

**AN INVESTIGATION INTO INFORMATION  
AND COMMUNICATION TECHNOLOGIES-  
BASED APPLICATIONS FOR  
SUSTAINABLE TOURISM DEVELOPMENT  
OF DESTINATIONS**

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A thesis submitted in partial fulfilment  
of the requirements for the degree of  
Doctor of Philosophy

QUEEN MARGARET UNIVERSITY

2009

## Abstract

Sustainable tourism is a heavily researched concept but in reality there has been limited implementation of the principles and practices of sustainable tourism for destinations. Adopting a destination focused perspective, this thesis presents research which expounded Information and Communication Technology (ICT) as a practical, new and innovative approach to sustainable tourism development i.e. computer-supported sustainability.

A literature review revealed that there was no specific study focusing on the uses and applications of ICT for sustainable tourism development despite the mention and benefits of doing so. However it did identify that several opportunities existed in destination management for using ICT as well as a collection of ICT-based tools/applications which can be used for managing different aspects of sustainable tourism. Therefore an investigative analysis was necessary in building a solid body of work on the uses and applications of ICT for sustainable tourism as a practical approach for destination managers.

These findings formed the input for the primary research which was conducted in two phases: surveys administered to destination managers and eTourism experts followed by semi-structured interviews with experts in this domain identified from the surveys. The primary research alongside the literature findings led to the development of a descriptive framework which identified, categorised and described the uses of these ICT-based tools/applications for managing tourism's impacts. Assessment procedures based on the sustainability goals of the destination were then developed in order assist destination managers selecting the ICT-based tools/applications that were best suited for managing the sustainable tourism development of their destinations. The conclusion of this research clearly identifies that destination managers' sophisticated application of ICT to sustainable tourism is the next logical and practical step they can take in making sustainable tourism a workable reality for their destinations.

This research is the building block for prospective research in the ICT-sustainable tourism domain. Future research avenues would be to use the results presented to determine the suitability, applicability and feasibility of the ICT-based tools/applications presented for destination managers. This existing research can be used to develop a more co-ordinated approach to theory development and engage in more empirical research to address tourism challenges with regards to using ICT for sustainable tourism development.

**Keywords:** sustainable tourism, information and communication technology, eTourism, ICT-based tools/applications, destination management, computer-supported sustainability.

## **Acknowledgements**

I am deeply indebted to many people who have helped me throughout this research process.

I would like to thank my supervisory team of Professor Andrew J. Frew and Dr. Calum MacLeod, not only for their constructive feedback and advice, but also their kind support and guidance throughout this process. It was a great pleasure to work with them.

I am also grateful to Queen Margaret University for the PhD research studentship and would like to thank all the members of staff who have helped me in accomplishing this thesis. My thanks also goes out to the individuals who participated in the research and the tourism industry stakeholders who provided me with invaluable assistance.

Lastly, I would like to thank my family and friends for their unwavering support and encouragement over the course of carrying out this research.

## Abbreviations

1G	First Generation Mobile Phone Network
2G	Second Generation Mobile Phone Network
3G	Third Generation Mobile Phone Network
ANOVA	Analysis of Variance
CC	Carbon Calculator
CEA	Cumulative Effects Assessment
CI	Community Informatics
CIS	Community Based Information System
COC	Code of Conduct
CS	Computer Simulation
DMO	Destination Management Organisation
DMS	Destination Management Systems
DSS	Decision Support System
EIAS	Economic Impact Analysis Software
EIA	Environmental Impact Assessment
EMIS	Environment Management Information System
EMS	Environment Management System
GIS	Geographical Information Systems
GPS	Global Positioning Systems
ICT	Information and Communication Technology
ITS	Intelligent Transport System
LAC	Limits of Acceptable Change
LBS	Location Based Services

PAGIS	Participatory Approaches and Geographical Information Systems
PDA	Personal Digital Assistant
SPSS	Statistical Package for the Social Sciences
TIS	Tourism Information System
VERP	Visitor Experience and Resource Protection
VIM	Visitor Impact Management
VT	Virtual Tourism
WCOCFS	Weather, Climate and Ocean Change Forecasting Software
WCS	World Conservation Strategy
WLAN	Wireless Local Area Network
WMAN	Wireless Metropolitan Area Networks
WiMax	Worldwide Interoperability for Microwave Access
WPAN	Wireless Personal Area Network
WWAN	Wireless Wide Area Networks

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# **Chapter One**

# **Chapter One**

## **Defining the Research Agenda**

### **1.1 Scope of the Research**

The research discussed in this thesis is an investigative study into the uses and applications of information and communication technology (ICT) for sustainable tourism development. It develops the proposition that use of such technologies can be a practical approach which destinations may use to mitigate some of tourism's negative impacts. Specifically, this thesis adopts a destination-focused perspective and, through the undertaking of a worldwide study, examined how ICT can be used operationally, tactically and strategically in the management of sustainable tourism. It presents a framework for the application of ICT by destination managers and discusses the opportunities in destination management for applying ICT to sustainable tourism development. This chapter therefore introduces the context on which this work is based and discusses the rationale for why research in domain is vitally important.

### **1.2 Research Background**

Tourism continues to develop as a major economic activity boasting visitor arrivals of 924 million in 2008, representing a growth of 2% over 2007 (United Nations World Tourism Organisation 2009a). This accounts for an increasing contribution to Gross Domestic Product, in some cases amounting to over 10% (United Nations World Tourism Organisation 2009b). These economic gains related to tourism development have led to the debate on its development as an industry (Pearce 1999; McCool et al. 2001; Holloway 2002; Croes 2006; Page and Connell 2006) and tourism has been and continues to be regarded as a cure for the economic and developmental problems of many countries (Saveriades 2000; Pforr 2001; Andereck et al. 2005). Today, it is still being promoted by numerous developing and developed countries as a lucrative means of diversifying their economic base especially in these times of economic crisis (World Travel and Tourism Council

2002). However this economic focus has prevented it from developing with the environmental concerns it should have considered from the outset (Barrow 2006).

Like any economic activity, tourism has produced detrimental environmental and socio-economic impacts (Becken and Patterson 2006; Choi and Sirakaya 2006) which are destroying tourism's chief product i.e. the environment (Murphy 1985; Poon 1993; Clarke 1997; Liburd 2005; Avdimiotis et al. 2006). Furthermore, irresponsible tourism management has led to degradation of all environments with many destinations already experiencing damage to their environments as a result of ad hoc and unplanned tourism development (Murphy 1985; Choi and Sirakaya 2006, Ruhanen 2008). Many times, the effects of these impacts are irreversible and this may leave many destinations with a legacy of economic, environmental and social problems which harms both the local community and the tourists (Hall and Lew 1998). In the literature there are no shortages of examples of the negative impacts of tourism which have been well documented and will not be repeated by the researcher (see Inskip 1991; Coccossis 1996; Swarbrooke 1999; Mason 2003; Andereck et al. 2005; Archer et al. 2005; Cooper et al. 2005; Wall and Mathieson 2006). Destinations are therefore increasingly confronted with the problem of finding the right balance between the level of economic growth and maintenance of the environment (Edgell 2006).

The concept of the environment is frequently mentioned in this thesis. Swarbrooke (1999) identified five dimensions: the natural environment, natural resources, the frames environment, the built environment and wildlife. Tourism's continued success depends on all environments being maintained, protected and preserved for the future. For this research, a broad perspective of the environment will be adopted as encompassing the environmental, economic and the socio-cultural aspects.

The emerging economies of Brazil, Russia, India and China, will also contribute to the environmental problems the industry already faces with more people now travelling from these countries. The World Travel and Tourism Council identified India and China as two of the fastest growing tourism industries for the next 10 to 15 years. By 2015 there could be 9 million outbound tourists from India and 67 million



from China (Destination World 2007). By the year 2020, China is expected to produce 100 million outbound tourists (United Nations World Tourism Organisation 2001b); and by 2040, China is forecast to be the largest economy in the world whilst India is expected to be the world's third largest economy (Destination World 2007). Likewise, by 2017 the Russian Federation will enter the ranking of the top ten in terms of total travel and tourism demand measured in absolute volume (World Travel and Tourism Council 2007) and the Brazilian outbound market is forecast to grow by 4.5% on average per year to 2020 (Intel International 2007). These trends were forecast before the global economy entered into a downward spiral but they are still valuable since tourism is a resilient industry, having overcome many obstacles before (United Nations World Tourism Organisation 2009a). Destinations therefore need to adopt a long-term perspective and prepare for when the recession is over, since increasing arrivals from these countries will undoubtedly lead to environmental degradation of destinations if they are not properly managed.

Another burgeoning concern for the industry is that of climate change (Gössling 2009). On March 20<sup>th</sup> 2009, Prince Charles of the UK warned there could be as little as 100 months left to save the world from the irreversible damage of climate change. Tourism's contribution to climate change is attributed mainly to greenhouse gas emissions from the aviation industry (Gössling and Hall 2006) and this will no doubt intensify with the growth of the emerging markets, low-cost airlines and cheap package holidays. The main concerns of climate change for tourism are the threats of rising sea levels on low-lying coastal destinations, increasing desertification and damage posed to sports and sight-seeing activities in polar and mountainous areas as snow and ice covered areas ebb (United Nations World Tourism Organisation 2007). The preparedness of destinations for these environmental threats will be a critical factor for the continued prosperity of the industry. Tourists are also continuously changing their tastes and values and are now insisting on a higher quality environment, more exotic forms of tourist activities and better value for their money. This places greater demands on the resources leading to worsening impacts on the environment.

Taken collectively, the tourism industry has responded to these challenges by applying the concept of sustainable development to tourism policy and planning i.e. sustainable tourism (Butler 1991; Hardy and Beeton 2001; Choi and Sirakaya 2006). This is reflected in the growth of sustainable tourism policy statements, guidelines, strategies and initiatives being developed by all level of institutions and local communities at the destination (Hardy and Beeton 2001). Sustainable tourism has been regarded as a mechanism for achieving economic development whilst protecting, preserving and enhancing the environment (Swarbrooke 1999; United Nations World Tourism Organisation 2004a). A destination can be considered sustainable if an appropriate balance is achieved in the environmental, economic and socio-cultural aspects of tourism development (United Nations World Tourism Organisation 2004a; Edgell 2006).

Enormous efforts have been made since the Earth Summit in 1992 (United Nations Conference on Environment and Development 1992) to apply the principles of sustainable development to tourism with the hope of ensuring the industry's viability and its contribution to sustainable development (de Saumarez 2007). A plethora of ideas, techniques and philosophies have been developed due to the growing concerns on how destinations can develop in a sustainable manner (Swarbrooke 1999; Hasse 2003). However, most of the work on sustainable tourism has focused on theorising and policy formulation. Theorising is a useful method of putting issues into context but there needs to be some way of implementing the theory of sustainable tourism (Bramwell and Lane 1993; Liu 2003; Ruhanen 2008). The challenge lies in finding practical tools for tourism professionals to transform theory into action (Coccosis 1996; Wright 1998). An article by Pigram (1990, p. 8) stated that sustainable tourism "runs the risk of remaining irrelevant and inert as a feasible policy option for the real world of tourism development, without the development of effective means of translating the ideal into action." This statement still applies to the industry today. Ruhanen (2008) undertook a study which examined the transfer of academic knowledge in sustainable tourism to the public sector in Queensland, Australia. This research found that despite the vast body of knowledge on sustainable tourism, there has been little diffusion of this knowledge to the people who need to use it to plan

and manage tourism at the destination level. Future trends therefore indicate that destination managers need to find some solution to ensure that tourism is developed along the principles of sustainable tourism development and the theorising and policy making are translated into practical applications for their destinations.

In view of the above, this research proposes that sustainable tourism can become an effective concept in destination management through the application of ICT. Many developmental problems can be alleviated through the use of ICT (United Nations Conference on Trade and Development 2004). The use of ICT in tourism is not a new idea; rather the tourism industry has been influenced by ICT for the past thirty years (European Commission 2006) and ICT continues to be one of the greatest influences, fuelling dramatic changes within the industry (Werthner and Klein 1999, Frew 2000; Buhalis and Deimezi 2004; Gratzner et al. 2004). Additionally, destinations, due to their internal structures, readily lend themselves to the use and implementation of ICT applications (Werthner and Klein 1999). Despite this symbiotic relationship, the literature on the uses and applications of ICT in tourism is relatively new and most of the research has focused on improvements in operational business practices and less research has looked at ICT for strategic or tactical purposes.

This thesis therefore seeks to consider ICT in making sustainable tourism more manageable for destination managers. The strength of ICT for sustainable tourism will revolve around the way it is used by these managers rather than in technical functions. Tourism impacts can be “managed, mitigated and controlled” but this depends on the efforts that destination managers are willing to commit (McCool and Lime 2001, p. 381). A destination manager’s perspective is adopted since they play a critical role in how the sustainability of a destination is managed. This research will focus on investigating the uses and applications of ICT-based tools/applications for use by destination managers in managing tourism impacts.

### **1.3 Overview of Research Approach**

The research approach consisted of using a phenomenological approach to investigate the opinions and perspectives of destination managers and eTourism experts in the area of ICT and sustainable tourism. The use of ICT for sustainable tourism development is an under-researched area hence an inductive approach is more suited to this research since it allows the researcher to use the collected data to go back and forth with the literature to identify linkages so that theory can be constructed, tested and refined. Efforts have been made to read across disciplines and incorporate ideas and theories from a variety of fields, to offer a trans-disciplinary perspective. The research methods consisted of an exploratory scoping survey of destination managers and eTourism experts, worldwide, before undertaking semi-structured interviews with experts in this domain.

Chapters two, three and four contextualised the research problem and demonstrated how it pieced together with the wider existing literature. Undergoing this process helped the researcher in developing the research design (Blaxter et al. 2001). The literature review looked at how this research aligned with the current sustainable tourism research and the wider work on sustainable development by looking at the current approaches to sustainable tourism and identifying opportunities that exist where ICT can be used for sustainable tourism. Furthermore, it sought to approach the research from an innovative perspective and showed the usefulness of using innovation and the Abernathy and Clark (1985) model. The reasons for selection of this model as compared to other models of innovation are critically analysed in Chapter four. This process therefore identified the research gaps and explained how ICT can be an innovative, practical approach for destination managers.

The research strategies and their findings are discussed in greater depth in Chapters five and six. The decision to use a multiple method approach reflected the inductive nature of this research. At the beginning of this thesis, the context and the subject were still evolving topics of interest and this is still the situation to date. The United Nations is beginning to recognise ICT as having a leading role to play in sustainable tourism with United Nations Conference on Trade and Development holding a

conference with a stream specifically devoted to ICT for Sustainable Tourism in 2007. Despite these efforts and discussions, neither theoretical nor empirical research has been conducted in this research domain. This necessitated the completion of a worldwide study to see what actions destinations were taking in applying ICT in managing sustainable tourism development as well as building a comprehensive body of work which destination managers can use in applying ICT to their destinations.

Primary data collection consisted of two elements. Firstly, online questionnaires were distributed to destination managers and eTourism experts to gauge the level of awareness of ICT for sustainable tourism and to obtain their opinions and perspectives on the uses of ICT for sustainable tourism. This allowed an analysis of the types of destinations which were using ICT for sustainable tourism, the main problems of sustainable tourism and the areas where ICT were and can be used. It would also help in developing a collection of tools and procedures for selecting these ICT-based tools/applications. This process subsequently allowed for the use of interviews to explore the ideas brought forth from the questionnaires with experts in this domain.

#### **1.4 Delineations**

In investigating the uses and applications of ICT for sustainable tourism, it must be noted that there are no relevant extant theoretical frameworks or common modes of analysis from which to approach this research. Both sustainable tourism and eTourism are widely researched fields but from differing perspectives. This diversity poses challenges and choices for the researcher wishing to find a practical solution to an important issue within which to address theoretical issues regarding ICT applications to sustainable tourism. Perhaps the most essential of these choices regarded how sustainable tourism should be viewed and what aspects of the wide ranging literature on ICT should provide the core for this study. This answer to this relates to the areas in which this research project can make a contribution to knowledge and ensuring the project is practical, realistic and manageable. In seeking to investigate ICT uses for sustainable tourism development, it is first useful to set

some boundaries to this research. Boundaries are important in giving the project direction. Those which are set too large can result in problems due to the diversity and complexity of issues involved whereas narrow boundaries do not permit all the necessary elements to be included; for a sound analysis to occur (Lee 2001).

This project is looking at ICT as a new and innovative approach to sustainable tourism development. It is not focusing on ICT adoption or diffusion. This is because research and applications of ICT for sustainable tourism is very new and the probability of destinations using ICT in their sustainable tourism management would be limited. Therefore, much information would not be available on how it is adopted or diffused by destinations. Additionally, this thesis is not looking at measuring the technology or innovation i.e. it is not concerned with measuring how much technology tourism enterprises use and the degree of innovation they are involved in.

Both the theoretical and empirical literature have considered ICT as a means of allowing a firm to gain a competitive advantage in the marketplace. Innovation resulting from the use of ICT for sustainable tourism will definitely give firms a competitive advantage but this is not the heart of this research. Even though the researcher recognises that the process of innovation cannot be separated from a firm's competitive advantage (Singh et. al 2002), by engaging in this aspect would make the project too large and could result in failure in completion. This researcher also feels that applying ICT to tourism no longer provides Destination Management Organisations (DMOs) with a competitive advantage since today it is an accepted norm that they have this technology. This competitive advantage will result from DMOs engaging in creative and innovative applications of this ICT.

Moreover, this thesis does not focus on developing any new types of technologies for sustainable tourism development. Rather it will focus on what ICT-based tools/applications already exist and how these can be used for mitigating tourism's negative impacts. Most innovative projects in tourism tend to focus on developing a new type of hardware or a new type of technology. In contrast, this project is not developing anything new. In that sense, rather, the novelty of this research will come

from canvassing the literature, undertaking primary research and demonstrating how these existing technologies can be used in managing sustainable tourism development.

Additionally, this thesis is not concentrating on looking at the uses of ICT for sustainable tourism from the perspective of individual businesses at the destination such as hotels, restaurants, tour operators, but rather from the perspective of a DMO. It should also be noted that this research is not attempting to criticise the existing tools/mechanisms already being used for sustainable tourism development but rather looks at complementing these approaches with the use of ICT-based tools/applications. It is taking a different approach to sustainable tourism development at the destination level by proposing the use of new technology for new tourism i.e. computer-supported sustainability.

Lastly, this thesis is not proposing that ICT is a cure-all for all ills related to a destination sustainability concerns or that it can be used for all areas of sustainable tourism. Schianetz et al. (2007) argued that there is no single tool that can manage the economic, environmental and social problems of tourism at all levels. The researcher agrees with this viewpoint since in operationalising sustainable tourism, several challenges are posed such as the nature of the tourism product, diverse groups of stakeholders in tourism with varying interests and the fragmented processes by which decisions are taken (Berno and Bricker 2001). However, the use of ICT can prove invaluable in removing some of these barriers and making tourism a long-run, viable success as will be discussed in subsequent chapters.

In setting boundaries, definitions are always a matter of importance in order to ask the right questions to the right persons and gather valid and reliable data. The glossary (See Appendix six) provides list of definitions from throughout this thesis. However, the researcher felt it was necessary to discuss the background to the definitions adopted for the terms: destination, destination management, destination management organisation, destination manager and tourism at this point since these terms are critical concepts in this research. Two other important terms in this thesis:

sustainable tourism development and ICT will be discussed in chapters two and three respectively.

#### **1.4.1 Destination**

Destinations can be regarded as any well defined geographical area such as a continent, a region, a country, a town or an attraction (Youell 1998; Hall 2000; Ritchie and Crouch 2003; Sainaghi 2006; Tourism Sustainability Group 2007). They are an important symbol and a means of attracting tourists (Ko 2005; Tsaur et al. 2006). They are considered away from home places (Ryan and Cave 2005) where people travel to enjoy the products and services (such as accommodation, attractions, events and other tourist facilities) which provide different experiences for the tourists to enjoy (Youell 1998; Buhalis 2000; Ritchie and Crouch 2003). These destinations are therefore critical to the tourist experiences (Vukonic 1997).

For this research, a destination will be defined as a physical space/geographical area which contains tourism products and services to be consumed by the tourists as part of the experience and which is managed and marketed by destination authorities /organisations. These destinations are the attracting power for tourists and they are the central point for all the stakeholders in tourism (Carter 2005; Ko 2005) but they are also the areas where the main tourism impacts (economic, social and environmental) ensue and are felt most powerfully (Murphy 1985; Medlik 2003; Wall and Mathieson 2006). Therefore they are also the places where preventative and remedial measures should be implemented for tourism to be managed in a sustainable manner.

Destinations are therefore vulnerable, complex and problematic interrelated entities (Prosser 1994; Saarinen 2004), where changes in one area result in consequences to other parts (Presenza et al. 2005). They present assorted challenges for management in that they must cater to a variety of stakeholders i.e. the tourists, the businesses and the local communities (Howie 2003). In these times of uncertainty and change, successfully managing destinations will present greater complexities. There needs to be a coordinated approach to managing the destination where strategic planning of



the component parts are maximised to the benefit of stakeholders. An organisation must be established to take this lead for the successful development of a destination (Lebe and Milfelner 2006). The desire to fulfil this need has resulted in the emergence of destination management and Destination Management Organisations.

### **1.4.2 Destination Management**

This concept of destination management is thought of as being a contemporary approach, whereby a macro level view is adopted to coordinate the micro-level activities that occur at the national, regional and/or local level in which tourism stakeholders carry out their individual and organisational responsibilities. It is an overarching term that envelops planning and control of tourism, visitor management, provision of infrastructure, standard setting and monitoring, marketing and promotion, local business support and other activities at a destination (Tourism Sustainability Group 2007). It involves strategic planning and management of the component parts of the destinations for the maximisation of benefits for stakeholders.

### **1.4.3 Destination Management Organisation**

According to the United Nations World Tourism Organisation (2004b, p. 3) DMOs:

...are the organisations responsible for the management and/or marketing of destinations and generally fall into one of the following categories:

- National Tourism Authorities or Organisations, responsible for management and marketing of tourism at a national level.
- Regional, provincial or state DMOs responsible for the management and/or marketing of tourism in a geographic region defined for that purpose, sometimes but not always an administrative or local government region such as a county, state or province.
- Local DMO, responsible for the management and/or marketing of tourism based on a smaller geographic area or city/town.

Traditionally, DMOs were thought of as destination marketing organisations (Presenza et al. 2005). “The concept of a DMO, where the “M” emphasises total management rather than simply marketing, is a somewhat recent conceptualisation of the organisation function of destination management” (Ritchie and Crouch 2003, p. 73). The role of DMO is evolving and there is an increasing recognition that it extends beyond marketing to include other elements which are key to the success of a destination (Presenza et al. 2005). From United Nations World Tourism Organisation’s (2004b) definition, there appears to be no clear distinction between a destination management organisation and a destination marketing organisation. A clear distinction will be identified between these two and this study will focus on DMOs as being destination management organisations rather than destination marketing organisations.

Ritchie and Crouch (2003) developed a model of destination competitiveness in which several components of destination management were identified. These were: organisation, quality of service/experience, information/research, human resource development, finance and venture capital, visitor management, resource stewardship and crisis management. Presenza et al. (2005) expanded upon Ritchie and Crouch’s (2003) work where the activities of the DMOs were categorised as falling under two main functions of external destination marketing and internal destination development. The external activities included marketing and promotion activities, aiding local firms in increasing their competitiveness and producing a competitive advantage for the destination through positioning (Sainaghi 2006). The internal destination development includes all other activities besides marketing and promotion. DMOs are also convenors since they ensure that varying stakeholders interests’ are integrated and are working together in a productive and meaningful manner (Carter 2005; Presenza et al. 2005). Clearly the operations and functions of a DMOs are more than purely marketing and promotion.

With regards to the sustainable development of tourist destinations, DMOs have a critical part to play. The quality of the environment is a crucial component in the attracting power of a successful destination and therefore an important concern for

destinations (Mihalic 2000). A DMO must make certain that the destination is sustainable for the visitor, the host community, the destination and the industry (Gilbert et al. 1998). For a visitor, a DMO must guarantee that the attractions and experiences fulfil realisations, provide value for money and sustain their appeal. The DMO must also ensure that tourism is socially sustainable, that there are peaceful and understanding relationships between the visitor and host community and that tourism is not seen as a threat to the local environment or cultural identity. Lastly a DMO must ensure that tourism facilitates economic development for the destination and for the tourism industry, and that investments generate sufficient return in order to encourage further investments. In summary, a DMO must promote a tourist destination but at the same time maintain its social, cultural, environmental and economic assets (Werthner and Klein 1999).

DMOs can take different forms being perhaps a governmental division, a quasi-governmental organisation, a public-private partnership, a non-governmental organisation, a not-for-profit organisation or a private organisation (Youell 1998; Ritchie and Crouch 2003; Presenza et al. 2005). Additionally, DMOs revenue can be gained from different sources such as government (Ritchie and Crouch 2003; Sheehan and Ritchie 2005), tourist taxes and levies, membership fees, advertising campaigns, promotional campaigns and commissions for booking conferences (Ritchie and Crouch 2003). All of this collectively demonstrates that the role of a DMO is by no means a small task but rather a daunting one. Carter (2005) stated that “DMO have no God given right to exist, they must however aim to do things better or add value to activities done by the private sector”.

Based on the above definition of a destination and discussion of a DMO, for this study, the term DMO will be ascribed to an organisation responsible for the holistic management of tourism at the destination level which encompasses a range of tourism development, planning and marketing activities and can fall under one of the following categories:

- Continental DMO responsible for the management of tourism in a continent defined for that purpose.
- Regional DMO also known as Regional Tourism Organisations, responsible for the management of tourism in a geographic region defined for that purpose.
- National DMO also known as National Tourism Organisations, responsible for management of tourism of a country.
- Local DMO, responsible for the management of tourism based on a smaller geographic area or city/town.
- Local attraction DMO responsible for the management of tourism based on an attraction or local feature of a geographic area or city/town.

#### **1.4.4 Destination Manager**

A destination manager will be identified as the person responsible for the overall management in one of the categories of DMO in their roles and responsibilities as identified above.

The researcher does understand that destinations exist which are not managed by a DMO as identified above. These destinations may be managed by a government Ministry, part of this Ministry, a local body, a private entity, a public-private partnership or some other type of management arrangement. The person(s) charged with the responsibility of managing these entities can indeed be identified as destination managers. Therefore, different classifications of destination managers do exist outside of the sphere of a DMO. Additionally, other agencies besides the DMO such as an environmental agencies may be responsible for managing the sustainable tourism development of a destination.

For the purpose of this research, the dimensions chosen for investigation needed to be realistic and meaningful for investigating the uses of the ICT-based tools/applications as well as developing the assessment procedures. Therefore for a comprehensive investigation of the ICT-based tools/applications for sustainable tourism, destinations were considered to be managed by a DMO and the person responsible for managing the DMO is the destination manager.

More specifically, DMOs were selected for this investigation since they:

- are established with the main purpose of managing tourism development of a particular destination;
- adopt an integrated and holistic approach at the destination i.e. system approach;
- are the primary body responsible for sustainable tourism development in the area; and
- represent the interests of all the major stakeholders in tourism development of that destination.

It has also been identified that even though the specific institutional arrangements may vary in countries, almost all destinations have a DMO (Werthner and Klein 1999). Therefore the definition of a destination manager as stated above will be used for this study.

#### **1.4.5 Tourism**

Tourism is a multi-disciplinary sector which takes into account numerous other sectors. Gratzner et al. (2004) identified over thirty different industrial components catering to the needs of tourists. It is neither a discipline nor an industry but rather a multi-disciplinary field and a business made up of many entities with differing dimensions which are generated by the major forces of demand and supply (Gunn and Var 2002). Due to its multi-sectoral nature with diverse industries and stakeholders, tourism must therefore be viewed as a system approach (Inskip 1991;

Hall 2000; Gunn and Var 2002; Liu 2003; Miller and Twining-Ward 2005; Page and Connell 2006; Mill and Morrison 2006).

Many researchers have proposed models of the tourism system such as Leiper (1979) and Mill and Morrison (1985). Recent examples of appreciating tourism as a complex system can be found in the work of Faulkner and Russell (1997), McKercher (1999) and Schianetz and Kavanagh (2008). Thinking about tourism as a system helps in understanding the phenomena in light of the larger whole and assists in explaining the complex interactions that take place (Hall 2000). More recently researchers, such as Farrell and Twining-Ward (2004; 2005) and Miller and Twining-Ward (2005), have extended this system view to state that tourism should be viewed not only as a system but as a complex, adaptive system since the nature of the tourism industry is intricate in its functions and operations.

Complex, adaptive systems are “unstable, unpredictable, multidimensional and in a state of constant change” which consist of a set of interconnected elements that influence and are influenced by factors extending beyond a single destination (de Sausmarez 2007, p. 702). To support this complexity, the solutions proposed for sustainable tourism development require a comprehensive, innovative approach which can be used for advancing a destination’s journey towards sustainable tourism development. This approach should also provide lasting benefits to all stakeholders involved and contribute to the wider goal of sustainable development. For this research, a complex adaptive system view of tourism will be adopted in investigating the uses and applications of ICT for sustainable tourism development.

Several reasons have been identified for this above stated perspective. Tourism is an interdependent system consisting of many interrelated components (Inskeep 1991; Gunn and Var 2002). It is dynamic and ever-changing due to its open nature (Butler 1997) and it is complex and competitive involving the potential for friction and disharmony (Mill and Morrison 2006; Page and Connell 2006). A complex adaptive system approach is therefore important to understanding the nature of tourism and its

relationship to the environment and sustainability (Liu 2003; Miller and Twining-Ward 2005). As fittingly written by Liu:

...the systems approach is not only ‘a way of looking at our world’ and ‘a framework for thought’, but also ‘undeniably an attitude of mind or a philosophy’ (White et al. 1984, p. 473). It ‘makes it possible to analyse, describe and synthesise different viewpoints from an overall perspective’ (Kaspar 1989, p. 443). The systems approach “views sustainability as an exercise in the conditional optimisation and fine-tuning of all elements of the developmental system so that the system, as a whole, keeps its bearings without one of its elements surging forward to the detriment of the others (Farrell and Runyan 1991, p. 35). (Liu 2003, p. 472)

Miller and Twining-Ward (2005) argued that trying to understand sustainable tourism from studying tourism’s main components is simplistic because tourism is multi-disciplinary, complex and non-linear in operations, with extensive impacts. These authors observed that an understanding of the whole, complex system would be more beneficial in addressing the challenges of sustainable tourism development. The use of ICT for sustainable tourism will undoubtedly have wide-ranging implications for different areas of the tourism ranging from a micro to a macro perspective and can be used for a variety of purposes. Using ICT will not only make tourism more sustainable but it will contribute to the overarching goal of sustainable development. Therefore a whole system approach is important in making this application of ICT a working reality for destinations.

A system approach also allows a researcher to contemplate the effects of changes to the system and the consequences on the other components (Page and Connell 2006). It enables modelling that supports decision-making (Barrow 1999) and allows tourism to be defined, analysed and managed in an integrated manner (Inskeep 1991). This is important in understanding how these identified ICT-based tools/applications can be used for sustainable tourism development as well as the developing of the assessment procedures.

Therefore, a conceptual stance on how tourism will be viewed will be adopted for this thesis. Tourism will therefore be considered as entailing:

- a systems approach
- the movement of people to and from a destination
- the movement of people being temporary and short term
- the reason for the visit is other than acquiring permanent residence
- situations will occur where tourists may not be counted as tourists
- tourist activities will result in impacts on the destination that can be either positive or negative.

### **1.5 Bridging the Gap: Why Study ICT and Sustainable Tourism?**

Numerous destinations are struggling to achieve sustainability (Sheldon et al. 2005) and to date, there is no agreed approach as to how destinations should develop their tourism in a sustainable fashion. Many destinations continue to be in a vicious circle, in what the tourists come to see is what is actually being destroyed (Poon 1993; Buhalis 1999; Wall and Mathieson 2006). “For every report of success it often seems that there are ten reports of failure or at least further recognition of the negative impacts of tourism” (Hall 2000, p. 1).

The research on sustainable tourism development has not progressed beyond the formulation and discussion of the principles and assumptions of sustainable tourism; and the alternative forms of tourism provide nothing more than a minimal solution to a larger issue (Liu 2003). Attempts have been made to apply the concept of sustainable tourism by developing indicators, monitoring, eco-labelling, codes of conduct, educating the tourist and other best practices. However, most of these attempts have been identified with “lack of quality, technical content, reliability, maturity, equity and effectiveness” (van der Duim and van Marwijk 2006, p. 449). Moreover, many researchers have tended to adopt a narrow view of sustainability by only considering the environmental sphere and this has led to the development of models which lack practicality in destination management (Ko 2005; Choi and Sirakaya 2006). In reality there appears to be a widening gap between the principles



of sustainable tourism and what is being actually achieved (Trousdale 1999) and there seem to be no progress being made towards solving the problems of tourism development (Hall 2000).

It is agreed that sustainable tourism is a valuable concept but its implementation has resulted in difficulties (Ahn et al. 2002; Wall and Mathieson 2006). There has been lack of common sense with over-emphasis on strategy formulation and limited emphasis on strategy implementation (Swarbrooke 1999; Page 2005). The most radical solution that can be proposed is to reduce the future growth of tourism by decreasing the amount of travel (air, rail, bus, coach) that occurs. However, this solution is neither feasible nor beneficial to anyone. Tourism is a fact of life and the associated problems need to be corrected as soon as possible (Theobald 2005). The difficulties associated with sustainable tourism should not lead us to be critical and complacent but rather we should develop realistic, practical solutions to progress forward (Bramwell and Lane 1993).

For tourism to be sustainable in the long-run, significant changes are needed (Gössling 2000). Management action is needed before destinations are deteriorated beyond repair (Wall and Mathieson 2006). It is time for new and innovative methods to be introduced for tackling the problems of sustainable tourism development. Re-evaluation of tourism and current sustainable tourism practices are needed and new approaches and management techniques are required (Swarbrooke 1999; Gezici 2005; Saarinen 2006). As quoted from Bramwell and Lane (1993, p. 4), “the time has come to walk the talk”.

Moreover, destination managers are faced on a daily basis with numerous challenges and decisions with respect to the proper planning and developing of their destinations. Many are related to sustainability concerns. They need to be equipped with practical tools and mechanisms to ensure they make the most accurate and reliable decisions with respect to the sustainable tourism development of their destinations. The application of ICT to sustainable tourism development can be the useful mechanism that destination managers require. Likewise, the solution for

sustainable tourism development will not come from advocacy, environmentalists or governments but rather the persons charged with its responsibility and development (Gunn and Var 2002) i.e. destination managers. This research proposes to make sustainable tourism development more achievable through the application of ICT by destination managers.

Mention has been made of the use of ICT for the sustainable development of tourism at destinations (Gilbert et al. 1998; Buhalis 1999; United Nations Environment Programme 2003; Buhalis and Deimezi 2004). However, there has been little academic research on the application of ICT-based tools/applications for destination managers in sustainable tourism development. There is a need to progress the research in eTourism beyond Internet marketing and distribution (Frew 2000). Evidence exists which demonstrate that ICT can play an invaluable role in an organisation's efficiency and productivity (Buhalis 1998) and in dealing with environmental sustainability (Erdmann and Goodman 2004). ICT has also been deemed as essential for the success or failure of the impacts of tourism at the destination (Buhalis and Spada 2000).

This research is therefore adopting a destination focused perspective and proposes to investigate the ICT-based tools/applications that can be used to manage the impacts of tourism at the destination level. New technologies offer considerable promise for dealing with environmental degradation whilst simultaneously promoting economic growth (Organisation for Economic Co-operation and Development 2002). The research gap will be addressed by developing assessment procedures for ICT-based tools/applications for destination managers in sustainable tourism development. This research is aimed at creating a new and more efficient way of managing tourism at a destination.

This thesis makes a contribution to knowledge, research, policy and practice. A contribution to knowledge is evident due to limited research in the ICT-sustainable tourism domain. This research therefore is responding to calls by academics, practitioners and the industry for a deeper investigation on how ICT can be used for managing sustainable tourism and making this elusive concept a workable reality for

destinations. A contribution to research is made by approaching ICT as an innovative approach to sustainable tourism and examining the usefulness of the Abernathy and Clark (1985) model. This thesis contributes to policy by demonstrating to destination managers the benefits of using ICT-based tools/applications. This widens the range of options which they can use to inform policy on how best to manage the sustainable tourism development of their destinations. Lastly, it impacts on practice by discussing a realistic approach which destination managers can implement to translate the theory of sustainable tourism into practical results for their destinations.

### **1.5.1 Benefits of Research to Stakeholders**

This research is designed to benefit destination managers, however these benefits can be extended to other tourism stakeholders who have an interest in seeing tourism developed sustainably. Specifically the benefits of this research to stakeholders are:

- recognition of the immense potential of the usefulness of ICT-based tools/applications as a new and innovative approach for lessening some of tourism's negative impacts
- a wide-ranging collection of ICT-based tools/applications that can be used to manage different aspects of sustainable tourism
- assisting decision makers at the destination level by adding ICT to their list of options available to them in selecting the best management approach as they attempt to alleviate tourism's negative impacts
- assessment procedures which assists destination managers in the best selection of ICT-based tools/applications for sustainable tourism development of their destination
- facilitating better decision making with dealing with different aspects of sustainable tourism development
- enhancing the communication between the different tourism stakeholders by bringing together different views and perspectives, all with the aim of making tourism more sustainable.

