspectives on sustainable tourism in relation to technology.
4. Determine the actual up-take of ICT tools/applications by in-trip tourists.
5. Explore the extent to which in-trip adopted technologies support sustainable tourism.
6. Determine the gaps between available and actual use of ICT tools/applications by in-trip tourists.
7. Explore how models on technology adoption behaviour can be applied to the consumer domain for understanding the actual use of technology.

The first objective, a review of the literature, was important for establishing the in-trip ICT tools/applications which could support sustainable tourism at a destination,

the theoretical constructs underlying technology adoption, and ultimately informing the best techniques to employ for the primary investigation.

The second objective explicitly outlines the intent of the e-survey conducted with eTourism experts. An eTourism expert is defined by his/her knowledge and expertise about the application of ICT to tourism. This expertise was drawn from professional databases and social networks dedicated to eTourism, academia, research publications and industry practitioners, and those involved in the development and/or implementation or use of ICT in tourism. The e-survey served to establish:

- eTourism experts beliefs about the role technology can play in sustainable development.
- The importance that eTourism experts attach to the promotion of sustainable tourism practices in the design of eTourism applications.
- The specific new or emerging ICT tools/applications that could enable in-trip tourists to be more sustainable at a destination.

The third objective shifted the focus of the research from the eTourism experts to the in-trip tourists, which constituted the more dominant component of the primary investigation. Through face-to-face semi-structured interviews, the researcher first sought to ascertain in-trip tourists' feelings about sustainable tourism and their views on its relationship to technology.

Through the interviews, the fourth objective sought to determine what ICT/tools or applications that in-trip tourists were actually using as they went about their leisure activities in the destination.

Having established the actual use of specific ICT tools/application in the destination by in-trip tourists, the fifth objective endeavoured to evaluate the extent to which in-trip technologies indeed supported a destination's sustainability efforts. Since the literature highlighted a number of tools available for different users, for example destination managers or tourism planners as opposed to tourists using technologies at different stages such as pre-trip, in-trip and post-trip, it was important to establish

how the specific in-trip tools/applications related to the aims of sustainable tourism (refer to Table 2.1).

The sixth objective was intended to bring together the secondary data and the two phases of the primary data collection, that is, the results of the eTourism experts' e-survey and the in-trip tourists interviews.

Lastly, the seventh objective was crafted with a view to exploring how existing models on consumer technology adoption could contribute to an understanding of how consumers actually use technology in the tourism domain.

3.3 Problem Definition

As a result of the opportunities that ICT offer for sustainable tourism (Liburd 2005; Ali 2009; Touray and Jung 2010; Ali and Frew 2013) and the challenges that exist in translating awareness about sustainability issues into action (Swarbrooke and Horner 2007; Pickett-Baker and Ozaki 2008; Miller et al. 2010), the research questions this study sought to answer include:

- What specific ICT tools/applications can best influence in-trip tourists to choose more sustainable tourism practices/products? (Quantitative question)
- What are in-trip tourists' awareness levels and/or concerns about sustainability issues? (Qualitative question)
- What factors will influence tourists using or not using ICT tools/applications that could make tourism at their selected destination more sustainable? (Qualitative question)
- Do the eTourism experts value the use of specific ICT tools/applications differently from in-trip tourists? (Mixed method question)

3.4 Ontology and Epistemology

A project's methodology is concerned with the researcher's strategy of enquiry and embodies the research methods and their use. On one hand, the methods focus on the specific strategies or techniques for collecting and analysing data while the methodology provides the philosophical foundation for the research approach. A project's methodology is driven by specific ontological and epistemological assumptions (Grix 2001) and these underpin a researcher's approach to studying a given problem or phenomenon.

Ontology is concerned with the study of reality, existence and being (Guba and Lincoln 1989) while epistemology is concerned with the theory of knowledge and how belief is justified (Audi 2003). The two main ontological positions are within the approaches of objectivism and constructivism (Grix 2001; Bryman and Bell 2007). The objectivist perspective is that social actors possess an existence that is independent of social phenomena and their meaning, while the constructivists view social actors as an integral part of understanding the meaning of social phenomena (Bryman and Bell 2007). Based on the foregoing discussion, this study which examines in-trip tourists' perspectives can arguably be described as conforming to a constructivist ontology. However, as Tashakkori and Teddlie (2003) argue, for mixed methods research, the research question should be of primary importance rather than the method or philosophical worldview that underlies the method. Additionally, they suggest that the force-choice dichotomy between post-positivism and constructivism and metaphysical concepts such as "truth" and "reality" should also be abandoned (Tashakkori and Teddlie 2003).

Epistemology follows from ontology as its focus is on the "knowledge-gathering process and is concerned with developing new models or theories that are better than competing models and theories" (Grix 2001 p. 27). Traditionally, epistemological assumptions fell within two research paradigms. Guba and Lincoln (1994) define a paradigm as the belief system or worldview that guide researchers. The positivist paradigm, often associated with quantitative methods, advocates for the application

of the methods of natural science to the study of ‘social reality and beyond’. The constructivist or interpretivist paradigm often associated with qualitative methods, incorporates the subjective meaning of social action, where the researcher recognises the difference between people and objects, which are studied in the natural sciences (Tashakorri and Teddlie 1998; Grix 2001; Bryman and Bell 2007). Some authors, for example, Tashakkori and Teddlie (1998) and Crewswell and Plano Clark (2007) use the term constructivism while Grix (2001) and Bryman and Bell (2007) use the term interpretivism to describe the same worldview, while others such as Patton (2002) have used the term naturalism in reference to the qualitative approach.

Notably, by the second half of the twentieth century dissatisfaction with the axioms of positivism, that is, the role of ‘values’ in research, gave rise to post-positivism. Though post-positivists, were still associated with quantitative approaches, they acknowledged that values, theories and our understanding of reality influence research. These tenets soon came to be shared by quantitative and qualitative researchers alike and began to stoke the fire of the paradigmatic debate that led to a new research paradigm (Tashakkori and Teddlie 1998).

3.5 The Research Paradigm

Mixed methods research is now recognised as the third major research paradigm or the third methodological movement along with qualitative research and quantitative research (Johnson et al. 2007; Teddlie and Tashakorri 2009). Today, mixed methods research is defined as “an intellectual and practical synthesis based on qualitative and quantitative research” (Johnson et al. 2007 p. 129), which partners with the philosophy of pragmatism to yield the best results to address one’s research question. Pragmatism offers an “alternative worldview to those of positivism/post-positivism and constructivism and focuses on the problem to be researched and the consequences of the research” (Feilzer 2010 p. 7).

Creswell and Plano Clark (2011) trace the evolution of mixed methods research through five stages of development- the formative period, the paradigm debate

period, the procedural development period, the advocacy and expansion period, and the reflective period.

Creswell and Plano Clark (2011) suggest that the discourse about combining quantitative and qualitative data among leading psychologists in the 1950s gave rise to the formative period, which defined the birth of mixed methods. The notion of triangulating qualitative and quantitative data had been introduced. The second evolutionary period, the paradigm debate of the 1970s and 1980s, was characterized by arguments about the philosophical assumptions underlying quantitative research, which were considered vastly distinct from the philosophical assumptions connected to qualitative research. Some of these divisive issues still linger to today, but as Creswell and Plano Clark (2011 p. 26) note, “are not as tightly drawn as envisioned in the 1990s”. Pragmatism emerged as the most suitable philosophical foundation for mixed methods research as more researchers began to posit the idea that multiple paradigms could be used to address research problems. During the procedural development period, the emphasis shifted to the methods that could be employed for data collection, analysis and research design and the purpose for undertaking a mixed methods study. More recently, the advocacy and expansion period is one in which authors are supportive of mixed methods research as a separate methodology, method, or approach to research. During this expansionary period there was a noticeable rise in the use of mixed methods research in many countries and in many disciplines. The final period, the reflective period, refers to a period in the middle to late half of the first decade of the new millennium. This latter period has been characterised by two main themes surrounding mixed methods research. One theme is related to an assessment of the field and its future and the other theme relates to the criticisms of the mixed methods approach (Creswell and Plano Clark 2011). The limitations of the mixed methods approach are highlighted in a separate section in this chapter.

An earlier definition of mixed methods research by Johnson and Onwuegbuzie (2004) emphasised that the mixing of methods occurred in a single study or set of related studies and that mixing could extend not only to techniques and methods, but

also to approaches, concepts and language. According to the fundamental principle of mixed research, researchers should collect multiple data using different strategies and methods so that the resulting mixture is likely to result in complementary strengths and non-overlapping weaknesses (Johnson and Turner 2003 cited in Johnson and Onwuegbuzie 2004). Robson (2011) who prefers the term multi-strategy to mixed methods, has highlighted some of the contentious issues surrounding the use of quantitative and qualitative approaches in a single study. Robson (2011) notes that the 'incompatibility thesis' holds that a multi-strategy approach is not possible because qualitative and quantitative research represent two distinct paradigms that are not compatible with each other. However, Robson (2011) suggests that the 'incompatibility thesis' is refutable given the increasing number of researchers who are successfully conducting multi-strategy research. Nevertheless, he acknowledged that there are major differences between the positivist paradigm associated with quantitative methods and the interpretivist paradigm associated with qualitative methods. Similar sentiments were echoed by Bryman (2004 p. 442), but he has proffered that "differences between quantitative and qualitative research in terms of their epistemological and ontological commitments" are not deterministic or perfectly aligned within singular paradigms.

More recently, Bryman and Bell (2011) have moved away from the term multi-strategy research and are now using the increasingly preferred term 'mixed method research'. Bryman (2004 p. 443) had posited the notion that the differences between quantitative and qualitative research tend to be exaggerated and "in fact research methods are much more free-floating in terms of epistemology and ontology than often supposed". Bryman and Bell (2011) have also suggested that there are two versions of the quantitative versus qualitative research debate, one is epistemological version and the other the technical version. The first version relates to the 'incompatibility thesis' cited by several scholars and highlighted earlier. The second version, the technical version asserts the compatibility of quantitative and qualitative research strategies while acknowledging each strategy's "distinctive epistemological and ontological assumptions" (Bryman and Bell 2011 p. 630).

The technical version of the quantitative-qualitative debate speaks to the practicality of conducting research where either research strategy can facilitate the needs of each other. As several scholars have noted, pragmatism is about “what works,” and takes a very practical approach to investigating a research problem, where objective and subjective knowledge are equally valuable (Tashakkori and Teddlie 1998; Johnson and Onwuegbuzie 2004; Teddlie and Tashakkori 2009; Creswell and Plano Clark 2007; 2011). “The focus is on the consequences of research, on the primary importance of the question asked rather than the methods, and multiple methods of data collection inform the problems under study” (Creswell and Plano Clark 2007 p.23). Pragmatism is characterised by pluralism, endorses “practical theory”, a preference for action over philosophising and has an outlook of knowledge as being both constructed and based on the reality of the experiential world (Johnson and Onwuegbuzie 2004). Some of the general characteristics of pragmatism are highlighted in Table 3.1

Table 3.1 Some General Characteristics of Pragmatism

<ul style="list-style-type: none">• Recognises the importance of the natural world, as well as the emergent social and psychological world, which includes language, culture, human institutions and subjective thoughts.
<ul style="list-style-type: none">• Actions supersede philosophising -pragmatism is in a sense, an anti-philosophy.
<ul style="list-style-type: none">• Endorses a strong and practical path to empiricism as the path to determine what works.
<ul style="list-style-type: none">• Places high regard for the reality and influence of human experience in action.
<ul style="list-style-type: none">• Theories are viewed instrumentally (they become true and are true to different degrees based on how well they currently work).
<ul style="list-style-type: none">• Endorses eclecticism and pluralism- different, conflicting theories and perspectives can be useful. Observation, experience and experiments are all useful means by which researchers can gain an understanding of people and the world.
<ul style="list-style-type: none">• Endorses theory that inform effective practice.
<ul style="list-style-type: none">• Offers the “pragmatic method” for solving traditional philosophical dualism as well as for making methodological choices.

Adapted from Johnson and Onwuegbuzie (2004)

Morgan (2007) proffers three main comparative distinctions with the pragmatic approach and the quantitative and qualitative methodological stances. As Table 3.2 highlights, the comparison was based on the connection of theory and data; relationship to the research process; and inferences made from the data. Morgan (2007 p. 71-2) adds that, “ Any practicing researcher has to work back and forth between various frames of reference, and the classic pragmatic emphasis on an *intersubjective* approach captures this duality.” It is this practical approach that will guide this research and therefore pragmatism will be the philosophical assumption underpinning this study.

Table 3.2 A Comparison of Key Issues in the Pragmatic, Qualitative and Quantitative Research Methodologies

	Pragmatic	Quantitative	Qualitative
	Approach	Approach	Approach
Connection of theory and data	Abduction	Deduction	Induction
Relationship to research process	Inter-subjectivity	Objectivity	Subjectivity
Inference from data	Transferability	Generality	Context

Adapted from Morgan (2007)

Apart from the pragmatism or practicality of mixed methods research, for this study, the mixed methods approach is deemed the best approach to address the research questions and advance the knowledge in the eTourism and sustainable tourism domains. There are several areas in which mixed methods are deemed superior to a singular approach design. Firstly, mixed methods research allows the researcher to simultaneously deal with a range of exploratory and confirmatory questions using quantitative and qualitative strategies. Secondly, mixed methods provide the researcher with an opportunity to make stronger inferences. Thirdly, mixed methods research gives the researcher the opportunity to acquire a greater variety of divergent views (Teddlie and Tashakkori 2009). Lastly, the nature of mixed method research allows for the convergence of the findings through triangulation which serves to enhance the validity of the research. As noted by Creswell (2009), the validity of qualitative research is strengthened by triangulating different data sources of information and by examining evidence from the sources to build a coherent justification for themes. By sampling eTourism experts and in-trip tourists the researcher was not only able to determine the technologies available for use by in-trip tourists that support sustainable tourism initiatives but also establish from the in-trip tourist's perspective, sentiments about the use of technology to support sustainable tourism and how their actual ICT usage compared to those technologies

proffered by the experts. Therefore, the divergent views from the two sample populations (eTourism experts and in-trip tourists) ultimately strengthened the inferences made and the richness of the data on the subject matter.

3.6 Tourism and Mixed Methods Research Design

While the genesis of mixed methods research dates back to the 1950s, it has only gained in popularity within the last twenty years (Mason et al. 2010), and is thus considered “new” in relation to traditional quantitative and qualitative approaches (Bryman 2007; Creswell and Plano Clark 2011). The number of published works using mixed methods research is increasing, however, the use of this research approach has been far less extensive in business, when compared to psychology, education, health and sociology (Creswell and Plano Clark 2011; Molina-Azorín 2011). It is not clear why mixed methods research is utilised less in business studies.

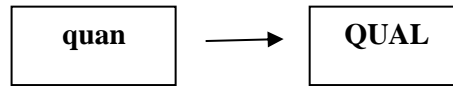
A search by this researcher in March 2011 of the Journal of Sustainable Tourism using the search terms “mixed methods” and “quantitative and qualitative” yielded thirty one (31) articles all published between 2008 and 2011. However, upon further analysis some of the papers were multi-method studies rather than a true mixed methods study. Mixed methods studies by definition involve at least one quantitative and one qualitative component and the integration or triangulation of the components. However, multi-method studies can involve multiple studies of solely quantitative or qualitative research and not necessarily both quantitative and qualitative research (Tashakkori and Teddlie 2003; Creswell and Plano Clark 2011). The use of the same search terms via Ebscohost and Science Direct in the Annals of Tourism Research; Information Technology & Tourism; and the Journal of Hospitality and Tourism Technology yielded no results. While this search exercise was in no way intended to be a comprehensive analysis, it served to illustrate the challenge in locating mixed methods study in the tourism literature. The researcher was able to find a mixed methods study in Information Technology & Tourism relevant to this current study entitled “Information Search with Mobile Tourist Guides: A Survey of Usage Intention” (Rasinger et al. 2007). Rasinger et al. (2007)

used a qualitative approach as part of their preliminary exploratory study, followed by the use of a survey in the quantitative strand of their study. Mason et al. (2010 p 432) “argues that when the overall tourism research study involves the use of mixed methods, an initial exploratory stage conducted as part of a sequential research process, requires a systematic approach to achieve a reliable platform for further investigation.” In sum, there is evidence that there is growing use of the mixed methods research approach in tourism and its use is likely to increase given the strengths identified in the preceding section.

3.7 Research Design

The research design sets out the specific approach or scheme of work for investigating the research problem. There are two main recent sets of typologies to choose from in relation to mixed methods research design, one presented by Teddlie and Tashakkori (2009), the methods-strand matrix and the other by Creswell and Plano Clark (2011). The researcher opted for one of the research designs from Creswell and Plano Clark’s (2011) typology- the explanatory sequential design. The design typology was selected because its specificity offered the best match for the research questions being investigated; the simplicity of the design; and the fact that it was drawn from a more contemporary literature source. While offering the best match, the selected research design did not match all, but most of the criteria for the chosen design. Collins and O’Cathain (2009) have in fact cautioned researchers that typologies are by no means a panacea and cannot cover the wide range of mixed designs possibilities. Woolley (2009) in her mixed methods study on structure and agency used a strategy that was not described by either Creswell and Plano Clark (2007; 2011) or Tashakkorie and Teddlie (1998). Teddlie and Tashakkori (2009) advocate for fluidity of mixed methods research design and suggest that flexibility and creativity are important when combining the quantitative and qualitative elements in a mixed methods research.

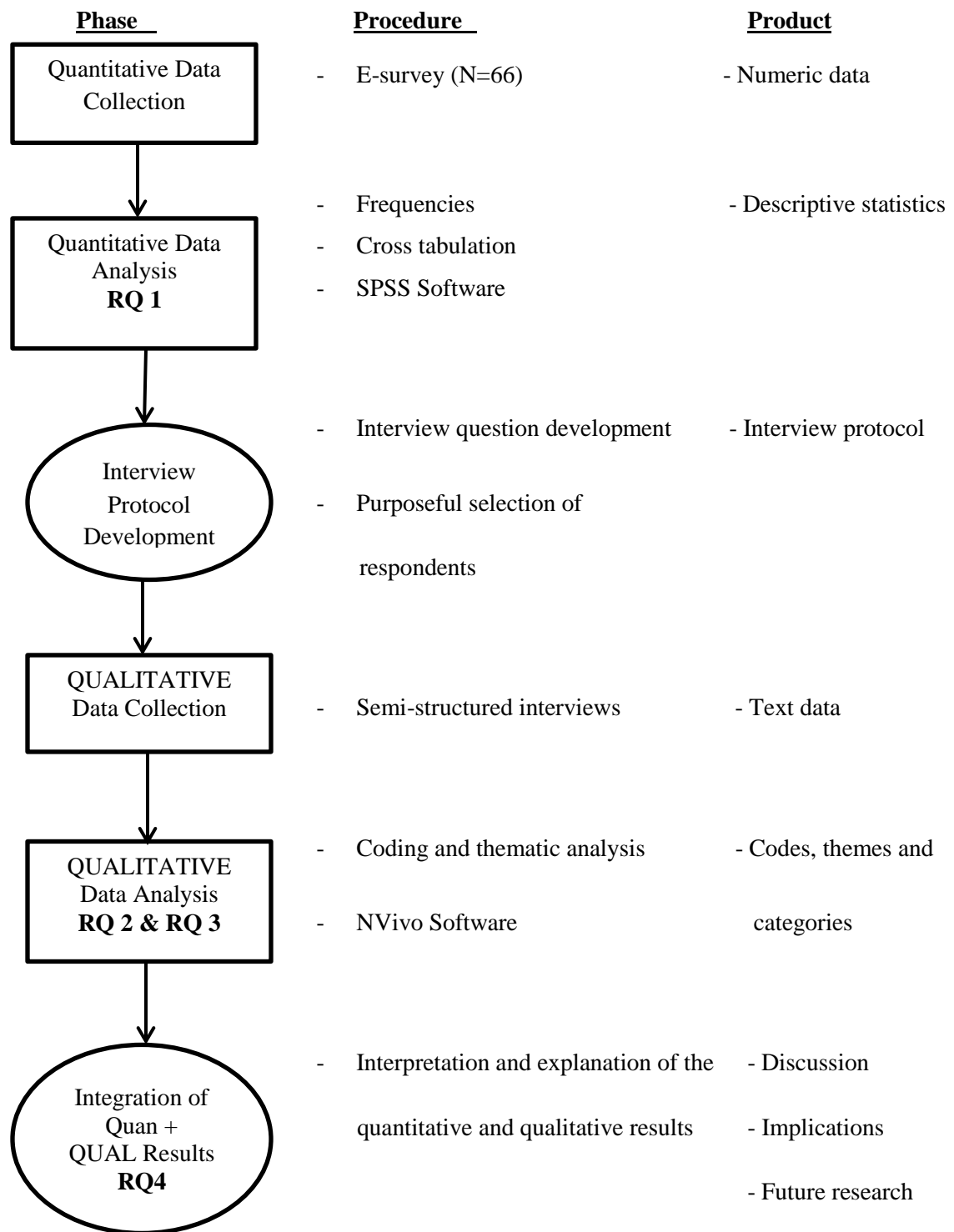
The two phase design for this research, which is the simplest type of sequential mixed method design, employed a ‘less dominant-dominant design’ where the quantitative component was less dominant than the qualitative component (Tashakorri and Teddlie 1998). The approach is depicted in Figure 3.1 Sequential Explanatory Design:



Source: Adapted from Creswell (2009) with upper case letters denoting the more dominant component of the study

Figure 3.1 Sequential Explanatory Design

Borrowing from Creswell and Plano Clark’s (2011) typology this research utilised an explanatory sequential design which involves first collecting quantitative data, analysing the quantitative data, and using the results of the first phase to develop the qualitative data collection in the second phase. However, unlike Creswell and Plano Clark’s (2011) typology, the intent is to use quantitative data to provide more detail about the qualitative results. The emphasis is on the qualitative strand, not the quantitative strand. According to Creswell and Plano Clark’s (2011 p. 185) sequential design typology, in an exploratory design, qualitative data is collected first, whereas in the explanatory design quantitative data is collected first, analysed and “using the results to inform the follow-up qualitative data collection.” A procedural diagram is provided in Figure 3.2 Schematic of Explanatory Sequential Research Design.



Key: RQ ≡ Research Question

Figure 3.2: Schematic of Explanatory Sequential Research Design

3.8 Limitations of the Design

While mixed methods research offers a number of advantages, there are challenges associated with this approach. Amongst the most noted challenges is the time and the resources that the two approaches require not only in terms of the data collection, but the time for the analysis and integration of the two research strands (Johnson and Onwuegbuzie 2004; Bryman 2007; Creswell and Plano Clark 2011).

The researcher was able to economize on time by adopting a research design where one strand, that is, the qualitative strand was more dominant, as opposed to having the quantitative and qualitative strands equally weighted. The use of Internet-based survey software for designing the questionnaire for the quantitative strand, and the use of e-surveys for data collection also promoted an efficient and cost effective use of resources. Additionally, the use of specific quantitative and qualitative software assisted in the analysis of the data for each strand of the research.

3.9 Rejected Methods

While a mixed method research approach was adopted for this study for a very practical reason, that is, it best served to answer the research questions, this is not to suggest that other methods were not considered before the methodology and methods were decided upon.

A strictly positivist approach associated with quantitative research was not desired since, as previously identified, the literature (as it relates to technology adoption) is saturated with quantitative studies. A qualitative approach was needed to extend knowledge about technology adoption behaviour and to acquire tourists' perspectives as it related to sustainable tourism and technology. Since the researcher was more interested in the factors which affect the use of in-trip ICT tools and applications and the extent to which these support sustainable tourism; and less interested in all the specificities of the destination, a case study approach was not adopted.

Given the need to ascertain consumers' perspectives on sustainable tourism and technology, consideration was given to undertaking an ethnographic study. Brewer (2003) defines ethnography as the study of people in naturally occurring settings which capture their social meanings and ordinary activities, involving the researcher participating directly in the setting. Since the researcher would not have been participating directly in touristic activities, the study would not have been providing 'insider knowledge' from rich data. Miles and Huberman (1994) also argue that ethnographic studies tend to be descriptive but show very little consideration for conceptual or theoretical meanings.

Pernecky and Jamal (2010) suggest that tourism studies are well suited to phenomenological approaches as phenomenology is about the study of lived experiences. However, the researcher reflected on the fact that this research was more about perspectives than experiences. If the study group involved other types of tourism stakeholders, for example the host community/locals or service providers, then a phenomenological approach could have been appropriate. However, based on the researcher's prior work experiences and the practical challenges in engaging with time-sensitive leisure tourists, the phenomenological approach was also rejected.

Focus group interviews were also considered however, it would have involved a minimum three hours out of the vacation time in any one day, and given the transient and time-sensitive nature of leisure tourists, and the diverse cultural backgrounds of the interviewees, one-on-one semi-structured interviews were considered a better option. Additionally, a survey approach for the leisure tourists, while requiring less time would not have provided any level of depth required to gain perspectives or provide the flexibility or opportunities for probing. However, the researcher reflected on the use of a survey approach to establish (from eTourism experts) an update-to-date inventory about the ICT tools/applications that could potentially be used by in-trip tourists to support sustainable tourism. A web-based survey could be conducted over a relatively short-time

span and provide a global scope, without prejudicing those without Internet access since the targeted study group (eTourism experts), were persons who constantly engaged with technology. The researcher felt it was important to have this knowledge about available ICT tools/applications before engaging with the leisure tourists. There were no studies in the literature that provided a single comprehensive inventory though attempts have been made to establish such an inventory or listing of such tools/applications available to destination management organisations (see Ali 2009). The Delphi technique was considered as an alternative approach for soliciting eTourism experts' opinions, however, given the time needed to conduct two to three rounds of interviews and the fact that no consensus is being sought on the type of eTourism applications in-trip tourists can use to support sustainable tourism practices, it was determined that a web-based survey would be the most efficient and effective data collection approach.

There were quite a number of options available even within a single philosophical approach. It is noteworthy that every single methodological approach in the literature seems imperfect. Ultimately, it led back to the ability of the researcher to practically achieve the aims of the research and answer the research questions. As such, a survey, followed by an interview process best met these requirements. Therefore, a mixed methods approach was adopted.

3.10 Mixed Methods Sampling Strategy

The success of a mixed methods study “is a function, to a large degree, of the combination of sampling strategies that are employed” (Teddlie and Yu 2007, p. 98). Given the qualitative dominance of this research a non-probability strategy was employed for both strands of the research, however a combination of strategies was employed in Phase 2. This is elaborated upon further in this section.

While a probability sampling strategy could have been employed for the web-based survey conducted in Phase 1, randomization proved to be challenge as the global

population of eTourism experts was indeterminate. Challenges with the level of response resulted in all contacts in the compiled database being contacted.

A purposive or purposeful sampling strategy is used primarily in qualitative approach and aims to strategically select information-rich cases, specific to the purpose of the study (Patton 2002). Purposive sampling is also known as non-probability sampling and offers a wide range of sampling strategies based on the goals of the research. These goals include whether the research aims to achieve representativeness or comparability; sample unique cases; use gradual selection or a combination of the aforementioned techniques thereby requiring multiple purposive techniques (Teddlie and Yu 2007). Given the pragmatic nature of this study, the researcher opted for a mixed purposeful sampling strategy (Patton 2002; Teddlie and Yu 2007). The researcher used a combination of criterion sampling and theoretical sampling for the second phase of the research. Criterion sampling involves selecting cases that meet some criterion while theoretical sampling also known as theory-based sampling seeks to achieve saturation of themes based on the phenomenon under study (Patton 2002).

3.11 Phase 1-Quantitative Data Collection and Analysis

A cross-sectional study involving eTourism experts as the unit of analysis constituted the first phase of the research process. The professional database of experts of the International Federation for Information Technology and Travel & Tourism (IFITT) and other relevant experts who are knowledgeable in the eTourism domain formed the main sampling frame for the quantitative strand.

The IFITT membership database has proven to be a useful resource for other doctoral studies (e.g. Ali 2009; Horan 2010), as well as other researchers, particularly since the organisation's mission is to "network eTourism stakeholders and nurture eTourism innovation, exploration and knowledge". The use of IFITT members for the expert survey provided a good baseline given the organisation's global reach; and strategic objectives and values. Two notable strategic objectives of IFITT are to "encourage

excellence in the research, development and implementation of tourism technologies” and to “support social causes such as sustainability”. IFITT values relevant to this study include that “technology should enhance tourist experiences and satisfaction” and to “promote useful and innovative technology that is fit for purpose” (IFITT 2011). The IFITT membership is quite diverse, representing global practitioners and academics who are interested in information technology and tourism; and advancing eTourism knowledge and practice. However, the researcher recognised that there are eTourism experts who are not members of IFITT. Consequently, other experts identified in recent literature, the researcher’s professional network, and authors active in the area were also utilised.

The IFITT database comprised seven hundred and thirty (739) members (as of July 2011). It must be borne in mind that membership numbers will fluctuate with the expiration of members’ annual subscription. There is a sizeable percentage of student membership but the designation of all members was not discernible from members’ posted information. Discernible student members were omitted, as well as members who based on their professional designations would not have been suitable for the study. This reduced the potential IFITT members to 600. The other two categories of potential eTourism experts were categorised as non-IFITT members, derived from industry contacts and eTourism publications experts, which accounted for 24 and 43 contacts, respectively. eTourism experts drawn from publications were selected based on their published research in peer reviewed journals in the eTourism domain over the period 2009-2011. Publications were selected based on the researcher’s knowledge and experience with conducting the literature review for this thesis. Publications known to cover eTourism were targeted in addition to searches by key terms. Searches on EBSCOhost and Proquest Research Databases were conducted using the search terms “ICT and Sustainable Tourism”, “eTourism” and “Tourism + Technology” proved to be inadequate. As a result, a search of the journals identified in Table 3.1 and Information and Communication Technologies in Tourism (familiarly know as ENTER) Conference proceedings for the 3 year period 2009-2011 was undertaken. ENTER Conference

proceedings are double blind peer reviewed and provide published papers very similar to the standard of journals by leading researchers in the eTourism domain. The rationale for such a relatively short time span for review of the journal articles and ENTER proceedings was with a view to capturing the most cutting edge research, as “new” is very short-lived in the technological domain.

Table 3.3: Selected 2009- 2011 Publications Researched for eTourism Topics Relevant to the Study

Journal Title	Presence of Relevant Material
Journal of Information Technology & Tourism	Yes
Journal of Hospitality and Tourism Technology	Yes
Journal of Sustainable Tourism	No
Tourism Management	Yes
Annals of Tourism Research	Yes
Journal of Leisure Research	No
Journal of Travel Research	Yes
Journal of Travel and Tourism Research	No
Journal of Vacation Marketing	Yes
Journal of Travel and Tourism Marketing	Yes
Journal of Hospitality and Tourism Research	No
International Journal of Tourism Research	Yes
International Journal of Hospitality Management	No
Information and Communications Technologies in Tourism (ENTER Conference Proceedings)	Yes

Selection criteria were developed based on key words appearing in the literature. Table 3.4 highlights some of the keywords occurring in the contemporary eTourism literature and the importance attached for this study. Notably, many of the names garnered from the search of publications were already included in the IFITT database. In some cases, while names could be identified from the publications, e-mail contacts could not be established. It is emphasised that the main objective of the search of publications was to find researchers (and their contact information) whose work was relevant to this study, in order to include them in the database of eTourism experts to be contacted. The initial combined (IFITT and non-IFITT) eTourism experts database comprised 667 persons.

Table 3.4: Criteria Used to Identify Most Relevant Papers/Presentations by Key Words

Importance	Key Words
Little Relevance (1)	Metrics for Tourism Website Evaluation, Marketing Tourism /Hotel Websites, Booking Interfaces, DMS Measurement, Website Evaluation
Not Very Relevant (2)	Semantic modelling, ontologies, Internet marketing
Relevant (3)	Web 2.0, e-Destination, consumer behaviour, intelligent systems, virtual tourism/world/heritage
Very Relevant (4)	Mobile Systems/Technology/Guides/Applications, Consumer Acceptance of Technology, LBS, Context-based services, technology acceptance model
Extremely Relevant (5)	ICT, Sustainable Tourism, Recommender Systems, eTourism applications, In-trip applications

A web-based survey was designed, piloted and revised before being disseminated to the sample population of eTourism experts. This served to augment the content validity of the survey instrument (Litwin 1995). The questionnaire was designed to garner

information from eTourism experts about available and/or emerging in-trip tourists' technologies and how and if these can be used to support sustainable tourism initiatives. A survey approach was adopted given the need to reach geographically dispersed experts who would have many demands on their time. Apart from the cost and time saving derived from the survey approach, it was determined that given the focus of this research on ICT and the target audience- eTourism experts, a survey administered on-line would not only be desirable but appropriate. No potential eTourism expert would have been denied an opportunity to participate due to a lack of Internet access. The merits and demerits of the web-based survey approach are addressed in the next section.

3.11.1 Rationale for Selection of Web-based Questionnaire

Research has shown that respondents of web-based questionnaires tend to complete them faster than their equivalent telephone or face-to-face administered versions. Other distinct advantages of the web survey over their paper counterparts are its visual appeal, questions are presented in a set sequence and respondents cannot skip ahead as they do in paper surveys; open-ended questions can be richer, longer and more revealing. Generally, surveys eliminate interviewer and social-desirability bias but on the other hand, there are no opportunities for question clarification by an interviewer (Brace 2008). Software for web surveys also allow for automatic download into a database, thereby cutting down the time spent for coding a large number of questionnaires (Bryman and Bell 2011). The researcher opted for the Bristol Online Survey (BOS) programme which allowed for the easy creation, administration and analysis of the survey via the web.

3.11.2 Sampling, Specific Procedures and Response Rates

Since the global population of eTourism experts could not be established and due to concerns about response rates, it was decided to send invitations to all the contacts in the established database. Contacts were sent an invitation letter (see Appendix A). Based on the researcher's experience with the pilot survey where respondents were recruited via LinkedIn's Travel 2.0 group, it was determined that it was more efficient and effective

not to send an invitational letter first, wait for a response about willingness to participate and then follow on with a link to the actual survey. LinkedIn is a social media website for professionals, of which the researcher is also a member. An initial posting was made requesting eTourism experts willing to take part in a pilot study looking at tourism applications and links to sustainability. The post generated a lot of interest but only those persons who gave a definite yes were subsequently contacted by email and sent the website link for the questionnaire. A total of seventeen (17) persons participated in the pilot phase. The majority of the respondents in the pilot group wanted to see the questions before committing to participate, as result, the researcher sent an invitation via email that included links to the project's information website, as well as the link for the web-survey. While only one respondent from the pilot group had a negative comment about the questions posed in the survey this was not specific nor did the respondent offer any suggestions for improvement. The majority of the respondents (94%) made no comments about the clarity or lack therefore of the questions. However, the researcher found that the question which asked respondents to rank seven items relating to their perception of the most important use of technology for in-trip tourist was incorrectly answered by 47 % (8 persons) of the respondents. Respondents tied some items despite instructions indicating that rankings could not be tied. As a result, this question (8) was reformatted for the final survey to avoid error. Additionally, the researcher noted that in the pilot survey the latter three questions of the pilot survey had subtle differences. Therefore, the researcher sought to condense these to obtain the same content and minimize the chances of the differences in the questions escaping the respondent for the final survey.

The web survey's opening pages allowed people to participate via informed consent where they were also guaranteed anonymity, confidentiality and the ability to withdraw at anytime without consequence. To enhance the clarity of questions, the project's information web-site also included a glossary of key terms used in the questionnaire. The web-based questionnaire included 18 items, with a mix of close and opened questions. It comprised four main areas- professional details, expertise, ICT

applications, ICT and Sustainable Tourism. There was also an optional area to include contact information. The first two areas served to specifically establish the level, source and nature of the respondent's expertise and validity for his/her consequent inclusion in the analysis. The latter two areas sought to establish opinions on the links between sustainable tourism and ICT, and to identify specific in-trip ICT tools/applications that could support sustainable tourism in a destination. The questionnaire can be found at Appendix B.

The effective database was reduced to 490 persons after taking into account failure delivery notices and automatic responses in cases where contacts had left the organisation. After sending the invitational letter, two reminder notices were sent. The initial survey period was for six weeks but was extended a further six weeks to cater for the interruption during the Christmas period and to increase the overall response rate. One additional reminder notice was sent during the period of extension, and business cards printed with a link to the web-survey was distributed to delegates of IFITT's ENTER 2012 Conference. After the three month survey period, November 2011-February 2012, the response rate was 13.5 % with all 66 responses deemed usable. As Baruch (1999) and Denscombe (2010) have noted there is no agreed norm about what constitutes an acceptable response rate. Bryman and Bell (2011) note that even when participants are recruited through invitations (emails or posting to discussion groups), it is impossible to calculate response rates for online surveys when the population is impossible to determine.