## 1.6 Conclusion

This introduction chapter has presented the background to this study and demonstrated the vital importance of undertaking theoretical and empirical research in this relatively new research domain of ICT and sustainable tourism. It has also displayed the usefulness of this work to destination managers and other stakeholders who have a keen interest in seeing tourism develop in a sustainable fashion. Moreover, it has laid the foundation for the literature review and the theoretical approach as well as provided a preliminary rationalisation for the research design.

## 1.7 Thesis Outline

This thesis is structured as follows:

**Chapter one** presents an introduction into the study of the uses and applications of ICT for sustainable tourism development. Specifically, it maps the context for this work by providing the research background and setting necessary boundaries. The methodological approaches adopted are outlined and the importance and relevance of work in this research domain are discussed.

**Chapter two** discusses the concepts of sustainable development and sustainable tourism in light of their relationship to this research. The current approaches to managing sustainable tourism are examined in order to demonstrate and understand if ICT is currently been used by destinations to manage their sustainability and prepare the groundwork for the theoretical framework.

**Chapter three** provides an overview of the current usage of ICT in tourism and demonstrates that sustainability is an area in tourism where ICT can be used. This chapter continues by identifying and discussing opportunities that were found in the literature for the use/s of ICT for sustainable tourism and specific ICT-based tools/applications which can be used for these opportunities.

**Chapter four** examines the theoretical perspective adopted in this thesis. It considers the role of innovation by adopting the viewpoint that ICT can be a new,

innovative approach to sustainable tourism development. Specifically, it discusses the Abernathy and Clark (1985) model in relation to its suitability and applicability in developing the above proposition.

**Chapter five** explains the research design selected for this study by discussing the aims and objectives of this work, problem definition, respondents' selection and philosophical orientation. The choice of a multi-method approach consisting of online questionnaires and semi-structured interviews for the primary research were elucidated upon. This chapter concludes by considering sampling and response rates, procedures used in conducting the primary research, methods of data analysis and ensuring the quality of the research design.

**Chapter six** describes the findings of the destination managers and eTourism experts survey. This was followed by a presentation of the findings of the expert interviews.

**Chapter seven** provides an analysis and discussion of the research findings by linking it to the literature and the theory in order to accomplish the aims and objectives of this thesis. The ICT-based tools/applications which can be used for sustainable tourism are presented with assessment procedures for destination managers' selection of these tools.

**Chapter eight** concludes by presenting an overview of this research, highlighting the main findings and discussing the contributions of this thesis. It then considers the limitations encountered in undertaking this research and concludes with a discussion on areas for future research.

## **Chapter Two**

# **Chapter Two**

## **Sustainable Development in Tourism**

### **2.1 Introduction**

Before any discussion could be entered into investigating the uses and applications of ICT for sustainable tourism, it is necessary to review the background on which this thesis is built. The intent of this chapter is to provide a review of sustainable development, sustainable tourism and the concepts and tools currently used for managing sustainable tourism. This discussion is necessary in order to show how this research fits with the existing sustainable tourism research and contribute to the wider sustainable tourism and sustainable development agenda. Sustainable development is considered since the concept of sustainable tourism, derived for its application to tourism, has its wider foundations and an intimate relationship with the concept of sustainable development (Bramwell and Lane 1993; Swarbrooke 1999; Gössling 2000; Hall 2000; Hardy and Beeton 2001; Altinay and Hussain 2005; Saarinen 2006).

### **2.2 Background to Sustainable Development**

The concept of sustainable development resulted from a series of worldwide political processes with the aim of uniting simultaneously the most important needs of our times. Some of these needs included overcoming poverty, environmental protection of the natural resources, social justice and cultural diversity (Yoon and Lee 2003). Today, with daily growing pressures on the world's finite resources, interest in sustainable development has been rekindled with many businesses "going green" and defining a sustainable agenda as part of their corporate strategy.

Hardy et al. (2002) provide a valuable historical account of sustainable development tracing concerns about the human impact on the environment back to the days of ancient civilisation. These researchers discussed the concept evolving in three forms: the conservation vision, economic theory and community vision. The conservation vision highlighted that in early times, even though sustainability was

not precisely defined as it is today, human beings did appreciate that resources needed to be conserved for future use (Hardy et al. 2002). After World War Two, sustainability awareness increased due to the rapid rate of economic growth which did not take into account ecological and social processes (Miller and Twining-Ward 2006). It was becoming apparent that economic development was destroying the environment with some forms of destruction being irreversible. From the mid-1960s, emphasis was placed on the relationship between the concepts of growth, economic development and the environment. Perspectives varied as to whether growth and development were compatible with protection of the environment. Economic models were failing to tackle the issues of poverty and inequalities and there were increasing calls for sustainable growth with environmental considerations (Bernstein 1973; Hardy et al. 2002). Communities were also not reaping the full benefits of development and it was felt that they should be consulted in matters that affected their interests. Measures were therefore needed to protect and preserve the environment.

Noteworthy developments at this time were the United Nations Conference on the Human Environment held in Stockholm on 1972 which resulted in the viewpoint that the environment and development were compatible (Page and Connell 2006). In March 1980, the publication of the World Conservation Strategy further promoted the ideas of sustainable development (Bramwell and Lane 1993; Hall and Lew 1998). The World Conservation Strategy emphasised the notion of fusing conservation with development; ensuring fundamental human needs were fulfilled, protection of invaluable species, ecosystems and ecological processes and ensuring fairness, social justice and cultural diversity (International Union for the Conservation of Nature and Natural Resources 1980). With the publishing of the World Conservation Strategy, sustainability was now a major talking concept in the international arena, uniting the concerns of the conservationists with the aims of developers (Bramwell and Lane 1993).

Sustainability had accrued large support because it sought to strike a balance between the environmental, social and economic aspects of development (Coccosis



1996). Economic sustainability refers to creating prosperity for all levels of society and focusing on the costs and benefits of these economic activities. Social sustainability referred to protecting the rights of individuals and ensuring equal opportunities for all, whereas, environmental sustainability pertains to protecting and managing our renewable and especially non-renewable resources to ensure continuity for future generations. It reinforces the viewpoints that economic growth and environmental development can work hand-in-hand (Pezzey 1992) since economic development cannot be considered in isolation from the concerns of the environment and society; since they share an mutually dependent relationship.

The concept was later defined and the most renowned and widely used definition of sustainable development originated from the Brundtland Report. This report defined sustainable development as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987, p. 43). In this report the term “sustainable development” was first used to merge the two conflicting concepts of economic growth and environmental conservation (Hardy and Beeton 2001; Altinay and Hussain 2005) and this report brought public attention to a debate many years before (Miller and Twining-Ward 2005; Choi and Sirakaya 2006; Cole 2006).

Sustainable development rests on the fundamental principles of futurity, equity and holism as identified by Sharpley’s (2000) model of sustainable development in Table 2.1. Futurity denotes that sustainable development is a long run process of change where short and medium run targets are set in accomplishing this long run goal. Equity is concerned with ensuring all people, especially the poor, get a fair share of the resources. There are two main types of equity: inter-generational and intra-generational. The former is concerned with the current generation using resources in such a manner that is it maintained or enhanced for use by future generations i.e. fairness between present and future members of society. The latter on the other hand focuses on the community sharing equitably in the costs and benefits, where the winners compensate the losers i.e. fairness between the members of the current society (Collins 1999). Holism implies that sustainable development can only

become a reality if it takes into consideration the global, political, socioeconomic and ecological contexts (Sharpley 2000).

**Table 2.1:** A Model of Sustainable Development: Principles and Objectives

<b>Fundamental Principles</b>	Holistic approach: development and environmental issues integrated within a global social
	Futurity: focus on long-term capacity for continuance of the global eco-system
	Equity: development that is fair and equitable and which provides opportunities for access to and use of resources for all members of all societies, both in the present and future
<b>Developmental Objectives</b>	Improvement of the quality of life for all people: education, life expectancy, opportunities to fulfil potential
	Satisfaction of basic needs; concentration on the nature of what is provided rather than income Self-reliance: political freedom and local decision making for local needs
	Endogenous development
<b>Sustainability Objectives</b>	Sustainable population levels
	Minimal depletion of non-renewable natural resources
	Sustainable use of renewable resources
	Pollution emissions within the assimilative capacity of the environment
<b>Requirements for Sustainable Development</b>	Adoption of a new social paradigm relevant to sustainable living
	International and national political and economic systems dedicated to equitable development and resource use
	Technological systems that can search continuously for new solutions to environmental problems
	Global alliance facilitating integrated development policies at local, national and international levels

Source: Sharpley 2000

Sustainable development is an amorphous concept which can be fashioned to fit a variety of perspectives and is not without its problems with respect to its definition, complexity, and its attempt to cover a wide scope of interests (Bramwell and Lane 2000; Saarinen 2006). It has been criticised for being vague and contradictory and subject to various interpretations by different groups with some regarding the term as an oxymoron (Sharpley 2000). In pursuing sustainable development policies, differing conditions have to be considered such as stages of economic development, management objectives, ethical considerations and host population concerns. This allows for a wide variety of applicability to different settings according to the circumstances presented. Sustainable development is therefore a “moving” goal (Lee 2001, p. 315).

Despite these shortcomings, sustainable development has however acted as mechanism on which the numerous stakeholders can cooperate, negotiate, and reflect on their actions and impacts on the environment (Saarinen 2006). Therefore it is invaluable. The principles of sustainable development have been applied to many businesses with tourism being no exception. Tourism's interest in sustainable development is understandable and logical since what tourism sells is the environment (Murphy and Price 2005). The response from the tourism industry has been to incorporate the principles of sustainable development in tourism policy, planning and delivery. According to Butler (1999, p. 8), "if there is a single factor that has the potential to change the nature of tourism more than any other, it is the introduction of the concept of sustainable development".

### **2.3 Sustainable Tourism**

In the late 1980s and early 1990s, tourism professionals began considering the implications of sustainable development for tourism (Berno and Bricker 2001). Today, the concept is widely researched with policy and research approaches focusing on varied topics including: historical development (Hall and Lew 1998), framework for progression of sustainable tourism (Clarke 1997), definitional issues (Hunter 1995; 1997; Butler 1999, Garrod and Fyall 1998, Sharpley 2000), differing interpretations (Hunter 1995; 1997; Coccossis 1996), conceptual and operational progression of sustainable tourism (Hardy et al. 2002), principles of sustainable tourism and policy perspectives (United Nations World Tourism Organisation 2005), consumer awareness and practices for responsible tourism (Harrison and Husbands 1996), eco-tourism and protected areas (Agardy 1993; Ceballos-Lascuráin 1996; Farrell and Marion 2002), rural tourism development (Hetherington 1991; Sharpley and Sharpley 1997; Wilson et al. 2001), parks and green spaces (Mertes and Hall 1995), the adverse ecological effects of nature tourism (Lindberg 1991), and indicator development and monitoring (United Nations World Tourism Organisation 2004a, Miller and Twining-Ward 2005; 2006).

Clarke (1997) proposed a framework which identified four positions; polar opposites, continuum, movement and convergence; on how sustainable tourism has grown and

continues to be interpreted by the tourism industry. Polar opposites were the earliest views held where sustainable tourism and mass tourism were seen to be conflicting because mass tourism was seen as bad whilst small scale tourism was viewed as good. In the 1990s this position was denounced and one of continuum was adopted when it was realised that small-scale tourism had the capacity to grow into mass tourism if not properly managed. This led to the third position of movement where mass tourism was no longer seen as a bad thing but rather something which can be developed into more sustainable forms of tourism. The last position on the framework was convergence where the current understanding of sustainable tourism lies as “a goal that all tourism, regardless of scale, must strive to achieve” (Clarke 1997, p. 229). This research completed by Clarke (1997) demonstrated how the concept of sustainable tourism shifted from its early popularisation to an understanding of how we know it today. The perception of scale as another dimension was added by Hardy and Beeton (2001) to Clarke’s (1997) framework. Hardy and Beeton (2001) observed that sustainable tourism has changed over time and that now it can be applied to a variety of landscape setting in different contexts and different scale of operations.

In the tourism literature, there have been two main streams of approaches in defining sustainable tourism. The first stream has defined sustainable tourism as a very sector specific, tourism-centric approach. These types of definitions are very inward looking and are centred on tourism maintaining its business viability over a period of time (Miller and Twining-Ward 2005). They are usually tailored to meet the needs of conservationists, governments, communities and developers (Page and Connell 2006) with sustainable tourism viewed as being separate from sustainable development. Hunter (1995;1997) argued that this view limits our understanding of scope and scale of resources used in tourism and it is unsuccessful in identifying the links that exist between tourism and other activities. Moreover, in defining sustainable tourism, additional information is necessary in determining what is an acceptable limit for tourism, exactly what should be sustained, for whom, for how long and under what conditions (Berno and Bricker 2001; McCool et al. 2001; Liu 2003).

The other approach seeks to define sustainable tourism in terms of a broader, multi-sectoral context whereby sustainable tourism is viewed in light of its parental paradigm, sustainable development (Hunter 1995; 1997; Collins 1999; Sharpley 2000; Sheldon et al. 2005). Hunter (1995, p. 156) termed this as “an extra-parochial, contributory sense”. This approach speaks of recognising and mitigating tourism’s impacts as part of achieving the bigger goal of sustainable development. Tourism is not the only user of resources in an area, therefore it should complement other resource users at the destination (Butler 1999).

The above discussion displays the diversity and complexity of this subject. Defining sustainable tourism has therefore become “something of a cottage industry” (Garrod and Fyall 1998, p. 199) and today the concept is still unclear despite numerous definitions which can be found in the literature (Farsari and Butler 2007). This lack of a widely accepted definition had led to confusion about what does sustainable tourism truly mean (Swarbrooke 1999) and this vagueness is most often attributed to the failure to implement sustainable tourism for destinations (Ioannides 2001; Ko 2005; Choi and Sirakaya 2006; Farsari and Butler 2007).

The researcher could elaborate extensively on the numerous definitions of sustainable tourism but the important point to note is that despite varying interpretations, there are certain fundamental features and commonalities in these definitions. They encourage an understanding of tourism’s impacts on the natural, cultural, human and economic environment. They also stress that in developing and maintaining tourism, one must ensure that tourism does not damage the natural and built environment and make sustainable use of environmental resources. Sustainable tourism should also be economically efficient in reducing over-consumption and waste. It should generate employment and bring benefits to the local economy. Tourism should also be aligned to the cultures and values of people affected by it and involve the host community in its development. It should be integrated into overall destination planning with continuous research, monitoring, implementation and providing benefits for all members of society. All of these commonalities in

definitions underpin the notion that the economic viability of a destination should be met without sacrificing the natural and socio-cultural environments.

However, in adopting this multi-sectoral perspective, some challenges still exist since some researchers view sustainable tourism as striking a balance between these three elements (economic, environmental and socio-cultural) for tourism to be considered sustainable. One example of this is Müller's (1994) magic pentagon where he discussed that an ideal situation will exist when a balance is reached amongst the following elements which all carry equal weight: economic health, subjective well being of the locals, unspoilt nature, protection of resources, healthy culture and optimum satisfaction of guest requirements. According to Müller (1994), harmony must be established in this magic pentagon in order to maximise the benefits and minimise the costs.

Finding this right balance between the economic, environmental, socio-cultural resources of a destination while competing for international tourism arrivals has become a leading challenge and pre-occupation for destinations worldwide (Organisation of American States 1997). Other conceptualisations of sustainable tourism discussed by researchers such as Hunter (1997), Garrod and Fyall (1998) and Weaver (2006), place sustainable tourism on a spectrum of interpretations ranging from very weak to very strong. A very weak interpretation was viewed as economic sustainability whilst a very strong interpretation place precedence on the natural environment (Hunter 1997; Garrod and Fyall 1998).

Striking this balance had always been a vital component of sustainable tourism however achieving this "balance" fails to take account of reality in that in everyday life trade-offs do take place. Likewise, Teo (2002) argued that exactly what achieving this balance requires has never been investigated in the tourism literature and it is often assumed that tourism development is often in a state of imbalance which must be resolved.

The researcher believes that achieving this acceptable balance between the economic, environmental, social and cultural elements is idealistic since in any tactical and strategic operation trade-offs must take place in favour of one or more aspects of sustainability (Collins 1999; McCool and Lime 2001). As Hjalager (1996) rightly pointed out, balance is easily said but not easily done. Johnston and Tyrell (2005) argued that it is doubtful whether all the elements of sustainable tourism can be sustained concurrently. Moreover, in the literature there is also the growing faction that states that achieving sustainable tourism is a utopian goal and a concept that lacks integrity (Hardy and Beeton 2001). The researcher does support the view that sustainable tourism may never be truly achieved but destinations can work towards becoming more sustainable. She also believes that opportunity costs do exist and all the elements cannot be necessarily sustained simultaneously.

Furthermore, there is a discussion in the literature about the notion of limits being inherent to the concept (Butler 1999; Hardy and Beeton 2001) whereas others have argued against such limits (Organisation of American States 1997; Johnston and Tyrell 2005). This researcher thinks that rather than focusing on restricting growth, the issues one should concentrate on are implementing policy and prescriptions to make sustainable tourism a working reality. If progressive action is not taken, negative outcomes are quite near at hand with the results being the end of the tourism industry.

Gilbert et al. (1998) recognised that the environmental degradation of a tourism destination ultimately results in this destination losing its drawing power. This translates into declining tourism revenues and if returns decrease then the compelling force for sustaining and developing the community is lost. Likewise, the sustainable tourism agenda will only be a triumph if the stakeholders involved can gain a profit through pursuing sustainable tourism (Organisation of American States 1997). Realistically, unless the doctrine of sustainable tourism becomes integrated with a “business model”, it appears dubious that it will have any worthwhile value or benefits (Sheldon et al. 2005, p.56).

Sustainable tourism, as demonstrated, is plagued with many shortcomings and has been the source of many arguments in the literature. Despite these problems, the concept had provided a unified platform where tourism stakeholders can “interact, negotiate, and reflect on their actions’ consequences for the environment” (Saarinen 2006, p. 1124). It is not the purpose of this thesis to labour over these disputes but rather acknowledge that they do exist and concentrate on a more pragmatic perspective of the concept. Swarbrooke (1999) criticised academics for being narrow-minded by focusing on defining and debating the concept with this process only leading to uncertainty amongst stakeholders and not aiding in putting the concept into practical applications. Since 1998, Garrod and Fyall have argued for moving away from definition to operationalisation. Some progress have been made however a whole lot more is required and new approaches are needed if the industry is to confront the mammoth challenges ahead.

A key point to note is that sustainable tourism is an approach to tourism management. It is not the only way that tourism can be developed, other options are available but it is hailed as best approach to adopt in tourism planning since it is seeking to ensure that the foundation of the tourism industry is maintained for the future. It is agreed that further discussions and research are required to assign a widely accepted meaning to sustainable tourism however operationalising of the concept is needed (Butler 1999). Discussing sustainability is simple; implementation is difficult hence this research is seeking to avoid sustainable tourism becoming an empty cliché.

These differing points of view, numerous definitions and perspectives present difficult choices in terms of research design for the student wishing to adopt a practical approach within which to address issues of sustainable tourism development. Perhaps the most fundamental of these choices involves deciding which aspects of the broad canvas of sustainable tourism should provide the focus of study. This is partly a question of practicality as the successful completion of the research project is after all partly dependent upon the extent to which it is a manageable proposition. It is also a question of establishing the areas in which the



research project can make a contribution to knowledge and how to make sustainable tourism a realistic reality for destination managers. Destinations do experience different economic, environmental and socio-cultural conditions therefore this variation in definition is logical (Ko 2005). Having one definition for the diverse tourism system can be “impractical and dangerous” (Bell and Morse 1999, p. 10). For theoretical analysis of sustainable tourism development a working definition is however required (Johnston and Tyrrell 2005) in order to avoid confusion at the beginning of any project (Ko 2005).

For this thesis, sustainable tourism is a positive, comprehensive and integrated approach to tourism development which involves resource management and working together with stakeholders for the long-term viability and quality of the social, economic and environmental resources (Prosser 1994; Hunter 1997; Murphy and Price 2005; Miller and Twining-Ward 2005; Ayuso 2007). It is about conservation and managing change for a bright, prosperous and long-term tourism future (Swarbrooke 1999). Sustainable tourism will be considered a moving process towards fulfilling the larger goal of sustainable development. It should therefore seek to integrate tourism into a balanced relationship with wider economic and conservation goals (Mycoo 2006) and stresses that tourism should be viewed in a holistic manner and developed and become part of the natural, social, cultural and human environment. Achieving sustainable tourism is not an end goal but rather it should be seen as a progressing goal which changes as the tourism system changes and which all destinations must aspire to achieve (Lee 2001; Swarbrooke 1999).

The plethora of literature that exists on sustainable tourism has failed to acknowledge ICT as a means of mitigating tourism’s negative impacts. Destination managers are charged with the task of making their respective destinations profitable entities. This will depend heavily on well maintained and conserved primary resources. There has been a paradigm shift towards sustainable tourism development where stakeholders are becoming involved and sustainability is being embedded in the creation, distribution and delivery of the tourism product (Gilbert et al. 1998; United Nations Environment Programme 2003). Destinations can become commercially viable

entities by adopting an environmental approach to managing their destinations in which they contribute positively to conserving and adding to the environment in which they operate. Careful policy remedies, business strategies and management tools are required to sustain tourism's resource base that has already been despoiled and will continue to be degraded as a result of the promise of quick returns. To ensure destinations are in for the long-run success, the lead for tourism should come from DMOs and destination managers. This research is focused on the use of ICT for destinations which will have inter-related effects on the other parts of the tourism system. Destinations and their sustainable development are the core parts of this work.

## **2.4 Managing Sustainable Tourism**

This section will provide a discussion on the concepts and the tools involved in achieving sustainable tourism development. "A concept is an idea of how to achieve sustainability" (Schianetz et al. 2007, p. 372) whereas a tool/mechanism is something that is used to implement the concept. Table 2.2 identifies the main concepts and their primary objective in sustainable tourism. This is followed by a discussion of the current tools/mechanisms that are used. It should be noted that the terms tools, mechanisms and instruments will be used interchangeably in this research for stylistic reasons.

**Table 2.2: Concepts for Managing Sustainable Tourism Development**

<b>Concepts</b>	<b>Definition</b>	<b>Main Objectives in Tourism</b>
<b>Carrying Capacity</b>	“The number of visitors that a destination is able to absorb without damage to the environment, community or visitor experience” (United Nations Environment Programme 2003, p. 20)	Prevention of environmental degradation caused by excessive tourist numbers
<b>Government Intervention</b>	A central authority takes mandatory measures to reduce environmental degradation (Gilbert et al. 1998)	Pollution prevention and control
<b>Economic Approach</b>	Instruments such as taxes and financial incentives are used to persuade tourism businesses to engage in more sustainable activities	Pollution prevention and control and the encouragement of sustainable practices
<b>Self-regulation</b>	Tourism industry taking responsibility for its own action	Pollution prevention and control and the encouragement of sustainable practices
<b>Education</b>	Educating the tourist on developing and displaying more sustainable behaviours at the destination	Encouraging sustainable consumption patterns by educating the tourists to see the effects of their actions on the environment and to modify their behaviour
<b>Monitoring</b>	Regular assessment of an issue with regards to specific goals, objectives and expectations set based on this issue (Miller and Twining-Ward 2006)	Provide a clear measurement of progress, updated information and enhanced knowledge to assist in the movement from sustainable tourism theory to practice
<b>Marketing and Information Services</b>	Destinations market segment in order to attract the types of tourists they want	Promote particular forms of tourism, influence tourist’s behaviour, promote product offerings and reduce seasonality by promoting off-season opportunities
<b>Environmental Management</b>	“Process of decision making about the allocation of natural and artificial resources that will make optimum use of the environment to satisfy at least basic human needs for an indefinite period of time and where possible to improve environmental quality” (Barrow 2006, p. 164)	Environmental objectives are integrated into the tourism policy and planning
<b>Cleaner Production</b>	“The continuous application of an integrated preventive environmental strategy to processes, products, and services to increase overall efficiency, and reduce risks to humans and the environment” (United Nations Environment Programme 2006, p. 3)	Pollution and prevention control

### **2.4.1 Visitor Management Techniques**

Specific techniques known as visitor management techniques have to be used when carrying capacity is determined to be reaching its threshold (Mason 2005) by monitoring visitor flows and controlling tourist numbers (Page and Connell 2006). These techniques include but are not limited to queues, reservations, lottery, pricing, timed entry, zoning, permits and setting up of protected areas. Queues, reservations, lottery, pricing, permits and timed entry are used to control visitor numbers by limiting their numbers or dispersing them throughout the year. The revenue accrued from pricing can be used for preservation and upkeep of the site (Organisation of American States 1997; Swarbrooke 1999). Permits are used to control visitor demand and have been used at National Parks as well as mass tourism exhibitions and tourism sites in Italy and Britain (Beeton and Benfield 2002). Zoning limits visitor access to specific areas and allows diverse recreation opportunities on how to use the area (Lawson 2006). The setting up of designated protected areas worldwide aims to prevent degradation of natural resources and also ensures that economic benefits continue to be accrued (Mason 2005). In addition to these visitor management techniques, several alternatives to carrying capacity have been developed.

### **2.4.2 Alternatives to Carrying Capacity**

McCool and Lime (2001) proposed alternative approaches to tourism carrying capacity by using planning frameworks which focus on sustaining the social and biophysical resources rather than setting limits to tourist numbers. These frameworks are: Limits of Acceptable Change (LAC), Visitor Impact Management (VIM), Visitor Experience and Resource Protection (VERP), Environmental Impact Assessment (EIA) and Cumulative Effects Assessment (CEA) which are briefly discussed below.

LAC is a planning procedure designed for recreation settings based on how much change is acceptable to managers and users (Wright 1998; Simón et al. 2004; Murphy and Price 2005). This decision is arrived at after a series of sequential steps that define what conditions are desired at a destination, what level of change is

considered reasonable and the management actions required to maintain or reinstate these acceptable conditions (see Stankey et al. 1985, Wright 1998). LAC differs from carrying capacity in that it does not look at establishing a particular number as the limit but rather looking at the conditions required in the area (Stankey et al. 1985; Ahn et al. 2002). LAC has been applied to Calhoun County, Texas (Ahn et al. 2002), Wet Tropics World Heritage Area in Australia (Page 2003) and Kangaroo Island in Australia.

VIM on the other hand uses a sequential process, which aims to reduce or control the impacts that threaten the quality of outdoor recreation, tourism areas and experiences. It requires two separate elements: description (of the relationships between specific conditions and use and the impacts associated with these conditions) and the evaluation (of the acceptability of various impacts). There are eight steps to the VIM planning process and this helps to address three issues inherent to impact management: problem identification, determination of potential causal factors that affect the occurrence and severity of unacceptable impacts, and selection of potential management strategies to address these unacceptable conditions (Wright 1998). VIM has been used in Prince Edward Island, Canada and Vera Cruz Mexico (Page 2003).

VERP is a management tool that focuses on desired ecological and social conditions rather than on visitor numbers and provides a logical process for managing carrying capacity at National Parks. In this respect it is similar to LAC and VIM since it involves public consultation and maintains that management goals should be translated into objectives through the use of indicators and standards (Wright 1998). However, VERP differs from LAC and VIM in that its use is intended solely for parks rather than wilderness areas with modification is needed for use outside the park setting (Wright 1998).

EIA provides useful information about impacts of proposed environmental developments (United Nations Environment Programme/United Nations World Tourism Organisation 2005). It has been used as a planning tool for some years in

projects to determine the approach to sustainability by assessing whether the perceived economic benefits are aligned with the environmental, social and cultural consequences (Wright 1998). EIA has been defined as:

...a process which attempts to identify and predict impacts of legislative proposals, policies, programs, projects and operational procedures on the biogeophysical environment and on human health and well-being. It also interprets and communicates information about those and investigates and proposes means for their management. (Canadian Environmental Assessment Research Council 1988, p. 1)

In the literature, little has been published on how EIA should be conducted for tourism. However, it can be a useful tool in tourism planning (Simpson and Wall 1999; Barrow 2006) since it accounts for impacts at all stages of a proposed development and considers alternative development options (United Nations Environment Programme/United Nations World Tourism Organisation 2005).

Lastly, CEA is “an assessment of the incremental effects of an action on the environment when the effects are combined with those from other past, existing and future actions” (Hegmann et. al 1999, p. 10). CEA has been used in tourism because of the different size and diversity of tourism developments and it is also “holistic and integrative” (Wright 1998, p. 81).

### **2.4.3 Sustainability Indicators**

The use of indicators has existed for a long time and has been generally used to guide decision making (Li 2004). Numerous governmental, non-governmental and international organisations such as the European Environment Agency, European Union, Organisation for Economic Co-operation and Development, United Nations Development Programme, United Nations Environment Programme, United Nations World Tourism Organisation and The World Bank have all taken steps in developing indicators (Miller 2001; Rebollo and Baidal 2003; Choi and Sirakaya 2006). Some

of these indicators include population growth rate, gross domestic product and trade balance (Li 2004).

Indicator development has been identified as an integral part of destination planning and management in promoting sustainable tourism development at all levels of the destination. In the tourism literature there has been widespread discussion on the use of indicators for better monitoring of the tourism system and progressing the goal of sustainable tourism (see Ceron and Dubois 2003; Choi and Sirakaya 2006; Miller 2001; United Nations World Tourism Organisation 2004a; Miller and Twining-Ward 2005).

Dubois (2005, p. 141) defined an indicator as “a variable which can take a certain number of values (statistical) or states (qualitative) according to circumstances (temporal, spatial)”. Indicators for sustainable tourism are “measures of the existence or severity of current issues, signals or upcoming situations or problems, measures of risk and potential need for action, and means to identify and measure the results of our actions” (United Nations World Tourism Organisation 2004a, p. 8). The development of indicators is no newcomer to tourism with the industry recording its economic performance for many years but its application to sustainability is relatively new (Miller and Twining-Ward 2006).

In this realm, indicators are used to monitor, measure and analyse changes and resultant impacts on the tourism system (Weaver 2006). Additionally, indicators can assist destinations in determining their sustainable tourism objectives, establish and track progress and prioritise for the future (McCool et al. 2001; Miller and Twining-Ward 2006). They can be used for baseline assessment of a condition or need, target setting for policies and actions, assessment of actions and evaluation, review and modification of policies (United Nations Environment Programme/United Nations World Tourism Organisation 2005). Indicators are intended to provide information in a straightforward, numerical and easy to understand format (Choi and Sirakaya 2006). For tourism, the best indicators are those that respond to the threats regarding sustainability (United Nations World Tourism Organisation 2004a).

The United Nations World Tourism Organisation has led the way and defined a new approach to indicator development (Miller and Twining-Ward 2005). In 2004, United Nations World Tourism Organisation produced a comprehensive guidebook to help tourism managers develop the most appropriate indicators for their respective destinations. Instead of core indicators or ecosystem specific indicators, a set of twelve baseline issues and 20 related indicators were suggested. The baseline issues and indicators were considered the most common and suitable for almost all destinations, allowing for international comparison. Including the baseline issues, United Nations World Tourism Organisation (2004a) developed a total of nearly 50 issues each with 10-15 sub-issues and 25 suggested indicators applied to 18 different types of destinations from small islands to theme parks, providing an immense and rather overwhelming monitoring resource of more than a thousand potential indicators. This 2004 guidebook described the issues and indicators in much more detail than previously existed and included a number of practical examples of implementation (Miller and Twining-Ward 2005).

In line with United Nations World Tourism Organisation's (2004a) guidebook, Miller and Twining-Ward (2005) produced a book which spoke about the need for, history of and developing of indicator and monitoring systems for sustainable tourism development. This text investigated the reasons for public and private sector adoption of sustainable tourism policies and how indicators and monitoring can help this goal to be achieved. It also looked at the principles and techniques involved in indicator development as well as provided case studies on indicators in action.

Sustainability indicators are now being actively pursued in tourism as a measure to deal with sustainable tourism. Choi and Sirakaya (2006) have developed indicators for community tourism, Miller (2001) developed indicators that tourists can use in the selection of their holidays and Li (2004) developed indicators based on the Pressure-State-Response Model for Tianmushan Nature Reserve in China.



Indicator development is not without its downfalls. Despite its perceived benefits, several researchers have criticised the development and use of indicators for sustainable tourism development. These criticisms include:

- indicators are difficult to assess (Miller 2001)
- problems exist in developing indicators that take into account all of the necessary requirements (Hughes 2002; Dubois 2005)
- there are issues with scale, differing interpretations and bringing subjectivity into an objective process (Hughes 2002)
- use of indicators can also lead to over-dependence on quantitative measures (Miller and Twining-Ward 2006)
- improper selection and inaccurate measurement of indicators can lead to negative consequences on the monitoring system (Choi and Sirakaya 2006)
- can be costly and time-consuming since it requires some degree of technical expertise and long-run dedication to monitor and report on its usage (Miller and Twining-Ward 2006).

Indicators are neither a solution nor can they alone create a tourism that is more sustainable (Ceron and Dubois 2003). They are still in the early stages of development and working examples are difficult to find (Miller 2001; Tsaur et al. 2006). Indicators however provide valuable information for informed decision-making and aid destination managers in developing and implementing action plans and increasing the general level of awareness of sustainable tourism (Miller and Twining-Ward 2006).

#### **2.4.4 Certification, Accreditation and Eco-labelling**

Certification is a process which ensures that there are some bases or principles by which organisations can conform to and meet certain requirements or standards (Font 2005; United Nations Environment Programme/United Nations World Tourism Organisation 2005). It is described as a voluntary procedure, which assesses, monitors, and gives written assurance that a business, product, process, service, or management system conforms to specific requirements (Honey and Rome 2001).

The certification process can be implemented by a national, regional or international certification body that sets the standards and assesses the organisations (see Font 2005, pp. 213-214). This process ensures continuous improvement of tourism and preservation and protection of the environment (United Nations Environment Programme 2003). Accreditation on the other hand ensures that the “third party” that is providing the certification operates according to highest standards and “guarantees that the competency of certification programmes and the validity of the standards they work to” (Font et al. 2003, p. 213)

Most certification criteria are based on Agenda 21 (United Nations World Tourism Organisation 1996) and ISO 14001 ([www.iso14000-iso14001-environmental-management.com](http://www.iso14000-iso14001-environmental-management.com)). They include the minimum acceptable criteria for reducing, re-using and recycling waste, energy efficiency, conservation, sustainable purchasing and consumption patterns, social and cultural development, efficient hazardous waste disposal, transportation policies, land use planning and management and protection of environmental/natural/historic sites (Mycoo 2006). Two examples of certification programmes currently in operations are:

- ISO 14001 which is an international certification for all sectors and set standards for an environmental management system. Being a global scheme, each country has a body that has been accredited to audit and certify local businesses with the ISO standard (Bambook and Murphy 2008).
- Green Tourism Business Scheme which is for all accommodation and attraction types in Britain and certified by VisitBritain and VisitWales.

The end result of certification is a marketable logo/seal which identified that a minimum standard has been met or exceeded (Font 2005). This logo/seal is what is commonly known as an eco-label. Certification can therefore be seen as the process and the eco-label, the product. Mihalic (1998, p. 33) defined eco-labels as “an effective market-based instrument, capable of reducing the negative impacts of tourism products, production methods, services and processes on the environment, whilst at the same time improving the environmental quality of tourism places”.

The principal aims of these eco-labels are to minimise the negative impacts of tourism and continuously enhance the quality and image of a destination (Sasidharan et al. 2002). It bestows a destination or tourism businesses at a destination a sign of approval that it has reached and is maintaining a certain environmental approach (Nair et al. 2003). This increases tourist satisfaction, gives a destination a competitive advantage (Kozak and Nield 2004) and serves as a benchmark for tourism operators (United Nations Environment Programme 2003).

Eco-labels tend to vary in scale, activity, content, context and organisation (Buckley 2001; Kozak and Nield 2004). Today there are numerous eco-labels (over 100) with not one having worldwide acceptance. Some of the more popular ones include: Certification in Sustainable Tourism, Costa Rica; Destination 21, Denmark; Green Globe 21, Worldwide; Nature and Ecotourism Accreditation Programme Australia; Blue Flag, Worldwide.

#### **2.4.5 Awards**

Awards are usually presented to tourism businesses by some recognising body as a reward for their efforts in becoming more sustainable. The receipt and the recognition of receiving awards are important since in competing for these award destinations are trying to be more sustainable. Even though the competition may be good in getting establishments to be more environmentally friendly, Mihalic (2000) argued most of these awards are not objective, not transparent, lack credibility and therefore makes judging of environmental quality difficult. She however observed that awards are an excellent starting point and promotes a good image for the destination but a more co-ordinated systematic approach is needed.

#### **2.4.6 Legislation, Regulation and Licensing**

Legislation, regulation and licensing can be used by a government authority to aid in sustainable tourism development by ensuring requirements are complied to and enforcing penalties if they are not. Legislation gives the authority to enforce requirements which are defined and elaborated by regulations and is a process of checking and showing compliance with regulations, standards or permissions

imposed (United Nations Environment Programme/United Nations World Tourism Organisation 2005).

An example of this is land use planning and development control. This can be used to shape the type and location of tourism development and prevent unnecessary or harmful developments from occurring. Land use planning includes integrated area management and zoning for tourism development. Other command and control mechanisms used are public regulation (for example setting building limits as in The Bahamas where laws regulate the type, size and location of the building), effluent and emissions standards and other techniques.