Denscombe (2010) suggests that it is more productive to evaluate the response rate that is actually achieved based on the level of reasonable response in line with comparable surveys; the measures taken to minimize non-response rates; and a determination of the extent to which non-respondents differ in any systematic and relevant manner from those who have responded. A recent comparable survey of eTourism experts for a doctoral thesis by Ali (2009) using the IFITT database, which at the time stood at 202 members, had 23 responses that yielded a response rate of 11%. Ali's (2009) database

was considerably smaller than the combined database created for this study which not only used IFITT's database, but included publications and industry contacts. Ali's (2009) study yielded a lower rate than the researcher's current study, however Ali's work has been successfully defended, published and accepted by academia (see Ali 2009; Ali and Frew 2010). Recent work by Tussyadiah (2013) involving a survey of travellers yielded a 3.5% response rate. These studies demonstrate that low response rates do not necessarily take away from the value or usability of the results. As such, the response rate for this study was considered satisfactory given the measures undertaken to reach prospective eTourism experts- use of reminder notices, extension of the deadline and distribution of business cards with the survey's web link to encourage and remind respondents of participation. Following on from Descombe's (2010) third and final factor to address the suitability of the response rate- there was no significant difference between the respondents and non-respondents for this study, since many of the non-respondents would have also come from academia, which represented the largest share of respondents for the study.

3.11.3 Web Survey Data Analysis

Based on the research questions and the main intent of the questionnaire, data for the closed ended questions were entered, coded and analysed using the Statistical Package for Social Sciences (SPSS) to provide descriptive statistics. The intent of the study was not to identify any relationships between independent and dependent variables. Oppenheim (2001) notes that descriptive survey designs are common and important, and the chief objectives of such surveys are fact-finding and descriptive- they are not designed to show causal relationships between one variable and another. Phase one was essentially descriptive in nature and as Teddlie and Tashakkori (2009) have noted, quantitative data analysis can simply describe the phenomenon of interest or try to find differences between groups.

Since variables are used as descriptors (Kent 2001), it was not possible to assume the population was normally distributed as there were varying levels of skewness for different variables and a general lack of continuous data to establish skewness or kurtosis values (Pallant 2010). As such, parametric statistical tests (e.g. t-test and analysis of variance [ANOVA]) to establish significance were not used given the non-predictive nature of the variables under investigation and the extensive use of nominal and ordinal data.

Chi-square is a commonly used non-parametric statistic and can be used on one or more groups, to compare the actual frequency in a group with an expected number (Munro 2005). Given the exploratory nature of this research there is no expected number established from theory, experience or comparison group. Assumptions on frequency data, adequate sample size with a minimum expected cell frequency of 5 or greater (Pallant 2010), measures independent of each other and theoretical reasons for the categories could not be satisfied for Chi-square (Munro 2005). Additionally, the use of non-parametric tests such as the Mann-Whitney U test and the Wilcoxon Signed Rank Test could not be used as the underlying assumptions for their use including continuous scales, randomness and independent observations between groups, could not all be met. Experts were treated as one group and even when dissected based on ICT or Tourism expertise these groups could not be considered independent. Therefore, a simple approach was taken to the analysis of the quantitative data utilising descriptive statistics, where the emphasis was placed on frequency distributions.

Content analysis was used to analyse the qualitative data within the survey, that is, the responses to the opened ended questions. Responses and comments were placed into an Excel spread sheet, coded and interpreted. A similar approach was undertaken by (Ali 2009) and this was well suited to this current study as the responses providing qualitative data were related to optional questions and the selected approach was effective and efficient for the relatively limited qualitative responses provided by the eTourism experts. Krippendorff (2004) notes that in conducting content analysis the

researcher has to consider the population of answers to the research questions and the population of texts that may signal an answer to the question. This researcher therefore did not focus on the accurate representation of all the textual material but those relevant to answering the research question(s). This same approach was followed in analysing the qualitative data, details of which follows this section.

3.12 Phase 2-Qualitative Data Collection and Analysis

The main unit of analysis in the second phase of the research was domestic and international in-trip tourists. Following the results of phase one, the semi-structured interview protocol was devised, tested and revised. By utilizing the semi-structured interview approach it allowed the interviewer sufficient flexibility to address the specific issues of the research project, to probe and/or clarify questions, while providing the interviewee some leeway in how to reply (Gray 2004; Bryman and Bell 2007). “It could be argued that the semi-structured interview is the most important way of conducting a research interview because of its flexibility balanced by structure and the quality of the data so obtained” (Gillham 2005 p.70). Gillham (2005) also notes that one of the strengths of the semi-structured interview is that it accommodates a strong element of discovery and at the same time, its structured focus enables analysis in terms of commonalities.

As highlighted earlier, focus-group interviews were considered however, semi-structured interviews were decided upon, given the time and cost of conducting focus group interviews, including the need to provide an incentive for participation and travel to a central location. Other considerations were the fact that the audience would be culturally mixed (international and domestic tourists), with the complexities of such dimensions amplified in a group setting. More recently, Roulston (2011 p. 362) highlighted the fact that physicians in the same Family Medicine Residency Program participating in focus groups “were reluctant to candidly discuss their views in front of peers.” Such reluctance to share perspectives on sustainable tourism and technology was

likely to take place among culturally diverse tourists with varying knowledge of the English language.

3.12.1 Study Sites

The face-to-face semi-structured interviews were conducted over six months during the period March 2012 to August 2012. The pilot phase took place over a two week period prior to the commencement of the full Phase 2 study. Six in-trip leisure tourists were interviewed during the pilot phase. Apart from the amendments to interview questions, the pilot phase identified a number of practical challenges, perhaps the most significant being the need to shorten the interview time from thirty minutes to twenty minutes as prospective participants were unwilling to spare thirty minutes, with some even trying to negotiate five minutes. Also, one of the initially identified study sites, Edinburgh Bus Tours, had to be substituted, the reasons for which are described below.

The study sites were selected based on VisitScotland’s (2009) data on the top paid and the top free visitor attractions within the city of Edinburgh. The top three attractions from each of the two categories were selected as shown in Table 3.5.

Table 3.5 Top Visitor Attractions in Edinburgh

Top Free Attractions	Top Paid Attractions
The National Gallery Complex	Edinburgh Castle
St. Giles Cathedral	Edinburgh Zoo
National Museum of Scotland	Edinburgh Bus Tours*

Source: VisitScotland 2009. * Substituted by Princes Gardens which is close to the starting point and main sales hub for Edinburgh Bus Tours

Soliciting respondents from these six attractions provided the opportunity to capture a variety of socio-demographic groups. Five of the study sites are situated within

Edinburgh's City Centre (See Appendix C: Map of Study Sites in Edinburgh's City Centre) while the Edinburgh Zoo is located approximately three miles out with the City's Centre (See Appendix D: Map Illustrating Location of Edinburgh Zoo Relative to Edinburgh's City Centre). Edinburgh Bus Tours was replaced by Princes Gardens as a study site because during the interview pilot phase, it became evident that it was too challenging to recruit bus tour participants at Waverly Bridge. The challenge arose due to the fact that the interviewer was seen as being in competition with the Edinburgh Bus Tour sales personnel for the attention of tourists; and tourists immediately assumed the researcher was selling something when approached. Also, the Waverly Bridge proved to be an awkward location as the researcher was left to stand on the pavement in a high pedestrian traffic area where train and Airlink bus passengers frequently traversed. Princes Gardens proved to be an excellent alternative as it was a relaxing atmosphere where seats were readily available for conducting interviews. It was a central location frequented by a cross-section of demographic groups, and was en route to or from another study site- the National Gallery Complex. Also, tourists were often easily identified in Princes Gardens as they were often seen during a break or with their luggage "killing time" at the end of their holiday before catching a train or the Airlink bus to the Edinburgh Airport. It is not surprising therefore, that the Princes Gardens proved to be the easiest site for interviewee recruitment. However, the researcher ensured that all sites were each visited on different days of the week over the six-month period.

There was only a comparative ease in recruiting interviewees at Princes Gardens when compared to the other study sites. Overall, it was a challenging undertaking to secure tourist interviews at all study sites. There were many occasions when the interviewer visited each of the study sites and was unable to secure any interviews. Initially, potential interviewees were offered a cup of coffee or tea but as a result of the difficulty in recruiting tourists, a £10 Marks & Spencer voucher was offered as an incentive. There was a progressive improvement during spikes in visitation for example, during the Easter Weekend and a marked improvement during the Edinburgh Festival period, July-

August 2012, though accessibility to some sites was difficult at times due to the volume of people and the live performances taking place. The reader is reminded that none of these interviews were pre-arranged and involved the interviewer standing outdoors in the elements (with the exception of the National Museum which was a popular visitor attraction on rainy days, a fact confirmed by personal communication with a museum staff member).

3.12.2 The Interview and Interviewees

“There are no rules for sample size in qualitative enquiry” (Patton 2002 p. 244). As Patton (2002) noted qualitative sampling is more concerned with information richness and typically focuses on relatively small samples or even a single case, purposively selected. The researcher secured thirty interviews before no new themes emerged from interviewees’ responses. Potential participants were approached on a random basis and for practical purposes travelling parties with more than two persons and/or children were excluded. Interviewees were advised that their participation was voluntary and that they were able to withdraw at any time. They were also informed about the purpose of the research and the approximate length of the interview. Interviewees were invited to review this information in writing before signing the consent form. The tourists were subjected to the following selection criteria based on the purpose of the research:

- Main purpose of visit to Edinburgh must be holiday/leisure.
- Use technological tools or applications e.g. the Internet or a mobile phone at least 5 days per week.
- Above the consent age of 18 years old.

The semi-structured interview protocol was designed and then piloted with actual tourists visiting Edinburgh. The questions were modified after the pilot phase and the interview time had to be reduced from 25-30 minutes to 15-20 minutes to increase the likelihood of recruiting participants. The interview protocol contained a few initial general questions to build a rapport and construct a story around the participant. There

were ten core questions as well as other follow up and probing questions related to these (See Appendix E). Interviews ranged from 9 minutes to 23 minutes, and the semi-structured interview protocol was amended to probe specific themes in the latter stages and therefore shortened some of the interviews. Interviews were recorded and transcribed verbatim. At the end of the interview participants were asked to complete demographic information related to their age, nationality, occupation, gender and educational level attained. Note, while the consent age was 18 and above, the age categories started with the age range 16-24 with the final category being 65+, to allow for comparability to age categories used in VisitScotland's tourism statistics. It was anticipated that this would be relevant particularly for the interpretation of the results and recommendations component of the dissertation.

3.12.2.1 Research and Reflexivity

Steirer (1995 p.163) defines reflexivity as “a way in which circularity and self-reference appear in inquiry, as we contextually recognize the various mutual relationships in which our knowing activities are embedded.” Blaxter et al. (2010) state:

There is no easy way in which the effect of the researcher on the research can be minimized. You cannot be wholly objective, and, in many ways, it is foolish to try to be so. The play of emotions between researcher, researched and research is often something to be welcomed. Yet there is a need to be aware of your influence on your research, and to be as open as you can in recording and recognizing these affects. (Blaxter et al. 2010 p. 84)

A further justification for this brief reflexive discourse is strengthened by Lincoln and Guba (1985 cited in Tashakkori and Teddlie 1998) who highlighted a number of activities that allow a qualitative researcher to establish credibility, which ultimately impinges on the trustworthiness of a study. Among these activities is keeping a reflexive journal – a diary of self and method. The researcher did initially keep a reflexive journal

whose recordings became quite repetitive after the initial stages of the field research. The main challenges were not so much with the interview process itself but the recruitment of interviewees. During the pilot phase the researcher had to quickly abandon counting the number of rejections, which exceeded one hundred on the first day. This proved to be a very counter-productive activity but the researcher did have to reflect on why recruitment proved to be such challenge at each study site. As Hughes (2006) notes, all knowledge produced through social enquiry is permeated with a researcher's biography which includes aspects of values, motives, personal status, ethnicity and gender. As highlighted above the main challenge lay in the recruitment and it was an inescapable fact that the researcher's ethnicity was not only different to every interviewee but also different to most of the resident population. As Blaxter et al. (2010) note this raises an issue about the context of the research and as such the role of the researcher in this context. The researcher's ethnic background was phenotypically obvious and seemed to be reflected in the way in which some tourists responded when approached. However, some tourists indicated that they just did not have the time to spare or felt the interview was too long (even after the interview time was reduced to 15-20 minutes after the pilot phase). The researcher's own assessment was that for those tourists who participated in the study, the researcher's ethnicity was not an influencing factor in biasing interviewee responses. However, with face-to-face interviews that seek to garner opinions or perspectives about a subject matter there is always the chance of interviewees giving socially desirable responses. Interviewees were generally in a jovial mood and interested in talking about their holiday experience, while others were just happy to assist.

As it relates to preconceptions, the researcher's own experience in sustainable tourism development in developing countries, did result in what for some other researchers' may have been less significant, was a significant and surprising discovery- some tourists viewed sustainable tourism as more important to developing countries than developed countries or rural areas than urban areas. In the case of the former, the researcher was uncertain if this was in any way related to the perceived background of the researcher on

the part of the interviewee and whether interviewees sought to demonstrate sensitivity about what is important for “you” or “them” as opposed to “us”. Apart from this issue, the researcher’s analyses were not deemed to be influenced by any other preconceptions but remained open and flexible to a priori and emergent themes.

As suggested by Blaxter et al. (2010), further reflections about the research took the form of methodological notes, theoretical notes and analytical memos which took place as the field work proceeded and during data coding. This is elaborated on in the next section.

3.12.3 Qualitative Analysis

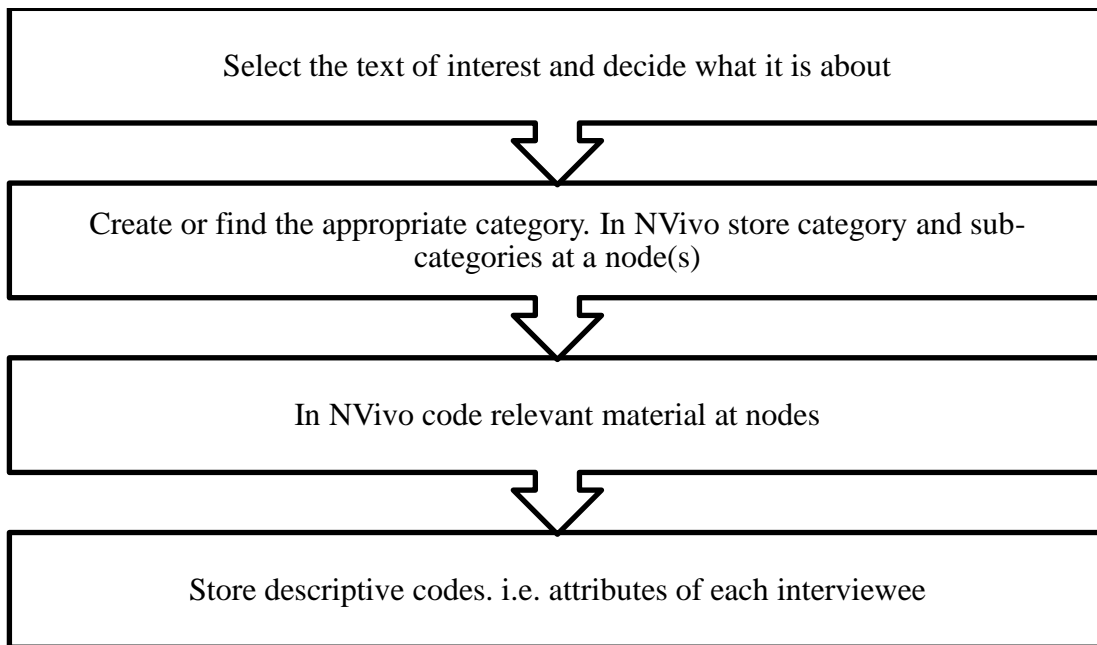
At the most fundamental level, data analysis involves data collection, data display, data reduction and drawing of conclusions (Miles and Huberman 1994). This study employed descriptive analysis (descriptive coding of demographic attributes), as well as thematic analysis of the interview data. The analytical procedure was an iterative process - going back and forth and constantly reviewing and revising, a feature that Moore et al. (2012) emphasise is part of many qualitative systems of analysis.

Narrative data produced as a result of audio interview recordings are typically prepared for analysis by a process of transcription (converting audio interviews to text) and then analysis (Miles and Huberman 1994; Tashakkori and Teddlie 1998). According to Miles and Huberman (1994 p.56), “Coding is analysis” and entails display, reduction and the drawing of conclusions. “Codes are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study” (Miles and Huberman 1994 p. 56). The process of coding can be approached from several different angles, considering different factors. These approaches and its application to this study are outlined next.

According to Boyatzis (1998), thematic analysis is a process for encoding qualitative data which requires codes to be explicitly defined as it relates to a specific phenomenon. Howitt and Cramer (2005) have suggested that there are at least three types of coding: pre-coding, researcher-imposed coding and coding emerging from the data. The former is more concerned with quantitative research whereas the latter two types of coding relate specifically to qualitative research. For this study the researcher utilised categories of data established a priori as well as those emerging from the data. A priori codes come from work previously undertaken by researchers about a phenomenon and agreed upon definitions can be located within the literature (Ryan and Bernard 2003). In the case of a priori themes for this study, these tended to be related more to the existing theory on technology acceptance models including the consumer technology acceptance model of Baron et al. (2006). Such a priori themes included the following key constructs: perceived usefulness, perceived ease of use, perceived enjoyment, social influence, perceived behavioural control, consumer traits and experience, which all impact on behavioural intention and subsequent use behaviour (as identified in Figure 2.5 Consumer Technology Acceptance Model). Additionally, the current research drew from the works of Chien-Hung and Mort (2007) which deliver key insights to possible factors that could motivate and inhibit consumers' uptake of technology. According to Howitt and Cramer (2005), using such researcher-imposed coding is not uncommon if the researcher has an interest in a theory that has an established system of analysis. The emergent themes were more evident in areas related to tourists' perceptions on sustainable tourism and its potential linkages to technology. In sum, the analysis for this study employed a combination of deductive and inductive thematic analysis, that is, from the theory and a priori research; and the raw data, respectively. Such a hybrid approach to thematic analysis serves to enhance a study's rigour (Fereday and Muir-Cochrane 2006).

Richards (2005) proffers another way at examining the process of coding. She distinguishes between three kinds of coding- descriptive, topic and analytical coding. While most studies use all three types, Richards (2005) suggests that descriptive coding

is more like quantitative coding (e.g. coding demographics or attributes about participants), whereas, topic and analytical coding are used more by qualitative researchers as these are interpretive processes. Richards (2005) notes that analytical coding is an integral part of qualitative enquiry, as it leads to theory emergence and theory affirmation. The process of qualitative analysis for this study utilised the four basic steps as outlined by Richards (2005) and is depicted in Figure 3.3 Basic Steps of Qualitative Coding. The process of coding for this study was aided by QSR International NVivo 9 which is qualitative software. A node is defined as “a container that lets you gather source content relating to themes, people, places, organizations or other areas of interest” (QSR International 2010). After mergers and elimination, there were twenty-one thematic nodes from which significant themes and patterns were derived. Source content for this study was derived from interview transcripts and as such there were thirty sources of content. The interview transcripts from this study can be found at Appendix I- in Volume 2 of this thesis.



Adapted from Richards (2005)

Figure 3.3 Basic Steps of Qualitative Coding

After transcribing the first ten interviews the researcher commenced a preliminary process of theme identification and coding using QSR's NVivo 9 software. Miles and Huberman (1994) strongly recommend early analysis (rather than at the end of data collection) as it allows new data to be collected and gaps to be filled. Transcripts and audio files were imported into NVivo 9 where editing was finalised and the themes were developed based on the research question, theoretical framework and later, the emergent data. Each node, which represents a theme, was defined (see Appendix F) and significant portion of these definitions came from the terms used in the extant literature. As eluded to earlier on the discussion on the hybrid approach to thematic analysis used for this study, themes were derived on the basis of (1) specific theoretical interest regarding consumer technology acceptance/adoption behaviour; and (2) recurrent issues raised in the interviews among tourists about their perspectives of sustainable tourism and their use of technology while in-trip. The study took advantage not only of a priori and emergent themes but also of both manifest and latent content analysis. Manifest content of the data refers to that which is directly observable whereas, latent content refers to implicit or underlying aspects of a phenomenon (Boyatzis 1998; Joffe and Yardley 2004). During all stages of the coding process the researcher engaged in "memoing" within and outwith NVivo, which served to tie pieces of data and to link data with theory. Memos also served to address personal, methodological, analytical and substantive issues of the inquiry (Miles and Huberman 1994; Blaxter et al. 2010).

Successive reviews of the transcripts and themes led to the merger and/or elimination of thematic nodes before the most salient issues were identified and shaped into a finite set of themes (Attride-Stirling 2001). Tashakkori and Teddlie (1998) highlighted that peer debriefing, negative analysis and an inferential consistency are ways in which the researcher can enhance the credibility or trustworthiness of their findings. Themes were checked by another researcher using a random sample of five interview transcripts of her choosing. All the interviews could not be checked as it would have entailed several weeks of work for another researcher to complete. Such an approach is more practical for funded non-doctoral research where there is a collaborative team effort on a project.

The researcher's colleague who examined the themes was provided with the initial full listing of themes identified, not only the most salient which were derived at the end of the process. These themes and their full descriptions are provided at Appendix F. Despite, some spirited exchanges about thematic choices and terms, the proportion of agreement among the two researchers was found to be high (.94). The inter-rater reliability was calculated as follows:

$$\frac{\text{Number of agreements}}{(\text{Number of agreements}) + (\text{Number of disagreements})}$$

This important step of checking the inter-rater reliability of the coding helped to ensure coding decisions were explicit and consistent (Joffe and Yardley 2004). This served to enhance the study's rigour and ultimately its validity. Once the coding was completed and verified, the salient issues were analysed based on a priori and emergent themes.

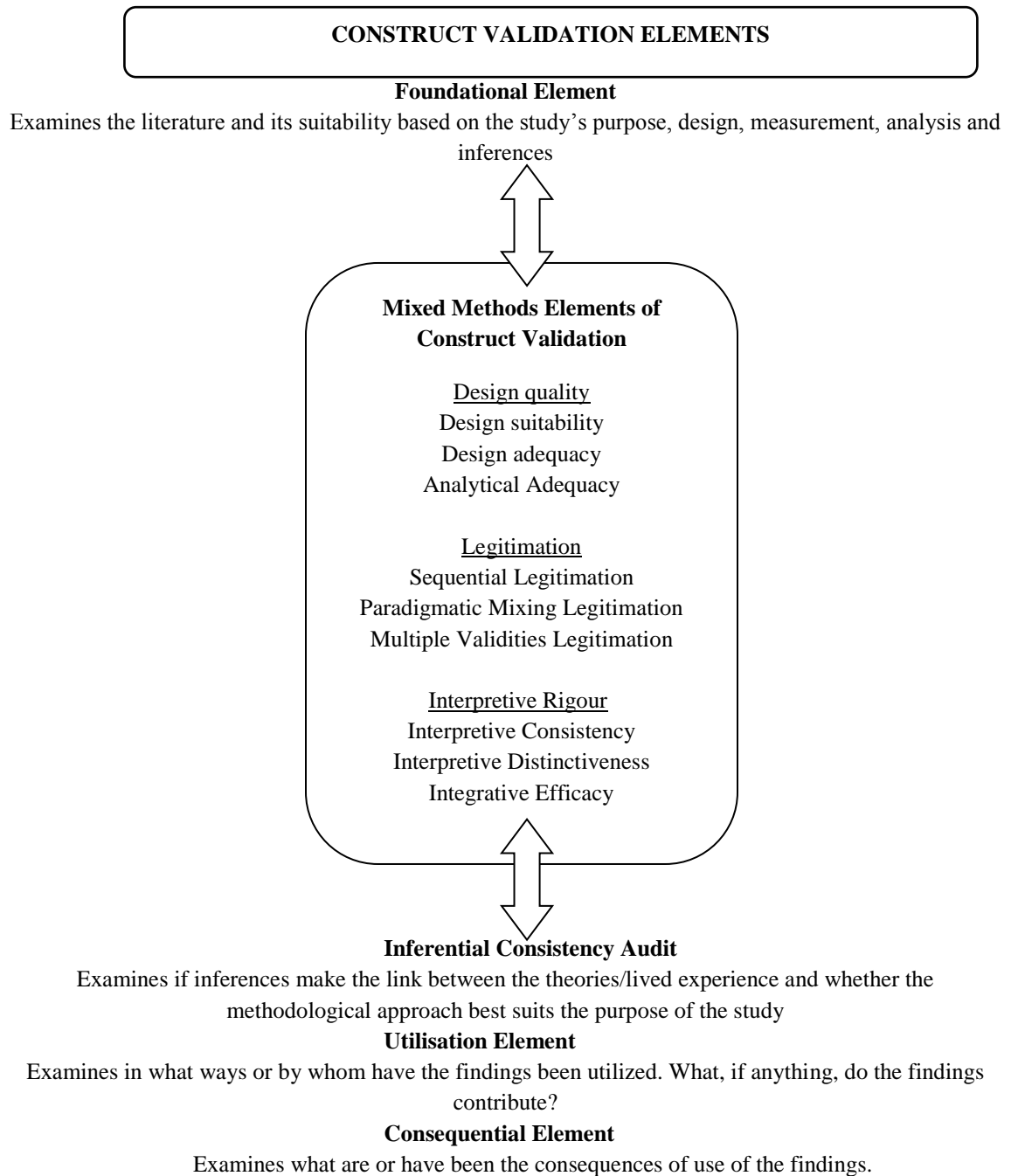
3.13 Mixed Methods Data Analysis Procedures

There are usually several points at which the quantitative and qualitative strand of a mixed methods study interface- at the point of design, during data collection, at the point of data analysis and during interpretation (Creswell and Plano Clark 2011). Typically all mixed methods designs interface in the findings and this research was no different. Additionally, based on the mixed method research question, data from the two strands formed an integral part of the overall data analysis procedures.

Validity refers to how well survey items measure what is set out to be measured, whereas reliability is a measure of the reproducibility of a survey (Litwin 1995). Quantitative researchers often make reference to the internal and external validity, generalizability and objectivity of research however, in qualitative research one speaks of credibility, transferability, dependability and confirmability (Lincoln and Guba 1985). Tashakkori and Teddlie (1998) suggest that in the mixed methods approach the

researcher switches between different modes of generalizability- at times the interest could be in generalizing to a theoretical population and other times one may wish to transfer or generalize the conclusions or results to a specific context. The intent of this research was to do the latter.

Validity in qualitative research is a contested topic and is only sparingly addressed in the mixed methods literature. The issue of validity as it applies to mixed methods research is yet to be fully delineated (Dellinger and Leech 2007; Creswell and Plano Clark 2007; Leech et al. 2010). Based on Dellinger and Leech (2007) validation framework this mixed methods research is validated through its pragmatic approach to collect data from more than one source and using more than one method, often referred to as triangulation (Miller 2003). The validation framework is a unifying framework that seeks to organise information to assist in the legitimation of all data types. Based on the validation framework this study will be validated based on five dimensions: the foundational element, the elements of construct validation for mixed research; inferential consistency audit; the utilization element and the consequential element (Dellinger and Leech 2007; Leech et al. 2010). See Figure 3.2 Validation Framework for Sequential Mixed Methods Design.



Source: Adapted from Dellinger and Leech (2007)

Figure 3.4 Validation Framework for Sequential Mixed Methods Design

Firstly, the foundational element of the validation framework places emphasis on the qualitative element where the researcher identifies if there are any pre-conceptions or biases that he/she may bring to the meaning of the data, and as such these must be acknowledged by the researcher. This was fully addressed in Section 3.12.2.1 Research and Reflexivity. Additionally, validation is determined through the foundational element of the framework by evaluating the appropriateness and quality of the literature review for the study, and its suitability for design, measurement, analysis and inferences. The methodology and methods outlined in this chapter served to justify the reasons for the research approach and the specific strategies employed.

Secondly, the core elements of the mixed methods construct validation focus on design quality (suitability, adequacy, analytic adequacy), legitimation (sequential, paradigmatic mixing and multiple validities) and interpretive rigour (consistency, distinctiveness and efficacy) (Dellinger and Leech 2007; Leech et al. 2010). It is believed that the sequential mixed method approach with the less quantitative dominant component contributing to the development phase of the more dominant qualitative component and the results therein served to legitimise the design and mixing strategy. Additionally, given the nature of the interviewees- tourists with limited time and transient in nature- member checks as a form of validation would not have been possible however, Phase 1 aided this validation process and served to improve the design of the interview schedule and ultimately the quality of the results. The mixed method sampling strategy and the hybrid approach undertaken for conducting the thematic analysis contributed to the study's interpretive rigour. As Ayeh et al. (2012) reiterate, multiple methods or triangulation serve to enhance the trustworthiness of a study.

Thirdly, inferential consistency audit seeks to legitimise the methodological approach by establishing consistencies between the theories, research literature, purpose, design, measurement and analysis. This audit ensures that conclusion with the study do not contradict each other (Dellinger and Leech 2007; Tashakkori and Teddlie 1998). Chapter six integrates Phases 1 and 2 of the research and demonstrate to a large extent,

consistencies with literature but also discusses some points of departure. There was some variance with experts' views and the actual use of ICT by in-trip tourist and tourists' views about sustainable tourism. Such variances and new information illustrates the original contribution of this thesis and this is elaborated on in Chapter 7.

Fourthly, the utilization element seeks to validate the research based on the utility of the findings, which may be anticipated at the beginning, realized at the end of a particular phase but the contribution of the results of the study may not be fully appreciated until long after the research is completed. Apart from the role that the results of Phase 1 played in the development of Phase 2, the results of the Phase 1 did highlight those technologies that have the potential to support sustainable tourism but also highlighted that DMOs will need to be more creative in the way that they embed sustainability into their practices and development (Scott and Frew 2013). This is further detailed in Chapter 6- analysis and discussion.

Lastly, the consequential element of the validation framework overlaps with the utilization element. The emphasis is on what are the consequences of the findings and the extent to which they are socially acceptable or if there is anything valuable that is contributed to the meaning of data (Dellinger and Leech 2007; Leech et al. 2010). This is highlighted in the last chapter of this dissertation.

3.14 Limitations of the Data

It is not unusual for studies of this nature to have limitations based on the data collected, particularly when such data is collected in natural settings with human subjects. Phase 1 utilized a web-based survey from a globally ill-defined population of eTourism experts. Attempts to cast as wide a net as possible to reach experts included seeking out other experts outside the IFITT database. Recognizing that there would be other eTourism experts who are not part of the IFITT community, the researcher sought to include experts who were industry practitioners, as well as, eTourism experts who had recent publications related to eTourism. Despite these attempts eTourism expert respondents to

the questionnaire were mainly Europeans engaged in education and research, with a low representation of data from industry practitioners. As such there may be differences in the perceived level of awareness or importance of sustainable tourism and in the priorities, awareness or even popularity of in-trip applications across national markets. Despite these limitations the response rate was relatively good as the data served its purpose in laying the foundation for the dominant qualitative component of the research (Phase 2). The use of descriptive statistics for the analysis of data in Phase 1 served to accomplish the main aim of the survey.

Ideally interviews could have been longer to explore issues at a much deeper level but because the participants were tourists, recruited while they were actively engaged in their holiday-making, the time was limited. A greater balance in age groups represented may have provided different perspectives but quota sampling by age group would have been impractical as recruitment was already a difficult process and the researcher had to interview those participants who were willing to give up some of their vacation time, irrespective of age.

3.15 Ethical Considerations

Though this research was non-invasive in nature it did entail human subjects and precautions were taken to ensure participant's rights were not violated and that the research did no harm. Given these considerations the researcher applied for and was granted approval from the University's Research Ethics Panel.

In-trip tourists and eTourism experts participated through informed consent. Neither the study populations nor the researcher were at risk from being harmed by participating in the research project. Steps were taken to ensure the anonymity of the data- as names were disassociated from responses during the coding and recording process for the quantitative component of the research involving the eTourism experts. In the case of the qualitative research with tourists, each interviewee was assigned a participant

number from 099-128 to protect their identities. The identity of the participants was only available to authorised personnel directly associated with the research project. In accordance with the University's retention policy the raw data and other material will be retained for five years after the research programme is completed. Signed consent forms will be kept separately from the data for twelve months on campus and thereafter in remote secure storage for duration of the retention of the physical data. Participants were advised that the findings of the research were likely to be published and agreed to this as part of the informed consent procedures.

3.16 Conclusion

This chapter outlined how the research plan was logically conceptualised, resulting in the selection of a mixed method approach with a less-dominant quantitative and a more dominant qualitative, explanatory sequential design. The quantitative strand utilised a web-based survey and the qualitative strand utilised semi-structured interviews, with eTourism experts and in-trip tourists as the study participants, respectively. Descriptive statistics were used to analyse the quantitative data while thematic analysis was used to analyse the qualitative data. The strengths and weaknesses of the respective data collection methods and limitations of the data were discussed. As a measure of the study's validity, a validation framework was presented to account for the appropriateness and quality of the research design; the analysis; and the inferences made.

Chapter 4

eTourism Expert Survey Results

4.1 Introduction

This chapter details the findings of Phase 1 of the field research which was conducted over a period of three months, from November 2011 to February 2012. As discussed in the preceding chapter, the main objective of this phase was to identify the specific in-trip ICT tools/applications available or emerging, that could potentially be used by tourists to support sustainable tourism. As outlined in Chapter 3, given the extensive use of nominal and ordinal data and lack of randomness and independence between groups, a simple approach was taken to the analysis of the quantitative data. Moreover, the use of descriptive statistics best served the needs of the inquiry. The results of the first phase were meant to be developmental in nature, in order to increase the breath and range of the enquiry for Phase 2 (Gray 2004). Generally, the proceeding findings seek to quantify the data garnered from the e-survey, with a focus on frequency distributions rather than bivariate relations or measures of central tendency.

4.2 Findings: eTourism Expert Survey

This section presents the findings of the web-based questionnaire administered to eTourism experts. The first section examines the characteristics of the key respondents—the eTourism experts. The sections that follow present the experts’ opinion on the usage of in-trip ICT tools/applications for sustainable tourism, and new and/or emerging technologies for in-trip sustainable tourism, respectively.

4.2.1 eTourism Expert Characteristics

The researcher first sought to establish the main industry in which the experts were active, their job title and the region in the world where they were based. Most of the respondents were in the field of Education (47 %), with Research (26 %) being the

second most significant area of work activity. Just under one quarter of the experts (23%) identified their main industry of activity as Tourism & Hospitality. These findings are depicted in Figure 4. 1.

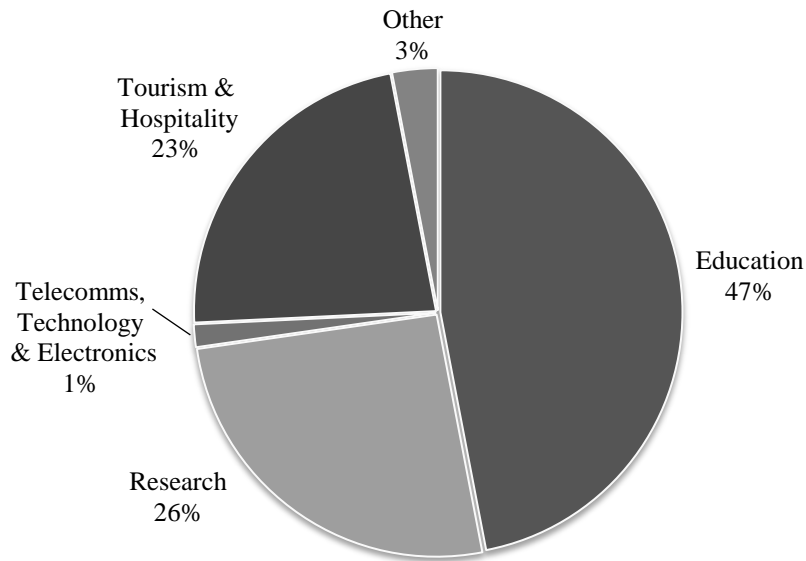


Figure 4.1: Industry Activity of e-Tourism Experts

There was quite a diversity of job titles, but the researcher was able to identify fifteen (15) distinct titles. Given the high percentage of experts coming from the fields of education and research, typical job titles included Lecturer (including Senior or Principal Lecturer); Professor (ranging from Associate, Assistant to Full Professors); Researcher (including Readers, Research Fellows, Post-doctoral research fellows) and Course Director. Other job titles included Chief Executive Officer, Managing Director, Project Manager, Head of Digital Media Strategy and Consultant. The full range of job titles and relative percentages are illustrated in Figure 4.2

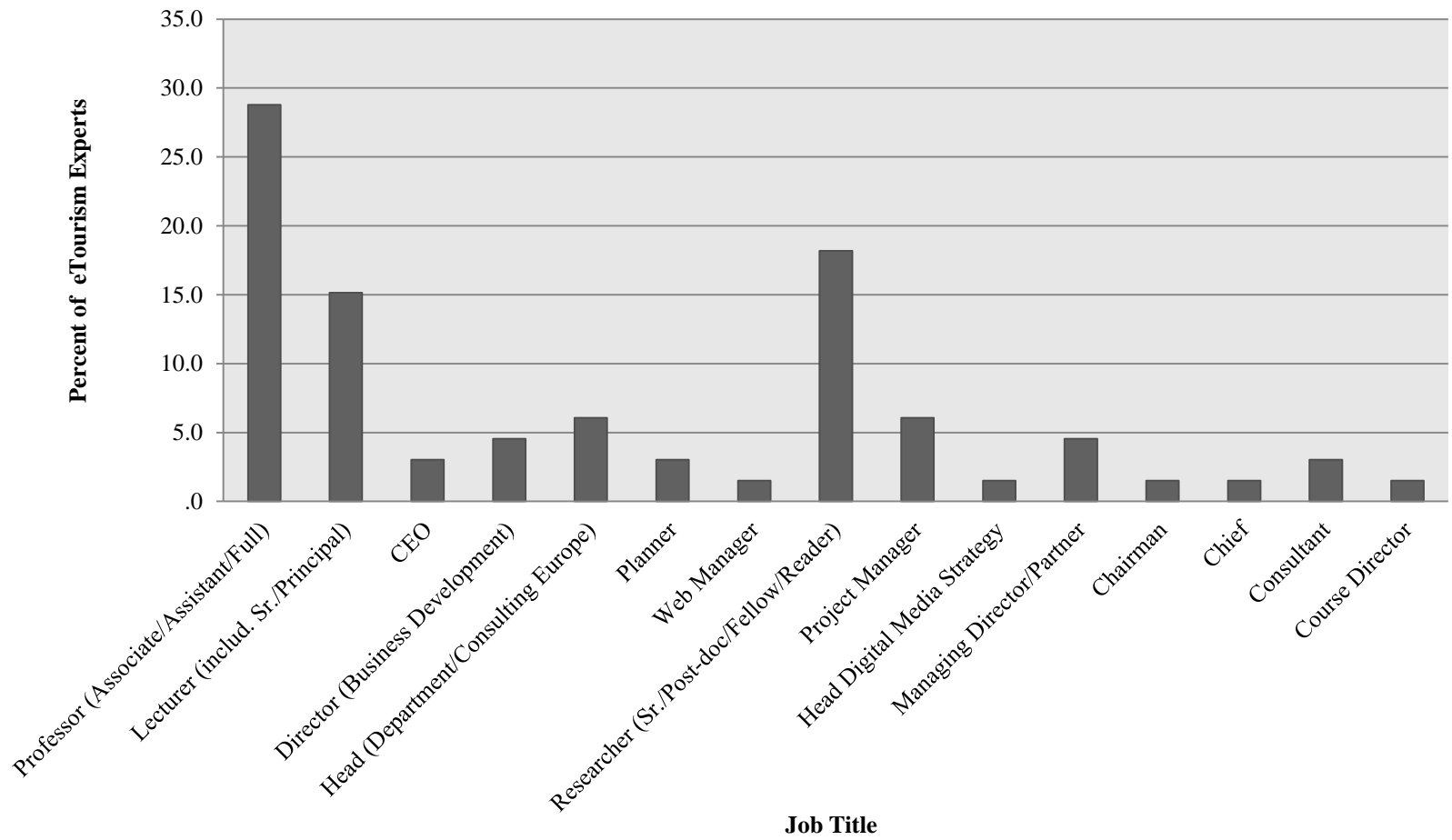


Figure 4.2: Range of Job Titles of eTourism Experts

Figure 4.3 illustrates the geographic distribution of the eTourism experts surveyed. A significant percentage of the eTourism experts were based in Europe (80 %) with 11 % from the Americas, 6 % from the Asia and the Pacific regions, and 3 % from Africa. Though included as a category of choice, there were no respondents from the Middle East.

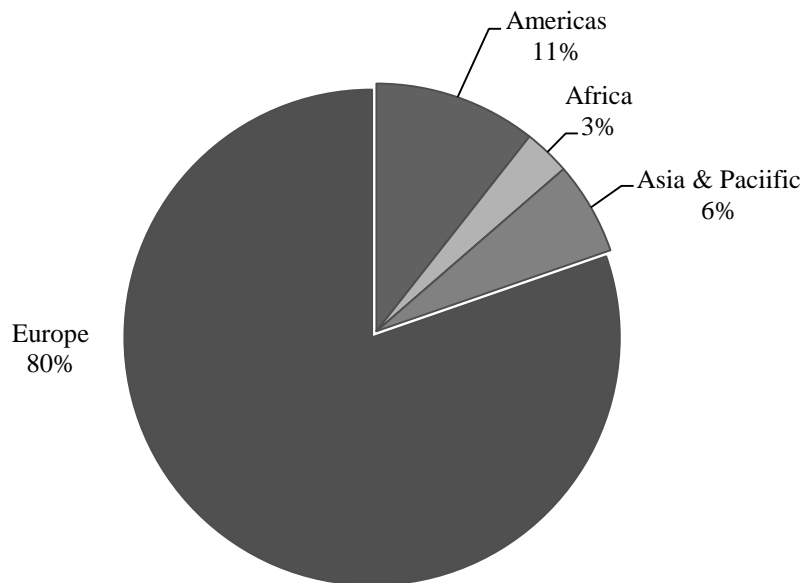


Figure 4.3: Geographic Distribution of eTourism Experts Surveyed

Recognising that eTourism is a field of study that cuts across the ICT research domain and the tourism research domain, survey respondents were required to conduct a self assessment about their level of expertise in the respective domains. Experts were initially required to indicate their years of experience in eTourism, then they were required to rate their level of tourism expertise and their knowledge of ICT, respectively. The researcher felt that given the objective of Phase 1, the expert's years of experience in each domain was a more valuable attribute to the study, rather than the age of the respondent. While age has been recognised as having a moderating effect on the adoption of technology (Morris and Venkatesh 2000), examining the experts' rate of adoption was not the purpose of Phase 1. Furthermore, it is quite possible for a person to

have changed careers, so job and/or experience in general was also less important, than experience in either the ICT or Tourism domains. Close to half (48 %) of the respondents had over 10 years of eTourism experience. Further segmentation of the responses indicated that 11% of the eTourism experts had more than 15 years but less than 20 years experience and 11 % had more than 20 years of experience. The findings, illustrated in Figure 4.4, also indicated that 10 % of the respondents had 1-3 years experience in eTourism.

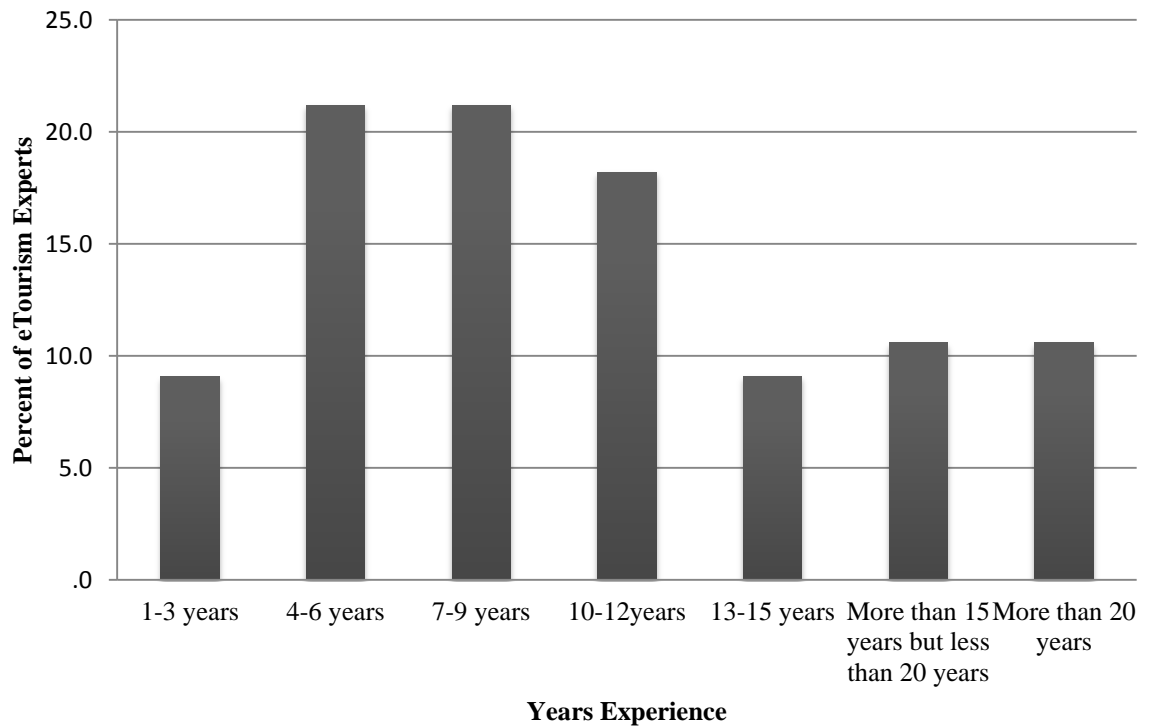


Figure 4.4 Years of eTourism Experience

Figure 4.5 depicts the findings of the self-assessment of the eTourism expert's rating of their level of tourism expertise. More than half (56 %) of the experts rated their expertise as high, with 21 % rating their expertise as very high, 20 % as average and 3 % as low. None of the respondents deemed their expertise in the tourism domain to be very low.

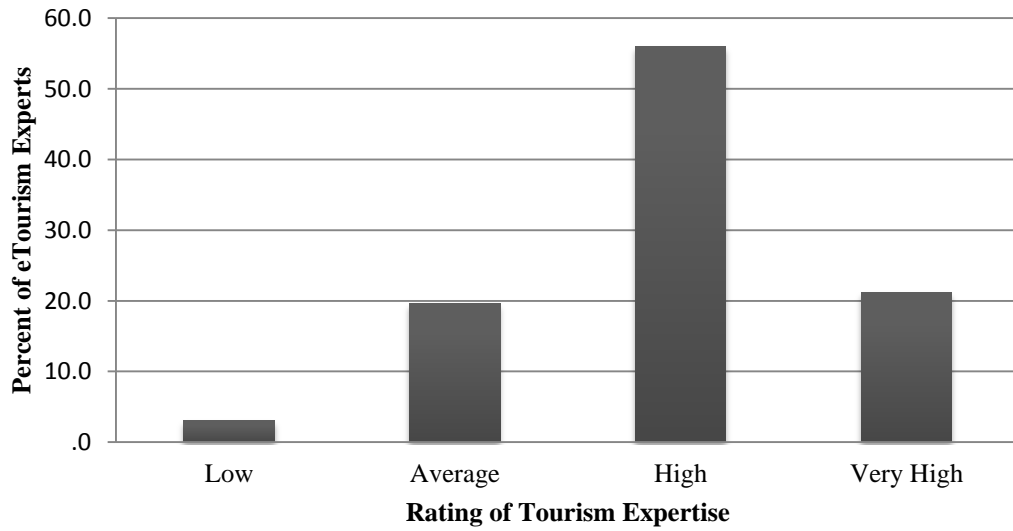


Figure 4.5: eTourism Experts Personal Rating of Their Tourism Expertise

ETourism experts had more “very high” ratings in the ICT domain when compared to the 21 % experts “very high” rating in the tourism domain. As illustrated in Figure 4.6, 32 % of the eTourism experts rated their expertise in the ICT domain as very high, 45 % as high and 23 % as average.

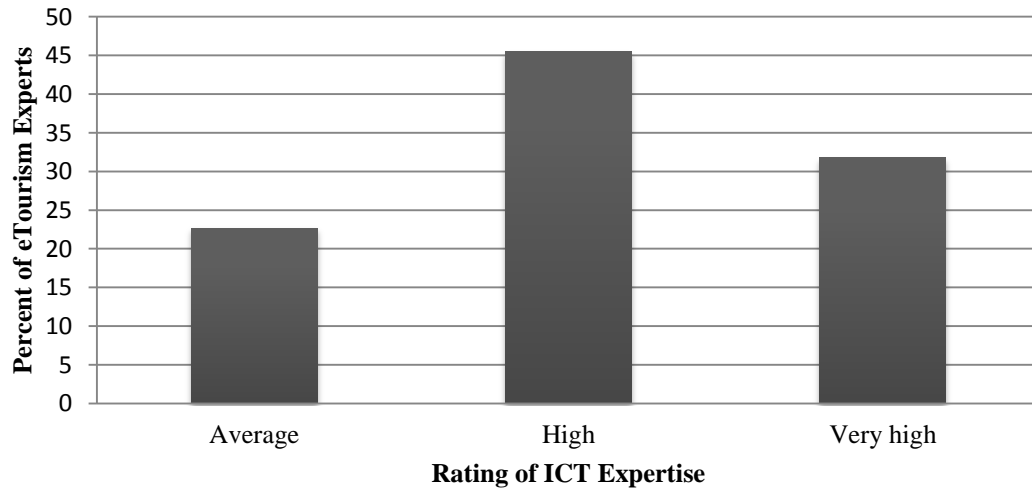


Figure 4.6: eTourism Experts Personal Rating of Their ICT Knowledge

A cross-tabulation was conducted on the years of eTourism expertise with tourism expertise; and the years of eTourism expertise with ICT knowledge. This was done to establish whether those respondents with only 1-3 years experience should be taken into account in the study. It was found that the 9 % of respondents who had the least number of years of experience (1-3 years) did not rank their expertise as low in either of the two research domains. The respondents with 1-3 years experience rated their tourism expertise as either average or high; and their ICT knowledge as high or very high. Given these positive self assessments, respondents with only 1-3 years experience were included in the study’s findings. Therefore, as illustrated in Tables 4.1 and 4.2, the least number of years of experience did not always equate to a low rating of either tourism expertise or ICT knowledge by the respondents.

Table 4.1: Cross Tabulation of eTourism Experts Years of Experience with Tourism Expertise Rating

Years Experience	Rating of Tourism Expertise (Per cent)				
	Very high	High	Average	Low	Very low
1-3 years	-	4	4	-	-
4-6 years	1	9	11	-	-
7-9 years	9	9	3	-	-
10-12 years	1	14	1	1	-
13-15 years	3	6	-	-	-
More than 15 < 20 years	1	9	-	-	-
More than 20 years	4	4	-	1	-

Table 4.2: Cross Tabulation of eTourism Experts Years of Experience with ICT Knowledge Rating

Years Experience	Rating of ICT Knowledge (Per cent)				
	Very high	High	Average	Low	Very low
1-3 years	3	6	-	-	-
4-6 years	6	7	7	-	-
7-9 years	4	11	6	-	-
10-12 years	4	9	4	-	-
13-15 years	3	3	3	-	-
More than 15 < 20 years	4	6	-	-	-
More than 20 years	6	3	1	-	-

4.2.2 Experts' Opinions on the Usage of in-trip ICT for Sustainable Tourism

As highlighted in the literature review, there has been a proliferation of studies on the importance of technology during the pre-trip phase of vacation planning. ICT tools/applications are used for a range of functions and activities including research, bookings, purchases, reviews, previews (e.g. virtual reality) and itinerary building. Given this study's focus on in-trip ICT tools/applications, the researcher thought it prudent to establish the expert's opinion on the relative importance of ICT tools/applications for in-trip use by tourists in comparison to the pre-trip and post-trip phases of a vacation.

Figure 4.7 illustrates that the majority of eTourism experts surveyed (91 %) deemed the use of pre-trip ICT applications as very important for tourists before arriving to a destination for a vacation.

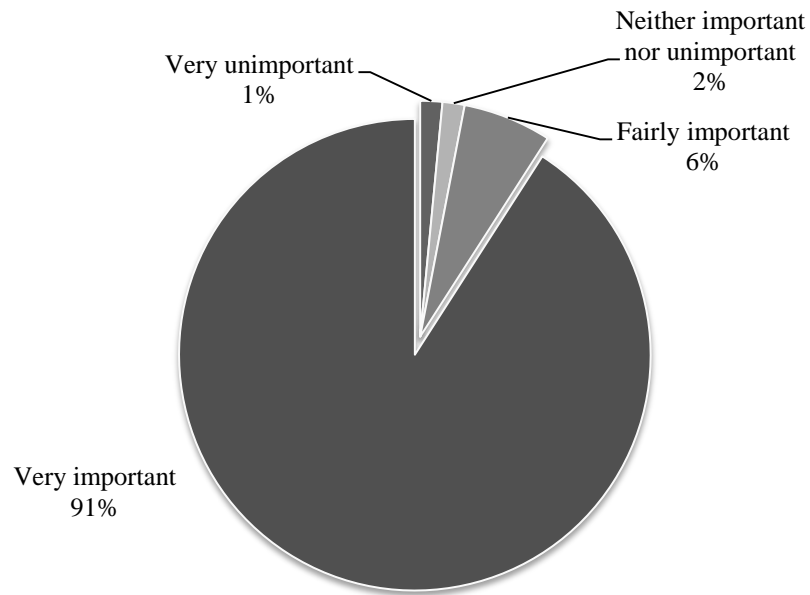


Figure 4.7: e-Tourism Experts' Rating of the Importance of Pre-Trip ICT Applications

When asked to rate the importance of in-trip ICT applications, 35 % of the eTourism experts rated them as very important, 47 % of the experts rated them as fairly important and 17 % rated in-trip applications as neither important nor unimportant. This is illustrated in Figure 4.8.

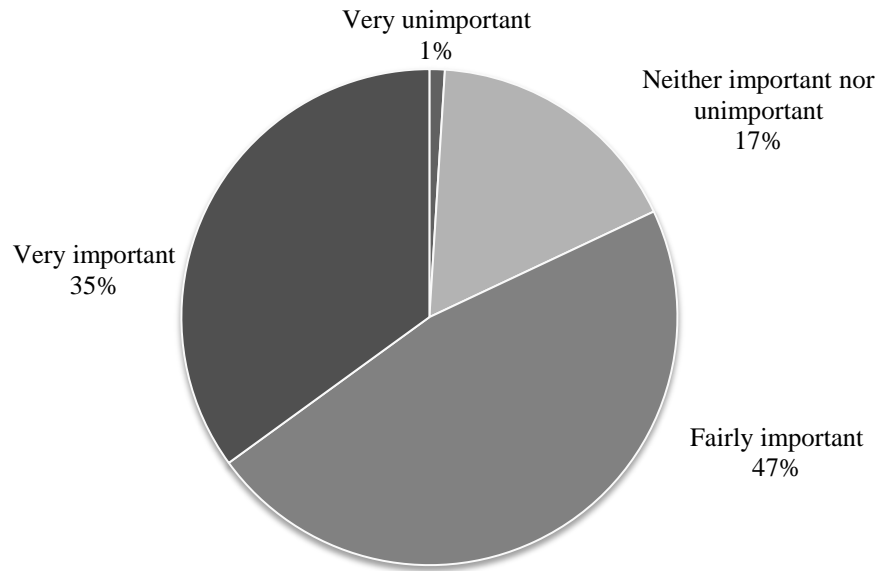


Figure 4.8: eTourism Experts' Rating of the Importance of In-Trip ICT Applications

Figure 4.9 depicts how eTourism experts rated the importance of post-trip ICT applications. Almost one quarter (23 %) of the experts indicated that they felt post-trip applications were very important, 45 % as fairly important with 23 % of the respondents remaining neutral. 9 % of the eTourism experts felt that the use of ICT application after tourists have left the destination was not important with 3 % of the respondents indicating that it was very unimportant.

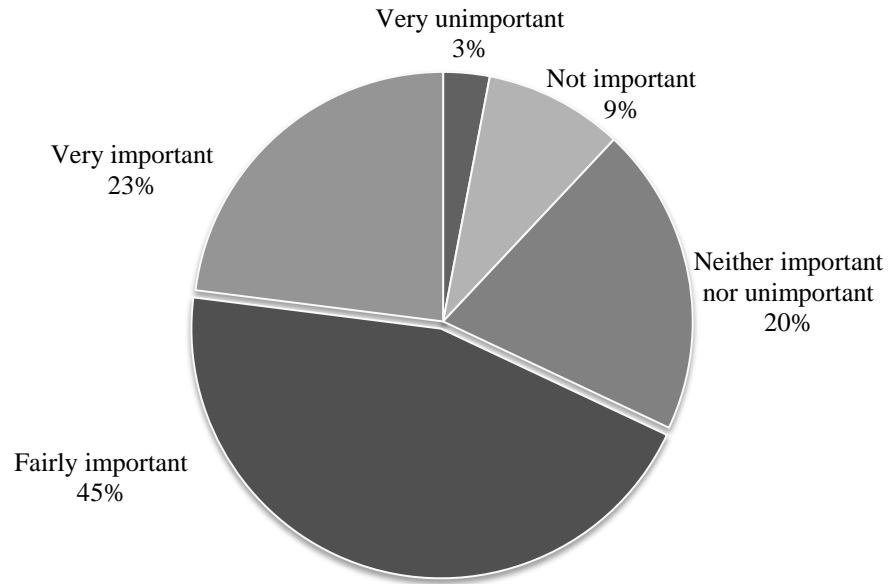


Figure 4.9: eTourism Experts' Rating of the Importance of Post-trip ICT Applications

Excluding the use of technology to capture photographs and/or video, eTourism experts were asked to rank the most important use of technology by in-trip tourists. Options for ranking were based on the work of Choi et al. (2007) on in-trip on-line activities in the US and Canada. The use of technology to retrieve information on maps & driving directions was ranked first out of the seven options provided, with the use of technology for email being ranked the lowest as seen in Table 4.3.

Table 4.3: Ranking of Uses of Technology by In-Trip Tourists

Ranking	Uses of Technology
1	Maps & Driving Directions
2	Information on events/attractions
3	Information on restaurants/bars
4	Weather/travel advisory
5	General information
6	Social media
7	Email

ETourism experts were asked to assess the relative importance of twelve attributes that in their opinion influence the use of technology by in-trip tourists. These attributes were derived from the literature and assessed by the researcher to be among the most salient to the in-trip tourist context. The findings of each of the twelve attributes are illustrated in Table 4.4. The findings illustrate that the perceived usefulness (of the application), content and cost were three attributes that enjoyed the highest level of rating (i.e. very important) by the eTourism experts. When the combined positive ratings, which included very important and fairly important ratings were examined, the most significant attributes were perceived ease of use (92 %), perceived usefulness (91%), and cost (91 %).

Table 4.4: eTourism Experts' Views on the Relative Importance of Selected Attributes in Determining the Use of Technology by In-trip Tourists

Attribute	Rating on the Determinants of the Use of Technology by In-trip Tourists (Per cent)				
	Very important	Fairly important	Neither important/ unimportant	Not important	Very unimportant
Skill	38	46	5	9	2
Experience	38	51	8	3	-
Other's use of technology	12	35	36	17	-
Cost	58	33	3	6	-
Perceived ease of use	51	41	3	3	-
Perceived usefulness	64	27	8	1	-
Promotion by destination	23	39	32	4	-
Promotion by provider	21	33	33	12	-
Interoperability	20	44	23	14	-
Content	62	26	8	1	-
Interactivity	26	44	23	8	-
Multiple Language Options	36	36	20	8	-

ETourism experts were asked to provide their opinion on the extent to which they believe that technology can play a role in sustainable development. As seen in Figure 4.10, half of the respondents (49 %) believed that technology could “very much” play a role in sustainable development while 42 % believed that technology could “somewhat” play a role in sustainable development. None of the eTourism experts felt that technology could not play a role at all, however, 6 % of the experts were “undecided” while 3 % felt that technology did “not really” play a role in sustainable development.

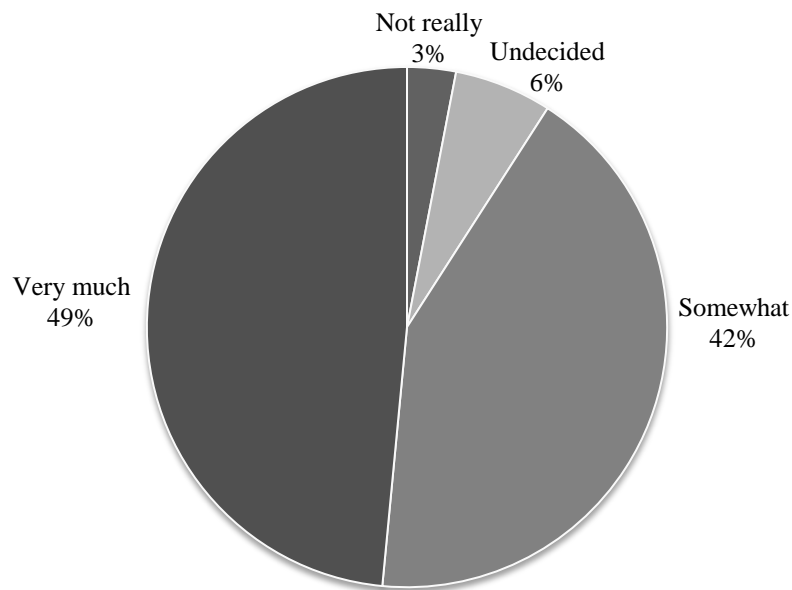


Figure 4.10: Extent to which eTourism Experts Believe that Technology can Play a Role in Sustainable Development

Figure 4.11 illustrates eTourism experts’ views on how important they think promoting sustainable tourism practices should be in the design of eTourism applications. It was found that just under half of the eTourism experts (48 %) thought that the promotion of sustainable tourism practices should be a “very important” factor in the design of eTourism applications. Thirty per cent (30 %) of the respondents were of the belief that it was fairly important and 20 % seeing it as neither important nor unimportant.

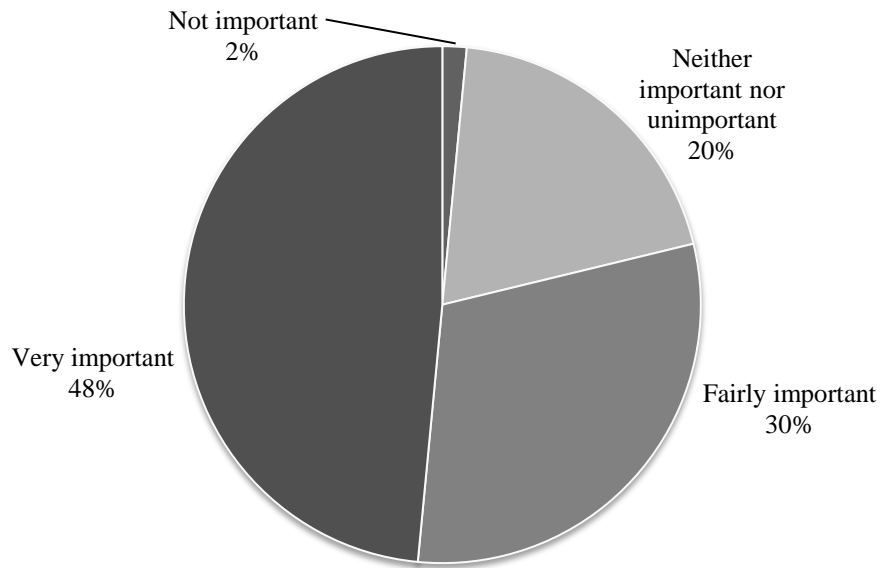


Figure 4.11: eTourism Experts' Views on the Importance of Promoting Sustainable Tourism Practices in the Design of eTourism Applications

While the previous illustration displayed eTourism experts' views on the importance of promotion of sustainable tourism in the design of eTourism applications, the researcher recognized that establishing importance and the extent to which there is an actual practice, implementation or incorporation and ultimately use would be entirely different. Therefore, eTourism experts were asked to express their views on the extent to which they think that eTourism application developers consider supporting sustainable tourism when developing their products. It was found that half of the eTourism experts think that sustainable tourism is not a consideration for eTourism application developers. The other respondents were almost evenly split- with 24 % indicating that they believe developers did consider sustainable tourism while 26 % indicated that they didn't know, as shown in Figure 4.12.

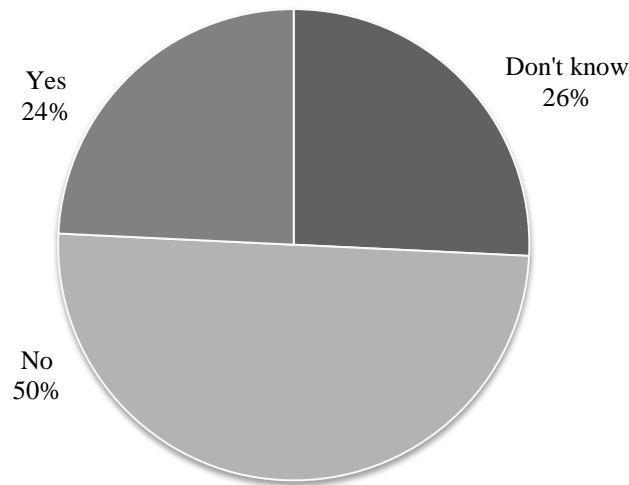


Figure 4.12: eTourism Experts Who Think Application Developers Consider Sustainable Tourism in Product Development

Based on the contemporary literature in the eTourism domain the researcher identified nine ICT applications that could potentially enable in-trip tourists to support sustainable tourism initiatives at a destination. These applications were: location based services, destination management systems, carbon calculators, virtual reality technologies, wireless technologies, intelligent transport systems, social media, augmented reality, and recommender systems. First, eTourism experts were asked to select from among the applications' identified by the researcher, the one they felt could support a destination's sustainable tourism thrust. Secondly, eTourism experts were asked to identify any other applications not identified, that could support sustainable tourism initiatives at a destination.

As illustrated in Figure 4.13, location-based services (73 %), destination management systems (62 %) and intelligent transport systems (61 %) were the most highly favoured in-trip applications to support sustainable tourism at a destination. Virtual reality technologies (26 %), augmented reality (29 %) and carbon calculators (33 %) were

among the least favoured applications by the eTourism experts, to support sustainable tourism initiatives at a destination.

When it came to the identification of other applications that eTourism experts felt could enable in-trip tourists to support sustainable tourism at a destination, there was an 18 % response rate to this optional question. There were only three (3) responses that did not overlap or was not already included in the nine applications identified. The other applications identified were: “visitor management applications”, “application eco-labelling” and “unified financial transactions through use of different POS systems through a variety of local service providers”.

While it is acknowledged that visitor management techniques can support sustainable tourism at a destination, given this study’s focus on the in-trip tourist, visitor management applications are more likely to be used by the destination management organisation (rather than a tourist) to *inter alia* control visitor numbers, manage tourist flows, zoning, permits, protection of sensitive areas, visitor waiting times in queues and pricing. Admittedly, visitor management applications can offer the benefit of a lower price for in-trip tourists during off-peak periods and thereby contribute to their level of satisfaction (visitor fulfilment). However, the value of visitor management applications to this study’s context is not deemed significant. Arguably, an eco-labelling application could be subsumed under a recommender system to aid in choice selection for in-trip tourists with the requisite sensitivity or awareness level, as such the application was not considered a unique response to the question posed. Therefore, the only distinctive response related to other applications was a local level unified financial transaction point of sale system.

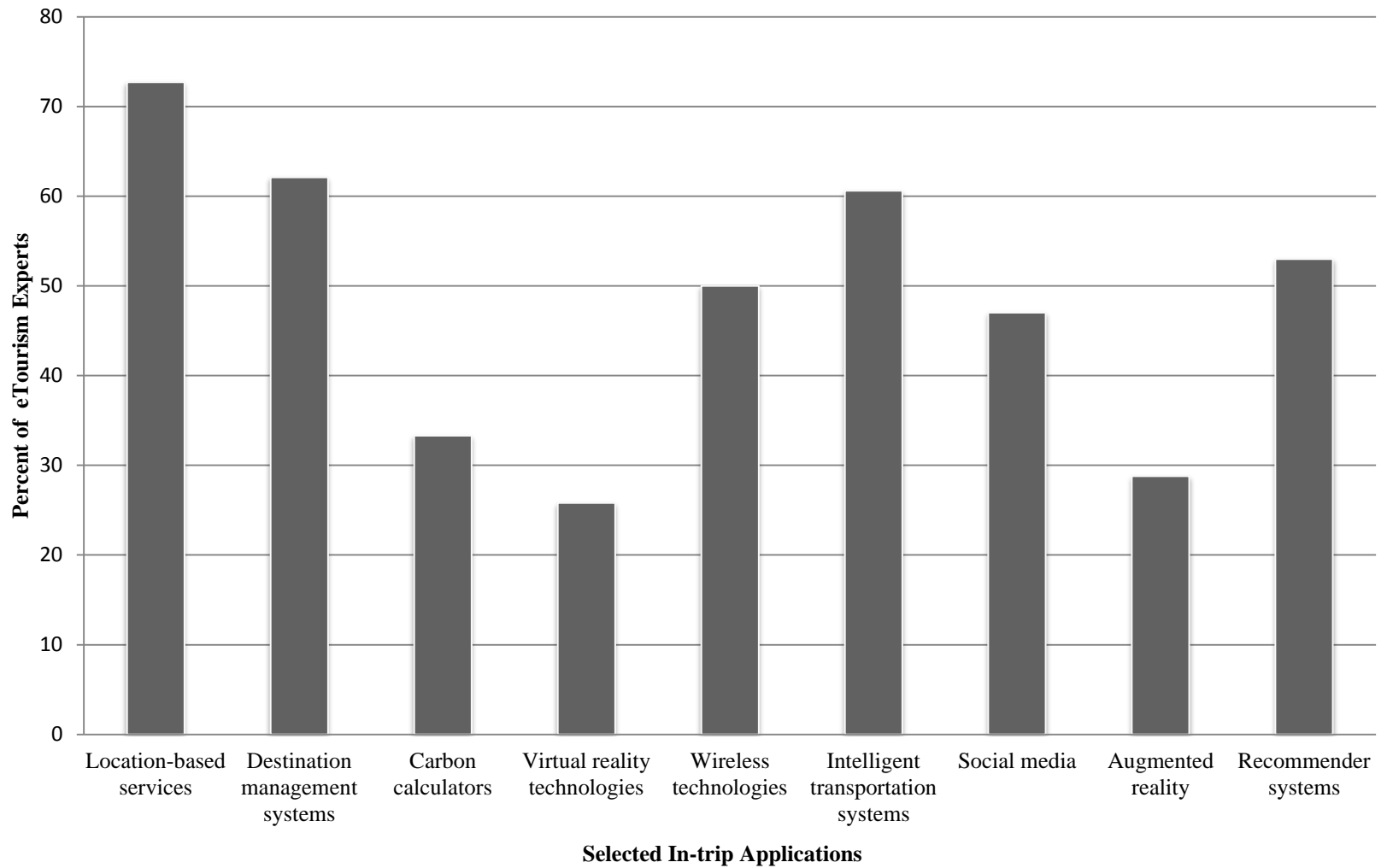


Figure 4.13: eTourism Experts' Selection of Applications that enable In-trip tourists to support Sustainable Tourism at a Destination

4.2.3 New and/or Emerging Technologies for In-trip Sustainable Tourism

A major cornerstone of Phase 1 is the identification of new and/or emerging ICT tools/applications that could allow in-trip tourists to support sustainable tourism at a destination. A few of the respondents (14 %) did not complete this open-ended question, which sought to identify new/emerging technologies that may change the way tourist experience a destination. Some of the eTourism experts identified technologies that could not be considered new and were already identified earlier in the survey (refer to Figure 4.13) as tools/applications that could enable in-trip tourists to support sustainable tourism. These included social media/social networking technologies/Web 2.0, transport systems, augmented reality, virtual reality and recommender systems. In terms of the technologies that could not be considered new or emerging were smartphones, mobile phones, mobile services, GIS, RFID and translators. Some of the identified technologies also reflected a destination management/manager's perspective, rather than technologies that could be specifically used by in-trip tourists. Some examples of these cited by the eTourism experts were "Destination Customer Relationship Management" (application), "Destination Knowledge Management System based on a balanced scorecard approach" and "Attraction Information Systems." Other responses that reflected the emerging technologies identified by the eTourism experts that could change the way tourists experience a destination included:

- Geocaching/game based-applications
- Cloud sharing knowledge
- Ambient intelligence
- QR codes
- Near Field Communication (NFC)
- Internet TV
- Tablets
- Cheap telecommunications for international tourists
- Context aware applications

As depicted in Figure 4.14, the majority of the eTourism experts (73 %) felt that the new/emerging technologies they identified could be used by in-trip tourists to support sustainable tourism at a destination. Since not all the eTourism experts identified any new or emerging technologies, and as highlighted earlier, some of the identified technologies were more applicable to a destination management organisation, it was not surprising that a quarter of the experts indicated “not applicable” in their response.

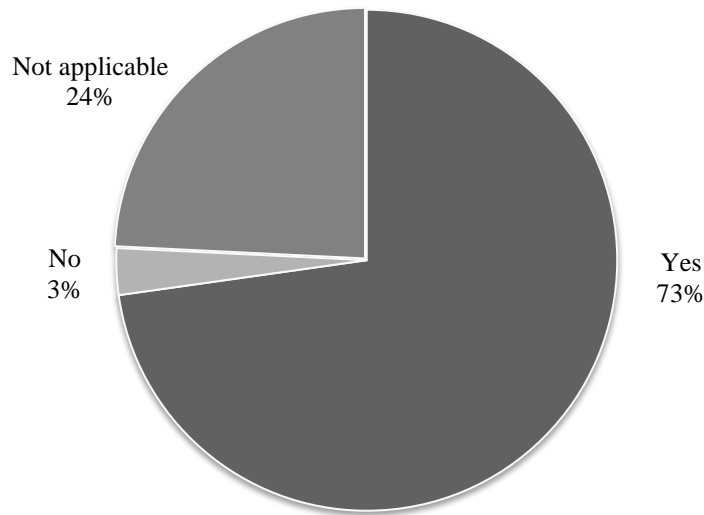


Figure 4.14: Extent to which eTourism Experts Believe Selected New/Emerging Technologies can be used by in-trip tourists to support Sustainable Tourism

The concluding question of the web-based questionnaire provided an opportunity for eTourism experts to provide any additional comments about the way in which ICT can be used to encourage in-trip tourists to support sustainable tourism. Only nine (14 %) eTourism experts provided comments and in two cases, the experts felt that the nine applications (highlighted in Figure 4.13) could be used by in-trip tourist to support sustainable tourism, with one of the experts elaborating that “...if they are developed with the appropriate content and made available in a suitable context. It’s all about the way they are used.” Other eTourism experts comments on the way in which ICT can be used to encourage in-trip tourists to support sustainable tourism were as follows:

Expert 010:

music, sms

Expert 014:

alert system based on LBS which help tourists reduce perceived risk by providing real-time information

Expert 021:

Critical is for the local service providers on specific destination to be linked through technology in the way that ICT supports all the transactions and backs up all the business processes that happen while visitor consumes the services on destination. By that you get the platform for selling integrative packages to end customers with models that stipulate direct consumption on location (secondary spending). In that way service providers increase their market exposure, get more profits which are then returned back to the community they serve and operate.