#### **2.4.7 Taxes**

Tourist taxes can be used in two primary ways for sustainable tourism development: to reduce demand and using the generated tax revenues for destination maintenance and development (Swarbrooke 1999). Taxes have been supported by the European Commission since it brings compliance in line with the “Polluter Pays Principle” (Palmer-Tous et al. 2007). It can be levied on a tourism business, on the tourist or on the resources such as an effluent charge or waste (United Nations Environment Programme/United Nations World Tourism Organisation 2005). Tourist taxes can be important in sustainable tourism development if it changes the behaviour of the tourists towards the benefit of the environment (Palmer-Tous et al. 2007). In addition to being an economic instrument, tourist taxes can be a visitor management technique since they can be used to influence demand.

This technique, however, has its disadvantages with Swarbrooke (1999, p. 13) identifying several issues with using tourist taxes. These range from tourist discrimination, lack of information about tourists’ willingness to pay, complex and costly mechanism required for tax implementation, may not lead to responsible behaviour, constant variation of taxes due to seasonality and based on the limitations of carrying capacity how can taxes be used to influence demand if the right “limit” is not truly known. Taxes can also be used in a different manner whereby tax incentives

can be given to organisations engaging in sustainable tourism development projects or being proactive in environmental stewardship.

#### **2.4.8 Codes of Conduct**

Agenda 21 established the development, adoption and implementation of codes of conduct (COC) by industries as a main priority for reaching goals of sustainable development (United Nations World Tourism Organisation 1996). COC in tourism act as guidelines as how the industry should operate within non-statutory requirements. They are public statements that demonstrate commitment to sustainability (Ayuso 2007). These codes are not enforced, nor are they enforceable. There are different types of codes and these can range from general tourism industry codes, codes that address specific sectors and activities, codes for tourists and codes directed to the host populations (Mihalic 2000; Mason 2003). Tourist are generally the largest audience for COC since it is hoped that these codes will modify their behaviour and hence reduce their perceived negative impacts (Mason 2003; Cole 2007). COC also exercise control, and provide useful guidance to different stakeholder groups (United Nations Environment Programme/United Nations World Tourism Organisation 2005).

There are a various reasons for adopting COC in tourism. It serves as a vehicle of communication between government agencies, industry sectors, community interests, environmental and cultural stakeholders (Mason 2003; Cole 2007). COC also generate awareness within the industry and governments of the importance of sound environmental policies and management and encouraging them to promote a quality environment and a sustainable industry (Mason 2003). It increases the awareness among international and domestic visitors of the importance of respecting both the natural and cultural environments (Cole 2007). Moreover, the host population can be sensitised to the importance of environmental protection and host-guest relationship and encourage co-operation among industry sectors and government agencies, host communities and non-governmental organisations to achieve the goals of sustainability with the use of COC. The adoption of codes can result in improvements to the natural environment and sustainability of the tourism industry.

It can have an improved image for the destination, can attract tourists who are seeking environmentally responsible forms of tourism, reduce costs because of more environmentally efficient practices and lead to an improved quality of life for the host community.

Some notable examples of COC are the Sustainable Tourism Charter (World Conference on Sustainable Tourism 1995), Agenda 21 for the Tourist and Travel Industry (United Nations World Tourism Organisation 1996), Berlin Declaration on Biological Diversity and Sustainable Tourism (The International Conference on Biodiversity and Tourism 1997), United Nations World Tourism Organisation's Global Code of Ethics for Tourism (United Nations World Tourism Organisation 2001a) and World Travel and Tourism Council's Corporate Social Leadership in Tourism (World Travel and Tourism Council 2003).

COC appear to be impressive but they have their flaws (Mason 2003). Very few attempts have been made in evaluating the effectiveness of codes and Cole (2007) found that the implementation of a tourist code in Ngadha, Indonesia was found neither cheap nor easy. Wheeler (1994, p. 651) describes COC as "laughable" and "futile" and questions their true effectiveness. The process by which COC are produced have been criticised since they are usually developed by concerned groups and do not involve a larger public consultation (Sirakaya 1997). They do not really serve any great benefit for destination managers because they present limited value for decision-making and action, they cannot direct environmental action or determine the nature of it and there are too many codes in existence (Cole 2007). Codes are usually poorly implemented and hardly monitored for progress and corrective action and therefore better co-ordination is needed since any one destination can have several COCs for different groups with diverse aims (Mason and Mowforth 1996).

#### **2.4.9 De-marketing**

Another tool that has been used to manage sustainable tourism at the destination level is de-marketing. De-marketing is defined as "that aspect of marketing that deals with discouraging customers in general or a certain class of customers in

particular on a temporary or permanent basis” (Kotler and Levy 1971, p.75). These researchers discussed three types of de-marketing: general de-marketing where there is a desire to reduce the total level of demand, selective de-marketing where demand from a certain market segment is decreased and ostensible marketing where there is the appearance of reducing demand as a result of scarcity but this in turn generates greater demand for the desired product.

With reference to sustainable tourism, de-marketing is also an action strategy aimed at dissuading tourist from visiting a destination (Gunn and Var 2002). Reducing the total level of demand can be aligned to the visitor management techniques discussed earlier. Effective market segmentation can be a key tool for sustainable tourism (Kastenholz 2004). If destinations identify the right segments that they want to attract then a “destination-fit” can be achieved which leads to the long-term goals of sustainable tourism.

De-marketing has not been actively pursued in tourism as a means of reducing demand and controlling supply but this approach can be used as a part of a destination’s marketing mix by allowing a destination to achieve its strategic objectives (Beeton and Benfield 2002). Some advocates have great confidence in the concept for sustainable tourism development (Swarbrooke 1999). Table 2.3 demonstrates where de-marketing can be applied in the tourism marketing mix. De-marketing has been used in Italy at The Last Supper (1495–97), Sissinghurst Castle Garden Kent, England and Wilsons Promontory National Park, Victoria, Australia (Beeton and Benfield 2002).

**Table 2.3:** De-marketing Strategies and Problem Areas where they are most Applicable

De-marketing Strategy	Problem Areas		
	Product Shortages	Energy Conservation	Excessive Demand
<b>Tying Agreements</b>	+	-	-
<b>Restricting Distribution</b>	-	-	+
<b>Sales Force Reductions</b>	+	-	+
<b>Price Increases</b>	+	+	+
<b>Allocation of Supply</b>	+	+	-
<b>Monitoring of New Products</b>	+	+	-

Key: + Applicable; - Not applicable

Source: Beeton and Benfield 2002

## 2.5 Conclusion

It can be seen that sustainable tourism has progressed a long way since its inception. Several techniques are currently in place for sustainable tourism development but many of these are implemented by individual businesses and few by a DMO. These mechanisms are also fraught with problems and issues depending on their applications. Table 2.4 identifies the concepts for sustainable tourism and their associated tools/mechanisms. It demonstrates that most of these existing tools/mechanisms can be used in some form for each of these concepts. Licensing, regulation and legislation and taxes cannot be used by the industry to self-regulate itself. Rather these tools/mechanism are imposed by a government authority. In the discussion of the above, there has been no mention of ICT in the literature as a concept or any ICT-based tools/mechanisms for managing sustainable tourism development.

This thesis will seek to consider ICT as a new concept in achieving sustainable tourism development and look specifically at the ICT-based tools/applications that apply to these. It will show that ICT will be a new approach with can be used to complement the existing approaches to sustainable tourism development and present opportunities in destination management for using these ICT-based tools/applications. ICT will therefore be a practical and innovative mechanism destinations can engage with in their struggle to become sustainable. The following



chapters will therefore look at the ICT as a new approach to sustainable tourism development from a destination manager's perspective.

**Table 2.4:** Concepts and their Associated Tools/Mechanisms for Sustainable Tourism

<div style="text-align: center;"> <b>Concepts</b>  <hr/> <b>Tools/ Mechanisms</b> </div>	Carrying Capacity	Government Intervention	Economic Approach	Self-regulation	Education	Monitoring	Certification	Marketing & Information Services	Environmental Management	Cleaner Production
Visitor Management Techniques	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alternatives to Carrying Capacity (LAC, VIM, VERP, CEA)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Environmental Impact Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sustainability Indicators	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Awards	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Legislation, Regulation and Licensing	✓	✓	✓		✓	✓	✓	✓	✓	✓
Taxes	✓	✓	✓		✓	✓	✓	✓	✓	✓
Codes of Conduct	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Marketing and de-marketing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

## **Chapter Three**

## **Chapter Three**

### **ICT and Sustainable Tourism**

#### **3.1 Introduction**

This chapter examines the other key aspect of this research, ICT, by painting a representative landscape of ICT in tourism. It discusses the linkages between ICT and sustainable tourism by identifying the opportunities for using ICT in sustainable tourism and the specific ICT-based tools/applications which can be used for these opportunities.

#### **3.2 ICT and Tourism**

Tourism as a technology based industry is now a well established body of literature since there is no doubt the ICT has brought about a metamorphosis of the tourism industry. ICT is not only a critical factor for destination competitiveness (Poon 1993; Sheldon 1997; Buhalis 2003; Buhalis and O'Connor 2006) but it is transforming the tourism system worldwide with regards to structure and operations (Buhalis and O'Connor 2006). ICT use in tourism has not only defined methods of making existing processes more efficient but has provided new ways of performing these existing functions (Cronin 1996). Table 3.1 demonstrates some of the ways that ICT has been used in tourism. ICT use in tourism can be traced back to the 1950s and the adoption of a Computer Reservation System in the airline industry but it was the rapid adoption and use of the Internet in the 2000s which brought about dramatic changes to tourism (Ma et al. 2003).

In essence, ICT is the technology required for information processing. These are innovative tools that form an integrated system of software and networked equipment that facilitates data processing, information sharing, communication and the ability to search and select from an existing range of products and services for an organisation's benefits (Buhalis 2003). It is the umbrella term that refers to any product that stores, retrieves, manipulates, transmits and receives digital data and how these differing applications work with each other.

**Table 3.1: ICT use in Tourism**

Area	ICT Use
Site selection and tourism development	Geospatial information technologies
Marketing	Inbound market research Outbound advertising
Customer relationship management	Home-destination-home Turn prospects into customers Book-travel, lodgings, tours etc. Trip management: pre, during, post
Operations	Buying, managing services and supplies Managing value chains
Managing and monitoring tourism site	Geographical information systems and global positioning systems

Source: United States Agency for International Development 2006

ICT-based tools/applications can be grouped into three sectors: ICT equipment, software products and ICT services and carriers (Erdmann and Behrendt 2003). This can be further sub-divided into microelectronics, new functions, networks, ICT devices and interfaces, software, knowledge management, services and applications (Erdmann and Behrendt 2003). Today, ICT applications include cell phones applications, Internet, wireless, voice-over information processing, Geographical Information Systems, Global Positioning Systems, Location Based Services, convergence (data, voice, media), digital radio and applications on demand. These ICT applications depend on a variety of products such as personal computers, net servers, mobile phones, cables, satellites and peripheral devices (screens, printers, scanners). These technologies are used by consumers, businesses, tourism marketing organisations, regulatory agencies, natural resource managers, local government, transport system managers, students and researchers, making their influence pervasive throughout the tourism system.

The growing significance of ICT in tourism has led to the coining of the phrase eTourism with regards to its use and applications. eTourism is defined as “reflecting the digitalisation of all processes and value chains in the tourism, travel, hospitality and catering industries” (Buhalis 2003, p. 76). It is all the ICT-based tools/applications that can be used by the tourism industry for business management, planning, development, marketing and distribution (Werthner and Klein 1999;

Buhalis 2003). The literature in the eTourism domain has focused on the way ICT has impacted and transformed tourism structure and performance. Milne and Ateljevic (2001) identified six areas as the main focus of eTourism research: knowledge management, changing consumer tastes, new product development, empowering small businesses, labour market impacts and disintermediation whilst Buhalis and Law (2008) identified three areas: consumer and demand dimensions, technological innovations and industry functions. This demonstrates that eTourism research has continued to focus on the same areas over the years. Consumer and demand dimensions encompasses research in changing consumer taste and knowledge management. Technological innovation includes new product development whilst industry functions refers to empowering small businesses, labour market impacts and disintermediation. Despite the main research areas remaining the same, the focus in these areas have shifted over the years. Discussions no longer revolve around tourism organisations investing in technology. It is an accepted fact that once you are in the marketplace, the use of technology is a given and is no longer considered to be a strategic weapon for organisations. Rather the research in these areas now evolve around how organisations engage and use this technology to interact with consumers, other businesses and stakeholders and increase their business performance. Some of the main areas discussed below are information processing, changing consumer requirements, suppliers and virtual communities.

### **3.2.1 Information Processing**

Tourism has been very well documented as an information intensive business (Poon 1993; Sheldon 1997; Werthner and Klein 1999; Buhalis 2003). Baggio (2006) rightly commented that any ICT which can be used to manage the information needs of the tourism industry will undoubtedly be useful. Tourism is a confidence good and therefore the choice of destination depends on the information available and not the actual destination itself (Staab and Werthner 2002). The characteristics of the tourism product makes it high risk requiring timely and accurate information relevant to customers' needs (Zehrer and Hobbhahn 2007). Effective information utilisation is therefore central to business success since information has now become as valuable as capital and labour (Werthner and Klein 1999).

In tourism, the use of ICT and especially the Internet have changed the way in which information is collected, stored, distributed, processed and managed in tourism. It acts as a mechanism for reducing the information gap (Zehrer and Hobbhahn 2007). Tourists are also demanding better, quicker and more reliable information (Gratzer et al. 2002) and using ICT is fulfilling this through the provision of timely, appropriate and accurate information. Destinations have benefited tremendously from ICT by using it to communicate, market and promote destinations to potential tourists. It also serves as a mechanism for new distribution channels (Wöber 2003; Flouri and Buhalis 2004) and increases communication and interaction with and between stakeholders (Buhalis and O'Connor 2006). Table 3.2 shows the ICT-based tools/applications that are used to manage the information requirements of tourism.

**Table 3.2:** Information Sources and Tools within Phases

Phase	Task	Source	Tools
Information gathering and modelling	Information gathering	On-line market data, statistical sources, questionnaires	Electronic search tools i.e. scanning, browsing, retrieving
	Performance monitoring	On-line performance	Statistical tools
Analysis and forecasting	Market analysis and segmentation	Market data	Market portfolio, data mining
	Forecasting and extrapolation	Historical performance data, market data	Econometrical models, simulation
Planning and decision	Product planning and creation	Market data, "own" infrastructure	Optimisation models, simulation
	Distribution channel selection	Market data	Optimisation models, simulation
Implementation and operation	Information distribution	Performance data	Statistical tools
	Negotiation and sales	Performance data	Decision models, game theory

Source: Werthner and Klein 1999

### 3.2.2 Changing Consumer Requirements

The use of technology in tourism has definitely led to a paradigm shift since it has empowered the consumer and now assists in shaping how they make their decisions. According to InternetWorldStats.com (2009), there are over 1.5 billion Web surfers. Customers have become "smart agents" and are now in better positions to compare

prices and product offerings (Connolly and Sigala 2001, p. 327). They are also expecting destinations and tourism business at the destinations to have an online presence and the technology they require when they are there. These savvy Internet customers want packages which are more flexible to their requirements. They want more personalised products and services and they want these to be available online. Travellers now have access to a vast amount of information not only provided by suppliers but by tourist organisations, private businesses and by the travellers themselves. Information search is an important part of the purchasing decision making process and through the use of ICT and the Internet, uncertainty and risks can be reduced and the quality of the experience can be enhanced. According to Buhalis and Law (2008) more research leads to more information and a more informed customer can identify the products and services that best caters to their needs and are able to interpret and interact better with the local culture and resources.

The Internet has not only allowed organisations to engage more with the customer but it has also decreased the time in between communication leading to faster response rates. With the advance development of the Internet and Web 2.0, customers are now able to network with each other, interact with businesses and local people at the destination. O'Reilly (2006) defined Web 2.0 as “the business revolution in the computer industry caused by the move to the Internet as platform, and an attempt to understand the rules for success on that new platform”. In recent years, Web 2.0 applications have taken on a life of their own and with regards to tourism, it is causing fundamental changes in how travellers use the Internet and their online experiences and expectations. Prior to Web 2.0, consumers were only able to engage in information search and possibly make some purchases. Now customers are able to identify, customise, comment and purchase tailor made products. Web 2.0 has placed the tourist in the middle of functionality and product delivery (Buhalis and Law 2008). The Web today is now characterised by information pull rather than push with a second generation of Web-based services such as wikis, folksonomies, social networking, user generated content, openness, sharing and collaboration (Tapscott and Williams 2006).

The content generated on these sites is shaping tourists' tastes and choice of destination products and services. Organisations should use the power of these new technologies to quickly identify the needs of these tourists and provide them with comprehensive, personalised and updated products and services. They can have dedicated persons scan through blogs, online communities and see what these tourists are writing about their experiences and use this to better cater to their needs. This is seen on Recommender Websites and public forum Websites.

### **3.2.3 Suppliers**

Perhaps the most affected areas in tourism from the use of ICT has been distribution and marketing (O'Connor, 2000; O'Connor and Frew, 2002). The topic of the Internet revolutionising tourism with regards to distribution channels and booking systems has been well documented (Sheldon 1997; Werthner and Klein 1999). Disintermediation refers to how the role and functions of intermediaries are being reduced or in some cases disappearing in the tourism value chain through the use of ICT (Werthner and Klein 1999). The Internet has re-engineered the production and delivery of tourism products (Belbaly et al. 2004; Gratzner et al. 2004; Buhalis and O'Conner 2006, Ndou and Petti 2007) and has dramatically altered both operational and strategic practices (Buhalis and Zoge 2007) since it has allowed tourism suppliers to be flexible and creative in their strategies by providing them with enhanced features to attract and sell to the consumer.

Before the Internet, tourism suppliers had no alternative but to use intermediaries for product distribution (Buhalis and Law 2008). The widespread use and adoption of the Internet presented suppliers with the opportunity to distribute their product directly to the end-consumers and allowed them to speak directly to the consumer without the involvement of a third party. The Internet has therefore added an element of transparency in the marketplace (Buhalis and Law 2008). This significantly altered the role of tour operators and travel agents since online bookings changed their sales channels (Werthner and Klein 1999; Buhalis 2003; Werthner and Ricci 2003). ICT has also empowered small and medium sized enterprises since they can now compete with larger organisation by using the Internet strategically and



developing eCommerce strategies. They can distribute, market and promote their products online just as large enterprises do, hence making them more competitive as well as resulting in cost savings.

Moreover, Web marketing is now considered the norm in tourism. The Internet is now seen as a multi-promotion tool and distribution channel for tourism (Gretzel et al. 2000; O'Connor and Frew 2004). Suppliers can now have one-to-one conversations with the consumers dispersed over a wide geographical sphere in a cost-efficient manner using a variety of online promotional activities. ICT has provided an avenue for new product development in tourism. It offers great possibilities for price differentiation, greater networking for dispersed elements and fosters a wider array of product choices (Milne and Ateljevic 2001). Buhalis and Law (2008) described this as "fitness to purpose" where ICT is used to package the tourism product to cater to the individual needs of the traveller and thereby offering huge opportunities to both the consumer and the supplier, resulting in an enhanced final product. The Internet has also enabled the profiling of consumers which allows organisations to become more customer-centric. Tourists portals collect and organise information which can then be used to tailor fit the product to the tourist requirements (La Micela et al. 2002). Recommender Systems can also be developed. These are applications which can provide suggestions to customers based on their needs and constraints on product and services and influence the decision making process (Ricci 2002).

The adoption of ICT by organisations is also leading to important consequences on the demand and use of labour (Milne et al. 2005). This has resulted in increasing demand for high quality IT staff, new skills and managerial requirements as well as organisations training their staff on the use of the technology (Koutsoutos and Westerholt 2005). According to Milne and Ateljevic (2001), researchers have started to focus on the consequences of an eBusiness strategy on the use of labour, training and delivering quality service.

ICT usage is critical to tourism suppliers since it allows them to develop, manage and distribute their offerings worldwide (Buhalis 1998). To remain competitive in the future, tour operators and travel agencies need to re-examine their product offerings and incorporate ICT in their business practices. They now have to focus on consulting and having more complex and diversified products (Werthner and Ricci 2003).

### **3.2.4 Virtual Communities**

Virtual communities are becoming a powerful force in the tourism world since they serve as a forum of customer-to-customer or customer-to-local resident communication rather than a form of marketing. Rheingold (1993, p. 58) defined a virtual community as “a group of people who may or may not meet one another face-to-face, and who exchange words and ideas through the mediation of computer bulletin boards and networks”. Virtual communities are now commonplace with the development of sites such as Facebook, Twitter, Bebo and Myspace and these communities are growing daily. The share of adult Internet users who have a profile on an online social network site has more than quadrupled since 2005, from 8% to 35%, according to a November–December 2008 Pew Internet and American Life Project Survey. Table 3.3 shows the top 10 social networks in the UK for the end of January 2009. These communities are used as a means of information sharing amongst members with a common interest (Chalkti and Sigala 2008) and allows members to post and share comments, opinions and personal experiences with others (Xaing and Gretzel 2009). The attraction of using these communities are that they provide seemingly unbiased comments/opinions/reviews from people who have experienced what you are about to experience and they provide key insights, tips and tricks which you could not have received before. This process is influenced by trust amongst the community members (Usono et al. 2007).

It also builds relationships amongst people and provides an easy source for obtaining information. According to Wang et al. (2002), online travellers are keen to meet with other travellers who share their attitudes, interests and way of life. Sharing knowledge, advice and experiences in these online communities are replacing old customs of hoarding and accumulation. Due to the many questions about the quality

and credibility of information on the Internet, virtual communities offer a sense of security since consumers seek the opinions of others who have shared or are about to engage in similar experiences in order to managed this perceived risk. Organisations need to pay attention to these daily growing virtual communities in order to better understand consumers behaviour and motivations. This allows organisations to better position their products, offer tailor made services, deal with customer complaints and determine what customers like and dislike. Brand awareness and brand association can also be strengthened through the assistance of virtual travel communities (Buhalis and Law 2008).

**Table 3.3:** Top Social Networks in the UK for January 2009

Rank	Website	Domain	Market Share*
1	Facebook	www.facebook.com	37.5%
2	YouTube	www.youtube.com	17.05%
3	Bebo	www.bebo.com	9.11%
4	MySpace	www.myspace.com	5.01%
5	Yahoo! Answers	answers.yahoo.com	1.10%
6	Nasza Klasa	www.nasza-klasa.pl	0.72%
7	Gumtree.com	www.gumtree.com	0.65%
8	Tagged	www.tagged.com	0.64%
9	BBC h2g2	www.bbc.co.ukk/dna	0.62%
10	MoneysavingsexpertForums	forums.moneysavingexpert.com	0.57%

\*Based on market share of UK Internet visits to Hitwise's Social Networking and Forum Categories

Source: Hitwise Intelligence 2009

Technology is becoming more advanced and complex but it is also getting cheaper and more user-friendly thereby allowing more users wider access. ICT convergence is eliminating the boundaries between equipment and software (Werthner and Klein 1999) and this is facilitating a holistic, integrated and networked system of hardware and software for more effective data processing and communication (Buhalis and Law 2008). The future ICT-tourism relationship will be one focused on user involvement and interactivity using these new ICT-based tools/applications to communicate, interact and fulfil customers' need.

Despite the exploitation of the areas described above, there are still other areas in tourism where ICT can be used with sustainable tourism development being one such

avenue. The application of ICT to sustainable tourism will not only expand the eTourism research domain beyond web based marketing and distribution (Frew 2000), but it will also stimulate innovation in the tourism industry.

### **3.2.5 DMO and ICT Usage**

Adopting ICT, as part of their business strategy, can have huge positive implications for DMOs. ICT has been used primarily for marketing and promotion of products and services, portraying an image of the destination and communicating their message to the tourists (Yuan et al. 2006). It can also assist them in improving their business processes more efficiently and facilitating better destination management and planning (Buhalis 2000; Ma et al. 2003; Yuan et al. 2006). By taking advantage of Intranets (internal systems that are accessed by employees) organisations can re-engineer internal processes, while Extranets can support the development of close relationships with trusted partners which can lead to online transactions, expansion of the distribution channel and extension of the value chain (Buhalis 2003, Buhalis and Deimezi 2004). The reality today is that if a DMO fails to adopt technology then they are choosing to fail (Buhalis 2003).

In 2004, the United Nations World Tourism Organisation undertook a survey of DMOs. The results of this survey identified that DMOs with an eBusiness strategy used ICT mainly for marketing and promotion activities, information collection activities, reservation services and product related activities as can be seen in Table 3.4 overleaf.

**Table 3.4: Activities of DMO with an eBusiness Strategy**

<b>Promotions and Marketing Activities</b>	<b>Past 3 years %</b>	<b>Next 3 Years %</b>
Production and distribution of brochures and print	100	90
International market planning	85	85
Domestic market planning	87	84
International advertising	76	81
Domestic advertising	84	81
Operation of a web site	100	93
Direct mail	76	70
<b>Email marketing</b>	70	88
<b>Customer relationship management (CRM)</b>	48	79
Travel exhibitions fairs and trade shows - organisation	76	69
Organisation of other events	84	84
Travel exhibitions fairs and trade shows - attending	97	90
Marketing to the travel trade	90	85
Convention Bureau operations	55	58
Market research	90	88
None of these	0	0
<b>Information Collection Activities</b>		
Collection of a wide range of tourist information including accommodation	95	82
<b>Operation of an information/content management system</b>	77	85
Operation of Information Centres for visitors	70	68
Other	12	15
None of these	0	0
<b>Reservation Services</b>		
Provision of a reservation service through Information Centres	45	47
Provision of a reservations service to telephone callers	42	44
<b>Provision of a live (real-time) web based reservation service</b>	29	61
Other	3	9
None of these	17	15
<b>Product Related Activities</b>		
<b>Package development and operation</b>	45	56
Classification and/or licensing of tourism businesses	33	32
Development of physical resources such as visitor centres signage etc	47	47
Regulation of the industry	20	26
Human resource development and vocational training	53	53
Advice and/or finance to assist tourism businesses	65	68
Other	5	5
None of these	6	6
<i>(base)</i>	<i>(66)</i>	<i>(66)</i>

Source: United Nations World Tourism Organisation 2004b

Tourism is no newcomer to using ICT with it being used mainly by DMOs for their marketing and promotion activities and enhancing their online presence through bookings and product offerings as demonstrated in Table 3.4. Many destinations have engaged with a Destination Management System (DMS) and have sought to coordinate the small and medium sized enterprises at the destination and offer their products and services in a one stop online shop. DMOs have also used ICT for product development however, there is no mention of ICT being utilised for sustainable tourism development. Little research exists on the specific applications of the use of ICT for sustainable tourism development, therefore ICT can be a new innovative approach for sustainable tourism development. By using ICT creatively and imaginatively DMO can be more transparent in associating a true environmental cost to the tourism product. They can also fill the information gaps that exist with regards to environmental information needed for proper monitoring and decision making. They can make “intelligent use of intelligent systems” (Berkhout and Hertin 2001, p. 2).

### **3.3 ICT and Sustainable Tourism**

ICT does possess the potential to mitigate tourism’s negative impacts at the destination level (Liburd 2005). A search of the literature revealed that opportunities do exist for using ICT-based tools/applications for sustainable tourism and there are several ICT-based tools/applications which can be used by destination managers for these opportunities. These opportunities are namely information management, tourist satisfaction, interpretation, enabling partnerships, community participation and sustainable consumption.

#### **3.3.1 Information Management**

Destination managers require vast amounts of information for decision making and long-term planning. Some of this information requirements include: business planning, establishing compliance with regulations/standards, product development, partnership identification, quality management and assurance, personnel management, market planning and evaluation, feasibility assessment, investment monitoring, policy making and evaluation, research problems, communication and

extension and identification of core competencies (Carson and Sharma 2002). It was observed by Fuchs and Höpken (2005) that in tourism there is a weak use of information for decision making and the potential for ICT in supporting tourism managerial decision making is largely unexplored and unexploited. This can be attributed to the diversity and fragmentation of data sources resulting in limited access and lack of know-how in data analysis and the most appropriate use of this information.

Tourism, a service industry, has an information and a physical component. In the realm of tourism the information context is usually the most significant (Elliot-White and Finn 1998) and if ICT can be used to help destination managers manage this information content with regards to sustainable tourism then they will be on a better path to ensuring their destinations are more sustainable. Destination managers need to find out if the information they require is available, where it is located, how to gain access it, determine the form the information exists in, how to make sense of it as well as decide and how to store and distribute this information. Moreover too much information can be overwhelming and confuse the decisions which destination managers have to make. The decision making process requires useful tools and applications that help in selecting the best and most workable decision that satisfies all parties involved. At best, destinations managers need to avoid making the wrong decisions, especially in developing their destinations in a sustainable fashion.

At the heart of sustainable tourism development lies the process of decision-making which is focused on the best allocation of resources in a limited period of time that satisfies all stakeholders involved. Not all tourism development is worthwhile and destination managers must be able to effectively sift through the necessary information, make sense of it (develop possible scenarios) and reach a workable decision in a suitable time period. If a destination manager has sound methods of monitoring and analysing environmental data (El-Gayar and Fritz 2006), the routes tourists use, the frequency of use and timings and how tourists account for time, space and place (Lew and McKercher 2005), they can better plan for tourism and making it more sustainable for destinations.

ICT can provide “concise, timely, and to-the-point information which is directly usable” for decision making (United Nations Environment Programme/ United Nations World Tourism Organisation 2005, p. 9). In short, information is power and being able to use this information wisely and effectively will definitely be to a destination manager’s benefit. There are several ICT-based tools/applications that can be used for information management. These are: Computer Simulation, Destination Management System, Economic Impact Analysis Software, Environment Management Information System, Geographical Information Systems, Global Positioning System, Tourism Information System and Weather, Climate and Ocean Change Forecasting Software.

#### *3.3.1.1 Computer Simulation*

Computer simulation (CS) modelling is an ICT-based tool/application which a destination manager can use in managing their information needs and making their destination more sustainable. This is a computer-based simplification of the real world and recent research efforts recognise that computer-based simulation modelling can be effective in planning and management of nature-based tourism and protected natural areas (Wang and Manning 1999; Lawson 2006). These models are designed to represent how a system operates over time and can be invaluable in observing and testing the different components of a system and its interactions with its component parts which may prove difficult for direct observation (Wang and Manning 1999).

In developing the simulation models, the approaches to modelling can either be dynamic, stochastic and discrete to account for the unique traits of the destination as described by Wang and Manning (1999) and Lawson (2006). Dynamic models represent how the internal elements of a system transform over time whilst with stochastic simulation model, the modelling of the system is based on probability distributions to account for variation within the system. Discrete models are those which considers immediate changes in the variables at unconnected points in time.



Four main ways were identified for using CS for the planning and management of protected sites. Firstly, according to Lawson (2006), it can be used to describe existing visitor use which is usually very difficult to observe in protected areas since they are large and have various points of entry and exit. He further explained that information about visitor use patterns is easier to collect (i.e. visitor use information collected at trailheads, parking areas, visitor centres, etc.). This information can be entered in the CS model to provide managers with precise estimates of visitor use of the protected, natural areas. The spatially and temporally explicit information about visitor use patterns can allow destination managers to recognise threats (trouble spots) and opportunities (areas for further development) to the natural and cultural aspects of an area.

Second, CS can also be used to monitor indicator variables that are difficult to measure (Wang and Manning 1999). Destination managers can develop management plans to shift the burden from areas with heavy usage to those with limited use. This allows them to understand how tourists account for use of time, space and place when they are on holiday (Lew and McKercher 2005). Certain examples cited for this use are “how many encounters do backpacking visitors have with other groups per day while hiking?” or “how does the number of people at a popular attraction site change throughout the course of a day or visitor use season and with increasing or decreasing levels of total visitor use?” (Lawson 2006, p. 602).

Third, it can also be used to test the effectiveness of different impact conditions by using hypothetical situations in order to facilitate the best decision making (Wang and Manning 1999; Lawson and Manning 2003). Some issues that can be tested include alleviating congestion by shifting use to other areas of the destination, the outcome of a quota on visitor numbers and revenue and the effect of visitor use along trails by using other transportation systems (Lawson 2006). Simulating situations allows destination managers to make better decisions surrounding carrying capacity issues.

Fourth, CS modelling can also be used to assist in community involvement and participation. It can be used to facilitate more practical research design for public consultation (Lawson and Manning 2003; Lawson et al. 2003) by providing the community with more realistic images and data about the proposed development (Lawson 2006). This can foster more informed decision making by the community.

The true benefit of CS for destination managers in sustainable tourism development lies in the fact that it can simulate real world scenarios of “those tasks that are too complex for direct observation, manipulation, or even analytical mathematical analysis” (Wang and Manning 1999, p. 195).

### *3.3.1.2 Destination Management System*

A Destination Management System (DMS) is the IT infrastructure of the DMO and supports the activities of the DMO (Sheldon 1997; Ndou and Petti 2007). Typically a DMS creates efficient internal and external networks and sustainable relationships with the tourist, local community and tourist businesses which impact on the competitive advantage of a destination, by using ICT and the Internet (Collins and Buhalis 2003; Horan and Frew 2007). They are instrumental in the marketing and promotion of destinations by providing information on activities and the range of products the destination has to offer and aid in attracting appropriate market segments, increasing visitor numbers, and providing comprehensive and updated information (Sheldon 1997; Buhalis 1999; Horan and Frew 2007). DMS therefore allows destinations to have an effective presence on-line and in the marketplace (Buhalis and Deimezi 2004).

A DMS should be the mechanism that integrates the different products and services for tourism and acts as the facilitator in accomplishing a destination’s objectives (Collins and Buhalis 2003). It allows a DMO to partner with tourism enterprises at the destination to co-ordinate their product offerings at the local level and offer them on the global stage (Buhalis and Spada 2000; Belbaly et al. 2004). DMS are therefore critical in destination management since they help to manage the information needs of stakeholders, increase customer satisfaction and promote a

destination as an integrated entity rather than separate products and services (Petti and Ndou 2004). In past years there has been notable work on the criteria for successful DMS (see Buhalis and Spada 2000).

In the literature, there are numerous definitions of a DMS and little consensus on its roles and operations (Buhalis 2003). After conducting a Delphi Study with a panel of experts in the field of eTourism the following definition of a DMS was proposed:

...Destination Management Systems (DMS) are systems that consolidate and distribute a comprehensive range of tourism products through a variety of channels and platforms, generally catering for a specific region, and supporting the activities of a destination management organisation (DMO) within that region. DMSs attempt to utilise 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, pp. 34-35).

In essence, the DMS is combination of Websites, Intranets, Extranets, reservation systems, customer services and other systems which assist the DMO in marketing, promotion and management of the destination. By having a DMS which goes beyond having a Web presence and truly engaging with the customers, local community and tourism businesses at the destination, a DMS can aid DMOs in their sustainability agenda. By serving as an “information diffusion mechanism” (Buhalis 1997, p. 84), a DMS can contribute to sustainable tourism development by fostering new tools for managing the valued resources (natural, economic and social-cultural) of a destination (Buhalis 1999). A DMS can lead to economic benefits by efficiently managing the resource inventory of a destination, providing managerial aid for small businesses and supporting the tourist experience before, during and after the visit. This DMS can also highlight the fragile eco-systems and resources of a destination.

The socio-cultural benefits can be improved by disseminating information to the tourists on culture, customs, history and other needed elements that foster an understanding between the tourist and the host community. A community based information system (CIS) can be developed to extend the functions of a DMS to support the tourists at the destination, potential tourists and the local community (Kazasis et al. 2003). These researchers argued that this system creates interaction between the tourist and the local community, whereby, through the use of the Internet, the CIS allows prospective tourists to be given evaluative information about a destination from members of the community and not any particular organisation. This gives a more unbiased impression to the potential tourist and fosters a greater feeling of security through evaluations from other tourist and direct interaction with the local community (Kazasis et al. 2003). This is critical to a destination's image since these comments may influence the tourists' destination choice (Staab and Werthner 2002; World Bank 2006). It also serves in sensitising tourists to the destination prior to arrival (World Bank 2006). This includes providing them with information on ground transport, directions, safety and security, events, eating places, and providing background information on the destination so that the prospective tourists are aware of the local culture, dress, behaviour, history and geography and how best to experience and learn about the destination (World Bank 2006). Kazasis et al. (2003) commented that using a CIS allows social objectives such as building community cohesion, increasing community awareness and their roles in decision making.

### *3.3.1.3 Economic Impact Analysis Software*

Many destination managers are under pressure to demonstrate how tourism development can lead to economic benefits of their destination. Economic impact analysis can be of importance to a destination manager if properly used and interpreted (Tyrrell and Johnston 2006). This type of analysis can be used to provide information on the type and amount of spending, gain public support for tourism development, ascertain which course of action best supports the community, increase economic activity and determine financial feasibility (Vogelsohn and Graefe 2001).

The challenge posed for destination managers is how to aggregate, analyse and make understandable these economic benefits to the wider community and stakeholders. This can be accomplished through the used of ICT-based applications. There are several software packages that can be used by DMOs for analysing the economic impacts. These packages are namely IMPLAN, RIMS II (Regional Input-Output Multipliers), REMI (Regional Economic Models Inc.), and the Fiscal Tool. Table 3.8 gives a brief description of this software. The software can be used by destination managers to develop models and estimations of the economic impacts. It can create detailed and comprehensible reports of tourism money entering the destination and how this money is being used to create further income hence making tourism sustainable and workable for the destination.