Expert 042:

A display in a room of energy consumed, other sustainability measurable parameters. Univ. courses should emphasize and educate students (future consumers)

Expert 059:

Smart phone applications, Social media

Expert 062:

Finding the tourists that are interested in sustainable tourism and offering them information, educating and entertaining them. Also raising awareness among those tourists that are not interested in sustainable tourism.

The central themes of the experts' comments (which was an optional, opened question) was the localization of services to provide real-time information and educating consumers.

4.3 Conclusion

This chapter presented the findings of the less-dominant Phase 1 quantitative component of the research. Though the survey sought to be global in nature, the majority of the eTourism experts (80%) came from within Europe and most had a background in either education or research. The eTourism experts who participated in the web-based survey identified LBS, DMS and ITS as ICT tools having the greatest potential to support sustainable tourism at a destination. Half of the respondents did not think that application developers should consider sustainable tourism when developing travel products, while a quarter said “yes” and the rest were “not sure”. Geo-caching, NFC, ambient intelligence and context aware applications were among the new or emerging applications that eTourism experts felt were likely to change the way tourists experience a destination in the future.

Chapter 5

In-Trip Tourists' Interview Results

5.1 Introduction

This chapter details the findings of Phase 2 of the field research which was conducted over the period March 2012 to August 2012 in the city of Edinburgh (UK), across six study sites: Edinburgh Castle, Princes Gardens, Edinburgh Zoo, St. Giles Cathedral, the National Museum of Scotland and the National Gallery Museum Complex. The qualitative strand of the study presented in this chapter represents the dominant component of the research, and sought to primarily address the research questions:

- (1) What are in-trip tourists' awareness levels/and or concerns about sustainability issues and;
- (2) What factors influence tourists using/not using ICT tools/applications that could make tourism at their destination more sustainable?

The findings presented in this chapter represent the key phases for building the ladder of analytical abstraction, (Carney 1990 as cited in Miles and Huberman 1994) that ultimately integrates the data into an explanatory framework, as the researcher moved through the process of developing coding categories, identification of themes, data reduction, the analysis and interpretation of the major themes in the data. The latter will be fully expounded upon in Chapter 6. However, as a result of the iterative process of data reduction, the over arching themes focused on perspectives related to sustainable tourism; and actual usage and perspectives about ICT. The themes as they relate to sustainable tourism awareness were environmental views, sustainability as a non-urban concept, holistic perspectives and the value-action gap. Technological themes were focused on use factors (including social connectedness, personal innovativeness, perceived ease of use, perceived usefulness and perceived enjoyment), ICT- sustainable tourism linkages and the role of developers.

5.2 Findings: In-Trip Tourists' Interviews

This section presents the findings of the semi-structured interviews conducted with thirty (30) international and domestic leisure tourists visiting Edinburgh. The first section examines the key demographics of the respondents- the leisure tourists. The consumer TAM and related literature have already established the influence of consumer traits in moderating the effect of the predictive variables for use behaviour (e.g. Morris and Venkatesh 2000; Venkatesh et. al 2003; Baron et al. 2006; Eriksson and Strandvik 2009). The interviewees were assigned numbers to preserve their anonymity. The assigned numbers range from 099 to 128 and "T" is attached to each participant to emphasise it's the opinion of an interviewed tourist e.g. T099. The other sections that follow present the themes and trends that emerged from the iterative process of reading, coding, re-reading and re-coding the interview transcripts.

5.2.1 Demographic Profile of In-Trip Leisure Tourists

An equal percentage of men and women were interviewed for the study (15 in each case), however, the respondents who were most willing to participate fell within two age groups, 25-34 and 35-44, as depicted in Figure 5.1

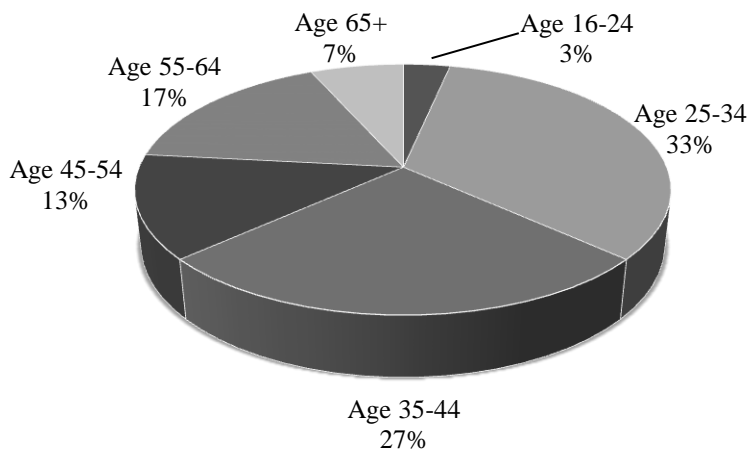


Figure 5.1 Age Profile of In-Trip Interviewees in Edinburgh

The “Professional” occupational group was the most represented grouping among the interviewees (11), followed by “Student” (6), “Retired” (4), “Manager/Senior Official” (3), “Administrative/Secretarial” (3), “Skilled Trade” (2) and “Sales and Consumer Services” (2). The level of education attained by the leisure tourists interviewed was generally high (up to Doctoral level in four cases), with the professionals, managers and retirees having attained a first/undergraduate degree or higher.

Seventeen (17) of the leisure tourists interviewed had not previously visited Edinburgh and there was a fairly wide-cross section of nationalities represented but, consistent with visitor statistics to Scotland (VisitScotland 2012), the most represented nationality was British (9). Other interviewees originated from Australia (1), Brazil (1), Canada (1), China (2), Colombia (1), India (1), Germany (1), Holland (1), Italy (2), Poland (1), Romania (1), Sweden (2), Sri Lanka (1), Switzerland (1) and the United States of America (4). Most of the leisure tourists were staying in paid accommodation, which they had booked on-line prior to their arrival. Two notable exceptions were one interviewee who indicated that his girlfriend had gone into a traditional brick and mortar travel agency to make their travel arrangements (flight and accommodation) and another interviewee indicated that they were staying in their rented Caravan at a Caravan site.

All the leisure tourists interviewed did have mobile phones however; one interviewee (T126) had only purchased a mobile phone in the UK for her exclusive use while on holiday in the UK. T126 typically used her mobile for making phone calls and sending text messages. At home (in Canada), she indicated that she does not use a mobile phone, only a landline. The maintenance of “social connections” emerged as a driving factor for T126 acquisition of a mobile phone. As it relates to this study, social connection was defined as actions displayed by tourists to maintain or conversely minimise contact with family, relatives or friends.

When it came to smart-phones, almost half of the interviewees (14 out of the 30) did not own a smartphone while 9 males owned a smartphone compared to 7 females. As Levy

(1988 as cited in Venkatesh et al. 2003) suggest studies of gender differences can be misleading without reference to age, so in examining how ownership of a smartphone compared among the age groups by gender, males in the 25 -34 age had a greater tendency to own a smart-phone compared to their female counterparts, as shown in Table 5.1 Interviewee Smartphone Ownership Distribution by Age and Gender.

Table 5.1: Interviewee Smartphone Ownership Distribution by Age and Gender

Age Group	Gender	
	Female	Male
25-34	3	6
35-44	2	2
45-54	1	1
65+	1	-

5.2.2 Emergent Sustainable Tourism Themes: In-Trip Leisure Tourists' Perspectives

After the demographic profile of the in-trip leisure tourists was established, a further examination of the interview transcripts and the findings therein dealt with addressing the research questions. One of the research questions was: What are in-trip tourists' awareness levels and/or concerns about sustainability issues? The emergent themes discussed ultimately linked back to answering the study's research questions.

5.2.2.1 Environmental Views

After a few initial questions to establish a rapport with the interviewees, they were then asked if they had heard the term sustainability or sustainable tourism used before. In cases where they indicated that they didn't know what the term meant a definition was provided: "Sustainable tourism is about achieving the right economic, social, cultural and environmental balance in tourism destinations to benefit current and future generations, while satisfying the needs of hosts communities and tourists." Some tourists who initially indicated that they didn't know what they term meant immediately picked-up on the environmental component, which for them suddenly suggested that they now knew what the researcher was referring to. Additionally, in some cases where interviewees indicated that they knew what the term meant focused on the environmental dimension. Environmental views were defined as views by interviewees on sustainability that were limited to a bio-physical or natural environment perspective. The following excerpts illustrate:

I'm more familiar with eco-sustainability so trying to make sure that tourism has a positive impact on the environment um what was the question again? Sorry. (T101)

Healthy life, responsibility to the environment, choose in your travels or in your trips choose enterprises or tours that are worried about the...take care about the environment also with my trash, garbage I used to be responsible or I am responsible and that's it. (T102)

Um sustainable tourism. My association is like eco-tourism or something like that yes I have like that on my mind in that direction my mind goes when you ask me about sustainable tourism I think like eco tourism. (T104)

(Respondent interrupts during reading of the definition) Green tourism. Is it something like the ecological travelling when you go for example to Asia or South America?(T110)

There were significant references to the issue of recycling and some of these comments were amplified for some tourists who were visiting during the Fringe Festival held in August. Environmental views were also demonstrated in response to questions related to interviewees' observations about anything that encouraged them while they were in

Edinburgh to be more sustainable, responsible or to have less of a negative impact. Environmental views were also expressed in response to a question posed to in-trip tourists about what they thought the destination could do to improve.

Indicative interviewee responses about things to improve that highlighted the issues of recycling and the separation of waste material are demonstrated below:

The tram, the tram, that's a good thing, that's a good thing yes and we wondered about the garbage if you are... at home we put the metal things there and the plastic... the vegetables and what you can you can't you can burn in the... We have lots of... (husband interrupts with something in Swedish to wife) but here it was not so much... everything in the same err...(T099)

For example to have more recycling you know the different containers where you put like plastic, metal and stuff like that is something like that. That you mean? (T104)

Maybe have more emphasis on recycling at the sort of major points where the tourists go, that might be something they could do. (T105)

Concerns about recycling were also reflected in the in-trip leisure tourists' observations about things they felt dis/encouraged sustainability in the destination:

Not really if you think about recycling or something or maybe transport but nothing particular really. (T105)

I have noticed in a lot of my travels through the main areas I haven't seen a lot of recycling bins. I mean there are little bins everywhere, but I haven't come across a lot of recycling bins. For example, if I finish my water now I probably just go and put it in that little bin. There's not a green bin next to that black bin and I would more likely go and put it in a green bin if it was recycling for bottles or cardboard boxes but looking around... I mean haven't seen that bin over there but it's a general use bin but there's no actual bin saying recycling I haven't seen any in the past two days. There probably are, but I haven't seen them. (T108)

Right now it's during the festival period so all I notice is rubbish. Yeah, somehow tourist create a lot of rubbish on the streets...um impact. (T123)

I guess the only other thing is that I haven't noticed that many bins or anything around for rubbish or for recycling. So that's one thing that could be better

because then if you are walking along or instead of littering or just putting paper in a bin then you could put it in a recycle bin or something like that. (T127)

Recycling, not much else. But I have a suggestion about the plastic bags in the supermarket. Because in my own country if you use... when you go shopping you have to take the money to pay but here you can get whatever you like to two or three it's not good that the customers can get how much they want. In my own country it's not like this. (T128)

While recycling and separation of garbage was an issue that resonated with a number of interviewees there were others who felt that the place was clean (e.g. T116, T112) and some of the leisure tourists felt that they were quite happy with what they had seen and had no recommendations for improvement. Others had just had arrived and felt it was too early to comment. A few of the leisure tourists interviewed commended the transport system (e.g. T108, T117, T115, T126) and some noted that with the on-going tram works that this was likely to improve further, and in the words of one interviewee, T127, “should make it more sustainable.”

5.2.2.2 Sustainability: A Non- Urban Concept

There were some in-trip leisure tourists, while expressing an understanding of the term sustainable tourism, felt that that this was not a concept that they thought about or mattered when visiting a developed destination such as Scotland or a city destination such as Edinburgh. The idea of promoting sustainability for some interviewees was more important for developing countries or rural areas and felt that care for the culture, the people and the environment were central to experiencing these less developed destinations. The notion of sustainability as a non-urban concept reflected the views of interviewees who tended to think about sustainability (more) when they are visiting a rural area or developing country. The following excerpts illustrate:

Well we went here we didn't think very much about it but when we go to other countries... We have been to Africa, to southern Europe and there we think more about it, I think. When we come here it is like... Like at home we don't think so much... (laughs)(T099)

T099 continued later...

Yes, but we think it is... more about it when we are in development (sic) countries. (T099)

It means for example if you go in a country and let's say for example that you go to a country which is not open so much for tourism, for example, Bhutan or something like that you should be very... if the country is not exploited or use to tourism that you should be very you know um ...what do you say... to not.. use the... it's hard to find the words in English. The essence is to pay respect to all the like would you say ecological chain of living organism or everything which is alive basically to treat the nature and people with respect to not you know have lots of yeah to take care of your own garbage and stuff like that. (T104)

T104 continues...

Maybe if I were more like in the country side or if I went for example to an island I have been to an island Iona, just outside of the... way up north just a little bit on the outside of Scotland and may be there. It was more of I had this in my mind not put garbage in the nature to also, to say support the local business and buy food from the people that lives on the island instead of from somewhere else and stuff like that. But in the city, I think it's much more tricky maybe going to the second-hand shops and recycling things that are going to other stores or you know things like that. (T104)

Even within the developing country conception of sustainability there was reference to garbage. Other examples of in-trip leisure tourists which emphasised a distinction between the importance of sustainability for “first world”/developing countries as opposed to developed countries are illustrated below:

Well I suppose. I mean Britain is just another first world country like America so I assume the same amount of waste problems and things like that, inefficiencies are just as common. If I were to do something more exotic like the Easter Islands yeah it would be a big thing for me. I try to be a hippie. Even though I don't dress like one.

Most certainly. If I go to a developing country ... This is the first time that I've been abroad by myself so, so it's kind of a big deal for me. I would probably be staying with a lot more like friends and people I knew I wouldn't be all by myself alone because I you know I wouldn't speak the language or whatever but it would probably be a lot more subdued like parties and hikes and stuff like that

very more outdoor exercise oriented I don't need to ride jet skis, rent a yacht or all the stuff ... I don't need.(T109)

Well, not that much in Scotland because I assume Scotland is a civilised country where normal law and order is at hand so not that way. But in every country there are of course things there are could be improved but is not like Thailand where children labour is in question. No, no.

No, no I assume European countries are all that civilised that we don't have to bother for illegal jobs, or fighting slavery, of course there is child.. man...what's the name in English? The trade in women? (T110)

Another interviewee (T105) felt that the impact of tourists to a city destination was minimal:

In cities there are lots of tourists anyway. So lots of tourists in Edinburgh. The impact of one or two tourists is not going to make that much of difference.(T105)

When asked if it wasn't a city destination if it would make a difference, T105 felt that for nature based holidays more attention would have to be paid to the environment.

5.2.2.3 Holistic Perspectives

A few interviewees expressed an awareness of a more holistic view of sustainable tourism that was not limited to the environmental dimension. Holistic perspectives were defined as views on sustainability that incorporate the social, environmental, cultural and economic components.

In response to a question about the understanding of the term sustainable tourism, T106 responded:

It means 100% not living from tourism. It must be balance between tourism and...not... (T106)

Notably, T106 continued later emphasising the notion of balance however, there was still a reference to waste (environmental component):

Yeah. Not only when we go on holiday. If we are at home, the same manner. It must be everything in balance, we are collecting waste, especially in Germany and here the same. I make no difference here or if I am at home.(T106)

T114 emphasised community engagement in expressing his conception of sustainable tourism:

Sustainable tourism... aah ... Um. I think so. I think it has to do with kind of making sure you're not exploiting the place that you are going to and kind of helping the community that you're engaging with.(T114)

T125 spoke about his concerns and specific activities to support sustainable tourism:

If I am able to I like also to improve this kind of tourism, I like very much travelling by train, for instance but this time wasn't possible for the distance, for the limited period I had. I've travelled a lot for instance in South America and I always try to look for a local agency improving sustainable tourism, being in contact with people from the country not only giving money to the tourism market. (T125)

The interviewer probed interviewee T125 further and asked him to what extent being sustainable affected his vacation decisions, to which he responded:

Yes, sometimes it affects, just to avoid someplace or to avoid some kind of tourism. Sometimes it's not always possible – trying to read about different options that tourism agencies offer, offer to me. Because when I travel I prefer to stay for a long time in a new town, in a new country much more than skip from a town to another. So I like if I'm able to find these opportunities or for instance to improve the local communities, helping with their projects. Also in like I told you in South America, be in a homestead or going to hostel or a house run by local communities.(T125)

It wasn't clear if interviewee T125 also had a developing country conception of sustainable tourism or had just travelled extensively throughout South America and as such his experiences there resonated more forcefully than in other destinations. T125 didn't own a smartphone but indicated that he used Couchsurfing a lot, including on his trip to Edinburgh. T125 spoke of how important it was to him to meet people in the places that he visits and was less interested in having virtual relationships through Facebook.

T114 also demonstrated some awareness surrounding the broader issues related to sustainable tourism:

I certainly try to avoid things that seem exploitative and like this is not a Scottish example, but it is an Irish an example. They have a lot of things that sort of seem to sell their culture in a way that I don't necessarily think it's beneficial. Like there is a Leprechaun Museum and things like that where I think that is just a synthetic version of their culture and so I try not to support those things.(T114)

He continued later:

Well, I definitely in terms of food, I try to eat things and go places that are not you know not necessarily chains, that are not... you know they're not going to sell me something American or shipped in from Japan or wherever, they're going to be local.(T114)

5.2.2.4 Value-Action Gap

The majority of interviewees however, whether they had or hadn't heard the term sustainable tourism used before, held on to an environmental conception of what it meant. Even those who previously had an awareness of sustainability, acknowledged that it didn't affect the choices they made before or while on holiday. Even though this research focused on the in-trip tourists' activities, many tourists when asked how did they travel to Edinburgh and the reason for their selection, most opted for the cheapest mode of transportation. For example, interviewee T102 when asked how he got to Edinburgh, recognised that flying was not very sustainable but sought the cheapest mode of transportation to travel:

By flight, I choose flight because it's cheaper, it's not sustainable because do a lot of contamination, is good? (Checking with interviewer to see if this is the correct English with "contamination") but it's cheap... unfortunate.(T102)

There was generally no awareness or concern about carbon dioxide emissions by those who opted to fly. On the other hand, some felt they had no impact beyond the flight and/or accommodation (e.g. T111, T121). A few expressed some guilt about not doing

more: “no I'm not a good citizen” (T102); “not perhaps as much as I should” (T117); “I haven't even thought about it though or ...” (T124).

T100 and T116 also expressed the view that the mere fact that they hadn't been to a place before that is what helps them to decide where to visit next and had nothing really to do with the sustainability of a destination. T100 went further to say that sustainability wasn't something he supported because nothing is constant. Even though he felt that Scotland was a sustainable destination, he wouldn't return as for him, “the cycle ends” and he would want to experience other destinations.

It appeared that, with the exception of T125 and T114, the value-action gap existed among most of those interviewed.

5.2.3 Technological Themes: Use Factors

A major component of this study was geared towards answering the research question: What factors influence tourists using or not using ICT tools/applications that could make tourism at their destination more sustainable. Apart from the manifest themes that were developed a priori, at the latent level that they were several thematic codes that simultaneously gave an insight into use and non use of ICT tools/applications.

5.2.3.1 Social Connectedness

A few interviewees expressed their intention to get a smartphone soon – having recognised the limitations they encounter by not having a smartphone, particularly during their travels. Here again, the theme underlying this desire to purchase a smartphone was the maintenance of “social connections”. This is exemplified in the following dialogues between T120 and the interviewer; and T125 and the interviewer:

Interview 120

Interviewer: Alright, okay. Do you own a smartphone?

T120: Actually I don't, actually I am in the process of getting one though.

Interviewer: Okay, so you have a regular mobile?

T120: yeah.

Interviewer: Have you used it since you've been here?

T120: I haven't because the issue is you need a smartphone in order to be able to get international service from the States so yeah, I don't have any use of it.

Interviewer: Okay, now you just said that you are thinking of upgrading.

T120: Yeah

Interviewer: What sort of drove you to want to get this new...upgrade?

T120: Simply because I'm doing travelling and I wanted to stay connected with family back home and I don't know to what extent with a lot of countries getting rid of the public phones that you can use it so would make it so much easier if you have your own mobile phone so that you can call at any given time so, just to be connected.

Interview 125:

Interviewer: Okay. That was the next question. I was going to ask if you have a mobile device and if it is a smartphone?

T125: No, I just have a very old cell phone and maybe this time is the first time that I think that I have to buy one because I am very used to when I'm travelling to look for an Internet point. Now, especially in these countries like Great Britain, Italy they are very few because everyone has a cell phone or a tablet and you can easily find a Wi-Fi spot so maybe after this trip I will need... I will think to buy also some new technology about my cell phone. To be connected also.

Also, as mentioned earlier T126 did not use a mobile phone at home but only uses a mobile to maintain contact with family while on holiday in the UK.

They were clear differences between standard mobile users and smartphone users in how social connectedness was maximised or minimised based on the personal preferences of the individual. Naturally, smartphone users would have more ready access to applications and in particular social media with Facebook, being the most popular. The

level of importance, purpose and the type of social media accessed varied- Facebook, Instagram, Couchsurfing, WhatsApp, Viber, Scout, Lime. For example, while in-trip checking reviews, contacting family or liaising with friends on social media about what to do or where to go, was important for some of the leisure tourists.

Contact with friends and family:

I just use it to because I think it's practical because it is useful, because the communication is very, very fast with WhatsApp, Viber things like this, but with my friends I felt the necessity because all of them has a modern cell...mobile phone, a computer but now I am 100% online but...and I think I am an addict now. (laughs) Yes... But I was usually slowly about the things but now okay I need to check my e-mails, I need to check Facebook, I need to check the... Oh yes, I forgot about the Facebook. Facebook was very good because some friends told me about the country, the Edinburgh and oh go there and oh visit that place and stay in here, I don't know I found that place was not very nice, Facebook has been very, very useful. (T112)

...especially when I want to contact my friends and family. I use an application called WhatsApp so if I can't get on the Net I can't communicate with my friends with this app.(T123)

Yeah, yeah, comments, pictures. I get in touch with friends, family through Facebook. (T122)

Reviews/Recommendations:

Travelling, I use a lot of social network not Facebook, I don't know if you know about it, Couchsurfing. I do it a lot. I also try to use it here in Edinburgh as I decide the last time, I didn't find anyone... (T125)

... I have used TripAdvisor for... like to see what attractions I should go to, what other people have recommended and that's probably about it really. (T127)

T125 though not a user of Facebook, used other forms of social media to create new social connections and to actually meet such connections when he travels, as he explains here:

I haven't a Facebook account and I use Twitter for work. The difference I think with for instance the Couchsurfing I'm using and Facebook is I think that social networks are useful if used in the right way. What I mean is they're just a technology-just to put in contact with people, with Couchsurfing for instance thanks to the Internet too, I can know people but then I can meet personally and this is what I like.

Often I see that Facebook is especially used just to have virtual friendships – I'm not interested in that, okay. Sorry I'm not talking bad way about Facebook but their main use in my opinion is not so interesting, so... (T125)

5.2.3.2 Personal Innovativeness

Personal innovativeness is defined by the individual's willingness to try out any new information technology (Agarwal and Prasad 1998). In-trip tourists' level of personal innovativeness was discerned from their responses about their technological expertise and how quickly they acquire new technology relative to their friends or colleagues. Some interviewees tended to use their relative age not only when describing their technological expertise but also in terms of how quickly they acquired new technology:

Interview 099, Age Group: 65+

Interviewer: But before I ask about your smartphone how would you describe yourself in terms of acquiring new technology?

T099: Rather good for my age (*laughs*) I think. What you say? (*directed towards husband*).

Interviewer: in comparison to your friends and relatives, what would you say?

T099: I'm... My friends in my age, they look up to me just as a technical Guru (*laughs*)

Interview 100, Age Group 55-64

Interviewer: What about you, how would you rate yourself in terms of your use of technology?

T100: My use of technology, in my branch of study practice, yes, not up-to-date but for my age I think I am fairly recent.

Interview 104, Age Group 35 -44

Interviewer: in terms of comparing yourself to friends or colleagues how quickly do you acquire new technology?

T104: like an average person I could say for example my... I've got a son, he is 21, and he is much faster than me and probably it's always like that, that younger people are more ... have more..., they adopt, they adopt much more faster, to new stuff and things like that.

Levels of personal innovativeness were classified based on interviewees' self assessment of their technological expertise; the speed of acquisition of new technology; and the factors that generally encouraged them (the in-trip leisure tourists) to use technological applications. Interviewees that demonstrated a high level of personal innovativeness were smartphone owners and used their smartphone while in-trip. Some of those interviewees that demonstrated a high level of personal innovativeness had brought along two devices (smartphone and a tablet) and one interviewee even had three devices- a smartphone, tablet and lap-top (T114). Interviewees with a high level of personal innovativeness also had an established high level of on-the-job technological use. Some of the responses that typified the interviewees with a high level of personal innovativeness were:

I worked with the Internet for 20 years in my job and I have a smartphone and I have sons who encourage me to be better and better. (T099)

Probably quite high really, quite an early adapter in most things. (T103)

I am working in IT so... quite an expert, yeah it's good. (T113)

Respondent: fairly quickly, fairly quickly but it's depending on funding, it's depending on money, you know. (T114)

...because where I work as well as a marketer I need to be abreast and keep in touch with my friends. So I'm really into my gadgets and keeping up to speed non-stop. (T119)

T099 was the only female who demonstrated a high level of personal innovativeness and represented an exception not only by gender but by age group, since she was over 65. Conversely, those interviewees that had a low-level of personal innovativeness generally did not own smartphones and either relied on traditional sources of information (e.g. guide books and paper maps) or their travelling partner's smartphone for use in-trip for Internet searches, weather forecast and maps or GPS functions. Those interviewees who were classified with low levels of personal innovativeness were far more effusive in their views on their unwillingness to embrace new technology as exemplified in the following excerpts from T116 and T120:

Interview 116:

I mean everything... It would be lovely to have everything brand-new, it would be lovely to go out and spend seven or 800 quid on a laptop or a new PC or whatever with all the modern... More up-to-date Microsoft Works and all that sort of thing for what I need at home, for what I have is sufficient. It would probably be the case of spending money for just spending money's sake rather than out of necessity.

My phones are limited because I don't use it often. It's a phone, should I say, it's a phone I can send messages do I need to do anything else on it? Nothing that I've missed. Alright. I don't have one, so I don't know if I've missed anything.

It's like say if I had a smartphone with all the applications on it then yes I would use it but I got a map, why do I need an application if I could use a map to get from A to B and know what's in there and you know all the tourist information that's out there that we've used in terms of entry prices and all that sort of thing, I don't need an application for it. (T116)

Interview 120

Well I consider if I'm I really going to use that because there is so much information out there that can do all these different things and I find that if ...if I don't find that it is going to fit into my lifestyle... I'm not a gadget person. So with that in mind I look at... I guess I am more of a minimalist in that regard so the extent to which I see if I'm gonna really use it or not. I tend not to be ahead of the curb in terms of being curious about... maybe having something seeing something that I can really apply to my lifestyle. (T120)

There was one exception (T124), with an interviewee who did own a smartphone but demonstrated a low-level of personal innovativeness. His smart-phone was switched off while in-trip because of roaming charges and he described himself as “slow” when it came to how quickly he acquired new technology. He also described a limited use of his phone when in his home country:

Interview 124

Interviewer: But generally do you have a higher usage of your smartphone when you are back home?

Respondent: No, actually not. I just use it for calling more or less calling or text messages. I don't use the Internet too often. Even though I could but it's more to keep in touch to call if we need something.

Other interviewees were classified as having a medium or low-medium level of personal innovativeness. Some interviewees explicitly described themselves as somewhere in the middle (e.g. average) when it came to their expertise or how quickly they adopt new technology:

Well, initially I was quite slow. I didn't get a mobile phone until I was nearly 12 and everyone else had maybe two or three before me. So, initially I was quite slow but I guess I was probably middle-of-the-road in terms of getting a smartphone or an iPhone. So I guess I'm average. (T127)

Something in the middle. I am not really one of the first adopters I need a little bit of time but if I have found something interesting, then okay, I buy this equipment very fast but sometimes need a little bit...(T106)

Definitely not the first, I guess not the last, somewhere in the middle. See and wait. (T123)

Additionally, some interviewees differentiated between their work-related adoption of technology and their adoption of technology when it came to their leisure pursuits:

It depends for some technology. I use for instance edit programs for my work that I think I can learn very quickly. Maybe for the technology that I am interested to... I don't know, for instance I am completely out about technologies of cell phone, I have a very old cell phone and maybe I'm not interested... I don't know, some aspects maybe I need more time. (T125)

At home we have the old televisions, the old one not the new one, eight years old but happy with the historic...and something in the middle. (T106).

T106 continues later....

I must see a need to use it. For example, I invest in equity for example and I travel to my work via train that's around 40 minutes each direction, time to go on the Internet and think about ...see if equity is good or not so good and decide if to buy or sell and therefore I need a good technology to go on the Internet and have it... It must be mobile. (T106)

The above excerpts themselves give credence to the need to not overly rely on traditional TAM models to predict those factors that influence technology adoption and actual use in the consumer domain. The importance of being technologically competent on the job was a distinguishing factor for some interviewees in terms of technological acquisition on the job as opposed for leisure pursuits or at home. For others, their level of personal innovativeness was influenced by their friends and drove their need to be “up-to-date” and use technological applications:

I am just learning more about these applications I don't know this year because I was very slowly ... (laughs) I just... My cell phone was very old and I just buy a new one, a modern one, just this year.

I bought one and... but I consider myself not so... how can I say this.. I am slowly, okay oh this is the most modern cell phone. I can't, I can't be without it. I just use it because I think it's practical because it is useful, because the communication is very, very fast with WhatsApp, Viber things like this, but with my friends I felt the necessity because all of them has (sic) a modern cell...mobile phone, a computer but now I am 100% online but...and I think I am an addict now[laughs]. (T112)

...because where I work as well as a marketeer I need to be abreast and keep in touch with my friends. So I'm really into my gadgets and keeping up to speed non-stop. (T119)

The willingness to embrace new technology was slightly higher among the interviewed men than the women; however an unwillingness to embrace new technology or low personal innovativeness did not differ significantly between the male and female interviewees. There was no discernible pattern that suggested that older persons had lower levels of personal innovativeness. A summary of interviewees' personal innovativeness and actual in-trip usage by gender and age group is provided at Table 5.2

Table 5.2 Summary of In-Trip Tourists' Personal Innovativeness Classification and Actual In-trip Usage

Interviewee	Age	Gender	Smart-Phone	Personal Innovativeness	Actual In-trip Usage
#099	65+	Female	Yes	High	Smartphone: Use not specified, used only when Wi-fi available
#100	55-64	Male	No	Medium	iPad- maps
# 101	25-34	Female	Yes	Medium	Smartphone- GPS functions, Yelp, Google
#102	35-44	Male	Yes	Medium	Smartphone: in the hotel at night - e-mail, Facebook
# 103	25-34	Male	Yes	High	Smartphone: Google maps and checking opening and closing times on the Internet
# 104	35-44	Female	No	Medium	Computer: Internet to check up on plans, info on where to buy tickets
# 105	35-44	Male	No	Low	Travelling partner's Smart phone: Weather forecast
# 106	45-54	Male	Yes	Medium	Stand –alone GPS for geocaching
# 107	35-44	Female	Yes	Medium	Smart-phone: GPS, Internet and updating Facebook
# 108	45-54	Female	No	Medium	Travelling Partner's smartphone: maps, Google, weather
# 109	25-34	Male	No	Low-Medium	iPod- map, music
# 110	45-54	Female	Yes	Medium	Smart-phone: game playing

Interviewee	Age	Gender	Smart-Phone	Personal Innovativeness	Actual In-trip Usage
# 111	65+	Female	No	Low	None
# 112	25-34	Female	Yes	Medium	Smartphone: Facebook, Viber, WhatsApp, Google Search, Ago
# 113	25-34	Male	Yes	High	Smartphone: Welcome to Scotland App, Map app, Searching
# 114	25-34	Male	Yes	High	Smartphone, iPad & Laptop: Guidepal apps, maps, e-mail and Facebook
# 115	35-44	Male	Yes	Medium	Smartphone: e-mails, weather forecast, Springpad for travel notes
# 116	45-54	Male	No	Low	None
# 117	55-64	Female	No	Low-Medium	Travelling Partner's Smartphone: Google for info on attractions/events
#118	55-64	Female	No	Medium	iPad, Travelling Partner's Smartphone, SatNav
#119	25-34	Male	Yes	High	Smartphone: Internet search, Foursquare, Time Out and TripAdvisor Ipad: Entertainment (film, TV)
#120	55-64	Male	No	Low	None
#121	35-44	Female	Yes	Low-Medium (Had just gotten smart phone)	Travelling Partner's Smartphone: checking online – availability & purchase of tickets, things to do in an area, Fringe App
#122	16-24	Female	No	Low- Medium (Very price sensitive consumer - accesses technology regularly once free)	Public Library Desk Computer: Internet search , Couchsurfing
#123	25-34	Female	Yes	Medium	Smartphone: Social media-Scout ,WhatsApp, Lime
#124	25-34	Male	Yes	Low	None

Interviewee	Age	Gender	Smart-Phone	Personal Innovativeness	Actual In-trip Usage
#125	35-44	Male	No	Medium	Desk Computer (Internet Cafe): Searching, Social Media- Couchsurfing
#126	55-64	Female	No	Low- Medium	Laptop: check my e-mails. Internet search, the weather, news headlines, travel diary
#127	25-34	Male	Yes	Medium	Smartphone: Internet search, Fringe App, TripAdvisor
#128	35-44	Female	No	Low-Medium	None

5.2.3.3 Perceived Ease of Use and Perceived Usefulness

While interviewees' level of personal innovativeness gave an insight into what influenced their use of technology at a latent level. The more manifest factors influencing use tended to be consistent with the literature. Interviewees, in the main, indicated that either perceived ease of use (PEOU) or perceived usefulness (PU) would be a main factor influencing technological use.

Interview 114:

Interviewer: What factors generally encourage you to use a technological application? What factors do you consider?

T114: Um... How easy it is to use. I mean can I quickly find what I need to find especially in terms of maps. Can I quickly zoom into the location that I am and figure out how to get to the next spot that I need to go, and then can I share this information with friends. Those are the two.

Other examples from interviewees who were posed with the same question and highlighted that PEOU was a main factor follows:

It must be fast, yes I'm sure and easy to understand, not too complicated and...yeah (T099)

The easiness. It's very easy and cheap because you don't have to drive anywhere to look at it whether home or at the office. It's everywhere nowadays. (T124)

I think the ease-of-use the fact that it is in my pocket so usually I can access it at all times, so I think, I think that is probably the best, best thing because you know if you are bored on the bus or something... Oh you know you're on the bus to Edinburgh or whatever you can plan ahead on the bus. (T127)

User-friendly. (T128)

However, there were some tourists who felt that a factor of influence to use a technological application or tool was that it should make their "life easier" or help them to "function" better, which was interpreted as the PU of a technological application or tool:

It would have to be something that I... To be able to function... it would have to be that vital I'm not a... I am not a because everybody has it, I have to have it, it's not that's not how I am which I think a lot of people keeping up with the Joneses that's how it a lot of people are these days . That's not how we live. We live because... We have things because we need it. We need it to live not because next door has, that's how we are. (T107)

When I need something I look to see if there is an application that can satisfy my needs. (T115)

To make my life easier, to get things done quickly. Because in London saving that extra couple of minutes could make a big difference. (T119)

Additionally, a number of other factors were raised by the interviewees: speed (T099, T121); cost (T103, T116) and size (T108, T126). A notable response was that of interviewee T112 who indicated that her desire to acquire a new technological tool, in her case, a smartphone was driven by the influence of friends but for future acquisitions, she would consider the usefulness and ease of use. More on the role of referent others and their social influence is highlighted in the next section.

5.2.3.4 Social Influence and Social Media

As highlighted in an earlier section the desired level of social connectedness influenced not only technological use in general, but also the type of social media used. The types of social media used in-trip by the leisure tourists and the use of some technological tools and applications was determined by the importance individuals attached to different types of referent groups, for example, family or friends or other travellers.

Some interviewees did mention that they used reviews on TripAdvisor, and accommodation websites pre-trip and also expressed how important it was to them to have others' opinions. Other interviewees also used review sites and other social media such as Yelp, Foursquare, WhatsApp, Couchsurfing and Facebook while in-trip for deciding on attractions and where to eat. Applications such as Facebook Places, Foursquare and Yelp are location-based and allow the user to see what's in their location

(once this functionality is enabled) and based on what's near, see the reviews or rating of sites of interest by other travellers. Such location-based services also allow tourism suppliers to connect with the traveller while in-trip. WhatsApp and Facebook can allow for real-time recommendations between the tourist and his or her family and friends, while TripAdvisor and Couchsurfing, for example, provide in-trip tourists with recommendations from other travellers.

A few travellers did use for e.g. TripAdvisor (T127), Yelp (T101) and Couchsurfing(T125, T122) to get recommendations or look at reviews while in-trip but the majority used other types of social media to check-in, contact people known to them or for posting their travel pictures:

Yeah, we checked in here this morning, we checked in at the Museum, the flight Museum yesterday and we checked in where we're staying as well so yeah. (T107)

No, yeah WhatsApp of course but with the relatives. I'm not that into Facebook and LinkedIn, of course every professional has LinkedIn but on Facebook I have 23 friends so I'm not into that. (T110)

Yeah, yeah, comments, pictures. I get in touch with friends, family through Facebook. (T122)

A bit, especially when I want to contact my friends and family. I use an application called WhatsApp so if I can't get on the Net I can't communicate with my friends with this app. (T123)

The following excerpt demonstrates how important Facebook was to one interviewee while in-trip:

...Oh yes, I forgot about the Facebook. Facebook was very good because some friends told me about the country, the Edinburgh and oh go there and oh visit that place and stay in here, I don't know I found that place was not very nice, Facebook has been very, very useful. (T112)

When T112 was asked if she had to choose one application, which one was the most valuable to her during her trip she replied, "Facebook, yes. Facebook because all that I

need I can just ask okay I am lost, I am lost can you help me please and some friend would see...”

One interviewee wanted to let his friends know where he was while he was in Edinburgh through Facebook Places, but expressed some frustration about not being able to check-in:

I have found that a lot of the places that I wanted to check-in, in Edinburgh are not showing up, even when I type in the name, like they're just not there. For example, University of Edinburgh is actually mis-listed, it is listed as Edinburgh University. The actual dorm residence that we're staying in, some of them are listed, some of them are not listed. The bar that we went to the other night didn't show up for checking in. The place where we had lunch today didn't show up, so I don't know if it's just a function of people here not having added those locations or what. (T114)

Social influence and the use of social media is not a unidirectional process, the co-creation process means that tourists also have the ability to influence the views of others while in-trip, as well as in their post-trip evaluation, through various types of applications. One interviewee, T119 recognised this collaborative process and stressed how important recommendations were to the value-creation of the touristic experience:

I mean one of the biggest things is recommending places so you know I use Instagram as well to put up pictures and stuff you know that's quite good so we are advising someone a little bit. And the good thing about Foursquare, if I check into a place or I am near somewhere, they will say my friend has been to this place and made this recommendation and so I would be like ahh, I trust these guys and I can go there. So those kinds of things actually add value to your journey, to your trip. Because otherwise we come, I mean we don't really know too many places to go, so we are asking if our friends would do the same thing because with mobile devices you can get the location enabled now so you can easily say alright. We are hundred metres away from Edinburgh Castle, or you should go visit this or that or there's a new exhibition at the gallery, so it's really good for things like that. (T119)

The influence of friends and their trustworthiness was an important element for T119 in making in-trip leisure choices.

However, quite a number of the interviewees had negative views about social media and demonstrated a desire to minimise social connections through this medium. Notably, such views were not limited to the regular mobile phone users but extended to the smartphone users as well. The following excerpts reflect some of the prevailing negative sentiments:

No, I am not so enthusiastic I don't want to tell the world or to look at what everyone else in the world is saying about Edinburgh. Maybe later but not straight away. (T105)

No. I am completely against Facebook because I couldn't understand why I post something to a colleague which is sitting for example 5 or 10 metres away and I have younger colleagues which make this in the way and I couldn't understand it. Maybe I am too old for this, maybe I'm...since a couple of days I am forty-five years old, maybe it's this, I don't know. No, I'm not a member of Facebook, and I'm not a member of "tulippostet" its a German community more or less for students or something like that... I'm not really aware. (T106)

No, I'm not big on Facebook I think it's a big ego trip, I'm not doing this to impress people I'm doing it because I've always wanted to come here. Because, like a lot of people I will tell oh I'm so jealous you going to Britain. I'm not doing it to make you jealous, I'm doing it because I want to. And I think they've had some studies that Facebook links ... It has links like to depression because you start comparing your life to this... Oh my life doesn't have X, Y and Z I'm not as good as a person and I've even had feelings of that. I've done it to myself and that's not the point of me doing this. That's why I'm not posting a dam...if I hadn't told you, you'd have no idea that I am out of the country. Social media has its place, but I also think it's like 75% of it is just like ... I don't care that you went to the shower, I do not care, no one needs to know that. But... I am not anti-technology. (T109)

No, I don't like it all I don't like the world knowing anything about me. I think it's very invasive.... and it has been abused. (T111)

I am not a Facebook fan. (T125)

5.2.3.5 Perceived Enjoyment

A number of tourists made references to checking-in via social media while in-trip (e.g. T107, T114, T119). T119 commented while he hadn't checked-in yet, he intended to but indicated that he only checks-in to "really good places" and mentioned that he was a Mayor in a number of places. The uses of social media in such instances were beyond the utilitarian function and provided an element of fun to users. T106 had brought along a large GPS to engage in geo-caching while in-trip. T106 had conducted research on-line and found a few destinations to look for a cache, though he lamented the heavy rainfall being a possible impediment. T110 use of her iPad while in-trip was solely to play a game: "I play "Sims" for free I and have to feed them (*laughs*). No, I am old." T119 also referred to his use of his iPad while in-trip to watch films and T118 also emphasised the use of her iPad for entertainment, including playing games.

5.2.3.6 Internet Accessibility Issues

Almost half of the interviewees were smartphone users and in some cases had access to other devices (e.g. laptop, tablet). Some of the interviewees who had standard mobile phones had access to their travelling partner's smartphone. However, it did not matter where the smartphone ownership resided, several of the interviewees lamented the inability to access Wi-fi. Some interviewees had to wait until they returned to their accommodation at the end of their day to access the Internet, while others had difficulty in accessing the Internet at their accommodation as well:

Interview 105

Interviewer: So your wife has a smartphone?

T105: Yeah.

Interviewer: Are you using her phone while you are making your way around the city?

T105: We haven't done much today.

Interviewer: Because you've only been here one day?

T105: We haven't had good access in the hotel.

Interviewer: Alright.

T105: it didn't seem to work.

Interview 114

Interviewer: Okay, okay. So tell me how you've used these apps so far in terms of determining where to stay and what activities to do?

T114: Well, it's hard because my phone service is turned off so I have to be somewhere that has Wi-Fi in order to use them which... That easily can happen obviously Starbucks and other places have that. But I definitely use them at night when I go home to kind of plan the next day where I might be interested in going, if we have time.

Interviewer: And how would you say your smartphone use since you've been in Edinburgh compares to say when you are at home?

T114: Well, it's definitely less because I have to seek out those spots that have Wi-Fi because if I use the regular service it's drastically expensive. However, when I do find spots with Wi-Fi, its out, I'm on it. I'm checking things, you know I'm seeing what's on near me, where can I go next and like I said then in the evenings, I use one of those devices to try and situate myself and think, about where might I go the next day.

Interview 123

Interviewer: okay. Are you using any devices while you were here too...?

T123: Mobile phone

Interviewer: Mobile phone

T123: yeah, I do have a mobile phone but getting Internet it's not easy here. I don't understand because very often, I can detect Wi-Fi connection but I couldn't connect to Wi-Fi like maybe it's too slow, I don't know, for some reason. In the hostel it's a bit better but still it's a bit slow comparing to Hong Kong.

Interview 126

Interviewer: did you bring any other devices to use...?

T126: I have a laptop with me.

Interviewer: You brought a laptop with you.

T126: Yes

Interviewer: So are you actively using that while you are here?

T126: Of course

Interviewer: and what's your typical usage?

Respondent: I check my e-mails. Now, where I'm staying here the Internet is sort of iffy but I found out last night if I open my door... Well I get hooked up. But that's usually... It's just the Internet or I also check the weather, yeah, to see what it's going to be like and I actually check the news back in St Marie, there is like... You probably have them here but the news headlines just to see what's happening in the town back home.

Though the link between sustainability and tourism is discussed in the next section, T120's response to a question on his thoughts about if technology could make a tourism destination more sustainable resulted a commentary about the lack of Wi-fi availability- Interestingly from a non smartphone user. However, his travelling companion his brother did have a smartphone. The extract illustrates:

Interview 120

Interviewer: Do you think that having a smartphone or any technology like a tablet could help make...encourage tourists like yourself to be more sustainable in the destinations that they visit?

T120: I think so, I think so because then you begin to have at your finger tips...again there are issues because my brother has a smartphone and we were trying to find information about the Olympic activities, the idea.. the whole point is to have Wi-Fi up .. and there is another issue...so if you have a smartphone to really get to utilise it, you need to have everything... in places where you have Wi-Fi. I don't see a lot of Wi-Fi here in different coffee shops. Maybe I've not seen it because I haven't really looked for it but obviously the more places that have the Wi-Fi availability the more it encourages ...it is more encouraging to be able to say you see it's all connected and I can go into any coffee shop or I can go into a train station, I can ride the train and there is Wi-Fi there, I looked. That is something that I might consider if all transportation offer that, Wi-Fi, I don't know I didn't see it on the train coming down, I didn't see a prominent

sign say “Wi-Fi”, and it’s pretty prominent as soon as you walk in, I didn’t see that on the train coming in here, as an example. A lot of people using their computers so either they were connection... so maybe it is there but it didn’t come out as visible.

The commentary of the preceding interviewee raised the issue of signage to make Wi-fi hot spots more visible to tourists. Starbucks’ free Wi-fi access for example was noted by a couple of tourists (e.g. T114, T109) but apart from lack of hot-spots within the city, there were Internet accessibility problems at some accommodation facilities. On the other hand some tourists indicated they were only willing to access Wi-fi if it was free (e.g. T099, T115, T118).

5.2.4 Sustainable Tourism-Technology Linkage

When it came to perspectives about the use of technology to support sustainable tourism, not everyone saw a linkage between sustainable tourism and technology and some interviewees openly said so, for example T111 said, “I don’t see how it could be, I don’t see how an app can help the sustainability of anywhere”, while a few others indicated that they hadn’t given it much thought (e.g. T104 and TT106). Some interviewees immediately saw an environmental benefit by reducing the production of paper-based brochures and physical maps and instead using travel applications or digital interactive displays as opposed to static paper signage:

I think maybe if some of the main attractions like the Castle or the Zoo had maybe an app where you could get a map and you could kind of... I’ve seen different places when I’ve been abroad sometimes when you go to a theme park or something you could download an app that kind of tells you where you are in the place rather than kinda getting a half map given to you and I guess if you use that more it would cut down kind of paper waste and things like that as well. People probably throw away maps quite a lot as well, so I think that some of the main, especially the Castle being quite a big site and the Zoo being quite big and if you can download an app which gives you a map and also maybe give you times when things are going to happen, also makes it a lot easier to get around and find things. (T103)

Well, for one thing you're going to be able to print fewer brochures and not kill as many trees and use as much ink, and you know, that whole facet of things. And I think, you know, in terms of just getting information to people more quickly and more easily and in ways that are just generally just less taxing to the environment, the people, I think that is probably what occurs to me the most.(T114)

Sustainable. I suppose it could because you could go paperless with things, you don't need printing off things on paper and actually displays that you see around have to...some of them have to be video generated. So yeah, I guess it could from that point of view. (T126)

Additional ways in which in-trip leisure tourists saw technology supporting sustainable tourism was through the availability of real-time information either through the co-creative process of social media or location-based services:

Maybe more information helps people to get better decisions and sustainable decisions maybe this is the role of the current technology... Get or give more information, no... maybe this is one of the roles I can tell...see. (T102)

A link between sustainable tourism and technology... Well this thing that you were saying I think there is one link because, like through technology you are much more aware of the place you are going and much more aware of your impact on the place and... yeah. This is what I'm thinking about right now. (T122)

Yes, I do because if you give the name of the city you get tons of stuff that pops up – advertising... probably, I say, yeah. (T124)

I think so. Of course just giving you useful information in a quick time and yeah I think so, I think so. (T125)

Well, I guess it could have... I guess it could have you know a section on it about sustainability like giving you tips on how to travel more sustainably I guess, so that's... That's all I can really think of...(T127)

5.2.5 Developer's Role

There were mixed opinions on the role that application developers should play in making a tourism destination more sustainable. As the interviews progressed the question was slightly modified to ask if interviewees thought that the people who commissioned the development of tourism applications should make sustainability a component of travel applications. This modification came as a result of the perspectives of two interviewees in particular, who worked in the field of information technology. T110 and T113 referred to the need to have an integrative approach- the technical knowledge with local content and managerial expertise:

Not, not in principle, I think. The effect of things Apple did and Google maps did I think were mere technicians who developed it and the use of it is beyond they imagined so I don't think it's absolutely a must. It would be nice, but I don't think its...and perhaps these two things are not all in one person integrated it is very different skills and talents, perhaps. (T110).

You know, if we are talking about the IT guys, only like on the basic level they are just only doing their job, but they have the managers which are like responsible for the project, it depends really if someone knows something more than just the technological stuff only, you know what I mean? So it's quite important to combine, you know, that technology together with that local information, generally.(T113)

Another interviewee, T114 also supported the notion of people with local content knowledge playing a role in application development:

Oh I think it would be excellent. I don't want a company, I don't want a third-party company building these things. I think that the people from home should build these things, so that you know an Edinburgh person is telling me about Edinburgh or a Glaswegian is telling me about Glasgow. I think that makes a whole lot more sense than having you know some Microsoft app or something from a giant third-party trying to say here the places that you should go and these are our favourite companies and you know... I'd rather have the locals contribute to my trip. (T114)

Other's felt that developer's incorporating a sustainable tourism agenda into applications should be dictated by the market while some interviewees felt that it would be a good thing for developers to do but it all came down to the businesses' profitability.

Yes. I mean grant it they are large companies and they have other things to think about in those respects but consider they are promoting tourism in areas they should keep that in mind, maybe have like certain kinds of ..like highlighting certain things that are sustainable. (T101)

They should but... I guess the market should dictate what they do but, I do not know that's a tough question because you shouldn't force somebody to make something like that as long as it's not causing harm to anyone but you could also argue that unsustainable tourism is hurting someone. I don't know that' a tough question. I would just abuse my power if I was in charge of that. I would take advantage of it somehow. I don't know. I don't know. (T109)

Yeah I think a lot of the apps that you see for main cities and things like that tend to be kind of where restaurants are and things like that. I guess it's more based on advertisement than anything else against their more looking at their kind of cost than anything else. I guess it would be kind of good if they did look into more sustainable things for tourism rather than just looking at their own profit I guess. (T103)

Well... Well they have their own motives for doing that so they want to make money by attracting people to their websites. I guess they have to get an interest in people in sustainability if that is something they can sell through their website then they will be interested in doing that. (T105)

Interviewees T121 and T127 felt that since the businesses benefit from tourism, something should be ploughed back into it:

If you're buying an application and wanting to support it yourself and you are wanting to visit that place and do something there, then I would like to see money invested there, not just my money when I go there but general money going into it as well. (T121)

I mean... I guess they probably should. They must get some sort of money for making the app. Even though the TripAdvisor app is free but they must get some sort of money from somewhere. I guess if they don't support sustainable travel

then maybe eventually they won't be a point for them to be on the Net or their apps are useless so yeah they probably should play a role. (T127)

5.3 Conclusion

This chapter reported on the main findings of the dominant component of the study- the qualitative component. Phase 2 of the primary research involved semi-structured interviewees with thirty international and domestic leisure tourists visiting Edinburgh over a six month period. The findings presented the results of the a priori and emergent themes and served to highlight the environmental conceptions that in-trip tourists had about sustainable tourism, and how values and actions by the interviewees depended on whether tourists were visiting a rural or urban destination or a developed versus a developing country. A significant number of in-trip tourists were standard mobile phone users and tended to have a low or low-medium level of personal innovativeness. A central theme running through reasons for use while in-trip and the type of applications used (especially social media) was the need to maintain social connections. There were challenges with accessing Wi-fi and this restricted the in-trip usage by several tourists. ICT usage for the in-trip tourist interviewees was influenced largely by PEOU or PU. Environmental issues and in particular, recycling resonated with the interviewees and as such, some tourists felt that technology could be used to benefit the environment.

Chapter 6

Analysis and Discussion

6.1 Introduction

The aim of this study was to examine the factors influencing in-trip tourists' adoption of ICT tools/applications which support sustainable tourism. The methodology chapter described the mixed method research design strategy that was employed by the researcher to achieve this main aim. The previous two chapters, four and five, described the findings of each phase of the research- the quantitative and qualitative components, respectively. This chapter will make sense of the data by interpreting the results and the attendant implications of the study for consumer technology adoption, sustainable tourism and by extension destination management. There were seven objectives that were subordinate to the achievement of the study's main aim and these are addressed in the first part of the chapter. Where the dominant qualitative component of the study is addressed the analysis and discussion focuses on the themes that emerged from the data, as described Chapter 5. Themes include awareness levels about sustainability, sustainable tourism-technology linkage, perceived ease of use, perceived usefulness, perceived enjoyment, social connections, social influence, social media, personal innovativeness and other tourist traits. The integration of the findings from the two phases of the research is examined and the chapter concludes with a discussion on the implications of the study for theory and practice within the tourism industry.

6.2 Literature on Key Research Domains

The first objective of the study was to review the literature on sustainable tourism, eTourism and consumer technology adoption behaviour. A careful examination of the study's main aim provided the justification for a review of the literature in these three main research domains. Firstly, the study ultimately sought to address the role that ICT tools/applications used by tourists could potentially play in supporting sustainable tourism in a destination. Edinburgh, an urban city destination was used as the study site for the research. A review of the literature examined the concept of

sustainable development and sustainable tourism, the aims of sustainable tourism and the challenges with measurement and practice. Secondly, existing and emerging technologies that could help meet the aims of sustainable tourism were critically assessed. Given the study's emphasis on in-trip tourists, those technologies that could potentially meet the goals of sustainable tourism from a consumer perspective, were the main focus. Again, with the focus on the consumer- the factors that influence consumer behaviour in general, those specific to the tourism context and technology adoption behaviour were also critically reviewed. A notable distinction made after the review process was the contemporary literature's focus on the prediction of technological usage by measuring use intention whereas this study examined actual usage. A review of the literature on technology adoption behaviour resulted in the consumer TAM (Baron et al. 2006) being amongst the most central theories used in this study to gain insights into the factors that could influence the adoption of ICT tools/applications by in-trip tourists.

6.3 eTourism Expert Surveys

The second objective of the study was to survey eTourism experts to identify the current and emerging ICT tools/applications that in-trip tourists can use to support sustainable tourism. A web-based survey conducted in Phase 1 of the research assisted in the fulfilment of this objective. As outlined in the research, the survey's main purpose was to assist in the development of Phase 2 (Molina-Azorín 2011), the dominant qualitative component of the study. Additionally, given the pace at which technological developments take place, the researcher felt that much of the existing literature could have been lagging slightly behind what was happening now, particularly in the area of emerging technologies and as such, it made sense to have an up-to-date perspective from the eTourism experts.

Before the identification of the specific technologies that could potentially be used by in-trip tourists to support sustainable tourism, the researcher sought to determine the experts' perspective about the relative importance they attached to the use of ICT tools or applications by in-trip tourists. There was a significant difference in how

eTourism experts viewed pre-trip versus in-trip applications, with 91% seeing it as very important pre-trip, compared to 35% for the in-trip phase. Undoubtedly, the use of technology pre-trip is essential in the planning and purchasing phase of a vacation. The use of technology during the initial phases of the consumer buying process for travel is an area of research that has been adequately and extensively covered in the literature (e.g. Snepenger and Snepenger 1993; Fodness and Murray 1998; Gursory and McCleary 2004; Sirakaya and Woodside 2005; Woodside et al. 2007). However, one of the justifications the author of this thesis makes for this research is the relative dearth of literature about in-trip usage and its potential to support sustainable tourism. Arguably, access to the Internet is more critical during the pre-trip phase for research and booking and/or purchasing the flight and accommodation. It is also becoming more and more difficult to get the most current, comprehensive information and the best prices without using the Internet. Recognising the risk in buying an intangible such as a vacation, technology is increasingly being used to minimize this perceived purchasing risk. Virtual tourism is one way in which tourists can “sample” the tourism product pre-trip (Cheong 1995; Cho et al. 2002) to allay any concerns. Hyun et al. (2009) have also suggested that a mobile-mediated virtual experience should be an important element of a DMO’s marketing strategy which can add the value to tourists’ travel experiences during all the travel phases- pre-trip, in-trip and post-trip. Social media and dedicated travel advice sites and blogs also allow tourists to view pictures, videos, seek advice and learn through other travellers’ destination experiences.

Consumer review websites such as TripAdvisor, travel blogs and other social media are becoming a powerful tool for businesses and consumers alike. Travellers have been transformed from passive consumers to empowered consumers actively involved in the co-production of their experience (Neuhofer et al. 2012). The vacation experience is indeed in-trip - where production meets consumption, and even though only 35 % of the eTourism experts said in-trip use of technology was very important 47 % of the experts felt in-trip applications were fairly important. If there is a disconnect between what the experts deem as valuable compared to what consumers use, then the opportunities that the strategic investment in mobile services

present to travel companies is not being maximized. The majority of the eTourism experts (78%) felt it was important to incorporate sustainable tourism practices in the design of eTourism applications, however only 50 % of the experts felt that sustainable tourism was even a consideration in the development of these types of products. While the persistent challenge is the actual usage of technology as opposed to what is available on the market, the increasing use of applications over the mobile web is indicative of the potential that resides in context aware technologies, recommender systems and location-based services in general.

A study conducted by Nieslen commissioned by Telmetric and advertising network xAd, using a mix of a survey of 1,500 U.S. smartphone and tablet users and observations of actual behaviour by 6,000 Apple and Android users highlighted some key findings, albeit for the US market:

- In travel, tablet users went directly to familiar sites and apps (46%) or apps and sites they had previously used (49 %) more often than they used search engines (15%).
- Two out of three mobile users notice ads. Local businesses and local promotions seemed the most relevant and received the most clicks.
- US mobile device owners prefer apps, spending 81 per cent of their time in apps instead of the mobile web.
- The top three reasons for engaging in mobile: (i) local relevance (ii) local offers/coupons/promotions (iii) features a known brand. (Tnooz 2012)

While the Telemetric-XAd research focused on the US market, the survey sample was significant and the mixed collection method - survey and observation to inform actual behaviour is notable. The data suggest great potential for the provision and acceptance of local content and advertising for a destination, suggesting that DMOs or travel companies and application developers can use mobile apps to promote a sustainable tourism agenda.

Nine in-trip applications were initially identified by the researcher based on their

potential to support sustainable tourism: location based services (LBS), carbon calculator (CC), virtual reality (VR) technologies, augmented reality (AR), recommender systems (RS), intelligent transportation systems (ITS), wireless technologies (WT), social media and destination management systems (DMS). LBS, DMS, ITS, RS and WT, from the experts' perspectives had the greatest potential to enable in-trip tourists to support sustainable tourism. However, additional emerging tools and applications were also identified. Based on the aims of sustainable tourism as espoused by UNEP and UNWTO (2005) (Refer to Table 2.1) and the consumer focus of this study, the more noteworthy tools/applications additionally identified by the experts were tablets, ambient intelligence, context aware applications and geocaching/game based-applications. While the tablets themselves are becoming smaller (e.g the iPad mini was launched in 2012), mobile phones still offer greater portability with smart phones enabling tourists to take advantage of numerous travel and other applications including gaming applications, location and/or context aware applications. Lamfus et al. (2013) suggest that context is the foundation of the new tourism experience through location-based media. They note that the new tourism experience is constructed through Internet- enabled mobile devices which have the power to change the context in which tourists interact with the physical, social and business environments (Lamfus et al. 2013). The researcher believes that within the context of this new tourism experience, destination managers will have to determine if the promotion of a sustainable agenda whether overt or covert is a value added service that can be embedded in computer applications or more generally on travel websites.

The survey achieved its primary objective by identifying the current applications (e.g. LBS, DMS, ITS and WT) and emerging in-trip applications (e.g tablets, context aware application and gaming) that can be used to support sustainable tourism. Also, the survey served to inform the semi-structured interview protocol.

6.4 In-trip Tourists Interviews

Once the basket of likely applications that could be used by in-trip tourists to support sustainable tourism were identified, the next objective in the study was to determine in-trip tourists' perspectives on sustainable tourism in relation to technology. Addressing this issue meant that awareness levels about sustainable tourism in general had to be established first, and then to establish if in-trip tourists saw a linkage between sustainable tourism and technology. More specifically, this third objective sought to answer the research question: What are in-trip tourists' awareness levels and/or concern about sustainability issues?

6.4.1 Awareness Levels and Sustainability Concerns

Many in-trip tourists held environmental views about sustainable tourism and there was a notable consciousness about recycling. The value- action gap problem may not only be about the lack of action by consumers despite awareness but more broadly, in the case of tourism, a limited view of what sustainability means for a destination may be hindering greater public buy-in and action as it relates to sustainable tourism. The practicalities of implementing actions that support a destination's sustainability is still tethering on early ecological views of both sustainable development and sustainable tourism as described by Hunter (1997) and Hardy et al (2002). The researcher questions whether consumer adjustments are more likely to be made if there is some punitive consequence, that is, paying for not making the adjustment in everyday practices. A simple example of this would be consumers paying for a bag if they didn't bring along their own while shopping. The moral persuasion of ethical consumption as suggested by Yeoman et al. (2006) and the success of fair trade products has only penetrated a small proportion of the population. Based on the interviews conducted by this researcher many of the interviewees can be described as what Defra (2008) termed "waste watchers" and "side-line supporters" (refer to Table 2.2) of sustainability. On the positive side concerns about and the practice of recycling is an achievement, even if the other 2Rs – reduce and reuse – do not resonate equally in the minds of consumers. Environmental views or concerns for sustainability enable destinations to achieve several aims of sustainable tourism:

physical integrity, biological diversity, environmental purity and some level of visitor fulfilment. However, limited views and more importantly, limited practices threaten the very viability that destinations are thriving to achieve. Indeed, as Sharpley (2009) has noted, a long-term approach to sustainable development is hinged on a holistic approach. Only a few in-trip–tourists interviewed espoused holistic views and endeavoured to engage in practices that reflected their level of consciousness (e.g. T125 and T114).

There were several interviewees who didn't think they had much of an impact or felt that sustainability was either a rural or developing country conception. While the latter views may benefit those specific types of areas or regions, this does not augur well for the future of urban, mature or mass tourism destinations. Clarke (1997) stressed that all forms of tourism should strive to be sustainable while Johnson and Tyrell (2005) argued that trade offs are implicit in the quest for sustainability. However, when one examines the twelve aims of sustainable tourism, tapping into three or four objectives is no trade off and suggests that more needs to be done to educate tourists and destination managers alike.

6.4.2 Perspectives on Sustainable Tourism in Relation to Technology

There were mixed views about how tourists saw the linkage between sustainable tourism and technology for several reasons including some apathetic views about technology in general and views about the functionalities of mobile phones by some tourists, particularly those who did not own smartphones. More on the views of these functionalities of mobile phones by in-trip tourists are discussed in the next section.

Mixed views about technology by the interviewees are quite consistent with the theory of technology paradoxes previously described in the literature review (Mick and Fournier 1998; Baron et al. 2006) where competing feelings- simultaneous positive and negative feelings exist. Such ambivalent feelings about technology are often accompanied by specific coping strategies and resulting emotional effects (Mick and Fournier 1998). Coping strategies can be demonstrated before purchase or

after purchase, referred to by Mick and Fournier (1998) as pre-acquisition and consumption strategies. In each case, such strategies could be avoidance or confrontative where for example a pre-acquisition avoidance strategy would be to delay purchase and consumption avoidance strategy would be to distance oneself. This is where an individual develops restrictive rules for the use of the new technological possession e.g. T111 suggested that if she got a smartphone it would be for practical reasons, dismissing the notion of using it for entertainment. T111 also remarked "...I don't see how an app can help the sustainability of anywhere." Naturally, it was more challenging to ascertain views on a linkage between sustainable tourism and technology if views on sustainable tourism were limited (despite the researcher explaining to the interviewees what the term meant). However, in cases where a linkage was seen the emphasis was on two main benefits- the provision of information in-situ to empower tourists in their decision making process (e.g. T102, T122, T124, T125) and on the environmental benefits- printing of less brochures, less paper and saving the trees (e.g. T103, T114, T126).

6.4.3 Up-take of ICT Tools/Applications by In-Trip Tourists

The fourth objective of this study was to determine the actual up-take of ICT tools/applications by in-trip tourists, in other words, what tools or applications were being utilised during tourists' vacation stay. All the interviewed tourists had mobile phones but only 53 per cent of those interviewed owned a smartphone, with a few tourists also bringing along tablets and/or laptops. Notably, for some of those tourists who did not have a smartphone, their travelling partner did and hence relied on this to assist with holiday-making activities. Weather advisory services, accessing maps and social media in various forms such as TripAdvisor, Yelp, Facebook, Facebook Places and WhatsApp were the most readily accessed by the study participants. A few had transportation (e.g. T109, T119, T123) applications but these were not specific to Edinburgh. Since Edinburgh is such a compact, central city destination, tourists have the option to walk to many sites and in this regard maps could be regarded as essential. Additionally, bus-trackers at most city stops in Edinburgh makes it convenient for tourists to know how soon the next bus would be available

and this may partially explain why transportation apps were less important for smartphone users.

Only one interviewee, T113 had downloaded a “Welcome to Scotland” application onto his iPhone. He indicated that he had learnt about the application from a tourist brochure. Another interviewee, T123, who was visiting during the month of August had downloaded the Fringe App and had made ticket purchases through it. Interviewees also indicated that they did general searches on return to their hotel rooms at night e.g. T102 and T114.

Internet accessibility issues emerged as a key theme hindering the use of mobile phones during the day with some expressing their frustration with not being able to access various social media e.g. FaceBook Places for checking-in (e.g. T114) and maintaining contact with friends and family via WhatsApp. Others referred to the cost, so, if a free Wi-fi service was not available they just didn’t use their mobile phones (e.g. T099, T112, T124), with some resorting to a visit to Starbucks to access their free Wi-fi services (e.g. T109, T114). These challenges with internet access, which also existed at some accommodation facilities, represent missed opportunities for local businesses in the destination and a diminished level of customer satisfaction. This means the important sustainable tourism aim of “visitor fulfilment” is threatened and can be progressively undermined in a world where consumers want to be constantly engaged with businesses, fellow consumers and members of their social network. Eriksson and Strandvik (2009) suggested that there are six factors that influence consumers’ intended or actual use of mobile tourism services- mobile value elements, service value, ease of use, risk, social influence and tourist characteristics. These factors are discussed, in relation to the findings of this research, in the next section.

6.4.3.1 Mobile Value Elements and Enjoyment

For in-trip tourists who are on the move, that is, those engaged in their holiday-making activities, mobile value elements would include time critical arrangements, spontaneous needs, entertainment needs, efficiency ambitions and mobile situations (Ankar and D' Incau 2002; Eriksson and Strandvik 2009). An example of a time critical arrangement would be if an individual is coming near to the end of their day out, she/he could check the closing time of an attraction (e.g. T103 indicated that this was one of the uses of his smartphone while in Edinburgh). A spontaneous need and an example of a mobile situation would be getting localized information using LBS (e.g. Yelp used by T102) to see what restaurants, other attractions or events are on in the area, while getting a route map would be an efficiency ambition. Another example of a mobile value element is using one's GPS to engage in geo-caching (e.g. T106) which would be an entertainment need and incorporate the fun of use or enjoyment element influencing technological use. T106 also linked the utility of a mobile device to his ability to accomplish things while travelling and as such demonstrates an efficiency function for filling "dead spots" during travel. In-trip interviewees T119 and T110 mentioned that they were using their tablet for entertainment- watching films and playing a game, respectively. These three references (T106, T110, T119) reflect the more manifest examples of enjoyment derived from the use of technology however, at the latent level the use of social media for checking-in and posting of holiday pictures (via Facebook or WhatsApp) also represent the fun of use element. Tussyadiah (2012) suggest with location-based services, social media incorporates social gaming as Facebook Places and Foursquare allows people to collect badges to become "Mayors" at establishments that they have most frequently patronized. T119 for example, boasted that he was the Mayor of a couple of places. Baron et al. (2006) and Rasinger (2007) have purported that within the consumer TAM, fun of use/perceived enjoyment influences behavioural intention and ultimately use. Abad et al. (2010 p. 251) have argued that, "Hedonic information systems aim to provide self-fulfilling rather than instrumental value to the user, are strongly connected to home and leisure activities, focus on the enjoyment aspect of information systems use, and encourage long-term rather than productive use."

Mobile value elements (Ankar and D' Incau 2002; Eriksson and Strandvik 2009) are akin to Chien-Hung and Mort's (2007) perceived value which they purported was among the three influencing factors for technology adoption in the consumer domain. The other two elements of influence that Chien-Hung and Mort (2007) referred to were technology readiness and perceived risk. Technology readiness has been interpreted by this researcher as synonymous with personal innovativeness in general and this is discussed later in the chapter. More recently, Wang and Xiang (2012) have made reference to several studies and have confirmed the ability of mobile technologies "to satisfy users' entertainment and spontaneous needs, help fulfil one's efficiency desires, and assist in making time-critical arrangements" (p. 309).

Pura (2005) suggested that measuring customer perceived value is an important dimension in evaluating current mobile services and projecting for future ones. She argues for a value-oriented approach to segmentation because of the diverse motives for technological use among customer segments (Pura 2005). Perceived value is addressed in the next section.

6.4.3.2 PEOU, PU and Risk

How mobile service elements are valued and the resulting perception of usefulness will be contextual. PEOU and PU were key factors that the in-trip tourists said influenced their acquisition or use of technology. This is consistent with the literature on technology acceptance models (e.g. Davis 1989; Venkatesh and Davis 2000; Venkatesh et al. 2003; Baron et al. 2006; Chuttur 2009), where PU and PEOU are two key variables influencing use behaviour. Within the consumer TAM (C-TAM), PEOU influences PU. Eriksson and Strandvik (2009) in examining the factors that could influence actual usage of mobile services focused on ease of use but didn't address PU. The researcher sees this as a deficiency in Eriksson's and Strandvik's analysis of factors affecting the actual use of technology in the tourism domain. PU is seen as a central factor affecting use behaviour. When it came to PU, interviewees made reference to technological tools or applications making "life easier" while others spoke about "need" (e.g. T106, T107, T115). As a factor of influence PEOU was referred to by several interviewees (e.g. T099, T114, T118, T119, T121, T124,

T127, T128) with some linking ease of use to usefulness, relative to a specific travel/holiday context, for example, travel guides, maps and the ability to make a booking on their smartphone.

Additionally, context influenced PU and PEOU since an assessment of the need for technological tools and applications were based on the interviewees' need to maintain social connections while travelling; and the need for specific types of applications for work versus leisure pursuits. Abad et al. (2010) argue that before the advent of 3G systems, people used mobile devices to create bonds and strengthen social networks. Foxhall et al. (1998) also note that the need for social affiliations is one of the characteristics that distinguish innovators from late adopters. If an application or specific tools were already used for work, then use while on holiday appeared to be more likely. For example, T119 and T125 used social media for work and had become used to always being socially engaged, albeit through different types of social media when on holiday.

PU comes from an assessment of perceived value. As the descriptions of the dimensions of perceived value demonstrate, each of these elements like PU (and PEOU) are also contextual. Pura (2005) highlighted six dimensions of perceived value:

- (1) Monetary value- comparable monetary benefit of one alternative over the other and the value derived from task fulfilment.
- (2) Convenience value- the effective achievement of a task with ease and speed.
- (3) Social value- derived from the benefit of social approval and the enhancement of self-image among individuals.
- (4) Emotional value- feelings or affective states derived from a product or service. Also related to enjoyment or fun derived from use.
- (5) Conditional value- is derived from any situation related to interaction between people, application and their surrounding environment. (Tourism and the in-trip experience is a perfect example of the conditional value of mobile/wireless technologies).

(6) Epistemic value- is derived from the experienced curiosity, novelty or gained knowledge.

The perceived value of in-trip technologies and how sustainable tourism practices can be linked can be derived from offering incentives that appeal to consumers' epistemic value- the curiosity or novelty gained from trial. This research and prior research has already demonstrated how the social value of technological applications influence use behaviour. Therefore, deepening the knowledge about in-trip tourists' perceived value can serve to inform strategies about the most appropriate promotional mix that can be used. This will not only encourage greater use of in-trip applications but also help in the incorporation of ideas about sustainable tourism that ultimately translate to action.