**Table 3.5:** Summary of Economic Impact Analysis Software

<b>Model Name</b>	<b>Model Description</b>	<b>Source Agency or Organization</b>	<b>Geographic Coverage</b>
<b>Minnesota IMPLAN Group, Inc.</b>	IMPLAN offers software and data to run economic impact analysis and the flexibility to create a region of study. They also offer individual multiplier reports, in their "other products" section of the website.	Minnesota IMPLAN Group, Inc	National, State, County, Zip Code
<b>RIMS II Regional Input-Output Multipliers</b>	RIMS II multipliers can be estimated for any region composed of one or more counties and for any industry, or group of industries, in the national input-output table. Also includes a windows-based software program that allows users to view the tables.	Bureau of Economic Analysis	National, State, County, Zip Code
<b>Regional Economic Models, Inc. (REMI)</b>	The REMI Policy Insight model can generate year-by-year estimates of the total regional effects of any specific policy initiative. The model is available in single- and multi-area configurations. Each calibrated area (or region) has economic and demographic variables, as well as policy variables so that any policy that affects a local economy can be tested.	Regional Economic Models, Inc. (REMI)	National, State, County, Multi-area
<b>Fiscal Impact Tool</b>	The Federal Reserve Fiscal Impact Tool is available in the form of an Excel workbook, for estimating the effects of proposed economic development projects on local sales and property tax revenues and on costs to local government. The estimates are based on user-provided information about the project (such as location and number of jobs) and the locality (such as tax rates and one-time government costs).	Federal Reserve Board	Multi-state models are available that coincide with the Federal Reserve District Banks

Source: <http://virginiaallies.org/research/impact.html>

#### *3.3.1.4 Environment Management Information System*

Environment Management Information System (EMIS) is another ICT-based tool that destination managers can use in managing for the environmental considerations of their destinations (United Nations Environment Programme 2000; El-Gayar and Fritz 2006). It is a computer-based technology that supports an environmental management system (Moore and Bordeleau 2001). There are many definitions of an

EMIS some of which are competing and others which are complementary (El-Gayar and Fritz 2006). A holistic definition put forth by The BTI Consulting Group (2001, p. 2) defined an EMIS as:

...representing a combination of computer hardware, software, and professional services to manage the environmental function within an organization. EMIS systematically gathers, analyzes, and reports business information related to environmental management, allowing a company to track, refine, and methodically improve its environmental management practice. EMIS represents all computer-driven information systems that control environmental management at a company from stand-alone PCs with a waste tracking spreadsheet to fully globally networked computer systems designed to integrate environmental, health and safety functions into the company business operations information system.

Therefore an EMIS co-ordinates such activities as tracking waste, monitoring emissions, scheduling tasks, coordinating permits and documentation, conducting cost/benefit analysis, and choosing among alternative materials (Moore and Bordeleau 2001). From the above, it can be seen that the EMIS is focused on the effective and efficient collection of performance data to sustain performance measurement and process improvement. It incorporates a variety of information technologies which include but are not limited to real-time data acquisitions systems, database systems, Geographical Information System (see later discussion), as well as Environmental Decision Support System-oriented business intelligence tools, computational intelligence, and enterprise systems integration (El-Gayar and Fritz 2006). The EMIS connects scattered information about urban and environmental issues in a way that allows the end-user to analyse the information in a most appropriate fashion with the information being stored in archives, databases and maps (United Nations Environment Programme 2000). In its simplest form, it is an information system for the management of information.

DMOs need to manage their internal environmental information with regards to collecting and distributing data on areas such as: environmental quality of the destinations, visitor impacts, visitor statistics and host population attitude (Mihalic 2000). Through the use of an EMIS, destination managers can obtain the answers to many questions which would have been difficult before due to the incompatibility, diversity and volume of information available (United Nations Environment Programme 2000). One of the benefits of EMIS lies in the fact that it provides cross-organisation integration of environmental data. It aims to automate the environmental management tasks (El-Gayar and Fritz 2006). These EMISs play a functional role in implementing an Environment Management System and it has been identified as “the backbone for environmental management efforts by supporting the firm’s internal Environment Management System and by meeting the reporting needs for various stakeholders” (El-Gayar and Fritz 2006, p. 768). EMIS can also aid in disaster prevention by providing early warning signs about potentially hazardous situations (United Nations Environment Programme 2000).

EMISs have been mainly used in the pharmaceuticals, petroleum, chemical, automotive, utilities, primary metals, and semiconductor industries (El-Gayar and Fritz 2006). The uses and benefits of an EMIS can be applied to tourism because of its significant environmental impacts that results from tourism activity. It can be used for sustainable tourism to address the need for environmental information. It can accelerate speed in which information is received by destination managers and improve information integration which can lead to sophisticated decision making in real-time (El-Gayar and Fritz 2006). Table 3.6 identifies how an EMIS can be used for environmental information management of sustainable tourism.

An example of an EMIS in action for tourism is Xanterra Parks and Resorts Ecometrix System (Xanterra Parks and Resorts 2008). Ecometrix computerised system monitors consumption of electricity, natural gas, gasoline, diesel, propane, fuel, oil, water, generation of solid waste, recycled materials, hazardous materials, recycled hazardous materials, sustainable cuisine and greenhouse gas emissions for most of the National Parks in the USA.



**Table 3.6:** Use of Environment Management Information System for Sustainable Tourism

Uses	Description	Technologies
<b>Environmental Compliance</b>	Ensure regulations are followed Find and correct violations	Legal and environmental health and safety databases Auditing systems Template-based policy generation
<b>Energy Management and Pollution Prevention</b>	Reduction of waste products, by-products and emissions Process optimization	Environmental Cost Accounting Waste management Emissions tracking
<b>Eco-efficiency</b>	Consideration of the “double bottom line” – economic value and ecological costs Process redesign	Business performance metrics, balanced scorecards Online Analytical Processing (OLAP) and query tools for business analysts
<b>Product Stewardship</b>	Company responsibility extends to consideration of product design and its environmental impact	Design-for engineering decision support Product Lifecycle Analysis Impact forecasting Supply chain integration
<b>Future Driven</b>	Social element creates the “triple bottom line” Consideration of long-term systematic effects	Stakeholder-focused Multiple Criteria Analysis Large-scale systems modelling Simulation Information-sharing with stakeholders and the public at large

Source: El-Gayar and Fritz 2006

### 3.3.1.5 Geographical Information Systems

A Geographical Information System (GIS) has been defined as “a computer based powerful set of tools for collecting, storing, retrieving, mapping, analysing, transforming and displaying spatial and non spatial data from the geographic world for a particular set of purposes that varies for each discipline” (Avdimiotis et al. 2006, p. 406). It is an information system that can be used to capture, store, manage,

manipulate, analyse, integrate and display large amounts of geographical data (Feick and Hall 2000; Lee and Graefe 2004; Hasse and Milne 2005; Chancellor and Cole 2008).

For tourism, a GIS operates as a decision support system for problem solving by combining database operations such as query and statistical analysis to geographically represent data (Boers and Cottrell 2006). This GIS manipulates two types of data elements: geographical or spatial data (locational aspects in the form of digitised maps with references such as latitude and longitude or postcodes and addresses) and attribute data (non locational data such as alpha-numeric records) (Bahaire and Elliott-White 1999; McAdam, 1999; Hasse and Milne 2005).

Bahaire and Elliott-White (1999) and McAdam (1999) concur that GIS will be extremely useful for tourism planning and management because it will be able to assist managers with the decision making process. There have been several studies conducted where GIS has been used for tourism planning and decision making (see Feick and Hall 2000; Boers and Cottrell 2006; Connell and Page 2008). GIS can be applied to a variety of settings such as testing different scenarios to determine what the outcomes might be based on varying variables, auditing of tourism resources and conditions, identification of locations for potential development and modelling outcomes. It can also be used for measurement of geographic, environmental, and socio-economic characteristics of an area which can be used to depict the socio-demographic attributes and identify possible market segments, examine spatial relationship between resource use and distance travelled, find alternative travel routes and identify hidden areas of damage (Lee and Graefe 2004). Table 3.7 identifies the capabilities of a GIS with specific regards to tourism. This can be a critical decision-support making mechanism to improve the quality and quantity of information that destination managers require to make decisions.

**Table 3.7:** Capabilities of a Geographical Information System

<b>Examples of Functional Capabilities of a Geographical Information System</b>	<b>Examples of Basic Questions that can be Investigated Using a Geographical Information System (After Rhind, 1990)</b>		<b>Examples of Tourism Applications</b>
Data entry, storage and manipulation	Location	What is at?	Tourism resource inventories
Map production	Condition	Where is it?	Identifying most suitable locations for development
Database integration and management	Trend	What has changed?	Measuring tourism impacts
Data queries and searches	Routing	Which is the best route?	Visitor management/flow
Spatial analysis	Pattern	What is the pattern?	Analysing relationships associated with resource use
Spatial modelling	Modelling	What if.....?	Assessing potential impacts of tourism development
Decision support			

Source: Bahaire and Elliott-White 1999

Using GIS in decision-making is becoming a necessity since being GIS-illiterate in the next decade would be like someone who does not know how to use e-mail and the Internet today (Lee and Graefe 2004). GIS development is indeed a full spectrum approach to retrieving information, developing new and existing products ensuring quality, managing the environment, providing services such as data on information kiosks and facilitating easier and wider distribution of tourism information to the users (Raghuvanshi et al. 2007). As stated by Millar et al. (1994, p. 120) and supported by Bahaire and Elliott-White (1999, p. 171)

... Geographical Information System offers a powerful tool for providing information to support decision-making in sustainable tourism planning and management, and to promote integrated management of resources based on sensitivity to their use and the needs of local communities and visitors.

Tourism is a spatial phenomenon and therefore is aligned to the uses of GIS (Avdimiotis et al. 2006; Boers and Cottrell 2006). It has the capability to bring the necessary information needed by destination managers for decision making on a common stage. If supported, GIS can be a fundamental tool for managing

sustainability. This can be a critical decision-support making mechanism to improve the quality and quantity of information that destination managers require to make decisions regarding the sustainability of their destinations. Chancellor and Cole (2008) commented that GIS will become more widely used in tourism as a decision making tool due to increasing awareness of the benefits for planning and management. Useful data for the GIS is becoming more available and the technology is becoming more user-friendly and cheaper. There are a number of ways in which GIS can assist in sustainability for destination managers as identified in Table 3.8.

**Table 3.8:** Geographical Information System Applications to Sustainable Tourism

<b>Geographical Information System Uses</b>	<b>Application for Sustainable Tourism</b>	<b>Importance to Sustainable Tourism</b>
<b>Data Integration</b>	Manage, integrate and co-ordinate data from numerous sources (Bahaire and Elliott-White 1999; Avdimiotis et al. 2006; Raghuvanshi et al. 2007). Lake District National Park Authority integrated accommodation data from the Cumbria Tourist Board, Population Census and Ordnance Survey to examine how the types of accommodation vary within the quieter and busier central valleys areas of the Lake District (Bahaire and Elliott-White 1999).	Data integration is important for decision making. It functions as a decision support system which is used to produce more informed arguments and facilitate compromise and resolution (Bahaire and Elliott-White 1999).
<b>Indicator Identification</b>	Indicator identification, definition and measurement (Avdimiotis et al. 2006)	Update old data as new data becomes available which takes account of changing demand over time (Avdimiotis et al. 2006).
<b>Resource Inventory</b>	Map and report about an area selected for development (Lee and Graefe 2004; Chancellor and Cole 2008). A landscape and resource inventory was developed in the Badenoch and Strathspey District in Scotland to analyse landscape classes, land use, altitude and recreational impacts and undertake a visual impact analysis (Bahaire and Elliott-White 1999).	Assist in determining problematic areas. It can be used to map and report about an area selected for development (Lee and Graefe 2004). Provide stakeholders with the types of information required to assert their point of view (Bahaire and Elliott-White 1999).
<b>Suitability Analysis</b>	Used for area designation and map overlays to identify and designate areas suitable for development, conservation and research (Bahaire and Elliott-White 1999). Help define boundaries for proposed tourism development, location of surrounding communities, right to the land in the area, accessibility to the proposed site, areas that require protection, identify utilities and highlight how the land is changing over time (United States Agency for International Development 2006).	Provides guidance in identifying suitable locations for tourism development, manage and control development associated with uses, capabilities and capacities (Bahaire and Elliott-White 1999). Used to sensitise stakeholders to externalities associated with their actions.
<b>Visual Impact Analysis</b>	Three-dimensional visualisations of areas can be produced before and after proposed developments. A digital-terrain model was produced for the Aonach Mor ski development in Scotland. This model provided a visibility analysis, the impacts of development on vegetation and alternative uses of the land (Bahaire and Elliott-White 1999).	Aids in the evaluation of proposals, alternatives and the degree of virtual intrusiveness (Bahaire and Elliott-White 1999).
<b>Monitoring</b>	Variables are inventoried over time to detect changes (Chancellor and Cole 2008).	Leads to more accurate information, better analysis and decision making.

### *3.3.1.6 Global Positioning System*

Global Positioning System (GPS) is a series of satellites which orbit the earth broadcasting signals and are picked up by a system of receivers (Shoval and Isaacson 2006). By triangulation of this data, GPS can be used for navigation and location. Information sent to the satellite is used to determine the geographic location of the user. This data is collected and recorded in a GPS receiver and can be transferred to a computer and be displayed on mapping software, GIS, Location Based Services, Personal Digital Assistant (PDA), mobile phones or in-car navigation (Savitsky et al. 2000). Sharda et al (2006) commented that the benefits of GPS rest in the ability to produce location specific information for both the tourists and the destinations and to track tourist movements which can be useful in managing visitor use of an area and for simulating future scenarios. GPS will therefore be useful for DMOs in managing information related to making decisions regarding the best use of space at the destination.

### *3.3.1.7 Tourism Information System/Decision Support System*

Another possible ICT-based tool that destination managers can avail of is a decision support system (DSS). A DSS is defined as “an interactive computer-based system or subsystem intended to help decision makers use communications technologies, data, documents, knowledge, and/or models to identify and solve problems, complete decision process tasks, and make decisions” (Power 2008, p. 149). In essence it refers to an ICT-based tool/application that improves the end-user’s ability in decision-making.

A type of DSS for the tourism industry is known as Tourism Information Systems (TIS). These are data warehouses which manage business critical information (Carson and Sharma 2002). They have been developed in tourism to assist destination managers in making more competent and effective decisions. Several initiatives have been undertaken to manage tourism information at the destination level by using TIS. These include DECIPHER in Australia (see Carson and Sharma 2002), Canadian Tourism Exchange (see Waksberg et al. 2000), Austria’s TourMIS (Wöber 2003) and Illinois Tourism Network (see Gretzel and Fesenmaier 2002).

A specific example of a TIS is action for the tourism sector is the Industry Performance Analyser Tool developed by the Sustainable Tourism Cooperative Research Centre for tourism businesses in Australia. This is a fully functioning DSS which is designed to support tourism businesses in calculating their savings from specific environmental and social programs promoted by Green Globe (McGrath et al. 2008). Data is entered into an online system which is used to map, monitor and compare key organisation performance data based on regional or organisation levels against industry averages.

#### *3.3.1.8 Information Management of Climate*

Weather and climate can affect both the attractiveness of a destination and the tourism operations at the destination (Altalo et al. 2002). According to Emily Schubert of Travelocity.com, “weather data is one of the most important tools consumers look at on travel sites”. Understanding, monitoring and predicting weather and climate are critical to sustainable development. In essence this translates to sustainable tourism since tourism is one industry that is very dependent on the whims and fancies of the weather, climate and ocean conditions (Altalo et al. 2002). DMOs need to have accurate and updated forecasts to ensure the industry maximises its economic benefits and use this information for tourism planning and management. This information can be useful for DMO in bidding for events, making decisions about proposed development, putting measures in place for hazards and risks associated with bad weather, providing tourists with updated information, energy management and other issues. Software applications do exist that destination managers can take advantage off for managing weather, climate and ocean changes. Science Applications International Corporation provides software that can enable DMOs to forecast and strategise the impacts of changing weather, climate and ocean condition on their businesses.

#### **3.3.2 Tourist Satisfaction**

Tourist satisfaction is regarded as critical in whether a tourist returns to a destination or encourages others to visit or not visit. Satisfaction has been found to be the relationship between expectations and experiences i.e. the difference between

expectations and perceived outcomes (Truong and Foster 2006). It is a subjective concept and determined by many influencing factors such as the safety and security, quality of sites and attraction, accommodation cleanliness of a destination, water quality, and hospitality of the destination. The United Nations World Tourism Organisation (2004a) identified tourism satisfaction as a baseline issue for sustainable tourism development since sustaining tourism satisfaction is important in whether tourists return to the destination and therefore plays a critical role in influencing the economic environment.

One of the most important determining elements of satisfaction is receiving accurate and comprehensive tourist information (Buhalis and O'Connor 2006). This information is becoming a strategic tool for destinations since competition amongst destinations is now fierce for tourists. DMOs can provide accurate and updated information to the tourists when and where they need it through the use of ICT.

Tourists can access information from numerous sources and the Internet has made access to this information easier. Today's tourists expect to have ubiquitous access to information which is customised to their requirements and they are able to access it through different devices such as a mobile phones, laptops or PDAs (Höpken et al. 2008). However there is a lot of information on the Internet, some of which is poorly organised and unstructured. Tourists can suffer from information overload and are thereby unable to make the best decisions regarding activities to undertake at the destination in order to maximize their experiences and satisfaction levels.

#### *3.3.2.1 Wireless Technology*

The world as we know it has transformed from an eWorld to a mWorld (Christodouloupoulou et al. 2000). Wireless technology and mobile networks have advanced to such a level that people can communicate anywhere at anytime (Flouri and Buhalis 2004; Buhalis and O'Connor 2006). It has facilitated the provision of "the right service, at the right time, in the right location" (Nokia.com 2003 cited in Flouri and Buhalis 2004, p. 27). The technology which focuses on ICT and mobility are mobile units for communication that can be built into vehicles, cellular phones



and PDAs, wireless telecommunication such third generation (3G) mobile telecommunication, radio communication, positioning such as GPS, cellular phone, cellular phone triangulation and GIS technology (Eriksson 2002).

Buhalis and Pistidda (2008) described four main types of wireless networks. These are:

- Wireless Personal Area Network (WPAN) – This is a network of wireless devices which are located within a short distance of each other, usually 3-10 metres.
- Wireless Local Area Network (WLAN) – This is a network that allows the user to have access to the Internet without the having any wired infrastructure.
- Wireless Metropolitan Area Networks (WMAN) – This network covers large areas such as an entire city through the integration of a large numbers of WLANs.
- Wireless Wide Area Networks (WWAN) – This network provided Internet access around a town/city or a broader areas such as a country. It can connect different WMANs thus offering ubiquitous connectivity to mobile users.

It is forecast that the mobile phone will become the primary Internet communications platform worldwide (According to Pew Internet and American Life Project 2008). The 1980s saw the widespread adoption and use of cellular phones. This was known as the first generation (1G) network and only allowed voice but not any data services. By the end of the 1980s the 1G network was being phased out for the second generation (2G) network. This was becoming more popular because it was based on digital technologies and supported good voice quality, text based messages and international roaming. Moreover, the devices were affordable, there were huge reductions in voice tariffs and the use of prepaid top-ups. The major problem with the 2G network was the slow rate at which data was transferred. Consumers were demanding a faster rate since they wanted to gain access to the Internet for browsing, downloading and sharing of files. This led to the development of third generation

(3G) mobile network. Oliphant (1999) identified some of the requirements for 3G networks: roaming between the different 3G network, a data rate of 144 kb/s for users moving quickly such as in vehicle, a data rate of 384 kb/s for pedestrians and a data rate of 2MB/s for low mobility environments. The cost of upgrading to 3G networks is huge and some providers are migrating firstly to 2.5G networks. Informa Telecoms and Media's Global Mobile Forecasts project that annual revenues from the global mobile market will reach (US) \$1.03 trillion by 2013. It is expected that 2G mobile phones will remain in the lead until 2013, but its market share is anticipated to fall from 66.9% in 2007 to 32.7% in 2013, as 3G+ technologies become more popular. Only 1.2% of total subscriptions in 2007 were accounted to 3.5G but it is forecast to increase to 22.9% worldwide by 2013 and surpass that of 3G ([www.mediapost.com](http://www.mediapost.com)).

The tourism system is founded on mobility (Staab and Werthner 2002) and customers' preferences are being strongly influenced by mobility (Corigliano and Baggio 2004). Tourists are using different sources to obtain information about the destination before and during a trip (Ghandour and Buhalis 2003). The implications of wireless technology and 3G networks for travel and tourism is extremely important and tourism presents ample opportunities to exploit the use of these technologies (Corigliano and Baggio 2004). It is changing the means by which information related activities are conducted since users can surf the Internet, check e-mail and undertake transactions from mobile devices (Lee and Mills 2007). Internet-enabled technology such as cellular phones, PDAs and handheld computers allow for the free movement of the user (Wei and Ozok 2005). Through wireless access, huge opportunities are created at the destination for interaction with the customer and the creation of personalised, destination related information.

Advantages offered by mobile services include "ubiquity, localisation awareness, immediacy, personalisation, broadcasting, portability and identification" (Lee and Mills 2007, p. 142). Due to these considerable advantages, research efforts are now focused on understanding how mobile technology could support the information needs of travellers ranging from touring museums, transportation and parking

information, location identification to tracking and navigation (Lee and Mills 2007). Mobile phones now have a greater reach even to communities that are digitally excluded (Buhalis and Law 2008). Different mobile devices, such as PDAs and 3G mobile phones with GPS are allowing the consumer to gain access to tourist information 24 hours a day, 7 days a week despite their location.

Likewise, more transactions are also taking place on these mobile devices which is known as mobile commerce (mCommerce). These transactions take place with a wireless device where users of mobile services can make airline, hotel, car rental and restaurant bookings (Berger et al. 2003) and is now becoming a critical component of the tourist experience and satisfaction (Eriksson 2002; Lee and Mills 2007). Forecasts indicate that mCommerce can have successful application and huge opportunities for tourism (Flouri and Buhalis 2004; Lee and Mills 2007). Some of the challenges presented in using mobile technologies include issues with usability, accessing information over different devices, tourist confidence and the interactivity (Werthner and Ricci 2003). These difficulties can however be surpassed with the development of sophisticated user models for tourism (Werthner and Ricci 2003).

The future of wireless technology seems to rest with Worldwide Interoperability for Microwave Access (WiMAX) since this technology is expected to offer the greatest possible coverage of up to 30 miles (Odinma et al. 2007). It can have large impacts in locations where wired infrastructure has not been developed or cannot be developed for economical reasons and this technology is also cheaper, simpler, smaller and more convenient to install than other types of broadband (Buhalis and Pistidda 2008). It can also support the end user with Internet access without having to pay expensive data roaming charges and it always available 24/7 (Buhalis and Law 2008).

Mobile communication devices can facilitate and play an important role in sustainable tourism development (Erdmann and Behrendt 2003; Liburd 2005). Tourists are increasingly demanding information that is “fast, flexible and convenient” (Corigliano and Baggio 2004, p. 16). They are also less inclined to put

up with delays and poor service and lack of adequate and accurate information (Buhalis and O'Connor 2006). They are expecting to have access to information when and where they require it from various handheld devices (Werthner and Ricci 2003). Using the American Customer Satisfaction Model, a positive relationship was found existing between perceptions and experience of satisfaction for the mobile tourist (Lee and Mills 2007). Mobile services also allow personalisation of services for the tourists (Oertel et al. 2002). Therefore, destinations, by using this ICT-based application can increase tourist satisfaction and contribute to the sustainable tourism development of their destinations. An important ICT-based tool for the sustainable development of tourism with incorporates the features discussed above is Location Based Services (LBS). The development and use of LBS can lead to increased tourist satisfaction.

#### *3.3.2.2 Location Related Information*

Location related information is important in tourism since it can influence the tourist decision making process by swaying the choice of destination, the behaviour and movements that occur at the destination and the evaluation and communication of experiences at the destination (Nielsen and Liburd 2008). Prior to the advancement in technology and the Internet, maps were provided in the form of paper. Now with developments in the Internet, advancement in satellite sensing, better software applications and Web 2.0, users can now access online maps from Google Earth, Virtual Earth and other mapping sites. Not only can users access online maps but they can now also create their own maps even if they are amateurs. The growth and availability of Application Programme Interface allows these users to build and share customised maps detailing points of interest of where they have been or planning to go to from websites as Google and Platial. Application Programme Interface are a set of functions, routines, resources, protocols and tools for developing software applications. Pictures can also be added and these images can be geo-tagged. Geo-tagging refers to adding geographical coordinates to photos, videos, websites etc.

Tourism is now being heavily influenced by multimedia content through such things photographs, videos, 3D virtual tourism and other graphics facilitated by the Internet.

This enhances the richness of the information and allows consumers to interact with the place they may be visiting. Multimedia can aid in enhancing this virtual tourism by producing telepresence. By using a variety of technologies, telepresence increases interactivity and allows users to have a simulated reality i.e. feel as if they were at a location or event or experience event though they were not. (Steuer 1992). Online maps have now become ubiquitous for finding directions as well as providing the user with points of interest and images, opinions and comments about these places. This trend is known as neogeography. According to Turner (2006) neogeography is a unifying concept which literally means “new geography” and refers to the wide array of techniques and tools that fall outside the realm of a traditional GIS. These maps can be created and entered after the user has completed the activity or it can be done instantaneously as the user has the tourist experience. The latter can occur if the user has a GPS-receiver that is either linked to, or built into another device (See earlier discussion of GPS). As reliable GPS units become cheaper, a new field of devices called geoware is emerging (Nielsen and Liburd 2008). These are devices that provide an awareness of location and are used to enhance performance or provide new information. The commercial application is often referred to as Location Based Services (Nielsen and Liburd 2008).

#### *3.3.2.2.1 Location Based Services*

Location Based Services (LBS) have been defined as “systems which utilise the location of a mobile device, in order to collect or deliver information” (Sharma et al. 2009, p.1). It aims to provide the user with targeted information based on their specific requirements. When people are on vacation they think in term of geographic location since they identify with places to eat, see and stay (Eriksson 2002). These LBS takes account of the current geographical and spatial considerations of the tourist (Zipf and Malaka 2001; Sustainable Tourism Cooperative Research Centre 2004). This offers possibilities for ICT-based applications in the provision and delivery of location-sensitive information (Eriksson 2002).

Some of the applications of the LBS include, but are not limited to, fleet tracking, traffic information, directions, parking, emergency services, law enforcement, sensor

monitoring, and customer location for target marketing and advertising, roadside assistance, stolen vehicle recovery, object visualisation, leisure information, location-based billing, mCommerce, child tracking, navigation and directory services (Zipf and Malaka 2001, Eriksson 2002, Sustainable Tourism Cooperative Research Centre 2004). Berger et al. (2003) identified four main uses of a LBS for tourism: (1) location of persons, objects, and places, (2) routes between them, (3) search for objects in proximity such as restaurants, shops, hotels, or sights, and (4) information about travelling conditions, such as traffic updates.

The use of LBS can promote greater tourist satisfaction. LBS offer huge opportunities for optimising the tourist experiences by personalising these services and becoming more customer focused, and flexible in their information and service delivery. This is essential in tourism becoming more responsive to the tourists' needs (Buhalis and O'Connor 2006; Sharda et al. 2006). These LBS can be seen as a mechanism for providing real-time and accurate information by providing easy and quick access to tourist as well as general information at the destination (Flouri and Buhalis 2004). LBS are transforming the tourism industry since prior to their existence tourists depended on guidebooks, maps and tourist information centres whereas now all the information they require whilst on holiday can be delivered on the LBS (Sharma et al. 2009). Sharda et al. (2006) commented that as more people access information and data services on their mobile devices then the need for LBS will be greater developed.

The environmental quality of a destination can be promoted by using LBS. This can lead to more sustainable production in terms of less paper production of maps and brochures. Liburd (2005) discussed these devices can also lead to sustainable consumption by allowing the tourist to make better decisions on what products to purchase and which companies to support. DMOs can also provide interactive based maps located at different points of the destination instead of paper based maps.

Destinations can make themselves ready for this by providing the necessary infrastructure needed for them to be available on LBS in real-time. Destination managers and DMOs can take the lead to ensure that the right infrastructures are in

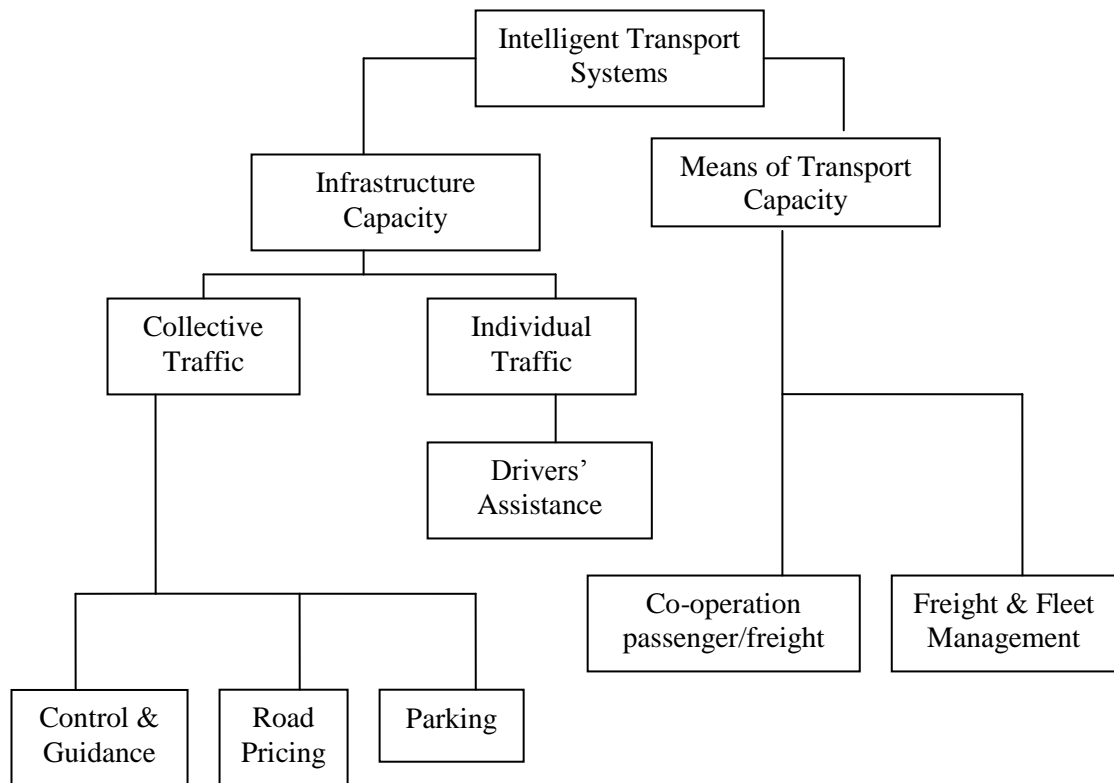
place to support LBS and other wireless technologies. For LBS to be successful, complementary factors such as bandwidth, positioning availability, user interface security issues, availability of accurate and timely information, localised data, end user costs and trust must also be taken in to consideration (Zipf 2002). The future of LBS looks promising. It is predicted that they will be widely accepted and used once they become readily available on mobile phones and different mobile networks, platforms and WLANs merge (Flouri and Buhalis 2004) GIS and GPS can also be built into LBS to allow the tourist to locate sustainable destinations whereby the tourists can run a query to determine “hot spots”. A GIS system also allows the presentation of different types of tourist information such as hotels, trails, maps, event location and determine the distances between points of interests (Frech and Koch 2003).

#### *3.3.2.3 Intelligent Transport Systems*

Information technology can also lead to an improved land transportation system (Sheldon 1997) through Intelligent Transport System (ITS). The use of ITS has been described as using a combination of IT to the management of ground transportation at a destination as well as providing useful travel information to the tourists at the destination (Sheldon 1997; Diagle and Zimmerman 2004). ITS uses telematic systems which provide detailed information on traffic, individual information, information from independent locations, traffic guidance and dynamic routing via GPS (Erdmann and Behrendt 2003). Different technologies can be included in ITS but with regards to tourism these include route guidance systems, traveller information systems, automated vehicle locations, fleet management systems and automated traffic management systems (Sheldon 1997). In cars, ITS can help a driver navigate, find the best routes and avoid traffic and collisions; in train and buses it can be used for managing and optimising fleet operations and offer passengers automatic ticketing and real-time traffic information; and on the roadside it can be used in co-ordinating traffic signals, detecting and managing incidents and displaying information for drivers, passengers and pedestrians (Eriksson 2002). As traffic increases at the destination, the local movement of tourists becomes more challenging (Diagle and Zimmerman 2004). Using ITS can increase tourist

satisfaction by avoiding “frustration, delays and accidents” (Sheldon 1997, p. 72) and allowing them to have “have safer, faster, and more enjoyable journeys” (Diagle and Zimmerman 2004. p. 151). Gassner et al. (1994) identified a typology for ITS (cited in Erdmann and Behrendt 2003, p. 105) which can be seen in Figure 3.1.

**Figure 3.1:** Typology for Intelligent Transport Systems



Source: Gassner et al. 1994 cited in Erdmann and Behrendt 2003

#### 3.3.2.4 Destination Management System for Tourist Satisfaction

DMSs and their roles and functions were discussed earlier. By providing coordinated online information, anywhere, anytime; DMS can lead to increase levels of tourists’ satisfaction since it reduces their search time and provides global access to all the pertinent information on a destination (Buhalis and Spada 2000). An example of a tool that a DMO can use is an eRating system which can be placed on the destination’s website, functioning as part of the DMS (Nair et al. 2003).



The Internet-based sustainable tourism rating expert system provides a rating of a destination based on its definition of sustainable tourism and takes into consideration such things as waste management, site preservation, staff training, security and safety, signage, interpretative media. The strengths of this approach lies in the accessibility of the information through a variety of mediums, transparency of rating via different raters, accountability of a person who use the system and incorporation of knowledge from domain experts and field data. This rating can be done by three groups which includes a person who has visited the site, the destination manager and a sustainable tourism auditor or sustainable tourism expert. As destinations are battling to become more sustainable, this form of monitoring and compliance can aid them in aligning themselves to the principles of sustainable tourism. It will help destinations that are really pursuing sustainability principles to criticise their performance and become more sustainable. It will also give the tourists more information about the destination so they can make more informed decisions.

DMS can also create lasting relationships with the visitor by monitoring his/her preferences while he/she accesses the DMS and provide data on habits and preferences (Dantas 2008). This is important in developing a profile of the tourists, keeping them updated on what the destination has to offer which suits their requirements and lead to increased satisfaction.

### **3.3.3 Interpretation**

Tilden (1957), one of the earliest commentators on interpretation, has suggested that interpretation is an educational process with the primary aim of revealing meaning and relationships. Interpretation has been defined as “an activity that creates the image that a specific territory and community will disseminate among visitors and that will contribute to community education, pride and sense of place” (World Bank 2006). It informs tourists about the significance of a destination and gives them insights into places at the destination so that they have better enjoyment of it and foster a positive demeanour towards conservation, preservation, history, culture and landscape (Mason 2005). Interpretation therefore plays an important role in sustainable tourism (Moscardo 1998; Stewart et al. 2001). Improving the visitor

experience, knowledge and understanding and helping with the protection and conservation of places and cultures have been identified as the main functions of interpretation with regards to achieving sustainable tourism (Moscardo 2000; Moscardo and Walker 2006).

Interpretation can be achieved through a variety of methods which include but are not limited to education, objects, media, signage, trained tour guides, maps and first hand experiences (Mason 2005). ICT can play an influential role in allowing better interpretation of a destination. This can contribute to sustainable tourism in that tourists are given better information before and during the experience. This leads to tourist satisfaction as well as protection and preservation of the environment.

#### *3.3.3.1 Location Based Services and Interpretation*

LBS can be used in tourist interpretation of a destination. The information provided on these devices can aid in sensitising tourists to the locale of an area and make them more aware of the culture and customs of a destination. It can increase the cultural exchanges since the tourists are aware beforehand and can adapt to the culture and have a more thorough understanding of the history, lifestyles, customs, sacred sites, rituals, language and other valued traditions of a destination. This will undoubtedly increase the sustainability of a tourist destination.

#### **3.3.4 Enabling Partnerships**

Tourism is a diverse and fragmented sector and some mechanism is needed to overcome this fragmentation of stakeholders for tourism to be sustainable (Bramwell and Lane 2000). Involving different stakeholders in tourism planning is now being seen as an essential part of the planning process (Swarbrooke 1999; Bramwell and Lane 2000; Tourism Sustainability Group 2007) since tourism is heavily dependent on effective partnerships (Buhalis and O'Connor 2006) which are linked to the sustainability of tourism (Milne and Ateljevic 2001).

Four reasons were identified by Bramwell and Lane (2000) as how partnerships and collaboration can aid in sustainable tourism development. Collaboration might

promote greater consideration for the natural and socio-cultural resources; it can lead to a more holistic approach to tourism planning and policy making; it may foster a more equitable distribution of the costs and benefits and policies which have fairer outcomes; and greater participation of stakeholders can lead to empowered decision making, capacity building and promote a sense of ownership amongst stakeholders (Bramwell and Lane 2000).