A number of in-trip interviewees raised the element of costs as a reason why they were not using their mobile phone and indicated they accessed the Internet for example, only when a free Wi-fi service was available. In a few cases cost was also raised as a barrier or consideration for acquiring new technology. While financial risks was the main risk that dominated, performance risk could well be linked to financial risks as the majority of smartphone users interviewed accessed free apps and were only willing to purchase apps at nominal costs. Privacy risk was as an issue raised by some for not using Facebook (e.g. T105, T106, T111) but wasn't a prevailing factor for the lack of technological adoption by interviewees. If consumers are uncertain how an application will perform, then there is some perceived risk associated with it, however, customer reviews can help minimize any perceived levels of risks.

6.4.3.3 Social Connections, Social Influence and Social Media

The need to maintain social connections was exhibited by standard mobile phone users and smartphone users alike. T120 and T125, who were not smartphone users, spoke of their desire to upgrade soon because of the need to maintain connections with family while abroad. T114 and T119 spoke of how important it was for them to

be able to share information with friends. T112 spoke of how influential her friends were in the acquisition of her smartphone. T112 referred to her late start (late adopter) but has now fully embraced the benefits of her more “modern” mobile phone and remarked, “....I think I am an addict now.” T112 also spoke how much she relied on her friends, through social media, for giving her tips while in Edinburgh.

As T109, insinuated, social media provides an outlet for “bragging” - “No, I'm not big on Facebook I think it's a big ego trip, I'm not doing this to impress people...” Impressing the members of ones referent group can be done during all phases of the vacation experience but more significantly during the in-trip and post-trip phases. Apart from the more basic communication function that mobile services provide, the use of social media while in-trip provides customer value as it appeals to individuals need for status and social esteem (Holbrook 2006). Citing the work of Schau and Gill (2003), Baron et al. (2006) note that the use of technology is not only influenced by subjective norms but also by user's need for a relationship with other social groups. As described in the literature review, status is one of the typical tourism motivators (Middleton et al. 2009) but there are externalities that affect behaviour such as media and the views of friends and relatives. The importance individuals attached to connecting while on holiday was reflected in the use and type of social media used by in-trip leisure tourists. Depending on who the members are in one's travel party could also influence the need to maintain specific types of contacts. Younger interviewees (25- 34 age group) tended to demonstrate a greater need to maintain their social connections via social media (e.g. Facebook and WhatsApp) while in-trip. Interviewees T123 and T125 used social media to not only maintain social connections but to also create new ones- to meet new people via Scout and Couchsurfing respectively. Interviewees who, from their statements, appeared to have lower status needs had more negative sentiments about social media, Facebook in particular: “No, I am not so enthusiastic I don't want to tell the world or to look at what everyone else in the world is saying about Edinburgh”(T105); “No. I am completely against Facebook...” (T106); “No, I don't like it all I don't like the world knowing anything about me” (T111). Swarbrooke and Horner (2007) noted that the

determinants of tourist behaviour vary according to each individual's personality and lifestyle and as such, status needs and sentiments about the use of different types of social media will vary.

At the experiential level however, the use of social media (and other technological applications) are value creating experiences (Baron and Harris 2010; Neuhofer et al 2012). According to Baron and Harris (2010 p. 520), the benefits derived from C2C interactions are deeper than the C2B relationship and as such social media provides an opportunity for “social interaction, to express concern for others, and to enhance self-worth”. Technology is indeed an experience enabler and as Neuhofer et al. (2012 p. 40) suggest “Web 2.0 can be considered one of the most relevant technological developments in relation to co-creation” with the prosumer also serving in the role of marketer for companies and destinations. The in-trip destination experience is enriched by the tourist's ability to virtually engage with other consumers (e.g. TripAdvisor), friends and relatives (e.g. via Facebook) and tourism suppliers (via location based services such as Yelp). The unavailability of Wi-fi hot spots and general internet accessibility challenges diminishes the opportunities for co-creation and as such a lost value-creating opportunity for the destination.

Couchsurfing as a form of social media represents a unique type of co-creation between the visitor and locals. Binkhorst and Dekker (2009) referred to the reciprocal benefit to the visitor and the visited within the tourism experience network and its potential contribution to the authenticity of the destination experience. Indeed, couch surfers T122 and T125 spoke of their desire to meet locals and experience something more authentic.

6.4.3.4 Personal Innovativeness

Earlier it was noted that some interviewees' PU of a technological tool/application was influenced by the individual's affiliative drive, that is, the ability to maintain or create social connections with others or the tool/application's utility or functionality relative to their context- work versus leisure. Personal innovativeness has been defined as an individual's willingness to embrace new technology (Agarwal and

Prasad 1998) and gave further insight into how PU and PEOU of ICT tools/applications were assessed by interviewees. In-trip tourists' attitudes about technology and their level of personal innovativeness were discerned from their statements about their level of technological expertise, how quickly they acquired new technology, how they utilised technology while in-trip and any other general comments about technology. Parasuraman (2000) described innovativeness as one dimension of technology readiness and a motivating factor for use.

Interviewees who were categorized as having a high level of personal innovativeness currently work or previously worked in the area of information technology. Low-levels of personal innovativeness suggest some level of resistance. The arguments regarding resistance or what may cause consumers to be unwilling to embrace an innovation or a new tool/application have been framed around three main view points. Firstly, Ram and Sheth (1989) suggest functional and psychological barriers. Functional barriers relate to usage, value and risk and while psychological factors are linked to an individual's personality, where resistance to change is associated with a desire to cling to tradition. Secondly, Schiffman et al. (2001) focused on cultural, situational and social factors as explanations for resistance. Thirdly, Swilley (2010) focused on personality- more in line with Ram and Sheth's (1989) psychological barrier.

This researcher argues that resistance or an unwillingness to embrace new technology is shaped by psychological, functional, social, cultural and situational factors. While it is difficult to make any psychological assessment of the in-trip tourist interviewees, it was more possible to make an assessment of some other factors. PU is directly related to the functional aspect of technological use and several interviewees weighed importance relative to the specific applications utility for work as opposed to leisure (situational factor). Some in-trip tourist interviewees saw the benefit of applications for both work and leisure. Others interviewed tended to view benefits separately. T119, for example, was assessed to have a high level of personal innovativeness, was a smartphone and iPad user while in-trip and used various forms of social media- at work and while on holiday. However, T125 who

was assessed to have a medium level of personal innovativeness used technology while in-trip but did not own a smartphone, was not keen on Facebook but used other forms of social media -Twitter for work and Couchsurfing for leisure. T125 also expressed his desire to get a smartphone as a result of the increasing difficulty in finding Internet cafes while on holiday. T106 was also assessed to have a medium level of personal innovativeness but had a smartphone (BlackBerry) that was provided to him by his employer. T106's smartphone was switched off while on holiday but he had brought along a standalone GPS to engage in geo-caching and used a paper-based guidebook to assist with his in-trip planning. T106 expressed his dislike for social media, especially Facebook and indicated that the usefulness of any new application was related more to the ability of that application to help him do his job better. T116, for example, was assessed to have a low level of personal innovativeness, didn't own a smartphone, initially suggesting that cost was the main factor. This would represent a social (or socio-economic) factor perhaps not so much resistance, but perhaps a slower adoption rate. T116 also suggested that he didn't need a smartphone because he didn't use his phone much and a standard mobile phone was adequate for making calls and texting. Later, he admitted that if he had a smartphone with applications he would use it, but felt a paper based-map could work just as well. For T116 the efficiency/inefficiency technology paradox was at play, where technology could be seen as facilitating less effort or time spent on some activities, and technology can lead to more time being spent on other activities (Mick and Fournier 1998).

Therefore some interviewees did not demonstrate a general resistance to technology but were less enthusiastic for some types of applications; additionally some interviewees simultaneously expressed both positive and negative views of technology (technology paradoxes). Dealing with the technology paradoxes in these instances could be either confrontative or avoidance. T116 demonstrated a coping strategy of avoidance while T120 also deemed to have a low level of personal innovativeness, expressed a desire to upgrade and as such was employing a pre-acquisition confrontative strategy where he was "taking stock of his needs" with a view to purchasing in the future.

6.4.3.5 Other Tourist Traits

Looking beyond the technology itself, there are some other specific tourist traits that influence the actual up-take of technology while in-trip. Experience has been put forward as a mediating variable both in the UTAUT (Venkatesh et al. 2003) and the C-TAM (Baron et al. 2006). Experience in these models relates more to technological experience. However, within the tourism context, Eriksson and Strandvik (2009) have proposed that destination experience (inexperienced versus experience) and travel experience are possible determinants of actual usage of mobile services. At a very intuitive level it can be seen that if a tourist had visited the destination before the information they are likely to access and the need for specific type of applications would differ from those of the first time visitor. For example, T126 is Scottish born but a Canadian citizen, who travelled annually to the UK for holiday and was therefore quite acquainted with the attractions in Edinburgh. T126 subscribed to newsletters of museums, had membership in the National Trust and knew pre-trip, what things she's likely to do. Several of the interviews had been to Edinburgh before and as such some wanted to do things they hadn't done before and others hadn't been for many years and wanted to revisit, as well as, experience new things. For example T103 had visited the city before while T118 was a first time visitor but the main reason for both their visit was to see the pandas at Edinburgh Zoo. T103 used his smartphone to check opening and closing times and Google maps for directions, whereas T118 drove from England and used their SatNav to find their way around, including their hotel which was next to the Zoo. The level of pre-trip planning whether first time visitor to the destination or an in-experienced traveller in general, would influence in-trip technological use but more extensive search about the destination is likely to take place pre-trip for the first time visitor of a destination.

Amongst those interviewed, the effect of gender was most discernible from the interpretation of interviewees willingness to embrace or try out new technology (personal innovativeness) not just strictly based on smartphone ownership/usage. Gender has been recognised in the literature (e.g. Venkatesh et al. 2003) as moderating variable however, what has been established is that there are no intrinsic

male or female characteristics that make males more likely to use technology than females. Males' interest or affinity to technology has occurred as a result of the socialisation process and inherited societal gender roles. Such roles while enduring can change over time (Venkatesh et al. 2003). Gender shouldn't be examined in isolation as a determinant of usage, but it should be looked at simultaneously with age, as this study revealed similarities and differences among the genders vary across age groups. Age was another moderating variable identified in the UTAUT (Venkatesh et al. 2003) and subsumed under consumer traits under the C-TAM. There were specific patterns of responses from the qualitative data that suggested that age influenced personal innovativeness and as such attitudes to technology, social media, in particular. Younger persons, that is, those in the 25-34 age group made greater use of social media for communicating with family and friends (e.g. WhatsApp and Facebook) and for in-trip destination advice (e.g. Welcome to Scotland App, Fringe App, TripAdvisor, Facebook). The use of maps and GPS functions tended to be used across the board by smartphone users, irrespective of age.

6.4.4 Adopted In-trip Technologies and Sustainable Tourism

The fifth objective of this study was to explore the extent to which in-trip adopted technologies support sustainable tourism. Most of the technologies that were actually being used by in-trip leisure tourists were not particularly different to those that had been previously identified in the literature review for their potential contribution to the aims of sustainable tourism (see Table 2.5). The technologies used by the in-trip tourists fell within the broad categories of location-based services, wireless technologies and social media. However, the Fringe App was very specific to Edinburgh for a major annual cultural event that emerged as unique. Focusing on the specific ICT applications used by in-trip tourists, Table 6.1 highlights how those applications used by the in-trip tourists potentially contribute to sustainable tourism.

Table 6.1 Use of Specific In-Trip Applications by In-trip Tourists & Potential Contribution to Sustainable Tourism

In-Trip ICT Application	Potential Contribution App Makes to Sustainable Tourism Aims	Examples
TripAdvisor	Economic viability, local prosperity, community well-being, cultural richness, visitor fulfilment	TripAdvisor provides local content and consumer reviews of local sights and attractions. At the same time it provides an opportunity for businesses to build on positive e-WOM and improve on services based on negative comments.
Couchsurfing	Local prosperity, cultural richness, community well-being, visitor fulfilment	Couchsurfing provides a unique opportunity for cultural exchange between locals in the host destination and tourists- a virtual relationship becomes real upon visitation. Couchsurfing allows the visitor to experience the authentic aspect of a destination in a very personalized manner.

Yelp	Economic viability, local prosperity, community well-being, visitor fulfilment	Yelp caters to the spontaneous needs of the tourist based on their location and provides the destination with an opportunity to promote local businesses and offer special promotions to boost patronage.
Facebook/Facebook Places	Economic viability, local prosperity, cultural richness, visitor fulfilment	Facebook Places can provide status and an element of fun for the visitor. e-WOM boost local business through loyalty programmes such as “Mayorships”.
Maps/GPS	Visitor fulfilment, cultural richness	GPS used for geo-caching provides gaming opportunities and collaboration with other tourists. This provides an element of fun or enjoyment and can also be educational.
Weather	Visitor fulfilment	Knowledge of the weather forecast can help tourist to plan their days and avoid disappointment when visiting outdoor sites and attractions.
Guides	Visitor fulfilment, cultural	Electronic guides provide

	richness, physical, integrity, biological diversity, resource efficiency	interpretation of sites and attractions and provide opportunities for education, entertainment and conservation.
Fringe App	Cultural richness, economic viability, local prosperity, community well-being	Fringe App allows the destination to maximize a major cultural event through a dedicated promotion channel and allows the visitor to fulfil efficiency ambitions (e.g. ticket purchasing), spontaneous needs and to be always in the know while mobile.

As noted by some of the in-trip interviewees, having more applications available as opposed to paper-base guides would reduce paper waste and make more information available to tourists while they were mobile. Notably, there was a huge amount of paper waste generated during the Edinburgh Fringe Festival and even though there were personnel picking up the paper, there were large amounts of paper littering the streets. Arguably, the paper can be recycled but the idea should be to reduce first, reuse and then recycle. Huge amounts of litter strewn across the street takes away from the visitor's experience. Though, this research demonstrated smartphone ownership is not as widespread as anticipated, visitors should be encouraged to go on-line even if it is at digital kiosks provided by local tourism stakeholders to cut down on this wastage by the individual entities.

6.4.5 Available Technologies Versus Actual Usage

The sixth objective was to determine the gaps between available and actual use of ICT tools/applications by in-trip tourists. Notably, this is where the results of the quantitative and qualitative phases are integrated and discussed. Triangulating data from different data source enhances the validity of research (Creswell 2009).

Recalling the results of the web-based survey conducted with the eTourism experts, maps & driving directions were ranked by the experts as the main use of technology for in-trip tourists, followed by information on events/attractions, information on restaurant/bars, weather advisory, general information, social media and email. The in-trip tourists were not asked to rank these items as the research was more interested in their specific use, if any, of ICT applications or tools. As a result of the qualitative nature of Phase 2 of the research, interviewees were not given any forced choice and as such, social desirability biases were reduced. Nonetheless, maps were a popular application used by in-trip leisure tourists with smartphones. The use of this application by the in-trip leisure tourists was therefore consistent with the eTourism experts' ranking of the main use of technology by in-trip tourists. However, the use of social media, which was ranked quite low (6th out of 7) by the eTourism experts, was cited more frequently by in-trip tourists as an activity and a way in which they used technology. Social media was used by the in-trip leisure tourists primarily for the maintenance of social connections but was also used to create new social connections (via Couchsurfing), post updates and get advice from friends or family (e.g. WhatsApp, Facebook) or advice from other tourists (e.g. TripAdvisor).

When it came to the assessment of the relative importance of selected attributes that determine the use of technology by in-trip tourists there was consistency with the extant literature amongst both study groups. The eTourism experts' and in-trip tourists' saw PEOU and PU as key factors influencing actual usage. However, as the qualitative research evolved the notion of personal innovativeness emerged as defining tourist trait that served to explain possible reasons for slow adoption rates. ETourism experts were asked to rate skill among the attributes influencing use of

technology by in-trip tourists. While skill is not the same as personal innovativeness it does have an impact on one's willing to embrace technology and may even determine outright rejection or resistance to technology. The technology paradoxes (Mick and Fournier 1998) provide some insight in this regard. The competence/incompetence dichotomy demonstrates how technology can simultaneously create feelings of intelligence or competence and also lead to feelings of ineptitude- this feeling could be interpreted as an assessment of one's own skill relative to others. Social influence has also been well established in the literature (e.g. Fishbein and Azjen 1975; Azjen and Fishbein 1980; Davis 1989, Venkatesh et al. 2003; Baron et al. 2006) as influencing intention to use and/or actual use of technology with social affiliation as a general characteristic defining innovators from late adopters (Fox et al. 1998). This researcher suggests that personal innovativeness and social influence work together to influence actual usage. Rogers (1986 p. 118) has noted, " Most individuals evaluate an innovation that they are considering adopting, not on the basis of scientific research of experts, but through the subjective evaluations of near-peers who have previously adopted the innovation". Several interviewees made reference to friends, in particular, influencing their need to keep up-to-date not only in the use of certain types of social media applications (e.g. T119) but also in terms of upgrading from a standard mobile phone to a smartphone (e.g. T112). Conversely, there were some interviewees who rejected the influence of near-peers on their technological use- rejecting the notion of "keeping up with the Jones" (e.g. T107) or using an application because of its popularity (e.g. T106).

There was a mixed assessment on the part of the eTourism experts and the in-trip leisure tourists about the role that technology could play in supporting sustainable development. About half of the eTourism experts felt that technology could "very much" play a role, while 42 % felt "somewhat" with the remainder undecided (6%) or felt "not really." (3%). Some of the in-trip tourists immediately saw the environmental benefit with a reduction in paper waste, while a few tourists were unsure how sustainable tourism and technology were linked.

There was a disconnect between those technologies actually used by the in-trip leisure tourists and those identified by the eTourism experts with the greatest potential to support sustainable tourism at a destination. The analysis of this difference must be tempered by the fact that a number of the in-trip leisure tourists expressed challenges with accessing Wi-Fi services which may have reduced the use of certain types of applications that could have assisted tourists while they were engaged in their holiday making activities. Also, in-trip tourists' use of different types of applications is generally not with sustainability in mind. However, strategies can be developed to enhance destination sustainability based on the knowledge about the specific types of tools/application used by in-trip tourists and those tools/applications with the greatest potential to advance the aims of sustainable tourism. Apart from social media used to maintain social connections with family and friends, maps proved to be among the more common type of LBS, but there was also the use of Yelp and Facebook Places. Since the output of the LBS can overlap with recommender systems, the former concentrating more on location and the latter on personal interests, it was not clear to what extent the interviewed tourists made use of such personalised tourism applications. Knowledge about the actual usage of tools and applications by in-trip tourists serve to highlight opportunities for local tourism authorities to advance their specific agendas, including enhancing the sustainability of a destination. In this regard, and given the significant use of social media by the interviewees, social media can also be used by the destination to extract valuable information about tourists (Tussyadiah and Zach 2013) and as such tailor marketing messages.

In terms of the emerging applications that were identified by the eTourism experts as possibly changing the way tourist experience a destination in the future, reference to tablets, geo-caching and QR-Codes were noted. Tablets used by interviewees in this study were more related to the mobile value element of entertainment needs (Anckar and D'Incau 2002; Eriksson and Strandvik 2009), as they expressed the use of their tablets to watch films and play games. T106 spoke of his intention to engage in geo-caching and T105 spoke of the utility of QR codes. The use of these tools and

applications contribute to the perceived enjoyment of the use of technology, an influencing factor in use behaviour.

When it came to the role of the application developers in promoting sustainable tourism in their product design, 50% of the eTourism experts were not in favour while 24% said yes and 26% were unsure if it should be incorporated. The in-trip leisure tourists had very mixed opinions when it came to the role of application developers. Some of the interviewees suggested the need for a demand driven approach, while others saw it as a necessary re-investment from the areas that profit from the business of tourism. Some in-trip tourists felt that the importance for each destination should come from the integrated technological knowledge of developers and managers knowledgeable about local content. Overall, the views on both sides were quite mixed and certainly points to the need for great internalisation of the role that technology can play in sustainable development and by extension sustainable tourism development. The Brundtland Report (WCED 1987) was progressive in identifying the importance of reorienting, developing and diffusing new technologies in enhancing the resource base and promoting sustainable development. The role of technology in sustainable development, as identified in the Brundtland Report (WCED 1987), has been progressively downplayed by scholars in the sustainable tourism domain. This apparent oversight however, gives credence to this study and the knowledge gaps in the literature that it seeks to narrow. However, with the prominence of climate change issues in the sustainable development discourse, Scott (2011) has noted that any success in bringing about emission reductions, for example, will also have to come from technological changes. This could come about in a number of creative ways, not only from transport but also from in-trip consumption practices by tourists through virtual reality technologies, augmented reality, location based-services and the like.

6.5 Implications for Theory

The seventh objective of this study was to explore how models on technology adoption behaviour can be applied to the consumer domain for understanding the actual use of technology.

Much of the foundational theories such as the TRA (Ajzen and Fishbien 1980) and the TPB (Ajzen 1991) that came before the TAM (Davis 1989) and the UTAUT (Venkatesh et al. 2003) were based on behavioural intention as predictor of usage behaviour, primarily in the organizational context. As several researchers have argued intention can remain the same but behaviour can change due to the context of opportunity (Sarver 1983); unforeseen circumstances (Ajzen and Fishbein 1980); and the proximal contextual factors such as available alternatives (Huffman et al. 2003). Therefore while useful, intention is not always an accurate predictor of future use. Moreover, this research was particularly interested in actual usage and not usage intention. Examining use behaviour in a voluntary context, where the consumer, in this case the tourist, can exercise total volitional control (Engel et al. 1995), must also take into account the cultural and social aspects of technology acceptance (Bagozzi 2007).

While the UTAUT has been able to explain 70% of the variance of usage intention in the consumer domain, several scholars (e.g. Bagozzi 2007, Chuttur 2009) have suggested that TAM-like models have become saturated and Baron et al. (2006) have argued for more qualitative approaches to explain the remaining level of variance and the need to incorporate social contexts, hedonic factors and monetary considerations (Chtourou and Souiden 2010; Bouwman et al. 2011; Fuchs et al. 2012). Baron's et al. (2006) proposed consumer TAM brought the consumer into focus however, the emphasis still remained on behavioural intention as a predictor of use behaviour (refer to Figure 2.4). Baron et al. (2006) while criticizing perceived behavioural control (PBC) as more of organizational conception still included it in his proposed consumer TAM. So, while this thesis has heeded some scholars call for more qualitative research, this researcher takes issue with Baron's et al. (2006) use of PBC in the consumer TAM. PBC is deemed to be a concept relevant to the

organizational context. Perceived behavioural control deals with the level of control the individual believes he or she exercises over the technology. This thesis argues that in the consumer context where use is voluntary this control is not a significant factor and the individual's experience and other personal traits (e.g. age, education) are more likely to influence PEOU and ultimately use behaviour. Eriksson and Strandvik's (2009), who built on the work of Anckar and D' Incau's (2002) mobile value elements, did not propose a specific model but proffered a number of constructs that were possible determinants of the actual use of mobile tourism services. Eriksson and Strandvik's (2009) work was very specific to technology adoption in the tourism domain and incorporates the TAM and UTAUT model. Note however, the author of this thesis has previously criticised Eriksson and Strandvik (2009) for excluding PU. The author also holds the view that the mobile value elements are central to understanding actual in-trip usage in the tourism domain. Considering the research from the aforementioned scholars and the insight garnered from this study, a Model of Factors Influencing In-Trip Technology Use by Leisure Tourists is proposed in Figure 6.1.

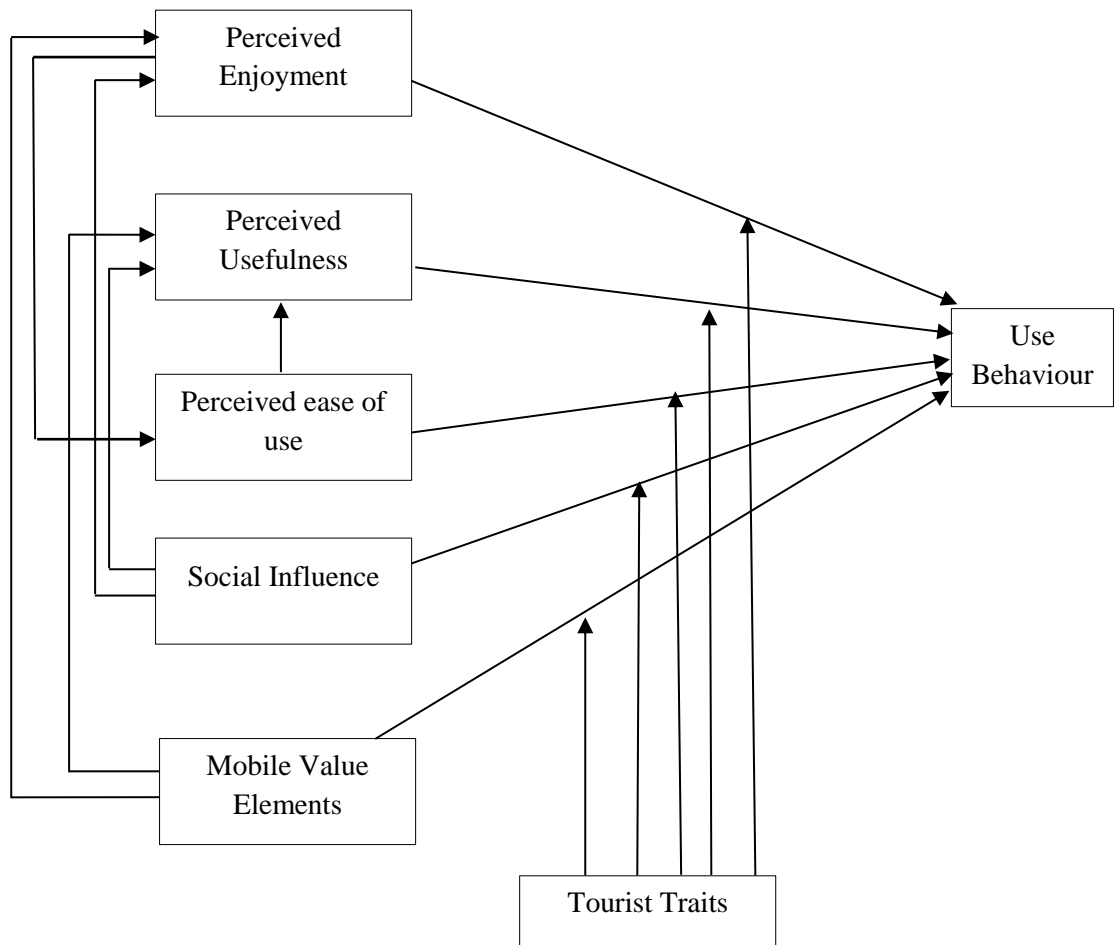


Figure 6.1 Model of Factors Influencing In-Trip Technology Use by Leisure Tourists

When compared to Baron's et al. (2006) C-TAM, Figure 6.1 replaces perceived behavioural control (PBC) with mobile value elements. Earlier the researcher critiqued the inclusion of PBC in a proposed consumer model and described mobile value elements as central to perceived ease of use, perceived usefulness which ultimately influence use behaviour. Additionally, as described in the literature review, mobile value elements with their implicit ability to fulfil the entertainment and spontaneous needs contribute to perceived enjoyment or fun of use. It is also argued that perceived enjoyment influence perceived ease of use. Abad et al. (2010) suggest that there is an inherent leisure component in mobile devices, irrespective of the task being performed. The proposed model replaces the more generic consumer

traits with tourist traits which include demographics and experience but also include experience with mobile services, travel experience, destination experience, type of travel, personal innovativeness and user device readiness. Tourist traits influence each of the core constructs- mobile value elements, social influences, PEOU, PU and perceived enjoyment- which ultimately influence in-trip use behaviour. Given the exploratory nature of this research, and based on the proposed model in Figure 6.1, further work is needed to deepen the knowledge about in-trip technology usage by tourists. Understanding the complexities of tourist traits is a massive undertaking, given the varied motives for travel among market segments. Examining the characteristics that differentiate those with high personal innovativeness versus low personal innovativeness is needed as tourists' assessment of the value of specific ICT tools/applications is contextual.

6.6 Implications for Practice

While the study was conducted in the city of Edinburgh, the intent was for the findings to be transferrable to other urban tourism destinations. This was deemed possible given the qualitative nature of this study, the fact that the study was conducted among international and domestic tourists, and its focus on factors influencing use behaviour and how in-trip technologies could support sustainable tourism. As a result of some of the unique observations about Edinburgh made by the in-trip tourists', the implications for this market is discussed first, followed by the more transferrable implications of this study for other urban tourism destinations.

6.6.1 Implications/Recommendations for Edinburgh

Some of the more popular tourist attractions in Edinburgh are in a very compact area, within the city's centre, which makes walking a very cost-effective and sustainable way of access. Despite the popularity of Edinburgh Bus Tours, walking should be promoted as an option for able-body tourists who are interested in attractions that fall within close proximity to each other. Typical examples would be the Scottish National Gallery, the National Museum of Scotland, St. Giles Cathedral and

Edinburgh Castle with other attractions in between like the Princes Gardens, the Scott's Monument and Mary King's Close. Mobile applications can be very instrumental in this regard, through LBS and RS that provide route maps and green transportation alternatives. Cycling is an additional fun alternative and business opportunity for the city but may have to be restricted to less congested areas. Guide applications and its benefits must be promoted on popular Edinburgh and Scotland websites that are traditionally frequented pre-trip. At the time of writing, VisitScotland's consumer website did not promote its app on its front page but this is something that can be easily rectified. A parallel strategy would be to post such information on popular hotel and airline websites, at airports, train stations and at tourist information centres and at visitor sites and attractions. Edinburgh Zoo, for example, has a free app but this was not widely promoted at the site itself. This would have been particularly useful for some UK visitors who came specifically to visit the pandas at the Zoo. For these domestic/regional tourists, no roaming charges would have applied for Internet access. Wi-fi access must be something that the city must address given the expressed challenges by a number of tourists and the reluctance of most not to use their smartphone if there was no free Wi-fi access available.

The city of Edinburgh should seek to work with the Fringe Festival organisers to reduce the high volume of paper-based promotion leaflets and pamphlets distributed and subsequently thrown onto the city's street, presumably to be re-cycled later. The first defence should always be to reduce. Strategically placed information kiosk may serve to curb this wastage and at the same time enhance the perceived fun of use of technology. This may be useful since there are still a significant number of standard mobile phone users as opposed to smartphone users.

While tourists should be encouraged to make greater use of their smartphones, businesses must also be encouraged to design apps or mobile versions of their websites that are fully integrated with social media. Use can be incentivized through loyalty reward programmes which could serve as an impetus for standard mobile phone users to upgrade to smartphones.

6.6.2. Implications for Other Tourist Destinations

As the interviewees from this study revealed there is a great desire by in-trip tourists to keep in touch with their social networks while on holiday, and this has implications for the design of mobile technologies. As Lamsfus et al. (2013) suggest, today's mobile technologies have the capability to change tourists' behavioural patterns and thus arguably includes engaging tourists in activities that support a sustainable tourism agenda. Apart, from the emphasis on content and the user interface, mobile technologies must allow for on-going engagement between the consumer and his/her social networks.

Wang and Fesenmaier (2013 p. 67) in their study on the use of smartphones for travel note that smartphones enhances the travel experience and allows "the traveller to better experience the authenticity of a destination", which *inter alia* creates visitor fulfilment and adds to the cultural richness of the experience and at the same time contribute to local prosperity and the host community's well-being. Authenticity can also be enhanced by social media such as Couchsurfing to create new social connections between individuals in the host destination and potential tourists. As this study demonstrated despite the ubiquity of Facebook, there are some negative sentiments about its use and as such, destinations should seek to make use of the full range of social media platforms available. Tussyadiah and Zach (2013) suggest that organizations which have become skilled at social media will be better positioned to transform pertinent customer information into valuable organizational knowledge that can be used for innovation. This research focused on the in-trip phase and Neuhofer et al. (2012 p. 41) suggest, the on-site phase can be "considered as the most intriguing phase for DMOs with multiple levels of engagement that allow destinations to co-create experiences with the tourist in the physical and virtual setting at the same time." Destinations therefore will need to have an integrative approach in the use of ICTs to enhance tourists' co-creation experiences and generate added value, which can then be used as a source of competitive advantage (Neuhofer et al. 2012).

Some traditional strategies may have to be utilized in concert with new media strategies, depending on the main tourist generating regions a destination derives its visitation from, the related demographics of that population and the info-structure available in the host destination. Perceptions, usage and adoption of social media vary across national tourism markets (Gretzel and Yoo 2005; Cox et al. 2009). Apart from the Wi-Fi challenges demonstrated in this study, smartphone ownership was not pervasive and cost remains a challenge for overseas Internet access. Thus, the promotion of applications may still have to be done through posters or better yet through digital displays at high tourist traffic areas such as airports and train stations. However, this has to scaled based on the profile of the main visitors and the main sources of in-trip information.

The success gained and the experience of fair trade labelling and marketing in the retail sector must be similarly harnessed in the tourism industry in the promotion of sustainability and extending consumer awareness and practices beyond recycling or green consumption. An excerpt from the Ethical Consumer Markets 2012 report which analyses sales data for various sectors in the UK including food, household goods and eco-travel highlights:

Markets for ethical goods and services have remained resilient throughout the economic downturn as a progressive core of retailers and producers continue to factor sustainability into their products and services (e.g. Fairtrade ingredients) and to sell sustainable produce. That is the conclusion of this annual Ethical Consumer Markets Report 2012 which shows that since the onset of the recession five years ago the total value of ethical markets has gone from £35.5bn to £47.2bn. (The Co-operative Group 2012)

The experience and the successes in the retail sector in ethical consumption and responsible sourcing demonstrate that awareness can be translated into action. As suggested by Kotler and Roberto (1989), a successful societal marketing strategy *inter alia* includes the communication channel and the change strategy. ICTs and the multiple channels that new media offers could be very instrumental in at least, firstly

influencing attitudes. There were a number of interviewees in this study who did not see sustainability as an issue for developing countries or for city/urban destinations. Therefore, more work needs to be done to highlight how social, economic, cultural and environmental issues are interconnected and important for every destination.

Destinations need to also reconcile the desire to be more sustainable with their thrust to grow visitor numbers from distant tourism markets (e.g. BRIC countries), which is only likely to generate increased carbon emissions from air travel. Similarly, DMOs will need to balance value and volume. Any significant gains made at the destination level to enhance sustainability can only come about through more responsible behaviours by all tourism stakeholders and creatively getting tourist do their part while in the destination. Technology and the co-creative opportunities it presents makes this even more possible than before as many seek to be engaged before, during and post-travel. DMOs have the opportunity to respond in real-time and use technology to manage the visitor's experience. Activities designed to promote sustainability in the destination can be incentivized to build loyalty and encourage positive e-WOM and simultaneously gather marketing intelligence for the customization of strategies for the future.

6.7 Conclusion

This chapter served to analyse and discuss the main findings of this research, relative to the aim and objectives of the study. The thematic analysis demonstrated that social connectedness inspired the use of in-trip ICT with social media being the primary platform. Environmental views dominated the conception of sustainable tourism with some in-trip interviewees having a non-urban and/or developing country application of the principles of sustainable tourism. Mobile value elements were postulated as influencing PU and perceived enjoyment while tourist traits *inter alia* were postulated as influencing PU and PEOU. Personal innovativeness emerged as a key tourist trait that impacted views about technology particularly as it related to upgrades and the use of certain types of applications. Wi-fi and roaming costs also accounted for the lack of use of mobile devices in general, not only smartphones.

These issues are significant for industry practice since almost half of the interviewees in this study did not own smartphones and this therefore limits the co-creative process and opportunities for in-trip leisure tourists and businesses alike. Destinations will not be able to use a one size fits all and therefore while ICTs have been advocated as important for on-going engagement, marketing intelligence and the societal marketing of sustainable tourism, some other traditional strategies may still have to be employed. These strategies should be based on the destination's infrastructure, tourists' source markets, tourists' profiles and sources of in-trip information.

Chapter 7

Conclusion

7.1 Introduction

The aim of this research was to examine the factors influencing in-trip tourists' adoption of ICT tools/applications which support sustainable tourism in the city of Edinburgh. The first chapter provided the background of the study, highlighting the rationale for the study, research gaps and the research's significance. Chapter two provided a comprehensive and critical review of the literature in the research domains that were deemed relevant to the research. The methodology and the methods used for this study; and the strengths and limitations of the adopted mixed methods approach were detailed in Chapter 3. Having adopted a sequential less dominant-more dominant qualitative mixed methods design, the findings of each phase were reported separately in Chapters 4 and 5, respectively. The findings were subsequently integrated in the analysis and discussion found in Chapter 6. The eTourism experts' survey (Phase 1) and the in-trip leisure tourists' semi-structured interviews (Phase 2) were analysed and discussed relative to the aim and objectives of the study. Overall, the analysis and discussion demonstrated inferential consistency between the theories on consumer technology adoption behaviour and the data derived from the qualitative and quantitative phases of this research. This served to legitimise the methodological approach and the benefits of triangulation. This final chapter pulls together the main conclusions of the research based on the findings and analysis of Phases 1 and 2. The chapter also outlines the original contributions this study makes to knowledge. The contributions of the thesis are examined theoretically, methodologically and also against the backdrop of the practical implications of the findings for the tourism industry. The chapter closes off with an examination of some of the limitations of the enquiry and how this research can be extended in the future.

7.2 Main Conclusions of the Study

In attempting to assess the conclusions of each phase of the study, one must do so with caution given the study's exploratory nature, response rates and its dominant qualitative component. The reader is also reminded that the purpose of Phase 1 was developmental in nature, and not predictive. However, relative to answering the research question, "What specific ICT tools/applications can best influence in-trip tourists to choose more sustainable tourism practices/products?" - it can be concluded that based on the eTourism experts' views, location based services offered the greatest potential to support sustainable tourism. Location based services contribute to the destination's economic viability, local prosperity, cultural richness, and community well-being by providing information about local service providers including discounts or special offers; and points of interests. Information about points of interest also has the potential to support or enhance the destination's resource efficiency, physical integrity, biological diversity and environmental purity. Ultimately, well presented, relevant information provides a level of visitor fulfilment.

The eTourism experts were also able to identify a number of specific emerging ICT tools/applications that they felt were likely to change the way in which tourists experience a destination in the future. These included geo-caching, tablets, ambient intelligence, NFC technology and context aware applications. These emerging ICT tools/applications proffered by the eTourism experts were assessed first based on likely use of such technologies by in-trip tourists (as opposed to DMOs) and also based on the identified technologies' ability to support the aims of sustainable tourism. The technologies identified by the eTourism experts were consistent with recent literature and industry research regarding context aware, intelligent mobile and innovation and technology trends in travel (see e.g. PhoCus Wright 2011; 2012; Lamfus et al. 2013). Those technologies identified by the eTourism experts together with the nine applications (location based services, destination management systems, carbon calculators, intelligent transport systems, virtual reality technologies, wireless technologies, augmented reality and recommender systems) identified in the

literature and subsequently used in the survey, served to highlight how each tool/application contribute to the aims of sustainable tourism.

When evaluating the main conclusions of Phase 2- the dominant qualitative component of this research, the author reflected on research questions 1 and 2 which dealt with awareness levels and factors of influence regarding the use of ICT tools/applications, respectively. One of the interesting and perhaps surprising revelations from the interview process was the rural and/or developing country conception of sustainable tourism held by some interviewees. Some interviewees were also uncertain about the relevance of sustainable tourism for developed countries. The environmental dimension of sustainability resonated most with tourists and there was a noted awareness of and participation in recycling. This environmental focus on sustainability comes as no surprise, and in the tourism context, as Dodds et al. (2010) suggest, it is the environment that often attracts people to a destination in the first place. One may also recall that the concepts of sustainable development and sustainable tourism have foundations in conservation and environmentalism (Hall 1998; Hardy and Beeton 2001). However, this study demonstrated that the value-action gap persists and there are many “side-line supporters” (Defra 2008).

Social connectedness was a central theme as it related to actual ICT use and factors of influence. Mobile phones were always created for communication purposes, but the capabilities of smartphones have transformed the communication process where ‘new media’ (Lister et al. 2009) and Web 2.0 have made consumers the producers of information-prosumers (Shuen 2008; Egger 2010). Consumers want to be constantly engaged (Egger and Buhalis 2008) and kept up-to-date and especially in the tourism context, the co-creation of the vacation experience through ICT is increasingly expected and is a source of added value (Neuhofer et al. 2012). The desire to maintain and/or create social connections drove in-trip usage and influenced the type of social networking applications used by the in-trip leisure tourists. Social influence impacted perceived usefulness and perceived enjoyment of technological applications. These factors ultimately affected use behaviour. The analysis

highlighted that esteem needs and the need for social affiliations while in-trip influenced the type of social media used. Foxhall et al. (1998) note that the need for social affiliations is one trait that distinguishes innovators from late adopters. However, social influence tended to be stronger in younger age groups- this is consistent with the literature that age moderates use behaviour (Morris and Venkatesh 2000).

While social connectedness was a dominant theme, the adoption of certain types of social media and the rejection of others (e.g. Facebook) varied based on age group and the nature and amount of job-related ICT usage by some of the interviewees. An indicative example of this was T125, who made extensive use of Couchsurfing, didn't like Facebook but used Twitter as its use was already required for his job. The analysis further demonstrated that since smartphone ownership was not pervasive, ICT usage and tools that could be used to support sustainable tourism may need to be incentivised to encourage greater usage of in-trip technological tools, even among smartphone users. Additionally, depending on the characteristics of tourists from the main tourist generating regions, destinations will need to gauge how they combine new media with more traditional marketing strategies.

Personal innovativeness also emerged as an important tourist trait particularly since almost half of the interviewees did not own smartphones. The concept of personal innovativeness not only gave insights to consumers' perspectives on technology and the use of contemporary applications but also possible reasons for non-use while in-trip. Parasuraman (2000) has noted that technology readiness is determined by an individual's personal innovativeness- willingness to embrace technology- but this is not a trait that has been fully explored in the eTourism literature.

The findings also demonstrated that in addition to some of the contemporary variables influencing consumer technology adoption such as social influence, perceived ease of use and perceived usefulness, mobile value elements were deemed germane to technology adoption in the tourism domain. Mobile value elements included time critical arrangements, spontaneous needs, entertainment needs,

efficiency ambitions and mobile situations. Additionally, there were specific tourist traits and perspectives about sustainable tourism that moderated the use of ICT tools/applications which are supportive of sustainable tourism. As it related specifically to the city of Edinburgh for example, prior destination experience, challenges with Wi-fi access and roaming costs accounted for the lack of use of in-trip applications.

Despite some negative sentiments about some social networking applications one can conclude that based on interviewees' usage in this study and global usage trends (refer to Table 2.5), social media offers great potential to promote a sustainable tourism agenda. Social media can play a significant role in tourism's co-creative process (Neuhofer et al. 2012). Apart from the visitor fulfilment it provides, social media has the potential to contribute to other aims of sustainable tourism- economic viability, local prosperity, community wellbeing, cultural richness, physical integrity, biological diversity, resource efficiency and environmental purity. Such benefits are derived from positive eWOM; pictures and videos; and interactions between consumers and businesses, consumers with other consumers, consumers with the host population; and among friends and relatives.

7.3 Original Contributions to Knowledge

It was previously highlighted that there is a dearth of literature on the actual use of technology in the consumer domain. This was therefore a specific area in which this thesis sought to make a contribution. The extant literature has emphasised intention as a predictor of use behaviour, with significant empirical support in the organisational context (Chuttur 2009), but very limited perspectives in the consumer context and less so in the tourism domain. Gretzel (2011 p.761) quite recently lamented the "great bias towards investigating intention to use and not enough research on actual use, use patterns, and most importantly, non-use". This thesis served to address all of these issues and makes an original contribution to knowledge by examining the actual use of in-trip ICTs by tourists in relation to sustainable tourism. This study also explored resistance factors affecting non-use as it related to

smartphones and specific types of applications. There are no existing studies that have under-taken such an investigation.

Methodologically, the use of interviews to gain insights into actual use and reason for non-use has been a departure from the numerous quantitative studies that have been undertaken about technology adoption. Moreover, by employing a mixed methods approach with a less dominant quantitative component and a more dominant qualitative component makes a contribution to the mixed methods literature. Molina-Azorín (2011) has noted that mixed methods research is difficult to locate in the management literature. The chosen sequential design which strengthened the investigative rigour of the enquiry was distinctive for business research studies.

This thesis has also made an original contribution by advancing the knowledge about technology use behaviour in the tourism domain. An alternative consumer model has been proposed to examine factors influencing the use of in-trip technology. The model was presented in Chapter 6 (see Figure 6.1 Model of Factors Influencing In-trip Technology Use by Leisure Tourists) and served to expand the knowledge about actual technology use behaviour. The proposed model extends the work of Baron et al. (2006) on the consumer technology acceptance model and includes possible antecedents of technology use behaviour postulated by Anckar and D' Incau (2002), and Eriksson and Strandvik (2009). The model uniquely proposes that mobile value elements and tourist traits as key variables influencing actual usage. The proposed model serves to address some of the weaknesses levelled against traditional technology acceptance models that have not taken into account social, contextual and hedonic factors (Bagozzi 2007; Chuttur 2009; Chtourou and Souiden 2010; Bouwan 2011; Fuchs et al. 2012). These factors are critically important in the tourism domain.

Additionally, no studies have examined how specific in-trip ICT tools/applications can contribute to the achievement of the aims of sustainable tourism and this study has done this by examining specific ICT tools/applications used and the potential contribution of each of these to the twelve aims of sustainable tourism: economic

viability, local prosperity, employment quality, social equity, visitor fulfilment, local control, community wellbeing, cultural richness, physical integrity, biological diversity, resource efficiency and environmental purity (UNEP and UNWTO 2005).

Apart from the contributions to knowledge outlined above this research is very relevant to destinations that wish to promote sustainable tourism development. Some useful insights were provided about leisure tourists' perspectives about sustainable tourism in an urban context. The tourists' perspectives suggest more needs to be done to educate consumers. Social marketing (Kotler and Armstrong 2006; Peeters et al. 2009), conducted through social media could prove to be a powerful tool to educate and transform consumer attitudes. As has been extensively discussed in this thesis attitudes influence behavioural intention and ultimately behaviour (Fishbein and Azjen 1975; Azjen and Fishbein 1980).

This thesis has made a contribution to the eTourism and sustainable tourism literature with a published conference paper and forthcoming book chapter (Please refer to Volume 2 of this thesis, Appendix G). These works help to narrow the research gaps identified in the consumer behaviour and tourism literature. The thesis also makes a contribution to consumer theory in mobile information systems and the field of human-computer interaction, which extend beyond the field of tourism.

7.4 Limitations

Exploratory work undertaken for doctoral research is often constrained by a number of issues, apart from time and financial factors. Ideally, the eTourism survey should have used a probability sampling strategy but since the population of eTourism experts could not be globally defined, a non-probability sampling approach was taken. Additionally, a higher response rate could have improved the veracity of the quantitative data collected. However, since the objective of the quantitative phase was not to establish significance or predict the relationship between variables a 13.5 % response rate was deemed adequate given the overall aim of the research.

One of the short-comings of this research is that the qualitative phase did not benefit from members check or confirmation of conclusions through a feedback process to informants. The use of geographically dispersed interviewees and the indicative challenges experienced in getting tourists to participate in this study would not have made this practical or cost-effective. To minimise this deficiency the researcher opted for a mixed methods approach where the eTourism expert survey served to enhance the quality, validity and trustworthiness of the conclusions drawn. Also, the use of other researchers during the qualitative data treatment, including the identification of themes served to reduce researcher effects (Miles and Huberman 1994). The researcher sought to triangulate by method; theory and data sources (using different periods in the tourist season, days, places, gender, nationalities and age-groups).

Arguably, making the ownership of a smartphone and active use of it while on holiday as additional criteria for the selection of in-trip interviewees could have deepened the data derived from the interviewing process. However, the researcher did not want to make smartphones the sole focus of in-trip usage as quite a number of studies have already taken place in this area and the true originality of this research could have come into question. Expanding the enquiry to include whatever technological tools (excluding cameras) in-trip tourists brought along while on holiday provided invaluable insights about non-use and attitudes about technology in general, as well as, tourists' perspectives about the use of technology to support sustainable tourism.

7.5 Future Research

This study extended the theoretical base of technology adoption in the tourism domain from the in-trip tourists' perspective. More specifically, this research examined actual usage of ICT in the tourism domain. Given the ubiquity of mobile technologies in today's market place, researchers may now take this work further by examining the moderating effects of the various tourist traits on technological use

behaviour. Such an enquiry may initially be better served by a quantitative approach or a mixed methods approach with equally weighted quantitative and qualitative components.

Research on the role of perceived enjoyment (PE) and mobile value elements and its influence on perceived ease of use (PEOU) and perceived usefulness (PU) can also be deepened. PE or perceived fun of use has already been proffered by a number of scholars as factor influencing intention to use and actual use (e.g. Bruner and Kumar 2005, Baron et al. 2006; Chien-Hung and Mort 2007; Chtourou and Souiden 2010; Abad et al. 2010) but more work is needed in this area in the tourism domain and in the in-trip tourist context. The increased opportunities for gaming in tourism to encourage collaboration and the co-creative process may also have implications for the creative internationalisation of sustainable tourism practices, and as such, should be investigated further.

The concept of personal innovativeness could also be an interesting launching pad for further investigation and the advancement of the work on technology resistance and possible reasons for slower adoption rates among different market segments.

This study also highlighted that there is still a challenge about how consumers perceive the importance and the contribution that they can make to sustainable tourism. Further work is needed on strategies for further transformation of consumer attitudes and how ICT, and in particular, social media can be used to translate positive attitudes into behaviour. A campaign could be built and a longitudinal study employed to see how social media can transform attitudes about sustainable tourism in a specific destination.

7.6 Concluding Remarks

By understanding what tools are used and how use is influenced, allows destinations to take advantage of the opportunities that the co-creative process provides for on-going consumer engagement. This research demonstrated that the collaborative

opportunities must continue to be built into the design of ICT tools/applications as consumers expect it and the survival of many businesses may depend on it. ICT presents invaluable opportunities for businesses to use marketing intelligence garnered from social media, for example, to manage the visitor experience, foster innovative products and develop creative marketing strategies that can also promote sustainable practices.

It is hoped that this research elucidated the ways in which the use of ICT by in-trip tourists can be used to harness the aims of sustainable tourism beyond the environmental dimensions. No existing studies have taken the approach used in this study, where ICT tools/applications were used to illustrate how they can support a destination's sustainability based on the UNEP and UNWTO's (2005) aims of sustainable tourism. The study demonstrated that getting an increased use of ICT by in-trip tourists to support sustainable tourism has to be first assessed against the backdrop of tourists' knowledge about sustainable tourism. Their perceived linkage between sustainable tourism and technology also has to be assessed. Additionally, the factors influencing the use of ICT had to be examined in the context of actual usage. This thesis provided useful insights in this regard and proposed a new framework for assessing factors influencing leisure tourists' in-trip technological use. Destination managers can then use this information not only as on-going sources of marketing intelligence, customisation and service recovery, but also for the modelling of programmes to ultimately close the gap between knowledge about sustainable tourism and responsible actions.

References

- Abad, M., Diaz, I. and Vigo, M. 2010. Acceptance of mobile technology in hedonic scenarios. *Proceedings of the 24th BCS Interaction Specialist Group Conference*. Swinton: British Computing Society, pp. 250-258.
- Adomavicius, G. and Tuzhilin, A. 2005. Toward the next generation of recommender systems: a survey of the state-of-the art and possible extensions. *IEEE Computer Society*, 17 (6) pp.734-749.
- Agarwal, R. and Prasad, J. 1998. A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research*, 9 (2) pp.204-215.
- Ajzen, I. and Fishbein, M. 1980. *Understanding attitudes and predicting social behavior*. Englewood Cliffs, N.J.: Prentice-Hall, Inc.
- Ajzen, I. 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50 (2) pp.179-211.
- Akehurst, G. 2009. User generated content: the use of blogs for tourism organizations and tourism consumers. *Service Business*, 3 (1) pp.51-61.
- Ali, A. 2009. *An investigation into information and communication technologies-based applications for sustainable tourism development of destinations*. [online] PhD thesis, Queen Margaret University. Available at <http://etheses.qmu.ac.uk> [Accessed September 29 2010].
- Ali, A. and Frew, A. J. 2010. ICT and its role in sustainable tourism development. In: Gretzel, U., Law, R. and Fuchs, M. eds. *Information and Communication Technologies in Tourism 2010*. Switzerland, New York: Springer-Verlag Wien, pp.479-491.
- Ali, A. and Frew, A. J. 2013. *Information and communication technologies for sustainable tourism*. Oxon: Routledge.
- Anckar, B. and D' Incau, D. 2002. Value creation in mobile commerce: findings from a consumer survey. *Journal of Information Technology Theory and Application*, 4 (1) pp.43-64.
- Andereck, K. L. 2009. Tourists' perceptions of environmentally responsible innovations at tourism businesses. *Journal of Sustainable Tourism*, 17 (4) pp.489-499.
- Arsal, I., Backman, S. and Baldwin, E. 2008. Influence of online travel community on travel decisions. In: O'Connor, P., Hopken, W. and Gretzel, U. eds. *Information*

and Communication Technologies in Tourism 2008. Austria, New York: Springer-Verlag Wien, pp.82-93.

Assael, H. 1998. *Consumer behaviour and marketing action*. Cincinnati, Ohio: South-Western College Publishing.

Attride-Stirling, J. 2001. Thematic networks: an analytic tool for qualitative research. *Qualitative Research*, 1 (3) pp.385-405.

Audi, R. 2003. *Epistemology: A contemporary introduction to the theory of knowledge*. 2nd ed. London: Routledge.

Ayeh, J. K., Au, N. and Law, R. 2013. Predicting the intention to use consumer-generated media for travel planning. *Tourism Management*, 35 pp.132-143.

Ayeh, J. K., Leung, D., Au, N. and Law, R. 2012. Perceptions and strategies of hospitality and tourism practitioners on social media: an exploratory study. In: Fuchs, M., Ricci, F. and Cantoni, L. eds. *Information and Communication Technologies in Tourism 2012*. Sweden, New York: Springer-Verlag Wien, pp.1-12.

Azuma, R. T. 1997. A survey of augmented reality. *Teleoperators and Virtual Environments*, 6 (4) pp.355-385.

Bader, A., Baldauf, M., Leinert, S., Fleck, M., Liebrich, A. 2002. Mobile tourism services and technology acceptance in a mature domestic tourism market: the case of Switzerland. In: Fuchs, M., Ricci, F. and Cantoni, L. eds. *Information and Communication Technologies in Tourism 2012*. Sweden, New York: Springer-Verlag Wien, pp.296-307.

Bagozzi, R. P. 2007. The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the Association for Information Systems*, 8 (4) pp.244-254.

Bagozzi, R. P. and Warshaw, P. R. 1990. Trying to consume. *Journal of Consumer Research*, 17 (2) pp.127-140.

Barnes, S. J. 2003. Location-based services: the state of the art. *e-Service Journal*, 2 (3) pp.59-70.

Baron, S. and Harris, K. 2010. Toward an understanding of consumer perspectives on experiences. *Journal of Services Marketing*, 24 (7) pp.518-531.

Baron, S., Patterson, S. and Harris, K. 2006. Beyond technology acceptance: understanding consumer practice. *International Journal of Service Industry Management*, 17 (2) pp.111-135.

- Barrero, F., Toral, S., Vargas, M., Cortes, F. and Milla, J. M. 2010. Internet in the development of future road-traffic control systems. *Internet Research*, 20 (2) pp.154-168.
- Baruch, Y. 1999. Response rate in academic studies- a comparative analysis. *Human Relations*, 52 (4) pp.421-438.
- Bauer, L., Boksberger, P., Hergt, J., Hierl, S. and Orsolini, N. 2008. The virtual dimension in tourism: criteria catalogue for the assessment of eTourism applications. In: O'Connor, P., Höpken, W. and Gretzel, U. eds. *Information and Communication Technologiess in Tourism 2008*. Austria, NewYork: Springer-Verlag Wien pp.521-532.
- Becken, S. 2004. How tourists and tourism experts perceive climate change and carbon-offsetting schemes. *Journal of Sustainable Tourism*, 12 (4) pp.332-345.
- Bellotti, F., Berta, R., De Gloria, A. and Primavera, L. 2009. Designing online virtual worlds for cultural heritage. In: Höpken, W., Gretzel, U. and Law, R., eds. *Information and Communication Technologies in Tourism 2009*. The Netherlands, New York: Springer-Verlag Wien pp.199-209.
- Binkhorst, E. and Dekker, T. D. 2009. Agenda for co-creation tourism experience research. *Journal of Hospitality Marketing and Management*, 18 pp.311-327.
- Blackwell, R. D., Miniard, P. W. and Engel, J. F. 2001. *Consumer behaviour*. 9th ed. Mason, Ohio: South-Western.
- Blaxter, L., Hughes, C. and Tight, M. 2010. *How to Research*. 4th ed. Maidenhead: McGraw-Hill/Open University Press.
- Bouwman, H., Carlsson, C., Lopez-Nicolas, C., McKenna, B., Molina-Castillo, F., Tuunanen, T. and Walden, P. 2011. Mobile travel services: the effect of moderating contexts factors. *Information Technology & Tourism*, 13 pp.57-74.
- Bowen, D. and Clarke, J. 2009. *Contemporary tourist behaviour: yourself and others as tourists*. Wallingford: CABI.
- Boyatzis, R. E. 1998. *Transforming qualitative information: thematic analysis and code development*. Thousand Oaks, CA: Sage Publication, Inc.
- Brace, I. 2008. *Questionnaire design: how to plan, structure and write survey material for effective market research*. 2nd ed. London: Kogan Page.
- Bramwell, B. and Lane, B. 1993. Sustainable tourism: an evolving global approach. *Journal of Sustainable Tourism*, 1 (1) pp.1-5.
- Brewer, J. 2003. Ethnography. In: Miller, R. and Brewer, J. eds. *The A-Z of Social Research* London: Sage Publications Ltd., pp.99.

- Bruner, G. C. and Kumar, A. 2005. Explaining consumer acceptance of handheld Internet devices. *Journal of Business Research*, 58 (5) pp.553-558.
- Bryman, A. 2004. *Social research methods*. 2nd ed. Oxford: Oxford University Press.
- Bryman, A. 2007. Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research*, 1 (1) pp.8-22.
- Bryman, A. and Bell, E. 2007. *Business research methods*. 2nd ed. Oxford: Oxford University Press.
- Bryman, A. and Bell, E. 2011. *Business research methods*. 3rd ed. Oxford: Oxford University Press.
- Buhalis, D. 1998. Strategic use of information technologies in the tourism industry. *Tourism Management*, 19 (5) pp.409-421.
- Buhalis, D. 2003. *eTourism: information technology for strategic tourism management*. Essex: Pearson Education Limited.
- Buhalis, D. and Law, R. 2008. Progress in information technology and tourism management: 20 years on and 10 years after the Internet-the state of eTourism research. *Tourism Management*, 29 (4) pp.609-623.
- Buhalis, D. and O'Connor, P. 2005. Information and communication technology revolutionizing tourism. *Tourism Recreation Research*, 30 (3) pp.7-16.
- Buhalis, D. and Pistidda, L. 2009. Wireless applications in destinations. In: Höpken, W., Gretzel, U. and Law, R. eds. *Information and Communication Technologies in Tourism 2009*. Netherlands, New York: Springer-Verlag Wien, pp.161-169.
- Burke, R. 2007. Hybrid web recommender systems. In: Brusilovsky, P, Kobsa, A. and Nejdl, W. eds. *The Adaptive Web*. Berlin: Springer-Verlag pp.377-408.
- Butler, R. 1998. Sustainable tourism - looking backwards in order to progress? In: Hall, M. C., Lew, A. A. eds. *Sustainable Tourism: A Geographical Perspective*. Essex: Pearson Education Limited, pp.25-34.
- Butler, R. W. 1999. Sustainable tourism: a state-of-the-art review. *Tourism Geographies: An International Journal of Tourism Space, Place and Environment*, 1 (1) pp.7-25.
- Candi, M., Höpken, W. and Fuchs, M. 2010. Application of QR codes in online travel distribution. In: Gretzel, U., Law, R. and Fuchs, M. eds. *Information and Communication Technologies in Tourism 2010*. Switzerland, New York: Springer-Verlag Wien pp.137-148.
- Carbon Offset Guide Australia. 2011. [online] Available at: www.carbonoffsetguide.com.au/node777 [Accessed May 6 2011].

- Cheong, R. 1995. The virtual threat to travel and tourism. *Tourism Management*, 16 (6) pp.417-422.
- Chien-Hung, C. and Mort, G. S. 2007. Consumers' technology adoption behaviour: an alternative model. *Marketing Review*, 7 (4) pp.355-368.
- Cho, Y., Wang, Y. and Fesenmaier, D. 2002. Searching for experiences: the web-based virtual tour in tourism marketing. *Journal of Travel & Tourism Marketing*, 12 (4) pp.1-17.
- Choi, S., Lehto, X. Y. and O'leary, J. T. 2007. What does the consumer want from a DMO website? A study of US and Canadian tourists' perspectives. *International Journal of Tourism Research*, 9 (2) pp.59-72.
- Chtourou, M. and Souiden, N. 2010. Rethinking the TAM model: time to consider fun. *Journal of Consumer Marketing*, 27 (4) pp.336-344.
- Chung, J. Y. and Buhalis, D. 2008. Web 2.0: A study of online travel community. In: O'Connor, P., Hopken, W. and Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien pp.70-81.
- Chuttur, M. Y. 2009. Overview of the the technology acceptance model: origins, developments and future directions. *Sprouts: Working Papers on Information Systems*, 9 (37) pp.1-21.
- Clarke, J. 1997. A framework of approaches to sustainable tourism. *Journal of Sustainable Tourism*, 5 (3) pp.224-233.
- Coccosis, H. 1996. Tourism and sustainability: perspectives and implications. In: Priestley, G. K., Edwards, J. A. and Coccosis H. eds. *Sustainable Tourism? European Experiences*. Wallingford, Oxford: CAB International, pp. 1-21.
- Coles, S. 2006. Information and empowerment: the keys to achieving sustainable tourism. *Journal of Sustainable Tourism*, 14 (6) pp.629-644.
- Collins, K. and O'Cathain, A. 2009. Ten points about mixed methods research to be considered by the novice researcher. *International Journal of Multiple Research Approaches*, 3 (1) pp.2-7.
- Committee on Climate Change 2013. Reducing emissions in Scotland: 2013 progress report [online] Available at: http://www.theccc.org.uk/wp-content/uploads/2013/03/1674_CCC_Scots-Report_bookmarked_2.pdf [Accessed: May 19 2013].
- Cox, C., Burgess, S., Sellitto, S. & Buultjens, J. 2009. The role of user-generated content in tourists' travel planning behavior. *Journal of Hospitality Marketing & Management*, 18 (8) pp.743-764.

- Creswell, W. J. 2009. *Research design: qualitative, quantitative, and mixed methods approaches*. 3rd ed. Thousand Oaks, CA: Sage Publications.
- Creswell, W. J. and Plano Clark, V. 2007. *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage Publications.
- Creswell, W. J. and Plano Clark, V. 2011. *Designing and conducting mixed methods research*. 2nd ed. Thousand Oaks, CA: Sage Publications.
- Curran, K. and Smith, K. 2005. A location-based mobile tourist guide. *Tourism and Hospitality Research*, 6 (2) pp.180-187.
- Daigle, J. and Zimmerman, C. 2004. The convergence of transportation, information technology, and visitor experience at Acadia National Park. *Journal of Travel Research*, 43 pp.151-160.
- Daniele, R. and Frew, A. 2008. Evolving destination systems: visitscotland.com. In: O'Connor, P., Höpken, W. and Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.232-243.
- Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13 (3) pp.319-340.
- Dekleva, S., Shim, J., Varshney, U. and Knoerzer, G. 2007. Evolution and emerging issues in mobile wireless networks. *Communication of the Association for Computing Machinery*, 5 (6) pp.38-43.
- Del Chiappa, G. 2011. Trustworthiness of Travel 2.0 applications and their influence on tourist behaviour: an empirical investigation in Italy. In: Law, R., Fuchs, M. and Ricci, F. eds. *Information and Communication Technologies in Tourism 2011*. Austria, New York: Springer-Verlag Wien, pp.332-342.
- Dellinger, A. and Leech, N. 2007. Toward a unified validation framework in mixed methods research. *Journal of Mixed Methods Research*, 1(4) pp.309-332.
- Defra. 2008. *A framework for pro-environmental behaviours*. [online] London: Department for Environment, Food and Rural Affairs. Available at: www.defra.gov.uk [Accessed March 23 2011].
- Denscombe, M. 2010. *The good research guide: for small scale social research projects*. 4th ed. Berkshire: McGraw-Hill.
- Dewar, J. 2007. *Tourism in Scotland subject profile*. [online] Scottish Parliament Information Centre (SPICe) Briefings. Available at: www.scottish.parliament.uk/business/research/briefings-07/SB07-34.pdf [Accessed February 08 2011].

- Dickinger, A. and Stangl, B. 2011. Online information search: differences between goal-directed and experiential search. *Information Technology & Tourism*, 13 pp.239-257.
- Dickinger, A. and Zins, A. 2008. Rivertale: mobile services for cruise ships. In: Egger, R. and Buhalis, D. eds. *eTourism Case Studies: Marketing and Management Issues*. Oxford: Butterworth-Heinemann, pp.427-434.
- Digital Tourism Think Tank 2013. Augmented reality in tourism: 10 unique applications explained [online] Available at <http://thinkdigital.travel/wp-content/uploads/2013/04/10-AR-Best-Practices-in-Tourism.pdf> [Accessed: May 16 2013]
- Dodds, R., Graci, S. R. and Holmes, M. 2010. Does the tourist care? A comparison of tourists in Koh Phi Phi, Thailand and Gili Trawangan, Indonesia. *Journal of Sustainable Tourism*, 18 (2) pp.207-222.
- Dolnicar, S. 2010. Identifying tourists with smaller environmental footprints. *Journal of Sustainable Tourism*, 18 (6), pp.717-734.
- Dolnicar, S., Crouch, G. I. and Long, P. 2008. Environment-friendly tourists: what do we really know about them? *Journal of Sustainable Tourism*, 16 (2) pp.197-210.
- Dwivedi, M., Yadav, A. and Venkatesh, U. 2012. Use of social media by national tourism organizations: a preliminary analysis. *Information Technology & Tourism*, 13 pp.99-103.
- Edgell, D. L. 2006. *Managing sustainable tourism: a legacy for the future*. New York: The Haworth Hospitality Press.
- Edwards, S., Blythe, P., Scott, S. and Weihong-Guo, A. 2010. Tourist information delivered through mobile devices: findings from the image project. *Information Technology & Tourism*, 8 pp.31-46.
- Egger, R. 2010. Theorizing Web 2.0 phenomena in tourism: a sociological signpost. *Information Technology & Tourism*, 12 pp.12-137.
- Egger, R. and Buhalis, D. 2008. Mobile systems. In: Egger, R. and Buhalis, D. eds. *eTourism Case Studies: Marketing and Management Issues*. Oxford: Butterworth-Heinemann, pp.418-425.
- Engel, J. F., Blackwell, R. D. and Miniard, P. W. 1995. *Consumer behaviour*. 8th ed. Forth Worth, TX: The Dryden Press.
- Ericksson, O. 2012. A follow up of Internet adopters' use, perception and channel preferences of electronic travel services. In: Fuchs, M., Ricci, F. and Cantoni, L. eds.

Information and Communication Technologies in Tourism 2012. Sweden, New York: Springer-Verlag Wien pp.155-166.

Ericksson, O. 2002. Location based destination information for the mobile tourist. In: Wöber, K., Frew, A. and Hitz, M., eds. *Information and Communication Technologies in Tourism 2002*. Austria. New York: Springer-Verlag Wien, pp.255-264.

Eriksson, N. & Strandvik, P. (2009). Possible determinants affecting the use of mobile tourism services. In: Filipe, J., Obaidat M. S. eds. *e-Business and Telecommunications*. Berlin Heidelberg: Springer, pp.61-73.

ETAG. 2007. Edinburgh tourism: a framework for growth 2007-2015.[online] Edinburgh, Edinburgh Tourism Action Group. Available at: http://www.etag.org.uk/assets/pdfs/knowledge/etag_framework.pdf [Accessed January 19 2011].

ETAG. 2008. ETAG Sustainable Tourism Strategy. [online] Edinburgh, Edinburgh Tourism Action Group. Available at http://etag.org.uk/assests/pdf/knowledge/etag_sustainable-urban-strategy.pdf [Accessed January 19 2011].

Etgar, M. 2008. A descriptive model of the consumer co-production process. *Journal of the Academy of Marketing Science*, 36 pp.97-108.

Featherman, M. and Pavlou, P. 2003. Predicting e-services adoption: a perceived risk facets perspective. *International Journal of Human-Computer Studies*, 59 pp.451-474.

Feilzer, M. Y. 2010. Doing mixed methods research pragmatically: implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4 (1) pp.6-16.

Fereday, J. and Muir-Cochrane, E. 2006. Demonstrating rigor using thematic analysis: a hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 5 (1) pp.80-92.

Fesenmaier, D., Werthner, H. and Wöber, K. 2006. Introduction: recommender systems in tourism. In Fesenmaier, D., Werthner, H. and Wöber, K. eds. *Destination recommendation systems: behavioural foundations and applications*. Oxfordshire: CABI Publishing, pp. xvii-xxii

Ficco, M., Pietrantuono, R. and Russo, S. 2010. Supporting ubiquitous location information in interworking 3G and wireless networks. *Communications of the Association for Computing Machinery*, 53 (11) pp.116-123.

Fishbein, M. and Ajzen, I. 1975. *Belief, attitude, intention and behavior*. Massachusetts: Addison-Wesley Publishing Company Inc.

- Fleischhacker, R. 2008. Lovo: the mobile lifestyle assistant. In: Egger, R. and Buhalis, D. eds. *eTourism Case Studies: Marketing and Management Issues*. Oxford: Butterworth-Heinemann, pp.435-444.
- Flouri, E. and Buhalis, D. 2004. Wireless technologies for tourism destinations. In: Sigala, M., Mich, L. and Murphy, J. eds. *Information and Communication Technologies in Tourism 2004*. Cairo, New York: Springer-Verlag Wien, pp.27-38.
- Fodness, D. and Murray, B. 1998. A typology of tourist information search strategies. *Journal of Travel Research*, 37 pp.108-119.
- Font, X. 2002. Environmental certification in tourism and hospitality: progress, process and prospects. *Tourism Management*, 23 (3) pp.197-205.
- Font, X. and Harris, C. 2004. Rethinking standards from green to sustainable. *Annals of Tourism Research*, 31 (4) pp.986-1007.
- Fotis, J., Buhalis, D. and Rossides, N. 2012. Social media use and impact during the holiday travel planning process. In: Fuchs, M., Ricci, F. and Cantoni, L. *Information and Communication Technologies in Tourism 2012 Sweden*. New York: Springer-Verlag Wien pp.13-24.
- Foxhall, G. R., Goldsmith, R. E. and Brown, S. 1998. *Consumer psychology for marketing*. London: International Thomson Business Press.
- Frazier, G. J. 1997. Sustainable development: modern elixir or sack dress? *Environmental Conservation*, 24 (2) pp.182-193.
- Frew, A. 2000. Information and communications technology research in the travel and tourism domain: perspective and direction. *Journal of Travel Research*, 39 pp.136-145.
- Fuchs, M., Scholochov, C. and Höpken, W. 2010. E-business adoption, use and value creation: an Austrian hotel study. *Information Technology & Tourism*, 11 pp.267-284.
- Fuchs, M., Höpken, W. and Rasinger, J. 2011. Behavioral intention to use mobile information services in tourism: the case of the tourist guide Dolomitisuperski.mobi. *Information Technology & Tourism*, 13 pp.285-307.
- Garcia, A., Linaza, M., Arbelaitz, O. and Vansteenwegen, P. 2009. Intelligent routing system for a personalised electronic tourist guide. In: Höpken, W., Gretzel, U. and Law, R., eds. *Information and Communication Technologies in Tourism 2009*. Netherlands, New York: Springer-Verlag Wien, pp.185-197.
- Getz, D. and Jamal T. 1994. The environment-community symbiosis: a case for collaborative tourism planning. *Journal of Sustainable Tourism*, 2 (3) pp.152-173.

- Ghandour, R. and Buhalis, D. 2003. Third-generation mobile services and the needs of mTravellers. In: Frew, A. J., Hitz, A. and O'Connor, P. eds. *Information and Communication Technologies in Tourism 2003*. Finland, New York: Springer-Verlag Wien, pp.222-231.
- Gillham, B. 2005. *Research interviewing: the range of techniques*. Berkshire: McGraw-Hill Education.
- Goodwin, H. and Walmsley, A. 2010. *Indulging indulgence- tourism, carbon offsetting and climate change*. [online] ICRT Occasional Paper 20 International Centre for Responsible Tourism. Available at: www.icrtourism.org. [Accessed May 6 2011] pp.1-19.
- Gössling, S., Hall, C. M. and Weaver, D. 2009. Sustainable tourism futures: perspectives on systems, restructuring and innovations. In: Gössling, S., Hall, C. M. and Weaver, D. eds. *Sustainable Tourism Futures: Perspectives on Systems, Restructuring and Innovations*. New York: Routledge, pp.1-15.
- Gössling, S. 2009. Carbon neutral destinations: a conceptual analysis. *Journal of Sustainable Tourism*, 17 (1) pp.17-37.
- Gössling, S. and Schumacher, K. 2010. Implementing carbon neutral destination policies: issues from the Seychelles. *Journal of Sustainable Tourism*, 18 (3) pp.377-391.
- Gray, E. D. 2004. *Doing research in the real world*. London: Sage Publications.
- Green Globe 2011. Available at: <http://greenglobe.com> [Accessed January 23 2011].
- Gretzel, U. 2011. Intelligent systems in tourism: a social science perspective. *Annals of Tourism Research*, 38 (3) pp.757- 779.
- Gretzel, U. and Yoo, K. N. 2008. Use and impact of on-line travel reviews. In: O'Connor, P., Höpken, W. and Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.35-46.
- Grbich, C. 2013. *Qualitative data analysis: an introduction*. 2nd ed. London: Sage Publications Ltd.
- Grix, J. 2001. *Demystifying postgraduate research*. Birmingham: University of Birmingham Press.
- Guba, E. G. and Lincoln, Y. S. 1989. *Fourth generation evaluation*. London: Sage Publications Ltd.
- Guba, E. G. and Lincoln, Y. S. 1994. Competing paradigms in qualitative research. In: Denzin, N.K. and Lincoln, Y. S. *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage Publications Ltd. pp.105-117.