The emergence of ICT allows networks to be created and enhanced (Milne and Ateljevic 2001). The use of ICT enables stakeholders at the destination to become more efficient in their communication strategies and support greater cooperation in the delivery of the tourism products and services (Buhalis and O'Connor 2006). It can enable the approaches to be more pragmatic and change the way sustainability was previously managed at the destination.

#### *3.3.4.1 Destination Management System and Partnerships*

DMS can be used for enabling partnership by fostering stakeholder consultation and information transfer. It can be a strategic tool for building and strengthening relationships, networks and communities which can transform the tourism planning process and enhance economic development at the destination level.

DestiNet (<http://destinet.ewindows.eu.org>), an initiative of the European Environment Agency serves as a good example of enabling partnerships through the Internet. The information resource and communications platform contains quality information on the ways in which tourism is being made more sustainable. DestiNet offers a number of services including the option to post news bulletins and suggest new links on relevant topics. It acts as a single European-level gateway to environmental sustainability for the tourism sector, allowing users to understand and report on sector impacts on the environment; learn how to improve tourism sector sustainability; and coordinate information exchange between tourism stakeholders (World Bank 2006). DestiNet also provides a comprehensive list of examples of the measures for managing sustainable tourism that were previously discussed. DMOs can follow examples like this and use their DMS to set up networks on the Internet to

encourage enhanced communication with local businesses, the community, tourists and other stakeholders.

### **3.3.5 Community Participation**

Community participation has been identified as a critical issue for sustainable tourism (Hardy and Beeton 2001; United Nations World Tourism Organisation 2004a). There has been a lot of discussion that tourism should reap benefits for the local community. However, there has been limited means of explaining how this can be accomplished (Din 1996). Community based approaches to tourism are particularly popular as they explicitly describe processes for involving local stakeholders in decisions about the types and locations of proposed tourism developments. Moreover, the increasing recognition of tourism impacts has led to calls for the community to be more involved in tourism development (Feick and Hall 2000). Mowforth and Munt (1998) observed that more community involvement in tourism planning and decision making can be important for allowing the host population more control in development decisions. Involving the local community would also lead to increased environmental awareness and maximise the local economic benefits (Milne 1987). Moscardo (2007) however, commented that the local community needs to have a sound understanding of tourism in order to effectively engage in tourism discussion and in the decision making process.

Likewise, the community should be involved in processes and decisions that affect their lives (Wall and Mathieson 2006). For the local community to truly benefit from tourism, it needs to be part of the decision-making process. ICT can aid in this respect thereby making tourism more sustainable. Online community tourism planning is now offered in Texas, USA through the development of a website which is specifically geared towards local community leaders to instigate tourism development in their local areas (see <http://www.rpts.tamu.edu/tourism/>).

#### *3.3.5.1 Community Informatics*

An ICT-based tool/application that can be used by destination managers for sustainable tourism development is Community Informatics (CI). The aim of CI is to

increase community participation in decisions that affect them through the “wired world” (Milne et al. 2005, p. 122). Gurstein (2000) describes set of principles and practices that are focused on designing and delivering ICT for enhancing community development (through personal, social, cultural or economic development) and the lives of the residents. Communities have untapped potential and through the use of ICT they can become enlightened on what they possess and what they are capable of thereby developing local commitment, resources and skills (Taylor 2004). Therefore, ICT is seen as having an important facilitating role in the community processes and community transformation through bridging the digital divide and dealing with community fragmentation and inclusion of previously excluded communities (Gretzel et al. 2009). Milne et al. (2005) identified five areas where ICT can enhance the quality of life of a community. These are the promotion of democratic participation, development of social capital, empowerment of individuals (especially marginalised groups), strengthening of community and its identity and creation of sustainable community economic development.

CI models have been developed by using e-mail, bulletin boards and community networks all based on the Internet (Milne et al. 2005). For example, the Internet has been used for citizen participation for the re-building of New York City Lower Manhattan area following the September 11<sup>th</sup> 2001 attacks (Green and Murrmann 2005). Similarly, Gretzel et al. (2009) used CI for heritage tourism development in the Hearne, Texas.

#### *3.3.5.2 Geographical Information System and the Local Community*

GIS can be used as a structured framework to assist in the socio-cultural aspects of sustainable tourism by enhancing public consultation and community participation process for tourism planning and development (Bahaire and Elliott-White 1999; Hasse and Milne 2005; Avdimiotis et al. 2006). This ICT application can be used to empower the community and make them an integral part of the planning process (Ghose 2001). The use of different types of data such as video, sound as well as three dimensional (3D) images and large scale maps can be used to give the community more information and hence foster better decision making.

Hasse and Milne (2005, p. 277) introduced the concept of Participatory Approaches and Geographical Information Systems (PAGIS) which can be used to “integrate local knowledge, such as values, emotions and perceptions of a place that have been gathered in participatory mapping exercise into a GIS”. This stimulates dialogue, heightens awareness, brings information into the public domain and improves and strengthens local involvement in decision-making (Gretzel 2009). It also offers the community the chance of having their future requirements incorporated in the decision making process and can extend and represent the community’s understanding to decision makers (Hasse and Milne 2005).

### **3.3.6 Energy Consumption**

Travel and tourism does indeed consume large amounts of energy (Lin 2009). Energy usage has become a main concern for tourism, especially with global warming and climate change. The tourism industry requires large amounts of energy in order to execute its product, services and ensure visitors have satisfying and lasting experiences (Kelly and Williams 2007). This energy is required for transportation to, from and at the destination, as well as providing the facilities and services required at the destination (Gössling 2000; Becken 2002). Air travel consumes the largest portion of energy at the destination (Gössling 2000) and from a global point of view, transport is the most relevant sector in terms of the environmental sustainability of tourism, accounting for an estimated 75%–90% of all greenhouse gas emissions caused by tourism (Gössling 2002; Ceron and Dubois 2003). It is estimated by the Intergovernmental Panel on Climate Change that aviation will increase by 30% by 2050 and could contribute to 15% of total carbon dioxide (CO<sub>2</sub>) (Dubois and Ceron 2006). Tourism is thought to be responsible for 5% of CO<sub>2</sub> emissions (Gössling 2009).

Energy consumption has resulted in greenhouse gases being emitted which have reduced the air quality and environmental health of a destination. If these emissions are not addressed they will undoubtedly have drastic implications for tourism (Kelly and Williams 2007). It is estimated that a two week vacation can create over 3385kg of fuel consumption per tourist in a developing country (Gössling 2000). Destination

planners therefore need to be vigilant and proactive and adopt energy management strategies and policies (Kelly and Williams 2007). Some of these strategies already in place are innovative planning, design, and management practices associated with transportation, building design and construction, and energy supply (Kelly and Williams 2007).

There are no clear and easy strategies for dealing with minimising energy use through ICT-based tools/applications (Erdmann and Goodman 2004). Solutions proposed for regulating and controlling emissions in tourism are charging passengers for emissions based on country of origin (Becken 2002), developing measures of economic-environmental accounting (Becken and Patterson 2006) and afforestation programmes (Gössling 2000). Additionally, managing the uses and impacts of energy is beyond a destination manager's control (Kelly and Williams 2007). However, there are still some ICT-based tools that they can adopt to enhance their destinations.

#### *3.3.6.1 Carbon Calculators*

Recently there has been a proliferation of Carbon Calculators (CC) which has sought to measure our carbon footprint based on our activities. Tourism is no exception to this, especially with air transport being one of the heaviest contributors to carbon emissions. Data now exists which can be used to measure tourism's contribution to carbon emissions. It is estimated that 76% of fossil fuels are used for air travel and the remainder on destination consumption (Gössling 2000). Airline emissions have therefore been given special consideration because they are emitted in the upper troposphere and lower stratosphere and therefore have a larger impact on climate change than emissions released at the Earth's surface (United Nations Environment Programme 2003) and 90% of energy consumption in tourism is spent on transportation (Gössling 2000).

In tourism, ICT can be used in to alleviate greenhouse gas emissions if destination managers developed:

...ICT-supported, cost-effective monitoring and reporting schemes that enable transport to be included in emissions trading schemes and prioritised ICT-based demand-side management measures, making it possible to adjust energy consumption and transport demand to a sustainable level using economic instruments” (Erdmann and Goodman 2004, p. 44).

An example of a carbon calculator in action of the tourism industry is Earthcheck developed by the Sustainable Tourism Cooperative Research Centre. This is a CO<sub>2</sub> benchmarking tool which was designed to allow organisations to monitor and decrease their level of emissions and impact on the environment by using main indicators such as water, waste and energy (Sustainable Tourism Cooperative Research Centre 2009).

#### *3.3.6.2 Virtual Tourism*

Virtual Tourism (VT) refers to experiencing the tourism experience in an electronic environment which acts as a substitute for the actual experience. This type of tourism will allow participants to travel to places via new technologies free of the usual restrictions of time, distance, cost and human frailty. Irrespective of the actual shape of the future, demand for travel will continue to exist, although, perhaps in forms different from what we understand at present. It is argued that one day VT will replace the industry as we know it today (Milne and Ateljevic 2001; Teo 2002). With virtual reality, once a tourist has on-line access, he/she can experience the culture, history and other points of tourism interest in a visual and interactive manner (Christodouloupoulou et al. 2000). Virtual reality can be used: for destinations which have exceeded their carrying capacity, for a destination that is fragile and in danger of being damaged by tourism, to sensitise tourists about a destination prior to their visit, substitute for activities which might be seen as socially unacceptable such as hunting or sex tourism, for tourists enjoying dangerous activities such as rock climbing or high altitude skiing and to rejuvenate declining resorts (Swarbrooke 1999). If VT can become a reality, it can be used to reduce tourist transport and hence have positive effect on carbon emissions. Virtual mobility can decrease passenger transport by 6% to 8% (Erdmann and Behrendt 2003). VT can reduce the



demand for transportation to and from a destination but this can only become a certainty if the virtual models of destinations are highly similar to the real thing and VT has to advance beyond what it is today and become mainstream.

These virtual worlds exist as simulated environments where avatars are used to represent the user. An avatar is used by a computer user to represent himself/herself in an online environment and can be personalised to the user preferences. Two existing examples of virtual worlds are VirtuyMall and Second Life. VirtuyMall is a 3D online mall where visitors, represented as avatars, can walk through the mall, go shopping and chat with others in the mall. Second Life, which has gained recent popularity amongst users and the media (Bellotti et al. 2009) is organised as a set of virtual worlds and avatars can have a variety of experiences by interacting with each other in a virtual space. This virtual world can be used by the tourism industry so that tourists can create their dream vacation. Examples of tourist companies that have a presence on Second Life are Synthravels, Lonely Planet, Starwood Hotels, and destinations such as the Maldives and Sweden.

A key question is “will virtual travel alter the desire for people to travel, and the ultimate seduction of “real” place”? (Milne and Ateljevic 2001, p. 385). VT may never reduce the actual experience of feeling what the destination is really like but what it can do is assist the tourist in getting a feel of what they are going to be encountering when they embark on the trip. VT can simulate those experiences and provide the tourist with what the actual experience will be like. It can also allow tourists to experience a destination or part of a destination that they might never be able to.

#### *3.3.6.3 Intelligent Transport System and Energy Consumption*

ITS can also assist in getting tourists to use more public transport rather than hiring private cars at the destination. Sustainable tourism should be linked for sustainable transport (Høyer 2000). If the system is properly developed where tourists are able to use ITS for real-time information about travel routes they would be more inclined to change to public transport. The largest amount of energy consumed by leisure

activities can be accounted for by transport (Gössling 2000). CO<sub>2</sub> emissions from the tourism sector are forecast to rise by 90% by 2020 (Peeters et al. 2007). At the destination ground transportation and travel is becoming more difficult and traffic congestion increases and ITS can aid in tourists having a safer and a more fulfilling vacation. ITS has been identified as a critical component of Europe's approach to environmental sustainability (Erdmann and Behrendt 2003).

### **3.4 Conclusion**

This section has detailed the progression of ICT to present and demonstrated that currently ICT does not play a critical part in sustainable tourism development as identified in Table 3.9. However opportunities do exist in destination management for using ICT and there are a varied ICT-based tools/applications which can be used for making this role more pronounced. These opportunities were: information management, tourist satisfaction, interpretation, enabling partnerships, community participation and sustainable consumption. As discussed in the above section, all these opportunities are directly related to making tourism more sustainable. The ICT-based tools/applications discussed are broad based ranging from macro uses (for example Destination Management System and Tourism Information System) to micro uses (Location Based Services and Economic Impact Analysis Software). Additionally, some of these tools could be used for more than one opportunity such as a Destination Management System being used for information management, tourist satisfaction and enabling partnerships. Empirical work is therefore necessary in gaining a deeper understanding on the uses applications of these tools for destination management, identification of other tools which were not acknowledged in the literature and categorisation of these ICT-tools/applications for sustainable tourism development.

**Table 3.9: ICT-Based Tools/Applications and their Uses for Sustainable Tourism**

<b>Opportunity</b>	<b>ICT-Based Tools/Applications</b>
<b>Information Management</b>	<b>Computer simulation</b> <b>Destination management system</b> <b>Economic impact analysis software</b> <b>Environment management information system</b> <b>Geographical information systems</b> <b>Global positioning system</b> <b>Decision support system/Tourism information system</b> <b>Weather, climate and ocean change forecasting software</b>
<b>Tourist Satisfaction</b>	<b>Wireless technology</b> <b>Location based services</b> <b>Intelligent transport system</b> <b>Destination management system</b>
<b>Interpretation</b>	<b>Location based services</b>
<b>Enabling Partnerships</b>	<b>Destination management system</b>
<b>Community Participation</b>	<b>Community Informatics</b> <b>Geographical information system</b>
<b>Energy Consumption</b>	<b>Carbon calculators</b> <b>Virtual tourism</b> <b>Intelligent transport system</b>

It has been stated that the environment is the lifeblood of tourism (see p. 3) whereas other researchers have stated that information is the lifeblood of tourism (see p. 56). Likewise, ICT has also been identified as a necessity for destinations to remain competitive and literally to survive (Milne and Ateljevic 2001; Gratzner et al. 2004) whereas other researchers have stated that the competitiveness of a destination is based on its sustainability (Laws 1995). It can be concluded that both ICT and sustainability are key to the longevity and future prosperity of a destination. Therefore what better way to develop the best destination in the global market environment by forming a synergistic relationship between these two i.e. using ICT to manage the sustainability of a destination. Quoting Middleton and Clarke (2001, p. 457) “no view of the future makes sense without reference to ICT”.

Today’s world is increasingly focused on the use and application of ICT and therefore destination managers must use this to their advantage. The strategic implementation of technology has already become necessary and will continue to be important for businesses to survive in the age of globalisation and commoditisation.

DMOs need to adopt ICT for sustainable tourism as part of their eBusiness strategy if they are to remain leading tourism destinations of the future. Stamboulis and Skayannis (2003) commented that the use of ICT in tourism have been defensive and have paid more attention to areas of increasing information provision, business transaction processes and cost-savings. The role of ICT has to move beyond its traditional functions. It may be that tourism researchers are in a comfort zone of restricting the research on the role of ICT to information provision, marketing and promotion and new distribution channels and moving beyond this might be unthinkable for some (Lewis 2002).

This research is attempting to move from an ad hoc to a more systematic approach in the managing of sustainable tourism development. The debate on how tourism can become more sustainable continues but despite this, sustainable tourism practices have been implemented worldwide (Choi and Sirakaya 2006) and there have been numerous case studies of sustainable tourism in action. This research broadens the existing knowledge and understanding of mechanisms for sustainable tourism development of destinations by applying ICT. Large amounts of pressure are being placed on destinations today to consider the environment in their business operations (Moore and Bordeleau 2001). Impacts will always occur once tourism occurs. To reduce the impacts to zero then the tourism will have to cease. Instead of limiting numbers, sustainable tourism should adopt an approach as to how to better manage the resources that are available and modifying tourist behaviour rather than specifying a limit to the number of visitor usage of the resources (United Nations Environment Programme 2003).

DMOs therefore need to adopt ICT and become technology-experts, eco-efficient and environmentally innovative in their operations with reference to sustainable tourism development. Not doing this will cause their destinations to suffer environmentally and economically. For this to occur, a DMO first needs to understand the benefits that ICT can offer. Once this is realised ICT will become part of routine operations and the resultant effect will be greater and higher levels of ICT use and implementation by DMOs (Yuan et al. 2006). Furthermore, ICT will

continue to have an growing important function on the tourism planning process. (Gretzel et al. 2009). Destinations can also create revenue without risking negative effects on the environment (Krozer and Christensen-Redzepovic 2006). There is neither a one-size-fits-all nor a simple and easy solution for sustainable tourism development. However the application of ICT for sustainable tourism can create a “frictionless” destination (Berkhout and Hertin 2001, p. 4) and make the approach to sustainable tourism development more practical and reliable.

## **Chapter Four**

## **Chapter Four**

### **ICT – An Innovative Approach to Sustainable Tourism**

#### **4.1 Introduction**

Chapters two and three examined the research background in which this work is set. This chapter considers the theoretical foundation by engaging in a discussion on the application of innovation theory to the study of ICT for sustainable tourism development. Engaging in innovative behaviours is critical to any industry seeking to achieve its potential with tourism being no exception to this. Hall and Williams (2008) commented that tourism can be a commanding force for driving and transmitting innovation. However, tourism is noted for paying insufficient attention to innovation (Hjalager 2002; Liburd 2005) with the research being limited, sparse and fragmented (Hjalager 1997; 2005). Tourism innovation research is still in its infancy but with a growing body of knowledge (see Hjalager 1997; 2002; 2005; Fache 2000; Ritchie and Crouch 2003; Hall and Williams 2008; Volo 2005). However a gap still exists in demonstrating the significance of how this tourism innovation can be carried out in practice (Hjalager 2002).

Innovating in tourism has mainly resulted from the use of ICT, with technology already being regarded as critical for tourism (Poon 1993; Sheldon 1997; Werthner and Klein 1999; Buhalis 2003), since it not only drives economic growth but it can also ensure the long-term prosperity of tourism (Liburd 2005). Moreover, there is indeed a link between ICT and innovation with ICT being identified as an important facilitator of innovation. Seventy-eight percent of European tourism companies in 2006 identified that innovations were critically linked to ICT (European Commission 2006). Increasing pressures are being placed on tourism organisations to “compute and compete” and to make their operational, tactical and strategic processes more efficient, with ICT being an attractive way of doing this. Using ICT to innovate will not only be beneficial but in fact essential to the long-run prosperity of the tourism industry.

Miller and Twining-Ward (2005) identified innovation as being important and appealing to organisations engaged in sustainable activities with Stamboulis and Skayannis (2003) agreeing that the impacts caused by tourism can be a major driving force for innovation in the tourism industry. Tourism researchers have however placed little emphasis on the application of ICT as an innovative approach to sustainable tourism for destinations. Racherla et al. (2008) argued that tourism destinations have not embraced the power of ICT to connect with innovation for tourism planning and development.

Researchers in different fields of tourism must therefore occasionally question the current ways of thinking and doing things and seek out more radical concepts, methods and practical solutions to revitalise the industry. Innovations in sustainable tourism would require changes being made to the existing tools and mechanisms that destination managers use for sustainable tourism. It is a process of change, or a path, rather than a fixed end point or a rigid goal (Farrell and Twining-Ward 2004). Sustainable tourism innovations call for re-defining the situation, practices and materials (van der Duin and van Marwijk 2006). Dearing (2000) observed that sustainable development must be treated as a framework for innovation, and management principles must be used and extended for this framework to be operational and effective. He also discussed that the use of better technologies will make sustainable development a reality. The same can be said for sustainable tourism which must be viewed in relationship with its parent concept of sustainable development. Sustainable tourism can be seen as a framework for innovating in tourism and using ICT as a new and innovative approach will extend the theories of innovation in order to make sustainable tourism a more workable reality for destinations.

Hjalager (2002) observed that classical innovation theories have much to offer tourism and to date there has been little research on their applications. This research therefore considers the use of the Abernathy and Clark (1985) model and its usefulness in the application of ICT as being innovative in managing sustainable tourism. The Abernathy and Clark's (1985) framework for innovation is also used in order to demonstrate that this wide ranging collection of ICT-based



tools/applications can be innovative for the tourism industry in differing aspects, both on a micro and macro level. Innovation is the first step in the diffusion process (Agarwal 1983) and the discussion will focus on this, and not on ICT usage and adoption and diffusion by tourism organisations for sustainable tourism and their behaviour.

## **4.2 Defining Innovation**

The concept of innovation is broad in scope since it can be classified in numerous ways (Hall and Williams 2008). Much of the research on innovation stemmed from Schumpeter's (1939; 1942) work which is grounded in economic theory and emphasised that innovations are at the heart of competition (Hall and Williams 2008). Following in Schumpeter's "creative destruction" footsteps, innovation is frequently placed on a continuum between invention and adoption with the existing literature categorising innovations based on a firm's capabilities (Singh et al. 2002; Volo 2005). Inventions are however different from innovations. The first happening of an idea is an invention whereas an innovation is the foremost effort to carry out this invention in practice i.e. invention is the new breakthrough whilst innovation is the new value. The core understanding behind an innovation is that the idea has to be developed and merged into a product, process or service for particular industry uses. Therefore innovation is not a one off happening but rather a long and cumulative process (Singh et al. 2002). Moreover, one of the problem areas in defining innovation is the understanding of the term "newness" (Hjalager 2002). Sundbo (1998) observed that an innovation does not have to be new, but rather only new to the market segment or industry. This thinking will be adopted for this research since the application of ICT is not new to tourism but it will be new for its uses for sustainable tourism.

According to Kanter (1983) innovation changes a problem-solving idea into an application. Innovation can exist in a variety of forms but share three main elements – creativity, a problem solving approach and a new way of thinking (Moscardo, 2008). Edward De Bono (1998) the leading scholar on creative thinking observed that all thinking techniques are connected by challenging the existing assumptions

and looking at the situation from a different perspective. Based on this, Moscardo (2008) argued that being innovative involves varying degrees of creativity. It must be noted that being creative is a necessary but not sufficient factor for facilitating innovation (Carayannis and Gonzalez 2003) but rather it is the ability to develop novel ideas that are useful for solving problems and satisfying needs (Hall and Williams 2008). It is therefore “a goal-oriented process that generates innovations” (Hall and Williams 2008, p. 83). This is at the core of this research which looks at the solutions to tourism’s negative impacts by approaching sustainable tourism from an alternative viewpoint. In looking at ICT applicability to sustainable tourism, this approach will be seen as a new and innovative one for the tourism industry i.e. a problem solving idea that transforms sustainable tourism into a practical concept.

Perdomo-Ortiz et al. (2006, p. 1172) provided an analysis of innovation and defined innovation as a “dynamic capability” which is a pattern of collective activity whereby an organisation changes how it operates in order to improve its effectiveness. This definition will be used for this research since it demonstrates that all forms of innovation are based on new ways of thinking associated with creative thinking techniques (Moscardo 2008). This definition is also relevant since the application of ICT for sustainable tourism will come from the organisations responsible for the management and development of tourism at the destination – the DMO. Being innovative in sustainable tourism requires management which supports strategy formulation, dissemination of new techniques and implementation. The DMOs can also bring together the creativity and problem solving expertise to generate the innovations and monitor changes at the destination (Krozer and Christensen-Redzepovic 2006). Therefore DMOs will change their current operations in how sustainable tourism is managed and display their dynamic capability by bringing forth a process of change which is innovative for the sustainable tourism of the destination through the use of ICT.

### **4.3 Classification and Innovation Theories**

Innovation is a process to classify and the output of this process results in a classification, which serves as a framework for ordering and representing (Coccia

2006). There are two main approaches to constructing such a classification: empirical and theoretical (Coccia 2006). The former approach involves using collected data that is analysed to produce the classification i.e. data is used to support the classification. The latter approach involves using existing theory to develop a classification where the topic under investigation is placed in this classification i.e. theory is used to support the classification. This research adopts both a theoretical and an empirical approach with the empirical work being used to support the classification developed from the existing theories.

Various classifications of innovation exist in the literature from different disciplines. In Schumpeter's (1939) term, innovation is aligned to a new goods, new quality products, new methods of production, new markets or marketing and new organisation or management. Most of the classifications of innovation are modelled after Schumpeter's research and Table 4.1 provides a listing of some of the more common classifications in the literature.

**Table 4.1:** Innovation Classification

<b>Categorisations</b>	<b>Existing Models</b>
Octa	<i>Reformulated, new parts, re-merchandising, new improvements, new products, new users, new market, new customers (Johnson and Jones 1957)</i>
Penta	<i>Systematic, major, minor, incremental, unrecorded (Freeman 1994)</i>
Tetra	<i>Incremental, modular, architectural, radical (Henderson and Clark 1990)</i>
	<i>Niche creation, architectural, regular, revolutionary (Abernathy and Clark 1985)</i>
	<i>Incremental, evolutionary market, evolutionary technical, radical (Moriarty and Kosnik 1990)</i>
	<i>Incremental, market breakthrough, technological breakthrough, radical (Chandy and Tellis 2000)</i>
	<i>Incremental, architectural, fusion, breakthrough (Tidd 1995; Tidd et al. 2001)</i>
Triadic	<i>Low, moderate, high innovativeness (Kleinschmidt and Cooper 1991)</i>
	<i>Incremental, new generation, radically new (Wheelwright and Clark 1992)</i>
Dichotomous	<i>Discontinuous, continuous (Anderson and Tushman 1990; Robertson 1967)</i>
	<i>Instrumental, ultimate (Grossman 1970)</i>
	<i>Variations, reorientation (Norman 1971)</i>
	<i>True, adoption (Maidique and Zirger 1984)</i>
	<i>Original, reformulated (Yoon and Lilien 1985)</i>
	<i>Innovations, reinnovations (Rothwell and Gardiner 1988)</i>
	<i>Radical, routine (Meyers and Tucker 1989)</i>
	<i>Evolutionary, revolutionary (Utterback 1996)</i>
	<i>Sustaining, disruptive (Christensen 1997)</i>
	<i>Really new, incremental (Schmidt and Calantone 1998; Song and Montoya-Weisse 1998)</i>
	<i>Breakthrough, incremental (Rice et al. 1998)</i>
<i>Radical, incremental (Balachandra and Friar 1997; Freeman 1994).</i>	

Source: Coccia 2006, p. 13

References are cited within the original source

The classification of innovations identified emerged from the theories of innovation which are depicted in Table 4.2.

**Table 4.2: Theories of Innovations**

<b>Model</b>	<b>Key Features</b>
Abernathy and Utterback (1978)	Introduced dynamism into the innovation process and the concept of a dominant design. This model examined the processes that occur with firms in an industry during the evolution of technology (Singh et al., 2002) and described three phases in an innovation's life cycle from a firm's perspective – the fluid, transitional and specific phases.
Appropriability and Complementary Assets	This model stated that more than technological capabilities were required to make use of an innovation. This model argued that the appropriate innovation and the complementary assets were needed by the firm, both of which were important. It therefore demonstrated that inventors are not always the ones to profit from an innovation.
Chandy and Tellis (1998)	Discussed the extent to which technology involved in a product is new or different from previous technologies and the extent to which the new product satisfies important customer needs better than the existing product.
Disruptive Innovation Theory	Discussed why new entrants to the market have a better chance of succeeding in the market. The reasoning behind this is that established firms in the marketplace have a greater likelihood of winning over the new entrants when the innovation is incremental or radical, whilst the newcomers tend to be more successful if the innovations are disruptive. Disruptive innovations are those which are simple, convenient and low-cost.
Foster "S" Curve (1986)	Foster argued that the rate of technology advancement is a function of the amount of effort put into the technology and this follows the shape of a "S" curve. This model contributes to predicting the end of an existing technology and the introduction of a new one.
Henderson and Clark (1990)	This model defined innovation based on its impact on the components and its impacts on the linkages between components. It argued that categorising innovation as either incremental or radical was incomplete and confusing since the large effects that minor improvements in technological products can have on an industry were not considered. Based on this, innovation was examined from a product development perspective, especially the development of a new product by building product demand which resulted in two types of knowledge: architectural and component knowledge. The combination of component and architectural knowledge leads to four kinds of innovation: incremental, radical, architectural and modular. This model provides insights into why established firms have trouble adapting to architectural innovations and why they fail at such types of innovations.
Local Environment Model	Stated that the ability of a firm to innovate is based on the environment in which it operates.
Moore's Chasm Concept (1991)	Based on the Technology Adoption Life Cycle, Moore explained why firms encounter difficulties in "crossing the chasm" from being early adopters to early majority with their products.
Resources, Processes, and Values Theory	Based on the above theory, this model explained why existing companies have difficulties grappling with disruptive innovations whilst newcomers fail at incremental or radical innovations.
Strategic Choice Model	Demonstrated that the strategic choices of a firm are what determined whether the firm exploited an innovation.

**Table 4.2 (continued): Theories of Innovations**

<b>Model</b>	<b>Key Features</b>
Strategic Incentive to Invest	Examined the type of firm that will invest or be the first to take advantage of an innovation based on whether this innovation is incremental or radical.
Strategic Leadership Model	Examined the role of top management in innovation and resolved that a firm's failure or success at adopting innovation is based on its management.
Teece Model (1986)	This model of innovation looked at why innovating firms tend to derive less returns compared to later market entries and innovators. It provided a framework which identified the factors that determined the firms which won from innovation. These were the firms which were first to market, follower firms, or firms that have related capabilities that the innovator needed.
Tushman and Rosenkopf (1992)	Discuss the extent that a firm can influence the evolution of an innovation and the dominant design (Mustonen-Ollila and Lyytinen 2003). This model considered that for a firm, the greater the complexity of an innovation, the greater the chances of it being affected by non-technical factors. Technological progress depends on factors other than those internal to the firm and the more it is under-determined by factors internal to it. It considered innovation from the perspective of the impact on market knowledge and technology. These researchers described market knowledge as being either new or existing technology and was classified as either incremental or radical. Using these two dimensions, innovation was classified into four categories: architectural, incremental, major product or service and major process.
Value-Added Chain Model	Investigated innovation according to the value added chain of suppliers and other innovators in the value chain. The significance of this model is that it explained why some firms tend to fail with incremental innovations but succeed with radical ones.

With regards to sustainable tourism, Hjalager (1997) developed an analytical typology for innovation comprising the following dimensions: product innovation, classical process innovation, process innovations in information handling, management innovation and institutional innovation. These can be further expanded for its applicability in using ICT for sustainable tourism as discussed below.

Firstly, product innovation consists of changing, combining or introducing a new tourism product or service, where the novelty of this is more attractive to the tourists. Examples of product innovation in tourism are nature tourism, organic farming and volunteering tourism. With regards to ICT for sustainable tourism, a product innovation would be the development of different types of ICT for use by various individuals and groups. One such example is Location Based Services, as discussed

earlier, is a wireless service for mobile users that employs geographic information to provide the user with targeted information based on his/her specific location (Zipf and Malaka 2001; Eriksson 2002). Location Based Services can lead to sustainable tourism by promoting greater tourist satisfaction through the provision of personalised tourist information.

Secondly, process innovation refers to raising the performance level through the redesign of the production and delivery systems with the aim of achieving savings in production inputs such as labour (Hjalager 1997). Examples of these in tourism include: computerised management and monitoring systems and self check-in/check-out machines. With regards to the application of ICT to sustainable tourism, an example of a process innovation would be a DMO use of a DMS which contributes to the sustainable tourism by fostering new tools for managing the valued resources (natural, economic and social-cultural) of a destination.

Thirdly, process innovation for information handling refers to using ICT for managing information. ICT will play an invaluable role in sustainable tourism through the efficient management and monitoring of environmental information and issues for better performance and a higher quality destination. An example of such an application is an Environment Management Information System as discussed in Chapter three.

Fourthly, management innovation refers to new management procedures which change the existing authority systems, creating new jobs and collaborative structures and staff empowerment (Liburd 2005). By using ICT for sustainable tourism, new roles in DMOs will need to be defined since these tools/mechanisms will assist them in better management of the destination, using information more appropriately, and having greater stakeholder involvement.

Lastly, institutional innovation lies beyond the individual enterprises as collaborative processes or regulatory structures that transect the public and private sectors. This type of innovation is more wide-ranging than those discussed prior since institutions

not only exist in a physical state, but are also habits and customs and provide some type of framework within which people can interact (Hjalager 1997). The tourism system will have to be managed by an institution that is located beyond the scope of individual businesses and organizations (Hjalager 1997). The use of ICT for sustainable tourism can stimulate this type of innovation by fostering better partnerships with stakeholders by use of the Internet and engaging in dialogue with the community by using Community Informatics as previously discussed.

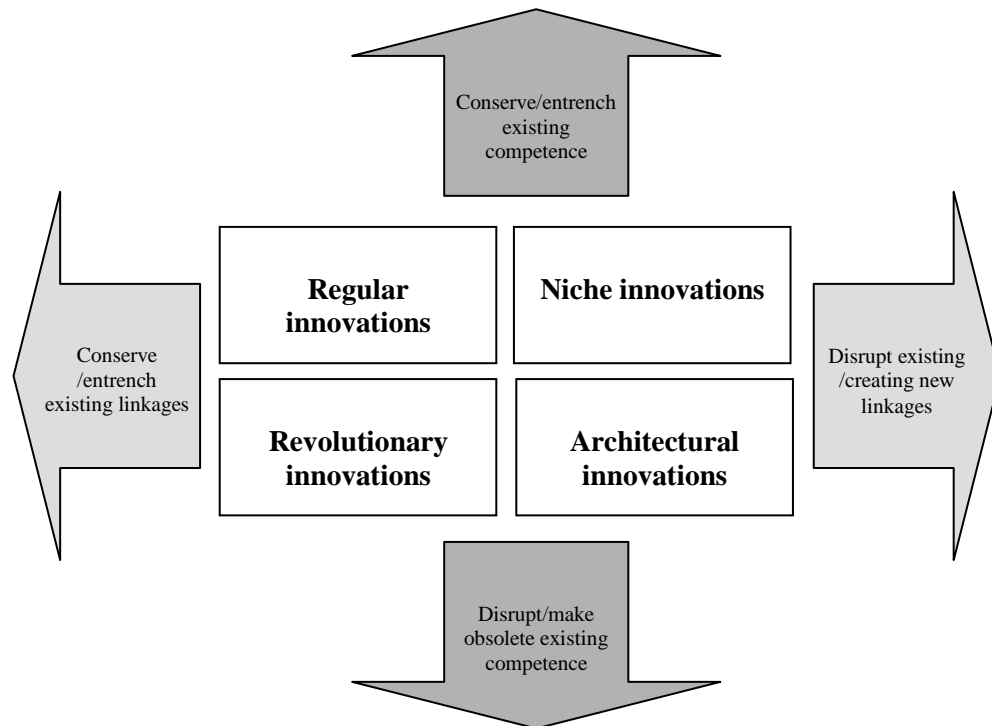
#### **4.4 The Abernathy and Clark (1985) Model**

The Abernathy and Clark (1985) model analysed innovation and the various roles this plays in competition. According to this model, innovation was classified according to two dimensions, market knowledge and technological capabilities of the firm. It distinguished between the preservation and destruction of this knowledge after an innovation has occurred and the capability of the firm needed for producing the product or service as a result of this innovation. The horizontal axis of the model identifies if particular innovations render current business linkages obsolete or lead to enhancement of these existing linkages. On the other hand, the vertical axis recognises the knowledge and competence used for the production of goods and services.

Based on this model, the technological capabilities of a firm can become archaic, but the firm can still maintain its market capabilities and use this to its advantage to deal with competing, newer firms in the market. Combining market knowledge and technological capabilities leads to four kinds of innovation: regular, niche, revolutionary and architectural as seen in Figure 4.1.



**Figure 4.1:** Abernathy and Clark Model (1985)



From the model, architectural innovation defines the architecture of the industry. It is broad based and involves changes not only to the industry but also the community in which it would be used (Hjalager 2002). It is both a radical technological and market innovation (Singh et al. 2002). Regular innovations are those that appear almost invisible but whose cumulative impact over time can be substantial i.e. conserves the manufacturer's existing technological and market capabilities (Abernathy and Clark 1985; Hjalager 2002; Singh et al. 2002). This type of innovation strengthens the existing competence. Niche innovations are those which are focused on strengthening the established structures but not the existing competences i.e. it enhances technological capabilities but obsolesces market capabilities (Abernathy and Clark 1985; Hjalager 2002; Singh et al. 2002). Lastly, revolutionary innovations are those which can have a disruptive effect on competences and cause radical consequences with structures remaining unchanged (Abernathy and Clark 1985; Hjalager 2002). This model was analysed by Hjalager (2002) with regards to its applicability for tourism by providing examples of the types of innovation identified for tourism.

The benefit of this model is that it demonstrates the importance of the market capabilities of a firm since businesses having well established markets and/or technological capabilities will tend to take advantage of regular, revolutionary and niche innovations. New market entrants will tend to exploit architectural innovations and niche innovations to a lesser extent. It also shows that innovation is not a unified phenomenon. Some types of innovation disrupt, destroy and makes obsolete an existing firm's competences while others refine and improve. The model also identified that different kinds of innovation require different kinds of organisational environments and managerial skills.

In discussing tourism innovation in the realm of several conceptual frameworks Hjalager (2002) used the Abernathy and Clark (1985) approach to provide examples of innovation of the types of innovation discussed above for the tourism industry. For this research the model will not only demonstrate how ICT will be innovative for sustainable tourism but it will also seek to identify some of the ICT-based tools/applications which can be used to accomplish this innovation.