- Gupta, S. and Ogden, D. T. 2009. To buy or not to buy? A social dilemma perspective on green buying. *Journal of Consumer Marketing*, 26 (6) pp.376-390.
- Gursoy, D. and McCleary, K. W. 2004. An integrative model of tourists' information search behavior. *Annals of Tourism Research*, 31 (2) pp.353-373.
- Guthrie, C. 2004. *Tourist information centres and ICT: opportunity not threat*. [online] Tourism Insights. Available at: www.insights.org.uk [Accessed April 25 2011].
- Guttentag, D. A. 2010. Virtual reality: applications and implications for tourism. *Tourism Management*, 31 (5) pp.637-651.
- Hall, C. M. and Gössling, S. 2009. Global environmental change and tourism enterprise. In: Leslie, D. ed. *Tourism Enterprises and Sustainable Development*. New York: Routledge, pp.17-35.
- Hall, M. C. 1998. Historical antecedents of sustainable development and ecotourism: new labels on old bottles? In: Hall, M. C. and Lew, A. A. eds. *Sustainable Tourism: A Geographical Perspective*. Essex: Pearson Education Limited. pp.13-24
- Ham, S., Kim, W. and Forsythe, H. 2008. Determinants of restaurant employees' technology use intention: validating technology acceptance model with external factors via structural equation model. In: O'Connor, P., Höpken, W. and Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.441-451.
- Hardy, A., Beeton, R. and Pearson, L. 2002. Sustainable tourism: An overview of the concept and its position in relation to conceptualisations of tourism. *Journal of Sustainable Tourism*, 10 (6) pp.475-496.
- Hardy, A. L. and Beeton, R. J. S. 2001. Sustainable tourism or maintainable tourism: managing resources for more than average outcomes. *Journal of Sustainable Tourism*, 9 (3) pp.168-192.
- Hofbauer, J., Stangl, B. and Teichmann, K. 2010. On-line destination marketing: do local DMOs consider international guidelines for their website design? In: Gretzel, U., Law, R. and Fuchs, M., eds. *Information and Communication Technologies in Tourism 2010*. Switzerland. New York: Springer-Verlag Wien, pp.261-271.
- Holbrook, M. 2006. ROSEPEKICECIVECI versus CCV- the resource-operant, skills-exchanging, performance-experiencing, knowledge-informed, competence-enacting, co-producer-involved, value-emerging, customer-interactive view of marketing versus the concept of customer value: "I Can Get It for You Wholesale". In: Lusch, R. L. and Vargo, S. L. eds. *The Service-Dominant Logic of Marketing: Dialog, Debate and Directions*. New York: M.E.Sharpe Inc. pp. 208-223.

- Höpken, W., Scheuringer, M., Linke, D. and Fuchs, M. 2008. Context-based adaptation of ubiquitous web applications in tourism. In: O'Connor, P., Höpken, W. and Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.533-544.
- Horan, P. 2010. *Developing an effectiveness evaluation framework for destination management systems*. PhD thesis, Queen Margaret University.
- Horan, P. and Frew, A. 2007. *Destination website effectiveness- a delphi study based eMetric approach*. HITA 07, Orlando: USA, pp.49-80.
- Howitt, D. and Cramer, D. 2005. *Introduction to research methods in psychology*. Essex: Pearson Education Limited.
- Huffman, C., Ratneshwar, S. and Mick, D. G. 2002. Consumer goal structures and goal determination processes: an integrative framework. In: Ratneshwar, S., Mick D. G. and Huffman, C. eds. *The Why of Consumption: Contemporary Perspectives on Consumer Motives, Goals and Desires*. London: Routledge, pp.9-35.
- Hughes, C. 2006. *Developing reflexivity in research*. [online] Available at: <http://www2.warwick.ac.uk/fac/soc/sociology/staff/academicstaff/chughes/> [Accessed October 30, 2012].
- Hunter, C. 1997. Sustainable tourism as an adaptive paradigm. *Annals of Tourism Research*, 24 (4) pp.850-867.
- Huvila, I., Uotila, K., Paalassalo, J., Huurre, J. and Verajankora, S. 2008. Passages to medieval archipelago: from mobile information technology to mobile archaeological information. In: O'Connor, P., Höpken, W. and Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.336-345.
- Hwang, Y. H., Gretzel, U., Xiang, D. and Fesenmaier, D. 2006. Information search for travel decisions. In: Fesenmaier, D., Werthner, H. and Wöber, K. eds. *Destination Recommendation Systems: Behavioural Foundations and Applications*. Oxfordshire: CABI Publishing, pp.3-16.
- Hyun, M. Y., Lee, S. and Hu, C. 2009. Mobile-mediated virtual experience in tourism: concept, typology and applications. *Journal of Vacation Marketing*, 15 (2) pp.149-164.
- IFITT 2011. IFITT Mission Vision & Objectives. [online] Available at: <http://www.ifitt.org/home/view/mission-objectives>. [Accessed April 12 2011].
- Inskeep, E. 1991. *Tourism planning: an integrated and sustainable development approach*. New York: Van Nostrand Reinhold.

- Joffe, H. and Yardley, L. 2004. Content and thematic analysis. In: Marks, D. and Yardley, L. eds. *Research Methods for Clinical and Health Psychology*. Thousand Oaks, CA: Sage Publications Ltd. pp.56-68.
- Johnson, R. B. and Onwuegbuzie, A. J. 2004. Mixed methods research: a research paradigm whose time has come. *Educational Researcher*, 33 (7) pp.14-26.
- Johnson, R. B., Onwuegbuzie, A. J. and Turner, L. A. 2007. Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1 (2) pp.112-133.
- Johnston, R. J. and Tyrell, T. J. 2005. A dynamic model of sustainable tourism. *Journal of Travel Research*, 44 pp.124-134.
- Junglas, I. A. and Watson, R. T. 2008. Location based services: evaluating user perceptions of location-tracking and location aware services. *Communications of the Association for Computing Machinery*, 51 (3) pp.65-69.
- Kaplan, A. M. and Haenli, M. 2010. Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, 53 pp. 59-68.
- Kent, R. 2001. *Data construction and data analysis for survey research*. New York: Palgrave Macmillan.
- Kim, H. and Schliesser, J. 2007. Adaption of storytelling for mobile information service for a site-specific cultural and historical tour. *Information Technology & Tourism*, 9 pp.195-210.
- Kotler, P. and Armstrong, G. 2006. *Principles of marketing*. 11th ed. New Jersey: Pearson Prentice Hall.
- Kotler, P. and Lee, N. R. 2008. *Social marketing*. 3rd ed. Thousand Oaks, CA: Sage Publications.
- Kotler, P. and Roberto, R. L. 1989. *Social marketing: strategies for changing public behaviour*. New York: The Free Press.
- Krippendorff, K. 2004. *Content analysis: an introduction to its methodology*. 2nd ed. Thousand Oaks, CA: Sage Publications.
- Lamsfus, C., Xiang, Z., Alzua-Sorzabal, A. and Martin, D. 2013. Conceptualizing context in an intelligent mobile environment in travel and tourism. In: Cantoni, L. and Xiang, Z. eds. *Information and Communication Technologies in Tourism 2013*. Innsbruck, New York: Springer-Verlag Wien, pp.1-11.
- Lane, B. 2009a. Thirty years of sustainable tourism: drivers, progress, problems-and the future. In: Gössling, S., Hall, C. M. and Weaver, D. eds. *Sustainable Tourism Futures: Perspectives on Systems, Restructuring and Innovations*. New York: Routledge, pp.19-32.

- Lane, B. 2009b. Implementing sustainable tourism in Scotland: an interview. *Journal of Sustainable Tourism*, 17 (6) pp.747-752.
- Law, R., Leung, R. and Buhalis, D. 2009. Information technology applications in hospitality and tourism: a review of publications from 2005 to 2007. *Journal of Travel & Tourism Marketing*, 26 pp.599-623.
- Lee, J. and Mills, J. 2007. Exploring tourist satisfaction with mobile technology. In: Sigala, M., Mich, L. and Murphy, J., eds. *Information and Communication Technologies in Tourism 2007*. Slovenia, New York: Springer-Verlag Wien, pp.141-152.
- Lee, J., Soutar, G. and Daly, T. 2007. Tourists' search for different types of information: a cross-national study. *Information Technology & Tourism*, 9 pp.165-176.
- Leech, N. L., Dellinger A. B., Brannagan, K. M. and Tanaka, H. 2010. Evaluating mixed research studies: A mixed methods approach. *Journal of Mixed Methods Research*, 4 (1) pp.17-31.
- Legris, P., Ingham, J. and Collette, P. 2003. Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, 40 (3) pp.191-204.
- Leiper, N. 2004. *Tourism management*. 3rd ed. Frenchs Forest: Pearson Education Australia.
- Liburd, J. 2005. Sustainable tourism and innovation in mobile tourism services. *Tourism Review International*, 9 (1) pp.107-118.
- Liburd, J. 2010. Introduction to sustainable development. In: Liburd, J. and Edwards D. eds. *Understanding the Sustainable Development of Tourism*. Oxford: Goodfellow Publishers Ltd, pp.1-18.
- Lim, W. M. 2009. Alternative models framing UK independent hoteliers' adoption of technology. *International Journal of Contemporary Hospitality Management*, 21 (5) pp.610-618.
- Linaza, M., Marimon, D., Carrasco, P., Alvarez, C., Montesa, J., Aguilar, J. and Diez, G. 2012. Evaluation of mobile augmented reality applications for tourism destinations. In: Fuchs, M., Ricci, F. and Cantoni, L. eds. *Information and Communication Technologies in Tourism 2012*. Sweden, New York: Springer-Verlag Wien pp.260-271.
- Lister, M., Dovey, J., Giddings, S., Grant, I. and Kelly, K. 2009. *New media: a critical introduction*. New York: Routledge.

- Litwin, M. S. 1995. *How to measure survey reliability and validity*. Thousands Oaks, CA: Sage Publications.
- Lonely Planet. 2013. Map of Edinburgh. [online] Available at: <http://www.lonelyplanet.com> [Accessed May 11 2013].
- Liu, Z. 2003. Sustainable tourism development: a critique. *Journal of Sustainable Tourism*, 11 (6) pp.459-475.
- Lunberg, D. and Lunberg, C. 1993. *International travel and tourism*. 2nd ed. New York: John Wiley.
- MacLellan, R. 1998. Tourism and the Scottish environment. In: MacLellan, R. and Smith, R. eds. *Tourism in Scotland*. London: International Thomson Business Press, pp.112-134.
- Mahmood, T., Ricci, F., Venturini, A. and Höpken, W. 2008. Adaptive recommender systems for travel planning. In: O'Connor, P., Höpken, W., Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.1-11.
- Manning, T. 1999. Indicators of tourism sustainability. *Tourism Management*, 20 (2) pp.179-181.
- Martin, D., Aluza, A. and Lamsfus, C. 2011. A contextual geofencing mobile tourism service. In: Law, R., Fuchs, M., Ricci, F. eds. *Information and Communication Technologies in Tourism 2011*. Austria. New York, Springer-Verlag Wien pp.191-202.
- Mason, P., Augustyn, M. and Seakhoa-King, A. 2010. Exploratory study in tourism: designing an initial, qualitative phase of sequenced, mixed methods research. *International Journal of Tourism Research*, 12 (5) pp. 432-448.
- McCabe, S. 2009. Who is a tourist? Conceptual and theoretical developments. In: Tribe, J. ed. *Philosophical Issues in Tourism*. Bristol: Channel View. pp. 25-42.
- McCool, S. F., Moisey, R. N. and Nickerson, N. P. 2001. What should tourism sustain? The disconnect with industry perceptions of useful indicators. *Journal of Travel Research*, 40 (2) pp.124-131.
- McFarland, D. 2001. The role of age and efficacy on technology acceptance: implications for e-learning. *Proceedings of WebNet 2001: World Conference on the WWW and Internet*. Orlando, Florida, October 23-27.
- McIntosh, R. W., Goeldner, C. R. and Ritchie, B. R. J. 1995. *Tourism: principles, practices, philosophies*. 7th ed. New York: John Wiley & Sons, Inc.

- McKercher, B., Prideaux, B., Cheung, C. and Law, R. 2010. Achieving voluntary reductions in the carbon footprint of tourism and climate change. *Journal of Sustainable Tourism*, 18 (3) pp.297-317.
- Mick, D. and Fournier, S. 1998. Paradoxes of technology: consumer cognizance, emotions, and coping strategies. *Journal of Consumer Research*, 25 (2) pp.123-143.
- Middleton, V., Fyall, A., Morgan, M. and Ranschod, A. 2009. *Marketing in travel and tourism*. 4th ed. Oxford: Butterworth-Heinemann.
- Miles, M. B. and Huberman, A. M. 1994. *An expanded source book: qualitative data analysis*. 2nd ed. Thousand Oaks, CA: Sage Publications, Inc.
- Miller, G. and Twining-Ward, L. 2005. *Monitoring for a sustainable tourism transition: the challenge of developing and using indicators*. Wallingford: CABI Publishing.
- Miller, G., Rathouse, K., Scarles, C., Holmes, K. and Tribe, J. 2010. Public understanding of sustainable tourism. *Annals of Tourism Research*, 37 (3) pp.627-645.
- Miller, R. 2003. Triangulation. In: Miller, R. and Brewer, J. eds. *The A-Z of social research*. London: Sage Publications, pp.326-329.
- Minghetti, V. and Buhalis, D. 2010. Digital divide in tourism. *Journal of Travel Research*, 49 (3) pp.267-281.
- Molina-Azorin, J. 2011. The use and added value of mixed methods research in management research. *Journal of Mixed Methods Research*, 5 (1) pp.7-24.
- Moore, K., Smallman, C., Wilson, J. and Simmons, D. 2012. Dynamic in-destination decision-making: an adjustment model. *Tourism Management*, 33 (3) pp.635-645.
- Morgan, D. 2007. Paradigms lost and pragmatism regained: methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1 (1) pp.48-76.
- Morris, M. G. and Venkatesh, V. 2000. Age Differences in Technology Adoption Decisions: Implications for a Changing Workforce. *Personnel Psychology*, 53 pp.375-403.
- Mowen, J. 1995. *Consumer behavior*. 4th ed. Englewood Cliffs, NJ: Prentice-Hall Inc.
- Munro, B. H. 2005. *Statistical methods for health care research*. 5th ed. Philadelphia: Lippincott Williams & Wilkins.

- Murphy, J. and Schegg, R. 2006. Information requirements of hotel guest for location based services: identifying characteristic segments. In: Hitz, M., Siagla, M. and Murphy, J. eds. *Information and Communication Technologies in Tourism 2006*. Switzerland. New York: Springer-Verlag Wien pp.248-259.
- Netto, A. P. 2009. What is tourism? Definitions, theoretical phases and principles. In: Tribe, J. ed. *Philosophical Issues in Tourism*. Bristol: Channel View. pp. 43- 61.
- Neuhofer, B. 2012. An analysis of the perceived value of touristic location based services. In: Fuchs, M., Ricci, F. and Cantoni, L. eds. *Information and Communication Technologies in Tourism 2012*. Sweden. New York: Springer-Verlag Wien pp.84-95.
- Neuhofer, B., Buhalis, D. and Ladkin, A. 2012. Conceptualising technology enhanced destination experiences. *Journal of Destination Marketing & Management*, 1, pp.36-46.
- New Media Trend Watch 2011. US early mobile adopters are frustrated with the speed, size and design of mobile Web [online]. Available at: www.newmediatrendwatch.com/news [Accessed March 25 2011].
- Nickerson, R. C. 2008. Whither wireless? Future directions in mobility. *Communications of the Association of Information Systems*, 23 (19) pp.333-350.
- Niininen, O., March, R. and Buhalis, D. 2006. Consumer centric tourism marketing. In: Buhalis, D. and Costa, C. eds. *Tourism Management Dynamics: Trends, Management and Tools*. Oxford: Elsevier Butterworth- Heinemann.
- Nusair, K., Erdem, M., Okumus, F. and Bilgihan, A. 2012. Users' attitudes toward online social networks in travel. In: Sigala, M., Christou, E. and Gretzel, U. eds. *Social Media in Travel, Tourism and Hospitality: Theory Practice and Cases*. Surrey: Ashgate Publishing Limited.
- Oh, S., Lehto, X. Y. and Park, J. 2009. Travelers' intent to use mobile technologies as a function of effort and performance expectancy. *Journal of Hospitality Marketing & Management*, 18 (8) pp.765-781.
- Office for National Statistics, 2013. Overseas Travel and Tourism, December, 2012 [online] Available at: http://www.ons.gov.uk/ons/dcp171778_298653.pdf [Accessed February 25 2013].
- Olsson, T., Lagerstam, E., Karkkainen, T., Vaananen-Vainio-Mattila, K. 2013. Expected user experience of mobile augmented reality services: a user study in the context of shopping centres. *Personal and Ubiquitous Computing*, 17 (2) pp.287-304.
- Olsson, T. and Salo, M. 2012. Narratives of satisfying and unsatisfying experiences of current mobile augmented reality applications. *Proceedings of the SIGCHI*

Conference on Human Factors in Computing Systems, Association for Computing Machinery pp. 2779-2788.

Oppenheim, A. N. 2001. *Questionnaire design, interviewing and attitude measurement*. New ed. London: Continuum.

Ozdenizci, B., Aydin, M., Coskun, V. and Ok, K. 2010. NFC research framework: a literature review and future research directions. *14th International Business Information Management Association Conference*. June 23-24. Istanbul, Turkey.

Pallant, J. 2010. *SPSS survival manual*. 4th ed. Berkshire: McGraw-Hill.

Parasuraman, A. 2000. Technology readiness index (Tri): a multiple-item scale to measure readiness to embrace technologies. *Journal of Service Research*, 2 (4) pp. 307-320.

Paskaleva, K. and Megliola, M. 2011. Innovative technologies for advanced urban tourism e-services. *Information Technology & Tourism*, 12 pp.269-282.

Patton, M. 2002. *Qualitative research & evaluation methods*. 3rd ed. Thousand Oaks, CA: Sage Publications.

Peeters, P., Gössling, S. and Lane, B. 2009. Moving towards low-carbon tourism: new opportunities for destinations and tour operators. In: Gössling, S., Hall, C. M. and Weaver, D. eds. *Sustainable Tourism Futures: Perspectives on Systems, Restructuring and Innovations*. New York: Routledge, pp.240-257.

Pantano, E. and Servidio, R. 2011. An exploratory study of the role of pervasive environments for promotion of tourism destinations. *Journal of Hospitality and Tourism Technology*, 2 (1) pp.50-65.

Payne, A. F., Storbacka, K., Frow, P. 2008. Managing the co-creation of value. *Journal of the Academy of Market Science*, 36 pp.83-96.

Pedersen, P., Nysveen, H. and Thorbjornsen, H. 2002. The adoption of mobile services: a cross service study [online].SNF Report No.31/02 Available at: <http://cosmic.rrz.uni-hamburg.de/webcat/hwwa/edok03/no2g/R31-02.pdf> [Accessed May 20 2013].

Perea y Monsuwe, T., Dallaert, B. and De Ruyter, K. 2004. What drives consumers to shop online? a literature review. *International Journal of Service Industry Management*, 15 (1) pp.102-121.

Pernecky, T. and Jamal, T. 2010. (Hermeneutic) Phenomenology in tourism studies. *Annals of Tourism Research*, 37 (4) pp.1055-1075.

Pesonen, J. and Horster, E. 2012. Near field communication technology in tourism. *Tourism Management Perspectives*, 4 pp.11-18.

Petr, C. 2009. E-Tourist behavior: the influence of IT on consumers. In: Kozak, M. and Decrop, A. ed. *Handbook of tourist behaviour: theory & practice*. New York: Routledge, pp.211-225.

PhoCusWright 2011. Travel innovation and technology trends: 2011 and beyond. [online] PhoCusWright Inc. Available at <http://www.phocuswright.com> [Accessed: October 20 2011].

PhoCusWright 2012. PhocusWright's mobile hits the mainstream: technology and industry trends. [online] PhoCusWright Inc. Available at <http://www.phocuswright.com> [Accessed: May 16 2013].

Pickett-Baker, J. and Ozaki, R. 2008. Pro-environmental products: marketing influence on consumer purchase decision. *Journal of Consumer Marketing*, 25 (5) pp.281-293.

Pine, J. B. and Gilmore, J. H. 1998. Welcome to the experience economy. *Harvard Business Review*, July-August pp.97-105.

Prahalad, C. K. and Ramaswamy, V. 2003. The new frontier of experience innovation. *MIT Sloan Management Review*, 44 (4) pp.12-18.

Prahalad, C. K. and Ramaswamy, V. 2004. Co-creation experiences: the next practice in value creation. *Journal of Interactive Marketing*, 18 (3) pp.5-14.

Poon, A. 1993. *Tourism, technology and competitive strategies*. Wallingford: CAB International.

Pura, M. 2005. Linking perceived value and loyalty in location-based mobile services. *Managing Service Quality*, 15 (6) pp.509-538.

QSR International. 2010. *NVivo 9 basics: set up a project in NVivo and work with your material*. QSR International Pty Ltd.

Racherla, P., Clark, H. and Hyun, M. Y. 2008. Exploring the role of innovative technologies in building a knowledge-based destination. *Current Issues in Tourism*, 11 (5) pp.407-428.

Ram, S. and Sheth, J. N. 1989. Consumer resistance to innovations: the marketing problem and its solutions. *The Journal of Consumer Marketing*, 6 (2) pp.5-14.

Rasinger, J., Fuchs, M. and Höpken, W. 2007. Information search with mobile tourist guides: a survey of usage intention. *Information Technology & Tourism* 9, pp.177-194.

Resatsch, F. 2010. *Ubiquitous computing: developing and evaluating near field communication applications*. Munchen: Springer.

- Ricci, F. 2010 Mobile recommender systems. *Information Technology & Tourism* 12, pp.205-231.
- Richards, L. 2005. *Handling qualitative data: a practical guide*. Thousand Oaks, CA: Sage Publications Ltd.
- Riegner, C. 2007. Word of mouth on the web: the impact of Web 2.0 on consumer purchase decisions. *Journal of Advertising Research*, 47 (4) pp.436-447.
- Rissen, J. and Soni, R. 2009 The evolution to 4G systems. *Bell Labs Technical Journal* 13 (4) pp.1-6.
- Robson, C. 2011. *Real world research*. 3rd ed. West Sussex: John Wiley & Sons Ltd.
- Rogers, E. 1986. *Communication technology: the new media in society*. New York: The Free Press.
- Rogers, E. 1995. *Diffusion of innovations*. New York, NY: Free Press.
- Roulston, K. 2011. Working through challenges in doing interview research. *International Journal of Qualitative Methods*, 10 (4) pp.348-366.
- Ryan, G. W. and Bernard, H. R. 2003. Techniques to identify themes. *Field Methods*, 15 (1) pp.85-109.
- Sarver, V. T. 1983. Ajzen and Fishbein's "Theory of Reasoned Action": a critical assessment. *Journal for the Theory of Social Behaviour*, 13 (2) pp.155-164.
- Schau, H. J. and Gilly, M. C. 2003. We are what we post? Self-presentation in personal web space. *Journal of Consumer Research*, 30 (3) pp.385-404.
- Schiffman, L., Bednall, D., Cowley, E., O'Cass, A., Watson, J. and Kanuk, L. 2001. *Consumer behaviour*. 2nd ed. Frenchs Forest NSW: Prentice Hall.
- Schmallegger, D. and Carson, D. 2008. Blogs in tourism: changing approaches to information exchange. *Journal of Vacation Marketing*, 14 (2) pp.99-110.
- Schmidt-Belz, B., Laamanen, H., Poslad, S. and Zipf, A. 2003. Location-based mobile tourist services -first user experiences. In: Frew, A., Hitz, M. and O'Connor, P. eds. *Information and Communication Technologies in Tourism 2003*. Finland, New York: Springer-Verlag Wien, pp.116-123.
- Scott, D. 2011. Why sustainable tourism must address climate change. *Journal of Sustainable Tourism*, 19 (1) pp.17-34.
- Scott, D. and Becken, S. 2010. Adapting to climate change and climate policy: progress, problems and potentials. *Journal of Sustainable Tourism*, 18 (3) pp.283-295.

- Scott, M. M. and Frew, A. J. 2013. Exploring the role of in-trip applications for sustainable tourism. In: Cantoni, L. and Xiang, Z. eds. *Information and Communication Technologies in Tourism 2013*. Austria, New York: Springer Verlag-Wien, pp.36- 46.
- Seaton, A. V. 1998. The history of tourism in Scotland: approaches, sources and issues. In: MacLellan, R and Smith, R. eds. *Tourism in Scotland*. London: International Thomson Business Press, pp.1-41.
- Sharpley, R. 2009. *Tourism development and the environment: beyond sustainability?* London: Earthscan.
- Sheldon, P. J. 1997. *Tourism information technology*. Wallingford: CAB International.
- Sheth, J. N. and Krishnan, B. C. 2003. Consumer behaviour. In: Calhoun, J. ed. *Marketing Best Practices*. 2nd ed. Mason, Ohio: Thomson Learning, pp.136-160.
- Shuen, A. 2008. *Web 2.0: a strategy guide*. Sebastopol, CA: O'Reilly Media Inc.
- Sirakaya, E. and Woodside, A. 2005. Building and testing theories of decision making by travellers. *Tourism Management*, 26 pp.815-832.
- Smallman, C. and Moore, K. 2010. Process studies of tourists' decision-making. *Annals of Tourism Research*, 37 (2) pp.397-422.
- Snepenger, D. and Snepenger, M. 1993. Information search by pleasure travellers. In: Khan, M., Olsen, M. and Var, T. eds. *VNR's Encyclopedia of Hospitality and Tourism*. New York: Van Norstrand, pp.830-835.
- Solomon, M. R., Bamossy, G., Askegaard, S. and Hogg, M. K. 2010. *Consumer behaviour: a European perspective*. 4th ed. Essex: Pearson Education.
- Stabler, M. J. 1997. An overview of the sustainable tourism debate and the scope and content of the book. In: Stabler, M. J. ed. *Tourism and Sustainability: Principles to Practice*. Wallingford: CAB International, pp.1-21.
- Stamboulis, Y. and Skayannis, P. 2003. Innovation strategies and technology for experience-based tourism. *Tourism Management*, 24 pp.35-43.
- Stankov,U., Lazic, L. and Dragicevic, V. 2010. The extent of use of Facebook user-generated content by the national tourism organizations in Europe. *European Journal of Tourism Research*, 3 (2) pp. 105-113.
- Steier, F. 1995. Reflexivity and methodology: an ecological constructionism. In: Steier, F. ed. *Research and reflexivity*. Thousand Oaks, CA: Sage Publications, pp. 163-185.

- Swarbrooke, J. 1999. *Sustainable tourism management*. Wallingford: CAB International.
- Swarbrooke, J. and Horner, S. 2007. *Consumer behaviour in tourism*. 2nd ed. Oxford: Butterworth-Heinemann.
- Swilley, E. 2010. Technology rejection: the case of the wallet phone. *Journal of Consumer Marketing*, 27 (4) pp.304-312.
- Tan, W. K. and Chang Y. C. 2012. QR code as an on-site tourism information source. *Information Technology & Tourism*, 13 pp.75-91.
- Tashakkori, A. and Teddlie, C. 1998. *Mixed method: combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage Publications.
- Tashakkori, A. and Teddlie, C. 2003. *Handbook of mixed methods in social & behavioral research*. Thousand Oaks, CA: Sage Publications.
- Teddlie, C. and Tashakkori, A. 2009. *Foundations of mixed methods research: integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage Publications.
- Teddlie, C. and Yu, F. 2007. Mixed methods sampling: a typology with examples. *Journal of Mixed Methods Research*, 1 (1) pp.77-100.
- The Co-operative Group 2012. *Ethical consumer markets report 2012*. The Co-operative Group.
- Therkelsen, A. 2010. Deciding on family holidays- role distribution and strategies in use. *Journal of Travel & Tourism Marketing*, 27 (8) pp.765-779.
- Tjostheim, I., Nordlund, B. and Vestgaarden, J. 2004. Location-based mobile services and privacy: controlling access to location information. In: Frew, A. J., ed. *Information and Communication Technologies in Tourism 2004*. Egypt, New York: Springer-Verlag Wien, pp.85-95.
- Tjostheim, I. and Fesenmaier, D. 2008. Mobile devices as substitute or supplement to traditional information sources: city tourists, mobile guides and GPS navigation. In: O'Connor, H., Höpken, H. and Gretzel, U. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.324-335.
- Tnooz. 2012. Nielsen study shows travel usage trends for mobile devices.[online] Available at <http://www.tnooz.com/2012/08/09/news/nielsen-study-shows-travel-usage-trends-for-mobile-devices-infographic/#Gj83VGyF1PeUM6Rm.99> [Accessed October 5, 2012].
- Touray, K. and Jung, T. 2010. Exploratory study on contributions of ICTs to sustainable tourism development in Manchester. In: Gretzel, U., Law, R. and Fuchs,

M., eds. *Information and Communication Technologies in Tourism 2010*. Switzerland, New York: Springer-Verlag Wien, pp.493-505.

TripAdvisor 2011. TripAdvisor's traveller's choice best destinations of 2011. [online] Available at: <http://www.tripadvisor.co.uk/> [Accessed May 28 2011].

Tussyadiah, I. 2012. Territoriality and consumption behaviour with location-based media. In: Fuchs, M., Ricci, F. and Cantoni, L. eds. *Information and Communication Technologies in Tourism 2012*. Sweden, New York: Springer-Verlag Wien pp.249-259.

Tussyadiah, I. 2013. When cell phones become travel buddies: social attribution to mobile phones in travel. In: Cantoni, L. and Xiang, Z. eds. *Information and Communication Technologies in Tourism 2013*. Austria, New York: Springer-Verlag Wien, pp.82-93.

Tussyadiah, I. and Zach, F. 2013. Social media strategy and capacity for consumer co-creation among destination marketing organizations. In: Cantoni, L. and Xiang, Z. eds. *Information and Communication Technologies in Tourism 2013*. Austria, New York: Springer-Verlag Wien, pp. 242-253.

United Nations Conference on Trade and Development. 2010. *Information Economy Report 2010: ICTs, enterprises and poverty alleviation*. [online] Available at: http://www.unctad.org/en/docs/ier2010_embargo2010_en.pdf [Accessed April 5 2011].

UNEP and UNWTO. 2005. *Making tourism more sustainable: a guide for policy makers*. United Nations Environment Programme and World Tourism Organization.

UNWTO 2002. *Voluntary initiatives for sustainable tourism*. Madrid: World Tourism Organization.

UNWTO. 2008. Understanding tourism: basic glossary. [online]. Madrid, World Tourism Organization. Available at: <http://media.unwto.org/en/content/understanding-tourism-basic-glossary> [Accessed January 17 2011]

UNWTO. 2009. *From Davos to Copenhagen and beyond: advancing tourism's response to climate change. UNWTO background paper*. Madrid, World Tourism Organization.

UNWTO-UNEP-WMO. 2007. *Davos Declaration. Climate change and tourism: responding to global challenges*. [online]. Madrid, World Tourism Organization. Available at: <http://www.unwto.org/pdf/pr071046.pdf> [Accessed January 17 2011].

UNWTO-UNEP-WMO. 2008. *Climate change and tourism: responding to global challenges*. Madrid, World Tourism Organization.

- UNWTO^a 2011. UNWTO Welcomes the world's one-billionth tourist [online]. Madrid, World Tourism Organization. Available at: <http://media.unwto.org/en/press-release/2012-12-13/unwto-welcomes-world-s-one-billionth-tourist> [Accessed: January 3, 2012].
- UNWTO^b 2011. Tourism Towards 2030: Global Review [online] Madrid, World Tourism Organization. Available at: http://media.unwto.org/sites/all/files/pdf/unwto_2030_ga_2011_korea.pdf [Accessed: October 14, 2011].
- UNWTO 2012. UNWTO Tourism Highlights 2012 Edition. [online]. Madrid, World Tourism Organization. Available at: http://dtxtg4w60xqpw.cloudfront.net/sites/all/files/docpdf/unwtohighlights12enlr_1.pdf [Accessed: January 3, 2012].
- Venkatesh, V. and Davis, F. D. 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46 (2) pp.186- 204.
- Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. 2003. User acceptance of information technology: toward a unified view. *MIS Quarterly*, 27 (3) pp.425-478.
- VisitScotland 2009. VisitScotland Corporate Plan 2009/2012. [online] VisitScotland. Available at: www.visitscotland.org [Accessed February 07 2011].
- VisitScotland 2011. Tourism in Scotland 2009. [online] VisitScotland. Available at: www.visitscotland.org [Accessed February 07 2011].
- VisitScotland 2012. Scotland: The key facts on tourism 2011. [online] VisitScotland. Available at: www.visitscotland.org [Accessed February 23 2013].
- Wang, D. and Fesenmaier, D. R. 2013. Transforming the travel experience: the use of smartphones for travel. In: Cantoni, L. and Xiang, Z. eds. *Information and Communication Technologies in Tourism 2013*. Austria, New York: Springer-Verlag Wien, pp.58-69.
- Wang, D., Park, S. and Fesenmaier, D. R. 2012. The role of smartphones in mediating the touristic experience. *Journal of Travel Research*, 51 (4) pp.371-387.
- Wang, D. and Xiang, Z. 2012. The new landscape of travel: a comprehensive analysis of smartphone apps. In: Fuchs, M., Ricci, L. and Cantoni, L. eds. *Information and Communication Technologies in Tourism 2012*. Sweden, New York: Springer-Verlag Wien, pp.308-319.
- Weaver, D. 2006. Sustainable tourism: theory and practice. Oxford: Elsevier Butterworth-Heinemann

- Weaver, D. 2009. Reflections on sustainable tourism and paradigm change. In: Gössling, S., Hall, C. M. and Weaver, D. eds. *Sustainable Tourism Futures: Perspectives on Systems, Restructuring and Innovations*. New York: Routledge, pp. 33-40.
- Weaver, D. 2011. Can sustainable tourism survive climate change? *Journal of Sustainable Tourism*, 19 (1) pp.5-15.
- Werthner, H. and Klein, S. 1999. *Information technology and tourism- a challenging relationship*. New York: Springer-Verlag Wien.
- Wheeller, B. 1991. Tourism's troubled times: responsible tourism is not the answer. *Tourism Management*, 12 (2) pp.91-96.
- Wilkinson, P. F. W. 1997. *Tourism policy & planning: case studies from the Commonwealth Caribbean*. New York: Cognizant Communication Corporation.
- Woodside, A. G., Krauss, E., Caldwell, M. and Chebat, J. C. 2007. Advancing theory for understanding travelers' own explanations of discretionary travel behaviour. *Journal of Travel & Tourism Marketing*, 22 (1) pp.15-35.
- Woolley, C. 2009. Meeting the mixed methods challenge of integration in a sociological study of structure and agency. *Journal of Mixed Methods Research*, 3 (1) pp.7-25.
- World Bank. 2009. Information and communications for development 2009: Extending reach and increasing impact.[online]. World Bank Publications. Available at: <http://www.worldbank.org/ic4d> [Accessed April 5 2011].
- WCED. 1987. *Our common future*. World Commission on Environment and Development. Oxford: Oxford University Press.
- World Travel & Tourism Council, World Tourism Organization, Earth Council. 1995. *Agenda 21 for the Travel and Tourism Industry*. World Travel & Tourism Council.
- Xiang, Z. and Gretzel, U. 2010. Role of social media in online travel information search. *Tourism Management*, 31 pp.179-188.
- Yang, K. and Jolly, L. D. 2008. Age cohort analysis in adoption of mobile data services: gen Xers versus baby boomers. *Journal of Consumer Marketing*, 25 (5) pp.272-280.
- Yeoman, I., Munro, C. and McMahon-Beattie, U. 2006. Tomorrow's: World, consumer and tourist. *Journal of Vacation Marketing*, 12 (2) pp.174-190.
- Yoo, K. and Gretzel, U. 2012. Use and creation of social media by travellers. In: Sigala, M., Christou, E. and Gretzel, U. eds. *Social Media in Travel, Tourism And Hospitality: Theory, Practice And Cases*. Surrey: Ashgate Publishing Limited.

Yovcheva, Z., Buhalis, D. and Gatzidis, C. 2013. Engineering Augmented Tourism Experiences. In: Canton, L. and Xiang, Z. eds. In: *Information and Communication Technologies in Tourism 2013*. Austria, New York: Springer Verlag-Wien pp. 24-35.

Zanker, M. , Fuchs, M., Höpken, W., Tuta, M. and Muller, N. 2008. Evaluating recommender systems in tourism-a case study from Austria. In: O'Connor, P. Höpken, W. and Gretzel, U. eds. *Information and Communication Technologies in Tourism 2008*. Austria, New York: Springer-Verlag Wien, pp.24-31.

Zipf, A. and Malaka, R. 2001. Developing location-based services for tourism: the service providers' view. In: Sheldon, P. J., Wöber, K. and Fesenmaier, D., eds. *Information and Communication Technologies in Tourism 2001*. Canada, New York: Springer-Verlag Wien, pp.83-90.