#### **4.4.1 Selection of this Model**

This model was chosen in comparison to the other models of innovation for this research for several reasons. Firstly, Coccia (2006) stated that in the management of technology, this model provided the most useful classification since it presents a clearer understanding of the nature of particular and well-defined innovations. Moreover, there are numerous ICT-based tools/applications that can be used for sustainable tourism and this model serves in providing a useful classification for the tourism industry in differing aspects both on a micro and macro level.

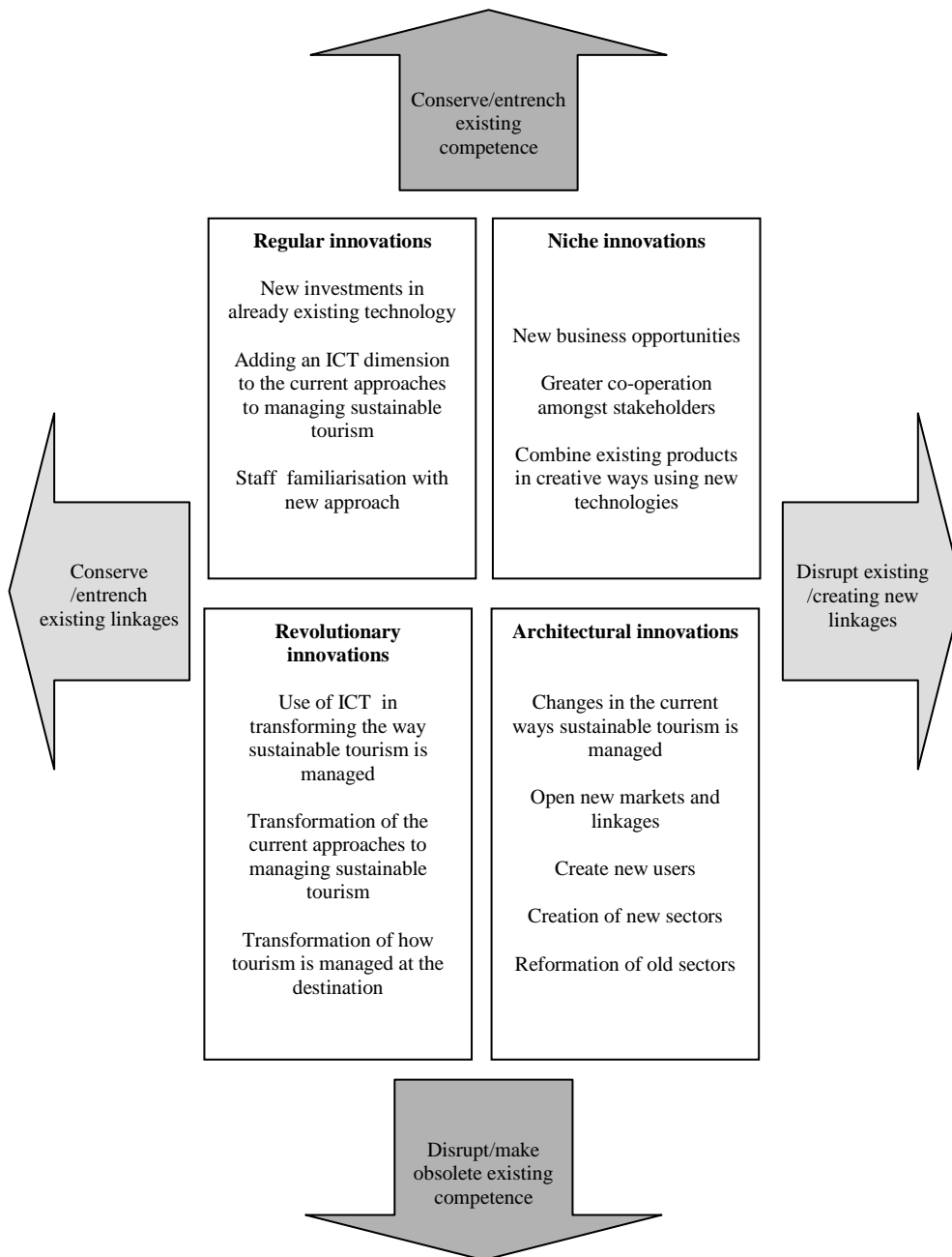
Secondly, many of the innovation theories looked at the behaviour of firms, the types of firms that innovate, the firms that generate innovation and the stages they go through in adopting these innovations. This research is focused on the types of innovation rather than the behaviour of firms in the innovating process. The intent is therefore to develop concepts that may prove useful in incorporating ICT in the struggle to make sustainable tourism more achievable. The reason for this is that

there is little knowledge on the use of ICT for sustainable tourism, the types of ICT based tools/applications that are being used, how they are being used and how they are selected by DMOs for their destinations.

Thirdly, Hajalger (2002) in her analysis of the Abernathy and Clark (1985) model used core competence as the unit of analysis. This measurement of core competencies is more suitable since innovation in tourism is often based on core competencies (Weiermair 2003). Since all destinations are striving to be competent in managing their sustainability, this model is most appropriate.

Lastly, the use of ICT for sustainable tourism can be classified under this taxonomy because the dimensions identified by Abernathy and Clark (1985) are appropriate as illustrated in Figure 4.2. Regular innovations will exist with ICT-based tools/applications in that their impacts will seem insignificant but over a considerable period of time this impact builds up and plays a huge role in sustaining the tourism industry. Regular innovation includes new investments in existing technology for sustainable tourism such as investments in DMS as discussed earlier. Another example includes adding a technology aspect to the current methods for managing sustainable tourism. This can be achieved by using an Environment Management Information System to assist with monitoring, if this is a method currently being used for managing sustainable tourism.

**Figure 4.2:** Innovation, ICT and Sustainable Tourism Development – A Modified Abernathy and Clark (1985) Model



Niche type innovations will be created with the use of ICT for sustainable tourism by strengthening the existing structures. New opportunities will be realised by using what the destination managers already possess. The same ICT that DMOs are using for other purposes can be used for sustainable tourism with this ICT being refined, improved or changed in some way to support the new use. One such example is extending the uses of a DMS. DMOs can improve the environmental quality of their destination by placing promotion materials and maps on their websites. This leads to sustainable production with less paper being used and sustainable consumption by the tourists using these Websites. Additionally, the DMS can be used as a tool for interpretation by encouraging interaction amongst tourists whereby they can share their experiences on a DMO's website. This is critical to a destination image since it might be these very comments that influence the tourists' destination choice (Staab and Werthner 2002). DMOs can also use the DMS creatively by providing the tourists with information on ground transport, directions, safety and security, events, eating places, and background information on the destination so that they are aware of the local culture, dress, behaviour, history and geography and how best to experience and learn about the destination prior to their visit. This DMS for sustainable tourism can also be used for enabling partnership by fostering stakeholder consultation and information transfer. It can be a strategic tool for building and strengthening relationships, networks and communities which can transform the tourism planning process and enhance economic development at the destination level.

Revolutionary innovations will occur when the types of ICT-based tools/applications used for sustainable tourism have a disruptive effect on the competence of how sustainable tourism is managed. This is accomplished by transforming the current methods to managing sustainable tourism, making some of these approaches obsolete and in the long term changing how tourism is overall managed at the destination. An example of a disruptive ICT-based tool/application could be the use of Geographical Information System.

Architectural innovation will occur through the use of ICT for sustainable tourism since it will change the existing ways in which sustainable tourism is managed. This will open up new market linkages and users and is characteristic of the creation of new industries as well as the reformation of old ones. The use of certain types of ICT-based tools/applications can change the framework of how sustainable tourism is managed and in effect make the destination more competitive.

No discussion of this approach would be complete without addressing some of the existing criticisms of the Abernathy and Clark (1985) model. The model has been criticised for being too static (Hjalager 2002). For this approach, this inflexibility can be overcome by applying it to a dynamic system such as tourism and changing the dimensions from its previous applications to see how it works in a tourism setting. Another criticism is that the model under-estimated the extent to which innovation builds on existing technologies. This adapted model will consider this aspect since, as mentioned earlier, this approach is not looking at developing new technologies but rather seeing what already exists and how these ICT-based tools/applications can be used for sustainable tourism. No model is flawless, however, despite the criticisms, this model aids in providing insight in forming a useful framework for addressing ICT as being an innovative approach to sustainable tourism.

#### **4.5 Conclusion**

Organisations generally and in our context destination-based organisations are being alerted to the fact that if they do not innovate they may cease to exist. No change issue is more vital than sustainability and arguably no economic sector is as sensitive to this as tourism. The author's premise is that through ICT, destination-based organisations may adopt an innovative approach to sustainable development issues. This chapter has introduced ICT as a new, innovative approach to managing sustainable tourism and demonstrated that the Abernathy and Clark (1985) model in progressing research in this domain. The following chapter will focus on the research design for conducting empirical research in the ICT-sustainable tourism domain. It is hoped that results of these findings will lead to refinement of the model

presented in Figure 4.2 and will describe, categorise, and show how this wide-ranging list can be used for different perspectives of the industry and how it will be an innovative approach.

Moreover, for this approach to be innovative, decision makers not only require and understanding of the ICT-based tools/applications which can be used for sustainable tourism, but also need to know what ICT-based tools/applications are available and how best to make use of them for their particular needs (Fache 2000). Decision-makers would be offered no practical benefit if they were only to be made aware of these tools and rather a systematic framework is essential in helping destinations select the best ICT-based tools/applications for them based on their particular needs relating to tourism development. Therefore, further exploration is warranted in progressing this research domain.

## **Chapter Five**



## **Chapter Five**

### **Methodology**

#### **5.1 Introduction**

Chapters one to four of this thesis focused on defining the context and discussing the theoretical framework adopted for using ICT as an innovative approach in managing sustainable tourism development. From the literature review, a variety of concepts and a number of tools/mechanisms directed towards reducing the negative impacts of tourism were identified. The literature review provided evidence that ICT can be an innovative concept for managing sustainable tourism with various opportunities existing for using these ICT-based tools/applications. Table 3.9 identified a wide-ranging array of ICT-based tools/applications that are suitable for managing different impacts of tourism at the destination level. In relation to these ICT-based tools/applications, the literature also demonstrated that there has been little empirical research in ascertaining if they were currently being used, describing their uses, identifying the specific aspects of sustainable tourism they can be used in, and identifying any assessment procedures for use by destination managers. Moreover, there may be other ICT-based tools/applications that were in use or can be used by destination managers but were not evident in the existing literature. Further research was therefore merited in providing answers to these identified issues.

A discussion of the methodology adopted for this research is contained in this chapter. Methodology is concerned with a set of assumptions about the nature of reality, the role of the researcher, concepts of action and the social actor, a range of methods for dealing with the research problem/s, a preference amongst the many methods which are available and a systematic sequence of procedural steps to be followed once the method/s have been identified (Silverman 2006). This chapter therefore begins by outlining and examining the aims and objectives of this work and then focuses on exploring the problem definition. This is followed by a discussion on identifying the research domain and the assumptions underlying the adopted methodology. The chapter continues with a detailed examination of the research design and its suitability for this thesis by focusing on the research instrument,

sampling, procedures involved, response rates and analysis of the data. A discussion on the measures taken to ensure the quality of the research design was not compromised is then presented and the chapter concludes by presenting a schematic of this research.

## **5.2 Research Aims and Objectives**

Alongside the literature review, the aims and objectives were developed with two main aims governing the research:

1. To investigate the uses of information and communication technology (ICT)-based tools/applications for destination managers in support of sustainable tourism development.
2. To develop assessment procedures for the ICT-based tools/applications that can be used by destination managers for sustainable tourism development.

Based on the first aim, in proposing ICT as a new management approach for sustainable tourism development, an examination of the existing opportunities for using these ICT-based tools/applications and any existing ICT-based tools/applications that can be used in managing sustainable tourism development was necessary.

With regards to the second aim, this research explored the ICT-based tools/applications that can be used and developed a descriptive framework that is valuable to destination managers in identifying, categorising, describing and selecting the best ICT-based tools/applications for managing the sustainable tourism development of their respective destinations.

These aims were supported by six specific objective, i.e. To,

1. review the background literature in sustainable tourism and eTourism
2. conduct surveys of destination managers and eTourism experts with regards to their opinions and perspectives on the use of ICT for sustainable tourism
3. examine the ICT-based tools/applications and describe their potential uses in destination management for sustainable tourism development
4. to demonstrate how ICT can be an innovative approach for sustainable tourism by using the Abernathy and Clark (1985) model in categorising these ICT-based tools/applications
5. determine the areas of sustainability where ICT-based tools/applications can be used in destination management
6. critically examine the current approaches in destination management for the use of ICT-based tools/applications for sustainable tourism development
7. assess how destination managers select these ICT-based tools/applications for their destinations.

Returning to the first of these objectives, the literature search was essential in determining existing ICT-based tools/applications, establishing the theoretical framework for accomplishing the aims and objectives and laying the foundation for the issues to be explored in depth in the primary research.

With regards to the second objective, data was collected and analysed from two populations with a defining interest in sustainable tourism development and eTourism. These populations were destination managers and eTourism experts. Destination managers were surveyed since they are usually identified amongst the key players charged with the responsibility for the holistic planning and management of tourism destinations and in essence, the sustainable tourism development of their destinations (Please see earlier discussion in Chapter one). An eTourism expert was defined as someone who possesses special expertise, knowledge and skills on the application of ICT to tourism. Examples of such experts would be individuals who have been involved in researching, teaching, using and implementing ICT in the tourism industry. These experts offer different types of expertise on eTourism which

range from such areas as electronic distribution, recommender systems, user generated content, online communities, mobile technology, travel technology, technology acceptance, tourism networks, Web 2.0 and context awareness. They were surveyed since they are forefront in researching the latest, cutting-edge applications of ICT for the tourism industry and therefore were instrumental in identifying current and potential tools and their uses in destination management. The aims of administering this survey were to:

- determine the level of awareness on the uses of ICT-based tools/applications for sustainable tourism development
- obtain perspectives on the uses of ICT-based tools/applications for sustainable tourism development
- determine current and potential ICT-based tools/applications for use in sustainable tourism development
- determine areas of sustainability that are of most concern to destination managers
- investigate the current approaches for the use of ICT-based tools/applications for sustainable tourism development
- establish how these ICT-based tools/applications can be used in sustainable tourism development
- develop a collection of ICT-based tools/applications for use in sustainable tourism development
- determine assessment procedures for the selection of these ICT-based tools/applications.

The third objective was identified with the expectation that both the primary and secondary research would reveal a collection of ICT-based tools/applications to be categorised and their prospective uses for managing sustainable tourism development described. This collection will serve as an important reference to destination managers in adopting ICT in their operational, tactical and strategic operations in managing sustainable tourism development.

The fourth objective was to demonstrate that ICT can be an innovative approach to sustainable tourism development and to analyse the Abernathy and Clark (1985) model in categorising these ICT-based tools/applications.

The fifth objective was designed based on findings from the literature which identified that opportunities do exist for using ICT-based tools/applications for sustainable tourism development. Further research was imperative in investigating these opportunities and identifying areas of sustainability where ICT-based tools/applications can be used in destination management.

The sixth objective was formulated by taking into consideration that some destinations were already using ICT-based tools/applications in managing the sustainability of their destinations. This research therefore identified these destinations, determined how these ICT-based tools/applications were being used and evaluated the approaches to using them.

Finally, the seventh objective of this research was to develop assessment procedures to assist destination managers in selection of the most appropriate use of these ICT-based tools/applications for their destinations. The intent was to develop research that proved useful in incorporating ICT into a more pragmatic approach to sustainable tourism development.

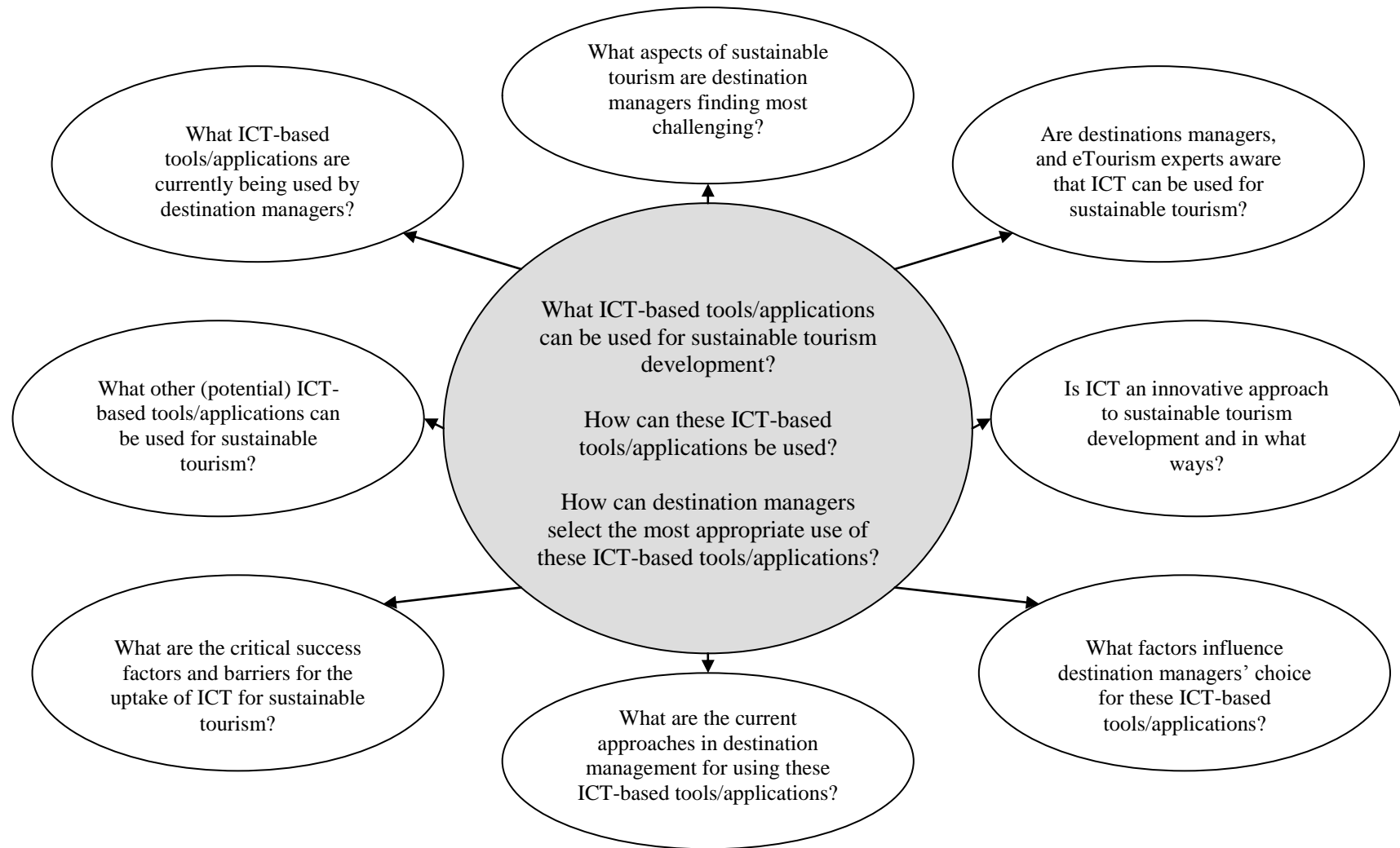
### **5.3 Problem Definition**

In determining the methodology and selecting the research design for investigating ICT and its applications for sustainable tourism, the research problem was defined and the research questions were determined. Destination managers and eTourism experts were identified as the two populations who can best provide the answers to these questions. From the literature, it was discussed that tourism activities comes at a cost to the environment and the problem posed was how sustainability can work for destinations. The literature demonstrated that the application of ICT can be the right step in this direction. Based on this, the main research questions to be answered were:

1. What ICT-based tools/applications can be used for sustainable tourism development?
2. How can these ICT-based tools/applications be used for sustainable tourism development?
3. How can destination managers select the most appropriate use of these ICT-based tools/applications for their destination?

These questions lead to the development of secondary research questions as depicted in Figure 5.1.

**Figure 5.1: Problem Definition**



## **5.4 Defining the Research Domain**

In order to take a more systematic approach in executing the aims and objectives of this work, it is necessary to broadly outline the research domain from the beginning so that the researcher is clear as to what is being researched. For this thesis, the research domain was defined in the early stages due to the apparent benefits of using ICT as an innovative and practical approach in solving some of the problems of the negative impacts of tourism at the destination level. Further definition occurred after an extensive review of the literature in sustainable tourism and eTourism identified limited work has been published on the application of ICT for sustainable tourism development. This literature review also guided the construction of the aims and objectives, definition of the research problem and the main research questions; which further delineated the research domain. Moreover, in investigating the uses of these ICT-based tools/applications, it was identified that information was needed from destination managers and eTourism experts which also contributed to further defining the research domain.

### **5.4.1 Defining the Research Paradigm**

Further demarcation of the research domain resulted from understanding the philosophical standpoint of this research. The philosophical stance of any research is controlled by the researcher with his/her actions being strengthened by a basic set of beliefs which determines his/her worldviews (Phillimore and Goodson 2004). This philosophical foundation is critical in the research process since it underpins the study design and influences important decisions regarding the way by which data are collected and how this data are analysed in the knowledge creation process (Hughes and Sharrock 1997). This is commonly referred to as paradigm and has three main elements: ontology, epistemology and methodology. Through the understanding of the issues described above and the ontological, epistemological and methodological considerations the researcher can identify her inquiry paradigm. This provides guidelines which help her shape the structure of the investigation and connects the theory to the research methods.



In the social sciences, research can be approached from varying standpoints adopting differing methodologies. Such research should be directed by whether data are collected to test or build theories i.e. a deductive or inductive approach (Bryman 2004; Newman 2004). With the former, hypotheses are deduced and subject to empirical testing resulting in theory acceptance, theory revision or theory modification and these are usually aligned to quantitative data. The latter approach is one where theory is the outcome of the research process and conclusions are drawn from one or more pieces of evidence and is commonly associated with qualitative data.

The overarching aim of this research was to investigate the uses and applications of ICT for sustainable tourism development. The research problems identified and the research questions presented earlier demonstrated that the application of ICT to sustainable tourism lacks empirical research in assessing how these ICT-based tools/applications can be used by destination managers. Furthermore it adopted the view that ICT can be an innovative approach to sustainable tourism and it facilitates the tourism industry to engage in more innovative behaviours. To accomplish this, it was felt that a phenomenological research approach would be most suited. This approach allowed the researcher to undertake rich, in-depth exploration on the opinions and perspectives of destination managers and eTourism experts on this important and relevant topic.

#### **5.4.1.1 Ontology and Epistemology**

Ontology answers the question of “what is reality?” i.e. what is viewed as reality or truth by the researcher. According to Bryman (2004), it pertains to whether the reality is influenced by or is separate from social actors. The researcher’s definition of reality strongly influences the knowledge creation process. In any research, the ontology adopted will direct the methodology as to the nature of reality and what is supposed to be studied. There are two main ontological positions: objectivism and constructivism. Objectivism views reality as being separated into variables that can be examined independently of each other. It asserts that “social phenomena and their meanings have an existence that is independent of social actors” (Bryman 2004, p.

16). Constructivism on the other hand posits that reality cannot be separated from the individual's perception since they are interconnected and mutually dependent (DePoy and Gitlin 1998).

Epistemology on the other hand is concerned with the nature of knowledge and a means of understanding how we know what we know (Crotty 1998; Bryman 2004; Bryman and Bell 2007). In essence, it is the nature of the relationship between the researcher and what is being researched (Phillimore and Goodson 2004). The type of knowledge the researcher is searching for will influence the methodology (Jones 1993) by either adopting a positivist or an interpretivist perspective.

Positivism is defined as “an epistemological position that advocates the application of the methods of the natural science to the study of social reality and beyond” (Bryman and Bell 2007, p. 16). Even though positivism has changed over time, the main underpinnings are that knowledge is viewed as being independent from the researcher and that the acquisition of this knowledge can be gained and confirmed by unbiased scientific methods. A positivist tradition is usually aligned to deductive theory where based on existing research in a particular domain, hypotheses are deduced and subject to empirical testing resulting in theory acceptance, theory revision or theory modification. Interpretivism, however, views this knowledge as being interdependent with the holder of the knowledge. The knowledge the researcher is seeking cannot be obtained without consideration for the respondent since this knowledge has meaning to the respondent and should be interpreted from his/her outlook (Bryman 2004). This results in findings which are the product of the interaction between the respondents and the researcher (Guba and Lincoln 1994). An interpretivist tradition is usually aligned to inductive theory where this theory is the outcome of the research process i.e. conclusions are drawn from one or more pieces of evidence. These two viewpoints align with the ontological standings discussed earlier where an objectivist view of reality adopts a positivist perspective and a constructivist view of reality takes on an interpretivist perspective.

#### **5.4.1.2 Methodological Approach**

In view of the above discussion, this research will be adopting a constructivist ontological stance and an interpretivist epistemology. There has been limited published theoretical and empirical research on the application of ICT for sustainable tourism development for DMOs and destination managers. Therefore, a deeper understanding of the uses of ICT for sustainable tourism is required from which a sound body of knowledge can be constructed on how DMOs and destination managers engage and make the best use of these tools for their destinations. According to Blaxter et al. (2001), under-theorised research or research which lacks empiricism is best suited to an inductive approach since it facilitates ideas and theory generation from the collected data. A deductive approach focused on measurement and determining cause and effect relationships was felt to be inappropriate. The researcher was concerned with *verstehen* which is the empathic understanding of the worldview of the populations being investigated (Newman 2004). This was important for gaining an accurate representation of the uses and applications of ICT for sustainable tourism by destination managers. An interpretivist perspective was therefore warranted in understanding destination managers and eTourism experts' opinions, perspectives and motivations for selecting and using these ICT-based tools/applications.

Furthermore the newness of ICT-based tools/applications to sustainable tourism as a research field and the exploratory nature of this study aligned itself to a more flexible and open research design rather than one that was highly structured and rigid. An interpretive stance would bring forth data that was not constrained by fixed, analytical categories and would allow the researcher to visit and re-visit the linkages between the data and the theory and explore the respondents' viewpoints on ICT for sustainable tourism. Interpretation, rather than statistical analysis, was better suited to researching respondents' perceptions, attitudes and feelings (Denscombe 2003).

Added to this, to answer the research questions posed, information was required from a large number of experts based at various geographic locations all over the world.

Due to the international scope of this research, a more flexible and open-ended approach was more desirable to elicit the required information.

This research developed assessment procedures on the most appropriate selection of these ICT-based tools/applications by destination managers. Understanding this process was one of the main aims of this thesis. An interpretative approach was more appropriate since it allowed the researcher to paint a representative picture, as best as possible, with the collected data on the how these ICT-based tools/applications were selected. It also allowed for the generation of richer and more relevant forms of data which were more context-bound and provided for a deeper understanding of how destination managers' selection process materialised. Such a process fosters the development of theories which are real-world grounded and more relevant to the individual (Patton 1990).

Moreover, Saunders et al. (2007) observed that an interpretivist perspective is best suited to a piece of research when the researcher has empathy and understanding of the topic under investigation. Each DMO possesses its own individuality on how ICT can be used to manage sustainable tourism development. The researcher was able to have a shared understanding of their experiences and was able to collate these and build a more complete, holistic portrayal of the ICT-sustainable tourism domain.

Even though this research adopted an overarching interpretivist perspective, it does not seek to discredit or disregard the positivist paradigm. The researcher appreciates that no research tradition is better than another since each is suited to its particular purposes; with a constructivist ontological position and an interpretivist epistemology being best suited to fulfilling the purposes of this research.

## **5.5 Research Design**

Based on the delineation of the research domain, a cross-sectional research design was selected. This design consists of survey research on a sample at a single point in time (Bryman and Bell 2007). It is very versatile since it allows vast amounts of different types of information to be obtained from questioning the respondents. The

strength of survey research lies in its ability to learn about people and their experiences, perceptions and opinions by asking well-chosen questions (Cooper and Schindler 2003). Following the secondary research, primary research was conducted in two phases: online questionnaires and semi-structured interviews.

Primary research therefore included both quantitative and qualitative methods due to the dynamic nature of the research topic being investigated. These methods complemented rather than competed with each other (Bryman 2004) with the literature displaying support of the use of a multi-method approach (see Newman 2004; Bryman 2004; Bryman and Bell 2007) and allowed for triangulation of the collected data and a more thorough understanding of the research problem under investigation (Bryman 2004; Bryman and Bell 2007).

This first phase involved administering online questionnaires to the destination managers and eTourism experts. A separate questionnaire was tailored for each population (See Appendix one and two). These online questionnaires were administered first in order to gain an overall picture on the uses and applications of ICT for sustainable tourism. Despite widespread general discussion of the uses of ICT for sustainable tourism there are very few destinations which were employing ICT for this purpose and there were also very few destination managers or eTourism experts who possess knowledge of this field. Therefore it was necessary to distribute the questionnaires first in order to discern which DMOs were using ICT for sustainable tourism and which eTourism experts were familiar with this topic. Evidence of this is seen from when the questionnaires were distributed, several respondents e-mailed the researcher indicating their willingness to participate but their lack of knowledge. The following quote from one of the e-mails received indicated this:

*I'm sorry but I've tried to fill in your questionnaire but unfortunately I have no knowledge to answer most of the questions since I am not quite an expert in ICT- sustainable tourism.*

Whilst one of the experts interviewed stated this :

*I think this area is very specialist. Whilst many people are talking about it, I don't think there are many people involved in researching and getting to the core of the matter.*

These questionnaires were therefore instrumental in identifying people who were knowledgeable in this area (Silverman 2006; Bryman and Bell 2007). Based on the responses, it also provided the foundation for the type of questions to be asked in the interviews and served as a means of adding validity and reliability to the interview questions. Using the online questionnaires also allowed respondents to be introduced to the topic and become familiar with the type of research that was being conducted so when approached for the interview, they were more willing to participate.

Additionally, not all the information required for the completion of the aims and objectives were available from the questionnaires, hence further data was needed which was gathered through the interviewing process. These interviews allowed the researcher to discover information which would have been unavailable elsewhere (Silverman 2006). It was also felt that combining these methods would improve the confidence of the findings and enhance the generalisations of the results (Bryman and Bell 2007). These questionnaires were administered during the period of July-October 2008.

An interpretivist perspective also reinforced the need to interview experts. These interviews focused on exploring key issues highlighted in the questionnaires for development of research in ICT and sustainable tourism. These interviews were conducted either by telephone, through the use of Skype (a Voice-over Internet Protocol application), or face-to-face. These interviews took place between December 2008- February 2009.

### **5.5.1 Selection of Research Methods**

The research instruments used for this thesis were online questionnaires and semi-structured interviews; conducted by telephone interviews on Skype and face-to-face. Before these methods were selected, alternative research methods were considered such as focus groups and the Delphi technique. It might have been useful to have a few focus group sessions involving representatives from the populations under investigation in order to obtain their joint perspectives on investigating the uses ICT-based tools/applications for sustainable tourism. A Delphi technique was also considered by allowing experts from the populations identified to develop the collection of ICT-based tools/applications for sustainable tourism development since this technique is seen as useful in reaching agreement on a complex issue that requires the participation of geographically located experts (Miller 2001).

However, these approaches were discarded for several reasons. The time taken to execute the research design was important since the respondents surveyed were all busy professionals and therefore a method of data collection was needed that acquired the necessary information but did not take up too much of their time. The methods considered above would have all required a great deal more of the respondents' time as compared to the methods chosen. This might have resulted in a lower response rate due to respondents' unwillingness to participate. Specific reasons for the selection of online questionnaires and semi-structured interviews are discussed subsequently.

#### **5.5.1.1 Selection of Online Questionnaires**

Instead of using the Internet, the questionnaire could have been delivered via post or over the telephone. Some of the respondents may have found it tedious to take the time to return the questionnaire by post or spend time answering questions over the phone as compared to completing the questionnaire online and clicking on a submit button. Evidence indicates that online surveys do have higher response rates (Glover and Bush 2005) and a slightly higher rate of completeness and quality than surveys conducted through traditional methods (Schonlau et al. 2002).

Additionally, the worldwide geographic distribution of respondents also influenced the use of this method (Litvin and Kar 2001). Other methods would have incurred heavy financial costs in trying to access respondents from all over the world. Such costs included but were not limited to domestic and international travel, postage, stationery and telephone. Using this approach ensured that the necessary people who had the information sought were contacted. The questionnaire also served as filter to identify those who had expertise in this area and had a wider reach in contacting and obtaining respondents' participation. Alternative research methods may have resulted in some respondents being excluded due to lack of a current mailing address or telephone number or their unwillingness to participate. Despite its geographical scope, the Delphi technique was specifically rejected since it did not appear to appropriately provide answers to all of the issues identified earlier since this study investigated more than one complex issue.

The use of online questionnaires also allowed large amounts of data to be collected quickly, easily coded and analysed. The turnaround for responses is much shorter as compared to other methods. The time taken to code data for analysis was also reduced. These surveys were designed on [www.surveymonkey.com](http://www.surveymonkey.com). This interface provided data analysis mechanisms as well as allowed the responses to be downloaded into a spreadsheet format which was transferred for more in-depth analysis into Statistical Package for the Social Sciences (SPSS).

A general disadvantage of questionnaires has been the inability of the researcher to explore issues in depth with respondents. It appears to be static when compared to other methods and can lead to ambiguity and misunderstandings when issues cannot be clarified. For the questionnaire, this was avoided with careful question construction in order to avoid vagueness, provision of comprehensive explanations in order to minimise confusion in the form of a glossary and piloting testing of the instrument to identify and solve potential problems that might occur. The use of both open and closed questionnaires also minimised this potential downfall. Closed questions provided information which was easily obtained from selecting among the choices whereas open questions were used to enable respondents a degree of flexibility to express their opinions, attitudes and identify new issues. Using open



questions was important in allowing for a deeper understanding of the use of ICT for sustainable tourism development. This provided the research with a broader outlook and strengthened the inquiry by generating qualitative data. Research has shown that online questionnaire tend to provide a greater amount of data to open ended questions than traditional surveys (O'Connor and Madge 2001; Glover and Bush 2005). Additionally, more of these issues were clarified with the respondents selected for the interview.

Furthermore, online research is usually criticised for being biased in its sampling procedures due to the sample not having access to the Internet (Fricker and Schonlau 2002; Madge 2006). The two populations selected for this study are professionals in their respective fields and will possess at minimum basic computer skills and will have access to the Internet. The use of an online questionnaire was felt as being appropriate as a result of the characteristics of the populations being surveyed. It could be reasonably expected that they would be comfortable with the everyday use of technology.

The use of online questionnaire also increases the anonymity of respondents. An e-mail was sent to respondents informing them about the nature of the research and inviting to participate by clicking on a Weblink which directed them to the questionnaire. This increases respondents' anonymity since they did not have to reply to the e-mail but rather fill out the questionnaire on the website and submit it. However, if these respondents' wished to further participate or gain updates on the research then they could have left their e-mail addresses. It could be argued that this method discriminated against participants who were knowledgeable on the topic but did not indicate a desire to be contacted. However it should be noted that all respondents who displayed an understanding of the topic indicated that they wished to be contacted further.

A different questionnaire was designed for each of the populations being surveyed. SurveyMonkey provided an enhanced interface that allowed the questionnaire to be tailored to each population such as in multi-lingual formats, pop-up instructions and

a link to a website where more information about the project was accessible (Zhang 2000).

#### **5.5.1.2 Selection of Semi-Structured Interviews**

As discussed earlier, semi-structured interviews were used as the second phase of the research design in order to get further information for those experts identified from the online questionnaire. Similar to using an online questionnaire, there are several advantages and disadvantages of using a semi-structured interviewing technique which the researcher will not go into in detail here (See Cooper and Schlander 2003; Jordan and Gibson 2004).

From the questionnaires, the researcher had collated a list of topics for further discussion in the interviews. Due to the relative novelty of the research topic the researcher wanted to introduce some flexibility in the research process (Bryman and Bell 2007). An approach was needed which allowed exploration of these topics from the questionnaires but also facilitated variation to change question sequencing and add in other questions as they may arise during interviewing. This could not have been achieved with either structured or unstructured interviews.

Additionally, these methods allowed the interviews conducted to be compared since the interviewees were asked the same questions (Jordan and Gibson 2004). It would have been difficult to gain comparability with unstructured interviews whilst structured interviews would not have allowed room for probing issues more deeply.

Lastly, this method was selected since little equipment was needed thereby allowing the research environment to be easily changed to facilitate interviewees and the interviewer.

These semi-structured interviews were conducted by telephone using Skype and face-to-face. Telephone interviews were selected due to the worldwide geographic location of participants. It allowed the researcher to have greater reach in targeting those who had knowledge in ICT and sustainable tourism. It also enabled the researcher to be accommodating to the interviewees since she was able to conduct

these interviews at their time and convenience. The use of telephone interviews were also quicker and cheaper to administer (Cooper and Schlinder 2003; Bryman and Bell 2007). Moreover, the face-to-face encounter was not fully necessary as the researcher was not interested in non-verbal cues and body language and employing visual aids. Additionally, the length of the interview averaged between 30-50 minutes and this was deemed an appropriate length of time to have participants on the telephone. Two of these interviews were done face-to-face since these interviewees had indicated that they were going to be present at a conference the researcher was attending and agreed to be interviewed there.

Skype was used because of the cheaper rate of telephone calls as compared to using a landline or mobile phone. It also allowed the option of recoding the calls directly on to the computer without the use of extra equipment hence facilitating an easier transcription process. Also the quality of reception on Skype was clear so both parties were able to hear each other plainly during the interview process.

## **5.6 Sampling and Response Rates**

Sampling refers to part of the population selected for investigation (Bryman 2004). For each of the populations being surveyed, a database was obtained that was thought to be representative of them. This database of destination managers was obtained from a leading, international tourism consultancy, TEAM Tourism, which undertook in 2004, the first worldwide survey of DMOs for the United Nations World Tourism Organisation. These respondents were sent an e-mail by the Managing Director of TEAM, explaining the nature of the survey and asking them to participate. This e-mail was sent via Constant Contact which is an e-mail marketing and online survey tool. This initial e-mail was followed by two reminder e-mails.

The number of DMOs contacted were 597, however from the e-mail statistic report provided by Constant Contact, each time this survey was sent there was only 163 “bounce/undeliverables”. This meant that only 434 DMOs were active in this database and this number was used as the base for the sample. Additionally this number was used because these meant that since these DMOs were the active ones

they would have a wider knowledge on the uses of ICT for sustainable tourism. From the 434 DMOs, 37 valid responses were received, yielding a response rate of 9%.

For the eTourism experts, International Federation for Information Technology and Travel and Tourism (IFITT) database was used. IFITT is the leading international organisation specialising in the exchange and development of knowledge on the application of ICT to tourism. Therefore this organisation would have a representative sample of eTourism experts worldwide both from academia as well as practising professionals. These respondents were sent an e-mail by the President of IFITT, explaining the nature of the survey and asking them to participate with reminder e-mails being sent twice. From a database of 202, 23 responses were received, this yielding a response rate of 11%. This response rate was considered satisfactory since, as mentioned earlier, a number of people e-mailed indicating their wishes to participate but their inability to do so.

The researcher felt that these response rates were adequate since appropriate measures were adopted to minimise non-responses by sending out reminder e-mails. Also since this was the first comprehensive study in the ICT-sustainable tourism domain there were no other studies to compare the response rates to determine if the level of response was in line with other surveys. Lastly, the non-responses did not differ significantly from those who did respond and hence did not impact on the representativeness of the findings. This information was obtained from the e-mails sent by those who did not answer the survey.

Sequential sampling was used to select those participants for the semi-structured interviews. This sampling approach was felt to be most appropriate for this phase due to the investigative nature of the research since these selected interviewees would be knowledgeable about the uses of ICT for sustainable tourism. Additionally, they would reflect their knowledge and experiences and hence make a valuable input into accomplishing the aims and objectives of this work. Cooper and Schlinder (2003) commented that this approach was appropriately matched to

exploratory research and best used when the researcher wants to discriminate the type of respondents that are required. Thirteen expert interviews were conducted and this number was based on reaching a saturation point. Saturation was reached when findings of the earlier interviews were being repeated by the later ones and added little benefit to the research (Newman 2004). In the literature it is argued that ten cases are adequate in developing themes and concepts from qualitative data (Eisenhardt 1989).

## **5.7 Procedures**

In administering the online questionnaire, several procedures were undertaken. The questionnaires were designed on [www.surveymonkey.com](http://www.surveymonkey.com) with a different one being designed for each population (See Appendix one and two). An e-mail was sent to respondents introducing the researcher and the purpose and scope of the research. This e-mail also informed respondents that there was no obligation to participate in this study, that anonymity and confidentiality would be maintained and they were free to withdraw from this study at any point in time. This questionnaire was anonymised but participants had the option of leaving their e-mail addresses if they chose to be contacted for further discussion. A link to the survey was contained in this e-mail and respondents were invited to participate by clicking on this link.

With regards to the interviews, once participants were identified, based on these responses, they were contacted by e-mail and asked to participate in an interview (see Appendix three). The participants were sent an information sheet outlining the interview procedures – anonymity, transcriptions being used not their actual voices and that these recordings would be destroyed upon completion of the study (see Appendix four). Once they agreed to participate, a mutual date and time was set and the participant was e-mailed a list of the questions to be asked in the interview. This research was granted ethical approval by Queen Margaret University and conformed to the University's guidelines.

## **5.8 Data Analysis**

The data from the closed questions in the questionnaires were coded and entered into SPSS. The data was analysed using cross tabulations and descriptive statistics since this provides a simple and rigorous way of arranging the data and presenting the results (Denscombe 2007). Analysis of Variance (ANOVA) tests were also used. Chi square analysis was considered unsuitable since, when the tests were run, more than twenty percent of the expected frequencies were smaller than five (Bryman and Cramer 2005). The researcher felt that complex statistical analysis was not suited to the data set due to the size of the sample and the categorical nature of the data. It was felt best to keep the analysis simple. The data from the open-ended questions were entered into Excel and subsequently analysed manually using content analysis by searching for main themes.

The interviews were also analysed manually using an informal approach. Each interview was transcribed verbatim upon completion. Adopting an inductive approach by using the text of the voice of the interviewees, the interviews were firstly broken down into broad categories and then organised into themes. These themes were based on the findings of the literature review. This assisted the researcher in identify patterns and emerging themes in the data. Text based on these common themes were compared and contrasted and further refinement of these themes occurred until key themes were identified which ensured meaning was made of the text. Emphasis was therefore placed on matching the data to the emerging theories rather than hypothesis deduction. Peräkylä (2005) observed that such an approach is perhaps the most appropriate choice in research designs where the qualitative text plays a complementary role rather than being the heart of the research.

### **5.8.1 Limitations to the Data**

The researcher recognised that the collected data had some limitations. Firstly, there may have been destination managers and eTourism experts who were not members of the databases used. However these databases were used because they were a

representative cross-section of the respondents under investigation and there were no other comprehensive listings of members of these two groups.

With regards to the analysis of the questionnaire, perhaps more sophisticated statistical techniques could have been used, however, because of the small number of responses, the data being largely categorical consisting of questions with categories which were mainly nominal and ordinal in nature and the exploratory, inductive nature of this research it was felt best to keep the analysis simple.

Moreover members of the databases that the questionnaires were distributed to were perhaps disinterested in the topic being researched therefore resulting in a lower response rate. The questionnaire length may have also discouraged respondents. The questionnaire took about 15 minutes to complete and this was mentioned at the beginning of the questionnaire. Respondents may have been unwilling to part with this amount of time to complete the questionnaire.

## **5.9 Quality of Research Design**

The hallmark of any good research design must ensure that the measurement instrument is valid, reliable and practical. To guarantee that the integrity of this research design was not compromised, several measures were adopted to ensure validity, reliability and practicality. Validity and reliability are concepts which are closely linked to quantitative research. Qualitative researchers tend to place less significance on these concepts because people's feelings and opinions are fluid and are usually shaped by external factors (Newman 2004). Validity ensures that the research instrument measures what it is suppose to whereas reliability focuses on the accuracy and precision of the measurement procedure (Bryman 2004; Agresti and Finlay 2009). Practicality refers to a variety of factors such as economy, convenience and interpretability (Cooper and Schindler 2003).

With reference to validity, there are two main types: internal and external validity. Internal validity refers to the ability of the research instrument to measure what it is supposed to measure and external validity refers to the data's ability to be

generalised across persons, settings and times (Cooper and Schlinder 2003). Internal validity can be further broken down into three main classifications of content validity, criterion-related validity and construct validity.

Content validity refers to how well the research instrument represents the entire universe of items (Salkind 2000). To ensure content validity for the online questionnaires and interviews, the following steps were taken. Firstly, the instruments were reviewed by a panel of experts. Secondly, the online questionnaires were modified in order to be sample specific and relevant to this research. Care was taken in the design of the questionnaire to clearly define the information being sought. A pilot test was then conducted to determine the suitability of the questionnaires and test for content validity, relevancy and under-representation of the research topic being studied. This pilot test also determined if the respondents understood the instructions and gauged the length of time taken to answer the questionnaires (Newman 2004).

The destination managers' questionnaire was pilot tested on members of the Destination Performance: UK; which is the membership organisation for local authority tourism services in the UK. It was felt that they would provide an ideal testing ground for this questionnaire since these members were destination managers responsible for managing destinations. Similarly for the eTourism experts, a pilot test was undertaken but this was done with eTourism experts identified by the panel of experts who scrutinised the questionnaires. Necessary changes were made until an appropriate questionnaire was achieved. Similarly, the interview was piloted on two experts also suggested by the panel of experts and necessary changes were made.

Criterion validity is concerned with how well a test estimates present performance (concurrent validity) or how well it predicts future performance (predictive validity) (Salkind 2000). Criterion must be measured in terms of relevance, freedom from bias, reliability and availability (Cooper and Schindler 2003). This study was interpretative in nature and hence estimation was not required for prediction. Construct validity examines the underlying constructs being measured and how well



the test represents them (Salkind 2000, Cooper and Schindler 2003). This was determined by the review of the questionnaires by a panel of experts and the pilot test. External validity was achieved through the sampling procedures discussed earlier. This was done to ensure that the samples were representative of the population being surveyed in order to ensure that a sound body of knowledge can be developed.

Reliability refers to whether the research instrument produces consistent results. The reliability of the research instruments were achieved through documentation from the pilot studies. Specifically with the questionnaire, reliability was maintained from the thorough design of the questions by ensuring clear conceptualisation of constructs. Levels of measures were increased for greater precision for those questions focused on measurement and using multiple indicators to measure variable. A glossary was also provided to avoid ambiguities since an unclear item is unreliable since people will respond differently to it (Salkind 2000).

Practicality refers to whether the research instrument is suitable for the research with respect to budget considerations, ease of administering and if the results can be interpreted by other persons besides the researcher. These characteristics were achieved through the review by the panel of experts and the pilot tests.

## **5.10 Research Schematic**

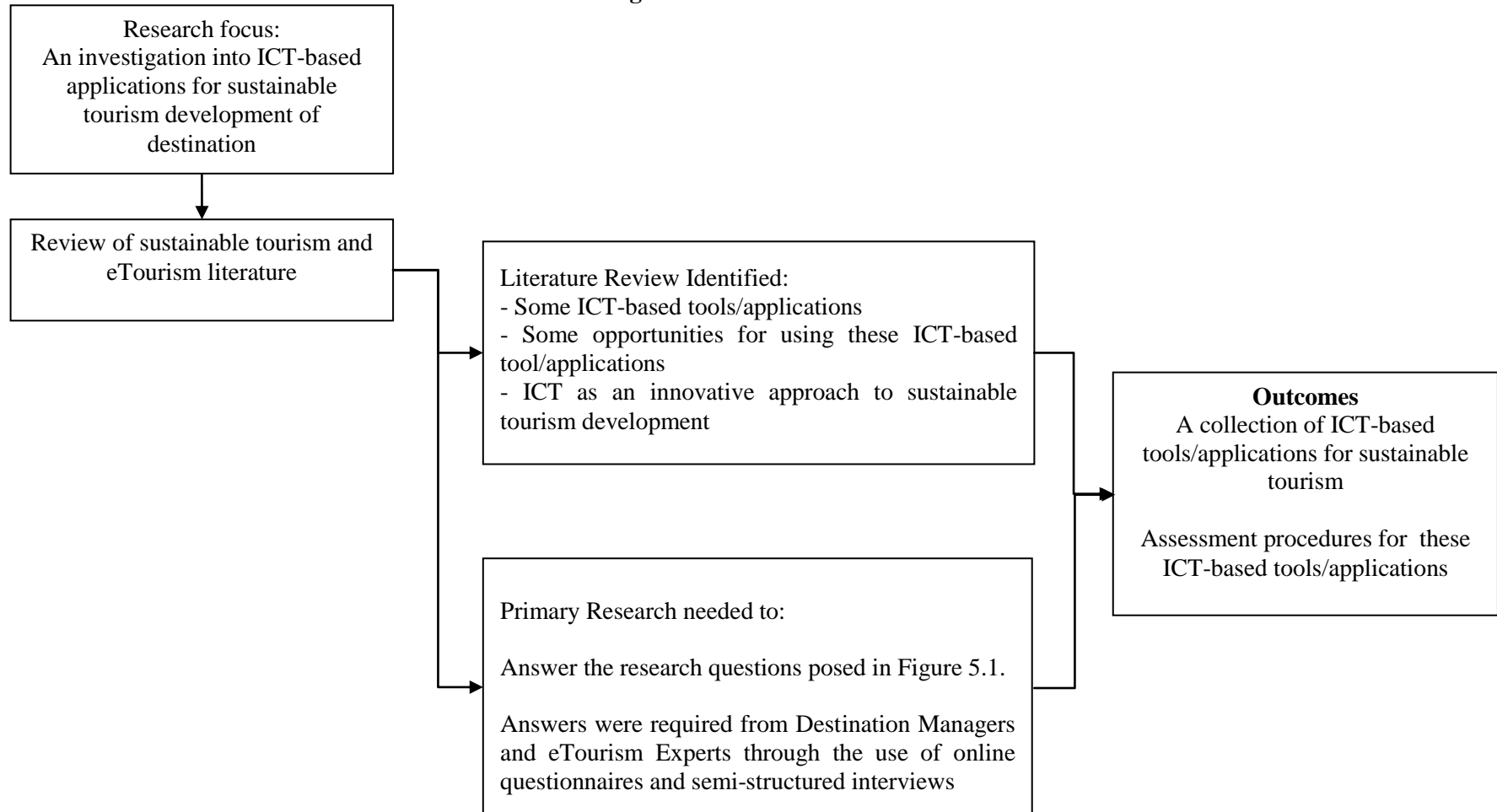
This research schematic serves as the map in identifying and outlining the steps taken in completing this research. Based on the questions posed, gaps in the literature, the type of measurement required and the methodological approach, the following schematic was developed as documented in Figure 5.2.

## **5.11 Conclusion**

This chapter has detailed the research strategy by discussing how the research domain was delineated. Based on the lack of empirical and theoretical approach, it was felt best to adopt an inductive approach aligning itself to an interpretive approach. This guided the selection of the research methods: online questionnaires

and semi-structured interviews. Reasons for selection of these were presented and justified along with measure for validity and reliability and procedures followed in the carrying out of the research design. The next chapter discusses the findings of this research and demonstrates the execution of the methodology.

**Figure 5.2:** Research Schematic



## **Chapter Six**

## **Chapter Six**

### **Findings**

#### **6.1 Introduction**

The preceding chapters examined the need for a critical investigation into the uses and applications of ICT for sustainable tourism development. This enquiry was completed during two periods of field work, as detailed in the research strategy previously discussed. This chapter focuses on presenting the results of the primary research. The findings of the online questionnaires administered to destination managers and eTourism experts will be considered first, followed by the results of the thirteen expert interviews. Analysis and interpretation of these results will be presented in Chapter seven.

#### **6.2 Findings: Destination Manager Survey**

This section presents the findings of the questionnaires distributed to destination managers. These findings are broken down into three sections: DMO characteristics, ICT usage and selection of ICT-based tools/applications for sustainable tourism development.

##### **6.2.1 DMO Characteristics**

As discussed in the methodology the person responsible for the operations of the DMO was surveyed i.e. the destination manager. This was the designation which referred to the person responsible for the management of a DMO and he/she bore titles such as Executive Director, President or Chief Executive Officer of the DMO. Most respondents fell into the age group of 31- 40 (41%). Almost one-third of respondents were aged between 41-50 (32%), whilst 14% were in the category of 21-30. The remaining respondents were 51-60. The majority of destination managers who responded were female (54%).

In Chapter one, a definition of a DMO was presented which included several categories. In the survey, DMOs aligned themselves to other categories falling outside the realm of this definition. These other groupings were namely: county,

island and coastal. The researcher felt it was necessary to include these additional categorisations in order to learn more about the types of DMOs which employed these ICT-based tools/applications for sustainable tourism. Of the thirty-seven DMOs that responded with valid data, most (20%) were local DMOs whilst the least were continental DMOs (5%) and coastal DMO (5%) as illustrated in Figure 6.1.

**Figure 6.1:** Distribution of the Types of DMOs Surveyed

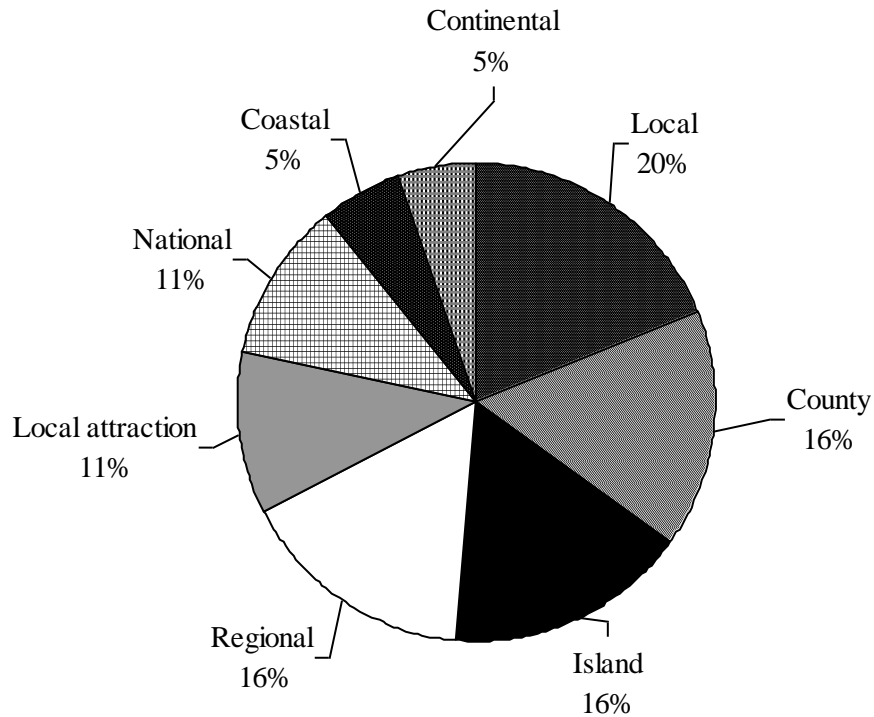
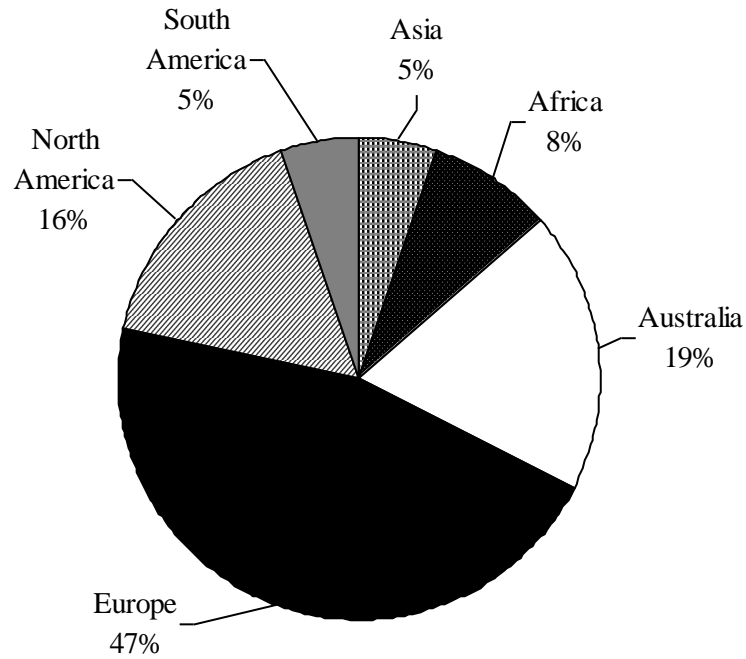


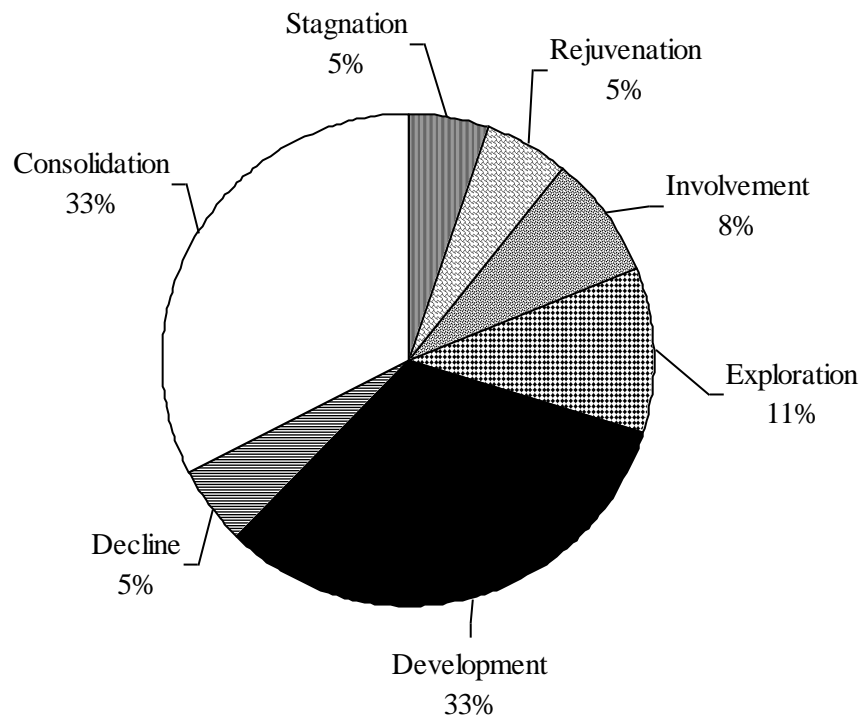
Figure 6.2 depicts the geographical dispersion of these DMOs. Just under half (47%) were located in Europe, whilst about one fifth (19%) were located in Australia and 16% in North America. Only five percent of DMOs surveyed were responsible for managing destinations in South America and Asia respectively.

**Figure 6.2:** Geographical Dispersion of DMOs Surveyed



DMOs were asked to identify their destination's stage in the tourism development process. Responses provided for this question were based on the classifications identified in Butler's (1980) Tourism Area Life Cycle of a Destination: exploration, involvement, development, consolidation, stagnation, decline and rejuvenation. This classification was used since it has been widely discussed in the literature (see Butler 2006) and destination managers are familiar with using this terminology for describing their destinations. Most destinations were in the development (33%) and consolidation (33%) stages of tourism development as depicted in Figure 6.3.

**Figure 6.3: Stage of Tourism Development**

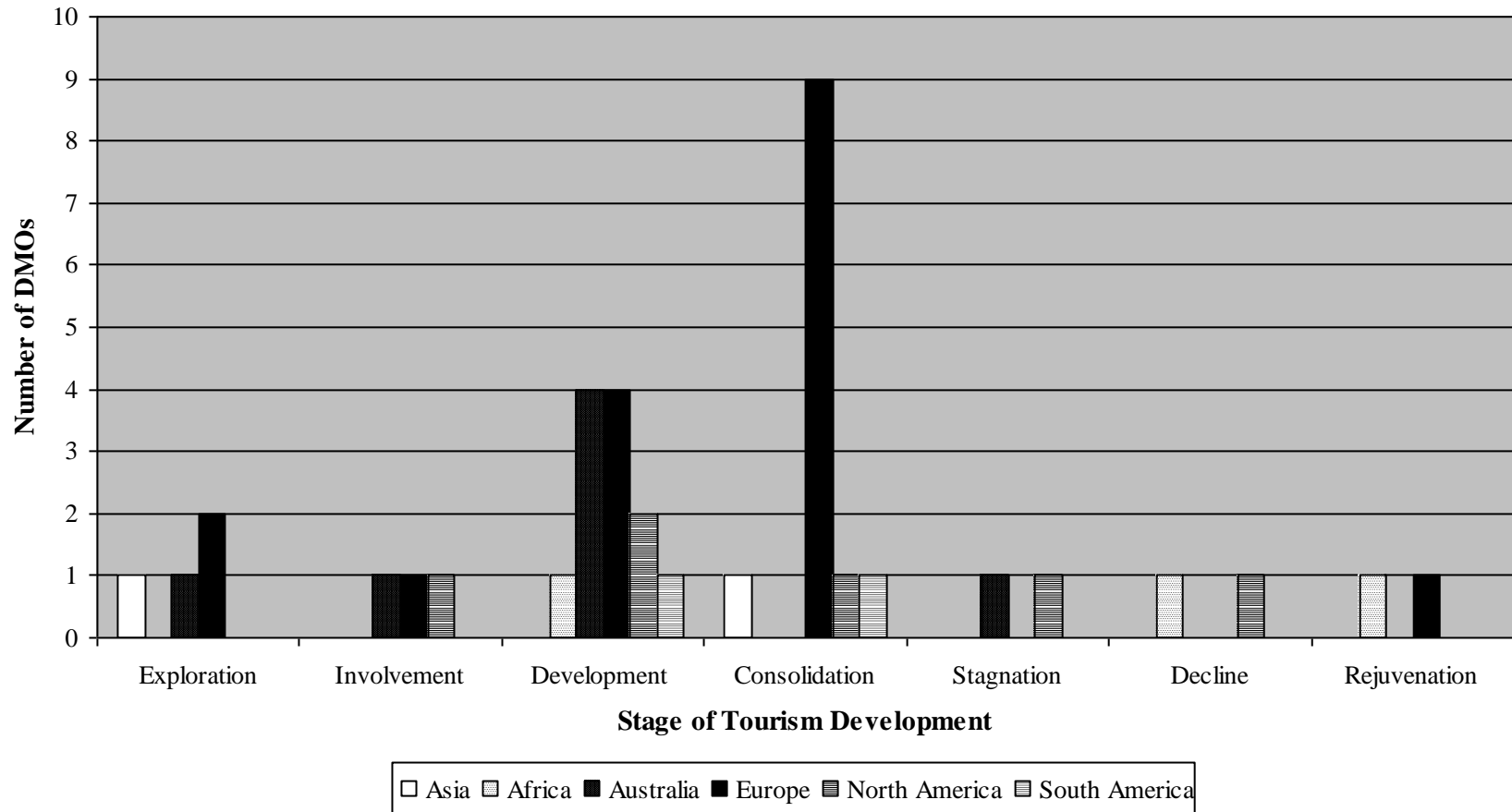


The stage of tourism development was plotted against the location of the DMOs to determine if any significant relationship existed. It was observed that most of the European destinations were in a consolidated stage of tourism development as illustrated in Figure 6.4. This may be attributed to the fact that most European destinations especially those in Western Europe have been actively involved in tourism for a long time and were more advanced in their stage of development. Moreover, most DMOs which responded were European. ANOVA one-way variance showed no significant relationship (sig. 0.784) between these variables.

Most DMOs surveyed (38%) were a department of a regional/provisional/state or local organisation as identified in the Table 6.1. Eleven percent of these DMOs operated for profit whilst 11% were a national governmental department and 5% were accountable to a national government.



**Figure 6.4: Stage of Tourism Development by Location**

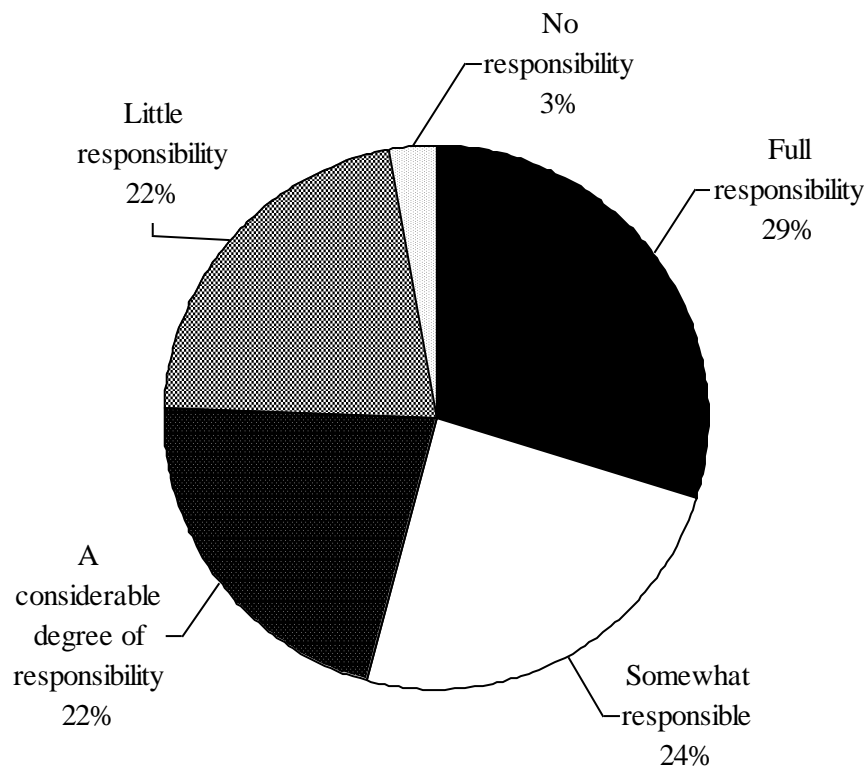


**Table 6.1:** Organisation Status of DMOs

Organisation Status	Percentage of DMOs
Department of a regional, provincial/state or local organisation	38
Not-for-profit public-private partnership	19
Profit driven company	11
National government department	11
Agency accountable to a regional, provincial/state or local government organisation	8
Not-for-profit association of tourism businesses	8
Agency accountable to a national government	5

Ninety-seven percent of DMOs identified that they had some level of responsibility for managing the sustainable tourism of their destination. Only one DMO stated that they had no responsibility. This respondent was still considered in the analysis because he/she still completed the entire survey and provided valid data on how ICT can be used for sustainable tourism. The varying levels of responsibilities are seen in Figure 6.5.

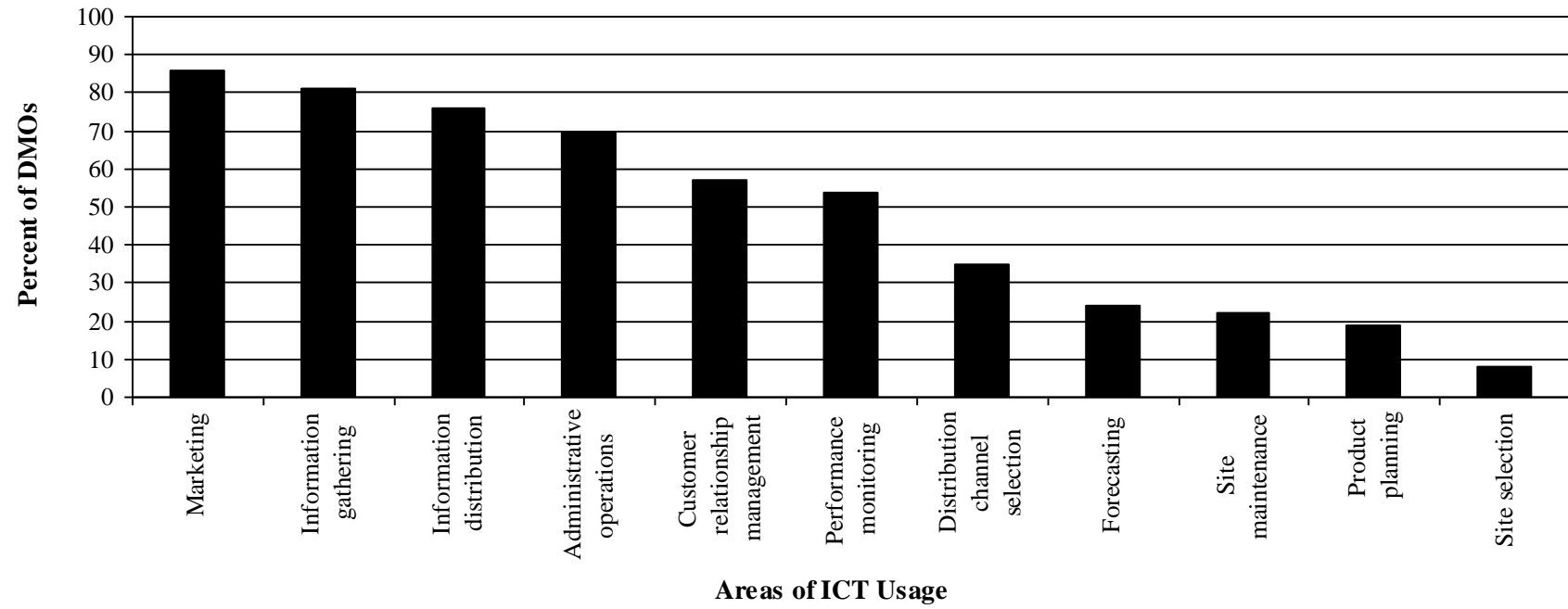
**Figure 6.5:** Extent of Sustainable Tourism a Responsibility of DMOs



### **6.2.2 ICT Usage for Sustainable Tourism**

DMOs identified that they were all using ICT to some extent in their business operations. Almost three quarters (73%) of DMOs surveyed, stated that ICT was utilised universally (32%) and to a great extent (41%) in their business operations. About one-fifth (19%) identified that ICT was somewhat used in their business operations whilst about one tenth (8%) used it very little. DMOs used ICT mainly for marketing, information gathering, information distribution, administrative operations and customer relationship management. ICT was used to a lesser extent for performance monitoring, distribution channel selection, forecasting, site maintenance, product planning and site selection as seen in Figure 6.6 overleaf.

**Figure 6.6:** Areas of ICT usage by DMOs



The specific type of ICT-based tools/applications used for these areas are portrayed in the Table 6.2.

**Table 6.2:** Uses of ICT by DMOs

<b>Area of ICT Usage</b>	<b>Type of ICT-based Tools/Applications Used</b>
Marketing	<ul style="list-style-type: none"> <li>• Destination Management System</li> <li>• Destination Website</li> <li>• E-mail</li> <li>• eNewsletters</li> <li>• Online surveys</li> <li>• Website optimisation tools</li> </ul>
Information Gathering	<ul style="list-style-type: none"> <li>• Databases</li> <li>• Destination Management System</li> <li>• Destination Website</li> <li>• E-mail</li> <li>• Online surveys</li> <li>• Social networks</li> </ul>
Information Distribution	<ul style="list-style-type: none"> <li>• Destination Management System</li> <li>• Destination Website</li> <li>• E-mail</li> <li>• Social networks</li> </ul>
Administrative Operations	<ul style="list-style-type: none"> <li>• Database</li> <li>• Destination Management System</li> <li>• E-mail</li> <li>• Internet</li> </ul>
Customer Relationship Management	<ul style="list-style-type: none"> <li>• Database maintenance</li> <li>• Destination Management System for target marketing to customers</li> <li>• Destination Website</li> <li>• E-mail</li> <li>• eNewsletters</li> <li>• Examining server log files</li> <li>• Profiling of customers and using one-to-one marketing</li> </ul>
Performance Monitoring	<ul style="list-style-type: none"> <li>• Destination Management System</li> <li>• Google analytics to evaluate Website performance</li> <li>• Online surveys</li> <li>• Internet</li> </ul>
Distribution Channel Selection	<ul style="list-style-type: none"> <li>• Destination Management System</li> <li>• Destination Website</li> <li>• eNewsletters</li> <li>• Evaluate Website performance</li> <li>• Internet</li> <li>• Partnering with online travel information and agency sites</li> <li>• Social networks</li> <li>• Website optimisation tools</li> </ul>
Forecasting	<ul style="list-style-type: none"> <li>• Database maintenance</li> </ul>

**Table 6.2 (continued): Uses of ICT by DMOs**

Area of ICT Usage	Type of ICT-based Tools/Applications Used
Site Maintenance	<ul style="list-style-type: none"> <li>• Content management systems to maintain a profile of Websites and Intranets</li> <li>• Destination Management System</li> </ul>
Product Planning	<ul style="list-style-type: none"> <li>• eNewsletters</li> <li>• Internet</li> <li>• Social networks</li> </ul>
Site Selection	<ul style="list-style-type: none"> <li>• Internet search using application such as Google Earth</li> <li>• Self developed site administration software</li> </ul>

From the above, most of the uses of ICT by DMOs were Internet-based since they were using the Internet for such activities as e-mail, Website development, online surveys, social networking sites and eNewsletters. DMS was identified as the main ICT-based tool/application used by DMOs for managing most of their operations. It was used for all of the areas identified above except site selection, product planning and forecasting.

The researcher attempted to determine if any relationship existed between the stage of tourism development and the level of ICT usage. Table 6.3 demonstrates that most destinations in the development stage used ICT to a great extent whilst a large amount in the consolidation stage used it universally. ANOVA test revealed no statistically significant relationship between these two variables (sigf. 0.359).

**Table 6.3: Stage of Tourism Development and ICT usage**

Stage of Tourism Development	Extent of ICT use in Business Operations (Percent)			
	Universally	To a great extent	Somewhat	Very little
Exploration	8	0	3	0
Involvement	3	3	0	3
Development	3	<b>19</b>	5	5
Consolidation	<b>16</b>	11	5	0
Stagnation	3	3	0	0
Decline	0	3	3	0
Rejuvenation	0	3	3	0

With regards to managing sustainable tourism, almost half (46%) of DMOs indicated that ICT was used somewhat, whilst a little over a quarter (27%) stated that is was

used very little. Five percent of DMOs identified that ICT was used universally for sustainable tourism whilst 11% stated it was not used at all. Table 6.4 illustrates a comparative analysis with ICT usage in business operations and ICT usage for sustainable tourism. Despite 32% of DMOs using ICT universally, only 5% of the DMOs were using it universally for sustainable tourism. Most DMOs (46%) stated that they used ICT somewhat for managing sustainable tourism, whilst a little over a quarter (27%) stated that they used it very little and 11% did not use any ICT usage for sustainable tourism.

**Table 6.4:** ICT usage in Business Operations versus Sustainable Tourism

	<b>Extent ICT used in Business Operations (Percent)</b>	<b>Extent ICT used for Sustainable Tourism (Percent)</b>
<b>Universally</b>	32	5
<b>To a great extent</b>	41	11
<b>Somewhat</b>	19	46
<b>Very little</b>	8	27
<b>Not at all</b>	0	11

Attempts were made to determine if there was any significant relationship between the stage of tourism development and the extent ICT was used to manage sustainable tourism development. ANOVA test revealed no statistically significant relationship (sigf. 0.870).

Table 6.5 shows that destinations in the development and consolidation stages used ICT somewhat for managing sustainable tourism development. About one quarter (24%) of DMOs strongly agreed that ICT has led to the better management of their destination whilst just under half (46%) agreed with this statement. It is interesting to note that about one quarter (24%) was undecided if ICT did lead to the better management of their destination. Perhaps the use of ICT is relatively new and therefore they have not yet realised the benefits of ICT application to sustainable tourism development. Only one DMO stated that they disagreed with this statement and one strongly disagreed.

**Table 6.5:** Stage of Tourism Development and Extent ICT is used to Manage Sustainable Tourism

Stage of Tourism Development	Extent of ICT used to Manage Sustainable Tourism (Percent)				
	Universally	To a great extent	Somewhat	Very little	Not at all
Exploration	3	0	5	0	3
Involvement	0	0	3	5	0
Development	0	3	<b>19</b>	11	0
Consolidation	3	3	<b>19</b>	5	3
Stagnation	0	0	0	3	3
Decline	0	5	0	0	0
Rejuvenation	0	0	0	3	3

Besides using ICT, DMOs were asked to indicate what other methods they used for managing sustainable tourism. The main method used for the current management of the sustainability by DMOs was marketing, being used by almost two-thirds of the DMOs surveyed (62%). Forty-three percent used visitor management techniques and 41% used awards. The least used methods for managing sustainable tourism were taxes (3%), de-marketing (5%) and carrying capacity techniques (11%) as evidenced in Table 6.6.

Moreover, the researcher wanted to discern what areas of sustainable tourism development were of most concern to destinations. This information was sought to draw linkages with the opportunities for using ICT for sustainable tourism which were identified in the literature. In 2004, the United Nations World Tourism Organisation identified baseline indicators for sustainable tourism development. Using this as a guide, DMOs were asked to rank the areas of sustainable tourism that were of most concern. The top three ranked areas were tourist satisfaction, economic benefits and the effects of tourism on host communities. This was followed by tourist seasonality, local satisfaction, development control, energy management, controlling use intensity and water availability and consumption. The least important areas identified were solid waste management, wastewater management and drinking water quality. Outside of this ranking, DMOs identified climate change, lack of skilled staff, education, behaviour and accountability of tourists, traffic management



and habitat protection as other areas of concern for the sustainable tourism development of their destination.

**Table 6.6:** Current Tools used for Managing Sustainable Tourism by DMOs

<b>Tools for Managing Sustainable Tourism</b>	<b>Number of DMOs (Percent)</b>
Marketing	62
Visitor Management Techniques	43
Awards	41
Tourist Education	30
Legislation, regulation or licensing	27
Codes of conduct	27
Certification	24
Eco-labelling	19
Sustainability indicators and monitoring	16
Environmental impact assessment	14
Fiscal incentives	11
Carrying capacity techniques	11
De-marketing	5
Taxes	3

### 6.2.3 Selection of ICT-based Tools/Applications

Table 6.7 identified the ICT-based tools/applications DMOs currently utilise and what they value as the current and potential uses of these ICT-based tools/applications for sustainable tourism. The Internet (65%) was identified as the most used tool for sustainable tourism development. This was included in the questionnaire as an ICT-based tool/application. However after further reading and reflection, the researcher felt that the Internet could not be classified as an ICT-based tool/application since this was the *platform* on which these ICT-based tools/applications were based and was henceforth removed from the analysis. eRating system was also removed since after further analysis this was found to be an extension of the functions of a DMS. From this point forward both the Internet and eRating system will be removed from the results and analysis of this research. A little over half (54%) stated that they used a DMS whilst just under half (43%) indicated that they used a Tourism Information System. The least used tools were Carbon Calculator, Weather, Climate and Ocean Change Forecasting Software and Intelligent Transport System.

**Table 6.7:** DMO use of ICT for Sustainable Tourism

ICT-based Tools/Applications	DMOs (Percent)	Current Uses	Potential Uses
Destination Management System	54	<ul style="list-style-type: none"> <li>• Information management</li> <li>• Marketing</li> <li>• Promotion</li> <li>• Bookings</li> <li>• Website</li> <li>• Monitoring</li> <li>• Provide visitor to information</li> <li>• Reduce print material</li> <li>• Manage accommodation and attraction providers</li> </ul>	<ul style="list-style-type: none"> <li>• Ticketing of events and attractions</li> <li>• monitoring of different aspects of the destination</li> <li>• Tourist education</li> <li>• Community awareness and participation</li> <li>• Stakeholder co-operation</li> </ul>
Tourist Information System	43	<ul style="list-style-type: none"> <li>• Information management</li> <li>• Managing tourist flows</li> <li>• Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring data and statistics for informed decision making</li> </ul>
Geographical Information System	27	<ul style="list-style-type: none"> <li>• Geographical data on tourist maps</li> <li>• Profile of visitors to the region</li> <li>• Development control system</li> <li>• Mapping visitor location</li> </ul>	<ul style="list-style-type: none"> <li>• Location identification</li> <li>• Management of the entire tourism industry</li> </ul>
Economic Impact Analysis Software	19	<ul style="list-style-type: none"> <li>• Economic impact modelling</li> </ul>	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>
Virtual Tourism	19	<ul style="list-style-type: none"> <li>• Identify sites</li> <li>• Information gathering</li> <li>• Learn about tourists habits</li> <li>• Limited use by some attractions of on-line guided tours</li> </ul>	<ul style="list-style-type: none"> <li>• Tourist education</li> <li>• Change behaviour</li> <li>• Lead to new tourists at the destination from the virtual experience</li> </ul>

**Table 6.7 (continued):** DMO use of ICT for Sustainable Tourism

ICT-based Tools/Applications	DMOs (Percent)	Current Uses	Potential Uses
Community Informatics	19	<ul style="list-style-type: none"> <li>• Community websites</li> <li>• Information distribution to the community</li> </ul>	<ul style="list-style-type: none"> <li>• Getting the community fully involved in the tourism decision making process and Transforming how sustainable tourism is managed</li> <li>• Monitoring</li> </ul>
Environment Management Information System	11	<ul style="list-style-type: none"> <li>• Management of environmental issues</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring</li> <li>• Transforms how waste and energy is monitored and managed at the destination</li> <li>• A new approach to managing sustainable tourism</li> </ul>
Global Positioning System	11	<ul style="list-style-type: none"> <li>• Mapping</li> </ul>	<ul style="list-style-type: none"> <li>• Tourist education and behaviour</li> <li>• Safety and security</li> </ul>
Computer Simulation	5	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>
Location Based Services	5	<ul style="list-style-type: none"> <li>• Identify sites</li> <li>• Information gathering</li> <li>• Information provision</li> </ul>	<ul style="list-style-type: none"> <li>• Tourist education</li> <li>• Tourist behaviour</li> <li>• Reduction of printed material</li> <li>• Personal marketing</li> <li>• Using technology creatively to attract and retain the customer</li> <li>• Create new businesses with LBS partnerships</li> </ul>

**Table 6.7 (continued): DMO use of ICT for Sustainable Tourism**

ICT-based Tools/Applications	DMOs (Percent)	Current Uses	Potential Uses
Intelligent Transport System	5	<ul style="list-style-type: none"> <li>• Providing real time transport information such as by bus stops</li> <li>• Measures to manage and control traffic</li> </ul>	<ul style="list-style-type: none"> <li>• Destination transport</li> <li>• Satisfaction</li> <li>• Energy reduction</li> </ul>
Weather, Climate and Ocean Change Forecasting Software	5	<ul style="list-style-type: none"> <li>• Weather reports</li> </ul>	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>
Carbon Calculator	3	<ul style="list-style-type: none"> <li>• Monitor the destination consumption of carbon dioxide</li> </ul>	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>

DMOs were asked to rank the importance of these tools for sustainable tourism development as seen in Table 6.8. Just under half (45%) of DMOs indicated that ICT will be very important in the future management of sustainable tourism whilst 41% indicated that it would be important. Eight percent of DMOs felt it would be moderately important, 3% felt it would be of little importance whilst similarly, 3% felt it would be unimportant.

DMS was ranked as the most important tool, followed by Intelligent Transport System and Tourism Information System. Computer Simulation and Weather, Climate and Ocean Change Forecasting Software and Virtual Tourism were identified as the least important tools by DMOs.

**Table 6.8:** Ranking of ICT-based Tools/Applications for Sustainable Tourism

<b>Ranking</b>	<b>ICT-based tools/applications</b>
1	Destination management system
2	Intelligent transport system
3	Tourism information system
4	Environment management information system
5	Location based services
6	Global positioning system
7	Geographical information system
8	Community informatics
9	Economic impact analysis software
10	Carbon calculators
11	Virtual tourism
12	Weather, climate and ocean change forecasting software
13	Computer simulation

With regards to the opportunities that exist in destination management for using ICT, DMOs ranked information management as the area where ICT will be most useful for sustainable tourism development. Tourist satisfaction was ranked the second most useful area followed by transport, sustainable consumption and enabling partnerships. The least important areas identified by DMOs were community participation, energy consumption and interpretation. Outside of this ranking, climate change was identified as another area of concern.

Table 6.9 highlights that DMS and Tourism Information System were used by all levels of DMOs. Geographical Information System was used by all DMOs except by Local DMOs. The majority of tools were used by Island and Local Attraction DMOs (9 ICT-based tools/applications each). There was also wide usage of tools by Regional (7 ICT-based tools/applications), County (7 ICT-based tools/applications), Coastal (6 ICT-based tools/applications), Local (5 ICT-based tools/applications) and National DMOs (5 ICT-based tools/applications). The least usage of these tools was by Continental Tourism Organisations (3 ICT-based tools/applications).

**Table 6.9:** Current Use of ICT-based Tools/Applications by DMOs

Type of DMO	Current usage of ICT-based Tools/Applications (Percent)												
	CC	CI	CS	DMS	EIAS	EMIS	GIS	GPS	ITS	LBS	TIS	VT	WOCFCFS
Continental							3				3		
National		3		5		3	3				8		
Regional	3			11		3	5	3			3		3
Island			5	5	3	3	8	5		3	5	3	
County				11	3	3	3		5		8	3	
Local		5		11	5						8	5	
Coastal		3		5			3	3			5		3
Local attraction		3		3	3		3	11		1	3	3	3

CC Carbon Calculator

CI Community Informatics

CS Computer Simulation

DMS Destination Management System

EIAS Economic Impact Analysis Software

EMIS Environment Management Information System

GIS Geographical Information System

GPS Global Positioning System

ITS Intelligent Transport System

LBS Location Based Services

TIS Tourism Information System

VT Virtual Tourism

WOCFCFS Weather, Climate and Ocean Change Forecasting Software

DMOs identified government advice, funding and following the lead of other destinations as the main reasons for selection of these tools for their destinations. Other reasons identified for choosing these tools were: destination manager's knowledge and awareness of the tools from research, keeping up with advances in technology and that the ICT-based tools/applications were the most effective means of accomplishing the goals of their destination.

Table 6.10 identifies the factors that DMOs considered to be critical success factors and barriers for the uptake of ICT for sustainable tourism. As one person critical success factor is another's barrier, several of the critical success factors identified were the same as the barriers. These are identified in the area with the dotted line.

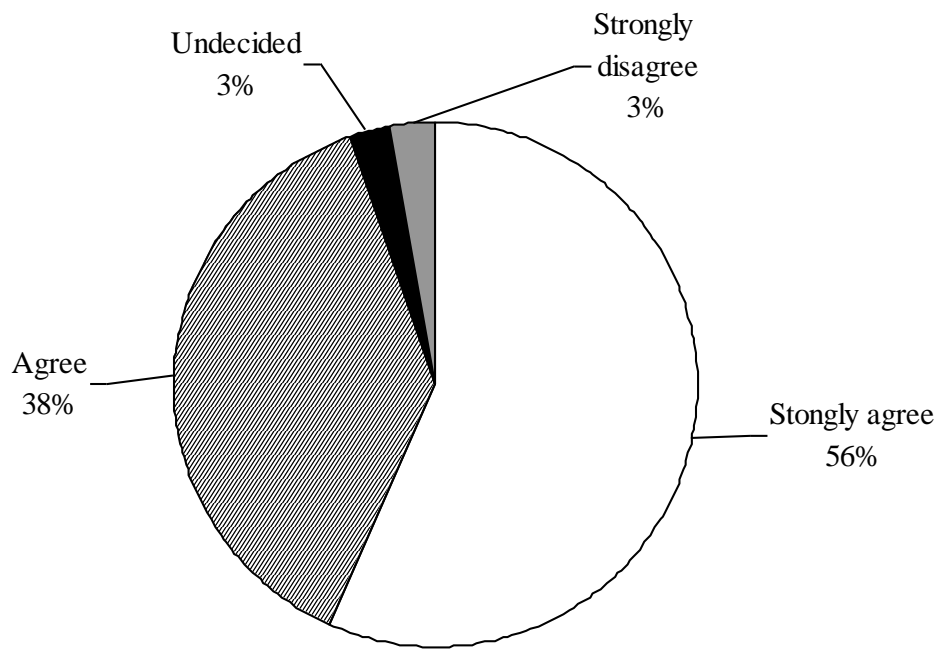
**Table 6.10:** Critical Success Factors and Barriers for the Uptake of ICT for Sustainable Tourism Development by DMOs

Critical Success Factors	Barriers
Finance	
Knowledge and understanding of the ICT-based tools/applications	
Stakeholder buy-in and co-operation by decision makers	
Accurate interpretation of the data	
Production of timely results	
Ease of availability of the tools and expertise	Employee training and staff resistance
Popularity of the tools	Rapid technological change that makes interim solutions redundant too quickly
Measureable outputs were produced which can be easily interpreted	Government support

The majority of DMOs (56%) surveyed strongly agreed that ICT is an innovative approach to sustainable tourism with more than one third (38%) agreeing with this. Only one DMO strongly disagreed while one was undecided as seen in Figure 6.7.



**Figure 6.7:** ICT an Innovative Approach to Sustainable Tourism Development



DMOs were asked to envisage how ICT would be used for their destinations. They visualised that it would be used for increased marketing and better management of the destination through developing networks and partnerships. It would also be used for improved waste management, energy monitoring, information comparison and integration and fostering better decision-making. It was felt that key information would be more readily available. Using ICT for sustainable tourism will also lead to better communication with the visitor, the host community and tourism businesses at the destination. This will help the diversified stakeholders understand their responsibility in the sustainable tourism process and make them more aware of appropriate and ethical behaviours.

One DMO described that ICT usage will lead to managing the entire destination in a network of actors and stakeholder whereby various employees would have access to these applications. This destination manager envisioned this as a dashboard where they can type various requests and queries can be entered.

### 6.3 Findings: eTourism Experts Survey

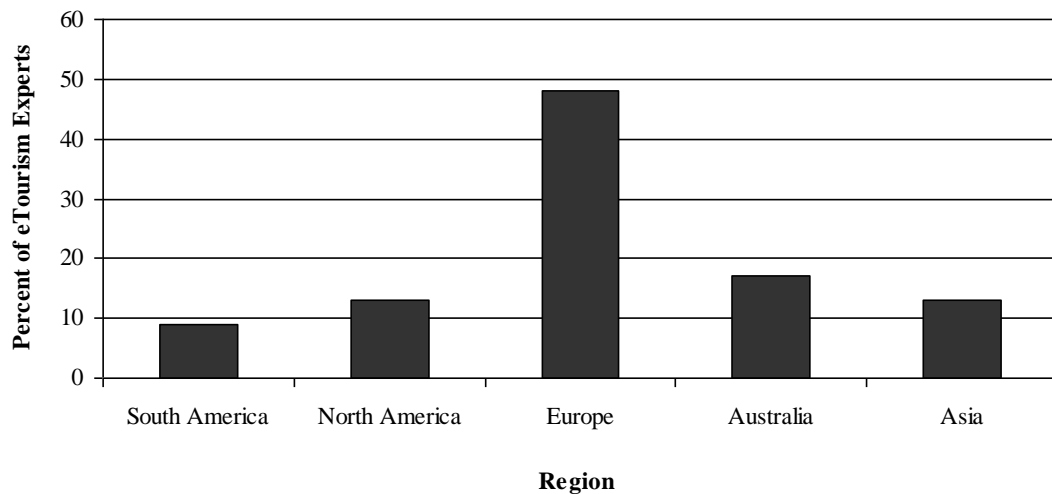
The findings of the eTourism experts survey are presented in this section. These results are broken down into three parts: eTourism experts demographics, ICT and sustainable tourism and selection of ICT-based tools/applications.

#### 6.3.1 Demographics

Of the eTourism experts surveyed, almost two-thirds (65%) were male whilst approximately one third was female (35%). Over half of these eTourism experts were in the age group 31-40 (52%), one fifth were in the grouping of 41-50 (22%) and the remaining were in the category 51-60 (13%) and 21-30 (13%) respectively.

Figure 6.8 illustrates the geographic location of the eTourism experts. Almost half (48%) were located in Europe. About one-sixth (17%) was located in Australia whilst 13% were each situated in North America and Asia and the remaining were based in South America.

**Figure 6.8:** Geographic Location of eTourism Experts

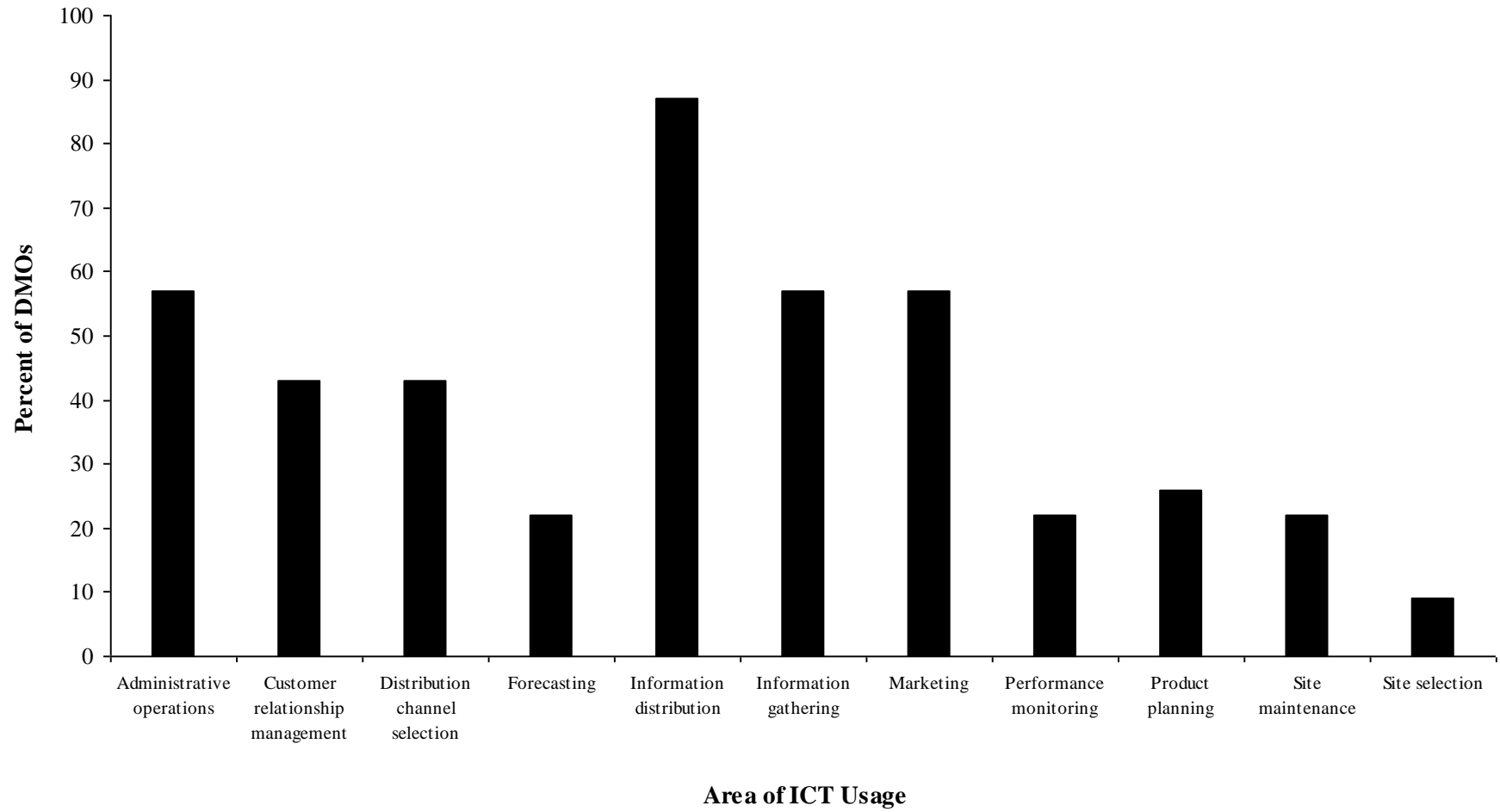


#### 6.3.2 ICT and Sustainable Tourism

According to these eTourism experts, ICT was used mainly in the areas of marketing and information distribution by DMOs as evidenced in Figure 6.9. These are existing ICT-intensive use areas by DMOs (Buhalis and Law 2008). The main ICT-

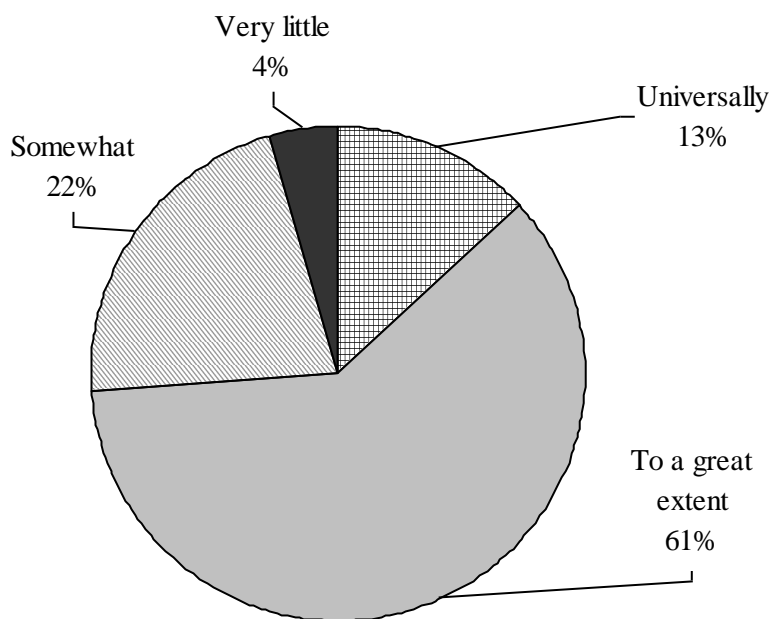
based tools/applications in these areas were Websites, e-mail and a DMS. Other Internet-based applications that were used were blogs, online review and eAuctions. Only one eTourism expert surveyed identified Geographical Information System being used by DMOs for site selection.

**Figure 6.9:** Areas ICT used for by DMOs



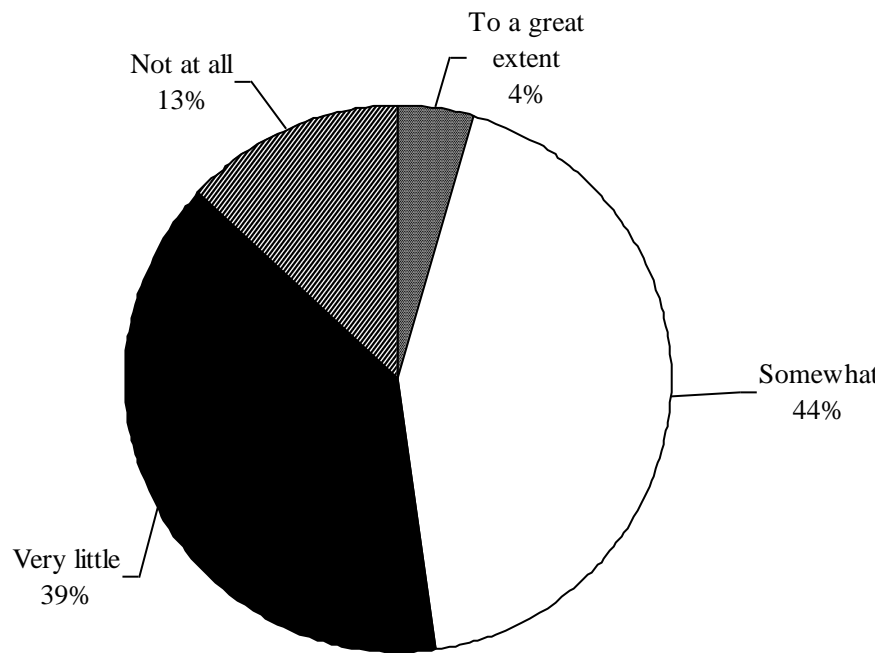
Almost two-thirds of eTourism experts surveyed (61%) stated that ICT can be used to a great extent for sustainable tourism by DMOs. All experts surveyed stated that ICT can be used to some extent with none of these experts identifying that it cannot be used at all as seen in Figure 6.10.

**Figure 6.10:** ICT can be used for Sustainable Tourism



Despite over two-thirds of eTourism experts attributing that ICT can be used for sustainable tourism, in actuality, only 4% of the eTourism experts stated that ICT is being currently used to a great extent for sustainable tourism. Just under half (44%) identified that ICT is being somewhat used for sustainable tourism as depicted in Figure 6.11. None of these eTourism experts stated that ICT is being used universally by DMOs for sustainable tourism.

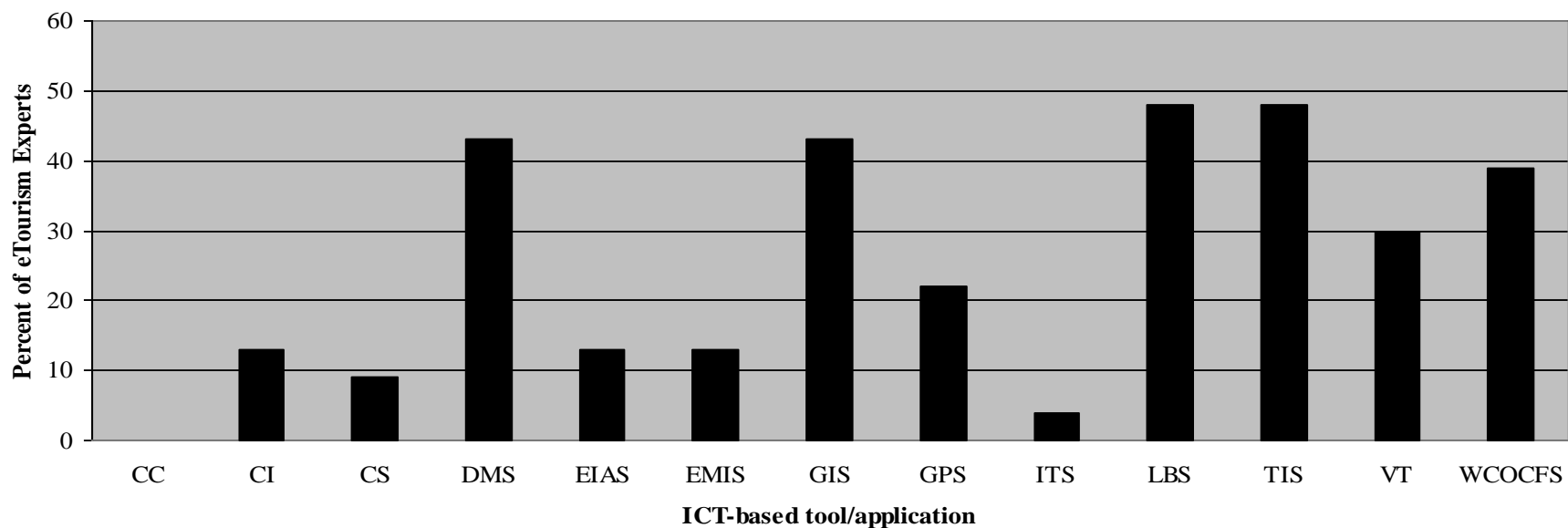
**Figure 6.11: ICT Current use for Sustainable Tourism by DMOs**



### **6.3.3 Selection of ICT-based Tools/Applications**

eTourism experts were asked to identify which ICT-based tools/applications they felt DMOs were using to manage the sustainable tourism of their destination. They revealed that Location Based Services was the most widely used tool, followed by Tourism Information System and Geographical Information System, as seen in the Figure 6.12. They did not see any use of Carbon Calculator at the destination.

**Figure 6.12: eTourism Expert Identification of Current Uses of ICT-based Tools/Applications by Destinations**



CC	Carbon Calculator	GPS	Global Positioning System
CI	Community Informatics	ITS	Intelligent Transport System
CS	Computer Simulation	LBS	Location Based Services
DMS	Destination Management System	TIS	Tourism Information System
EIAS	Economic Impact Analysis Software	VT	Virtual Tourism
EMIS	Environment Management Information System	WCOCFs	Weather, Climate and Ocean Change Forecasting Software
GIS	Geographical Information System		

Table 6.11 presents a description by eTourism experts of the current and potential uses of these ICT-based tools/applications for sustainable tourism by DMOs.

**Table 6.11:** Current and Potential uses of ICT-based Tools/Applications

<b>Type of ICT-based tools/applications</b>	<b>Current Uses</b>	<b>Potential Uses</b>
Carbon Calculator	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>	<ul style="list-style-type: none"> <li>• Incorporation into travel planning</li> </ul>
Community Informatics	<ul style="list-style-type: none"> <li>• Providing a greater exchange of information with the community</li> </ul>	<ul style="list-style-type: none"> <li>• Brings together communities to discuss about resources</li> <li>• Greater stakeholder co-operation</li> <li>• Allowing decisions made to be more sustainable since the community will have a voice on how the destination is managed</li> </ul>
Computer Simulation	<ul style="list-style-type: none"> <li>• Information distribution</li> <li>• Scenario modelling</li> </ul>	<ul style="list-style-type: none"> <li>• Scenario modelling</li> <li>• Risk management</li> <li>• Simulating the destination experience</li> <li>• Tourist education</li> <li>• Aiding with indicator development and monitoring</li> </ul>
Destination Management System	<ul style="list-style-type: none"> <li>• Managing resources</li> <li>• Raising awareness</li> <li>• Forming a sustainable culture</li> <li>• Information distribution</li> <li>• Distribution of resources</li> <li>• Destination marketing</li> </ul>	<ul style="list-style-type: none"> <li>• Support of small businesses at the destination</li> <li>• Information distribution</li> <li>• Identify sensitive resources</li> <li>• Providing the opportunity for tourist to use an online forum to combine the products they want at the destination in a one-stop shop</li> <li>• Tourist awareness and education</li> </ul>



**Table 6.11 (continued):** Current and Potential uses of ICT-based Tools/Applications

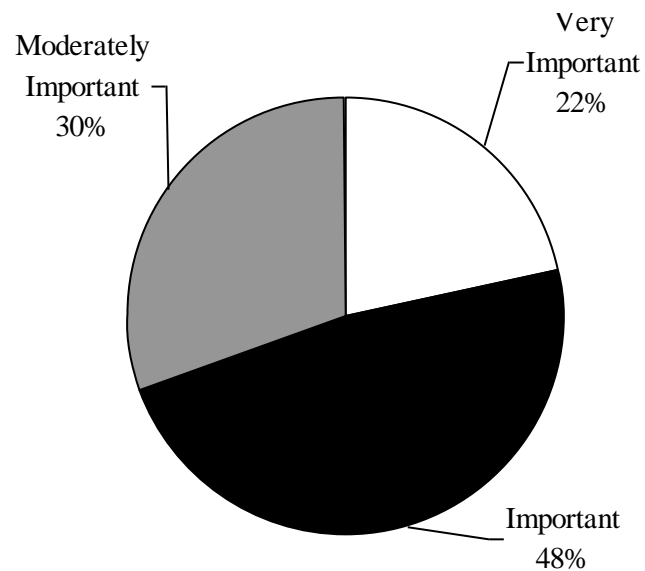
Type of ICT-based tools/applications	Current Uses	Potential Uses
Economic Impact Analysis Software	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>	<ul style="list-style-type: none"> <li>• No uses identified</li> </ul>
Environmental Management Information System	<ul style="list-style-type: none"> <li>• Tourist education</li> </ul>	<ul style="list-style-type: none"> <li>• Resource management</li> <li>• Overall sustainable tourism management of the destination</li> </ul>
Geographical Information System	<ul style="list-style-type: none"> <li>• Planning in restricted areas</li> <li>• Provision of location-dependent information</li> <li>• Linking tourism with geographic information for better management</li> </ul>	<ul style="list-style-type: none"> <li>• Area planning</li> <li>• Transportation planning</li> <li>• Use for product analysis</li> <li>• Product development planning</li> <li>• Identify and manage resources</li> <li>• Mapping patterns of visitors flows</li> <li>• Site identification</li> <li>• Route identification</li> <li>• Inventory of attractions</li> <li>• Greater stakeholder co-operation for provision of data</li> <li>• Might lead to new businesses for the collection of statistics for use in this system</li> </ul>
Global Positioning System	<ul style="list-style-type: none"> <li>• Tracking tourist movement</li> <li>• Reducing printed material</li> <li>• Location identification</li> </ul>	<ul style="list-style-type: none"> <li>• Adds value to the destination products</li> <li>• Safety and security</li> </ul>
Intelligent Transport System	<ul style="list-style-type: none"> <li>• Reduces energy consumption</li> <li>• Information distribution</li> <li>• Location identification</li> </ul>	<ul style="list-style-type: none"> <li>• Route management according to environmental impacts</li> <li>• Energy management</li> </ul>

**Table 6.11 (continued):** Current and Potential uses of ICT-based Tools/Applications

Type of ICT-based tools/applications	Current Uses	Potential Uses
Location Based Services	<ul style="list-style-type: none"> <li>• Providing location-based information about nature</li> <li>• Preservation and facilitating the tourists in making sustainable choices</li> <li>• Providing services that may be of interest to consumers.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide information about destinations</li> <li>• Events</li> <li>• Attractions for stimulation of longer stays in the destinations and increased spending</li> <li>• Identify and manage the destination resources</li> <li>• Adds value to the destination products</li> <li>• Pervasive computing</li> <li>• Greater stakeholder interaction</li> <li>• Aids in the already existing methods for sustainable tourism development such as marketing and de-marketing</li> </ul>
Tourism Information System	<ul style="list-style-type: none"> <li>• Information provision</li> <li>• Information distribution</li> <li>• Resource management</li> <li>• To avoid paper printing</li> </ul>	<ul style="list-style-type: none"> <li>• Information distribution</li> <li>• Identification of sensitive resources</li> <li>• Monitoring of tourist behaviour regarding sustainable consumption</li> <li>• More stakeholder co-operation for data provision</li> <li>• Might lead to new businesses for the collection of statistics for use in this system</li> </ul>
Virtual Tourism	<ul style="list-style-type: none"> <li>• Information distribution</li> <li>• Tourist education and behaviour</li> <li>• Tourist experience</li> <li>• Identify sensitive resources</li> <li>• Simulating the destination experience</li> </ul>	<ul style="list-style-type: none"> <li>• Tourist education and behaviour</li> <li>• Distribute information</li> <li>• Development of a virtual market for tourism products</li> </ul>
Weather, Climate and Ocean Change Forecasting Software	<ul style="list-style-type: none"> <li>• To avoid accident</li> <li>• Information distribution</li> <li>• Managing the destination</li> </ul>	<ul style="list-style-type: none"> <li>• Forecasting of weather for better co-ordination</li> </ul>

All eTourism experts surveyed agreed to some level of importance for the use of ICT for sustainable tourism as seen in Figure 6.13. None of the experts stated that these tools were of little importance or unimportant.

**Figure 6.13:** Importance of ICT for Sustainable Tourism



Not only were eTourism experts asked to comment on the overall importance of ICT for sustainable tourism development but they were also asked to rate the importance of each of these ICT-based tools/applications. Geographical Information System was identified as the most important tool with Carbon Calculator being identified as least important as seen in Table 6.12.

**Table 6.12:** eTourism Experts Ranking of the Importance of ICT-based Tools/Applications for Sustainable Tourism Development

<b>ICT-based Tools/Applications</b>	<b>Ranking</b>
Geographical information system	1
Global positioning system	2
Location based services	3
Tourism information system	4
Destination management system	5
Environmental management information system	6
Intelligent transport system	7
Weather climate and ocean change forecasting software	8
Virtual tourism	9
Economic impact analysis software	10
Community informatics	11
Computer simulation	12
Carbon calculator	13

With regards to the types of DMOs that would use these ICT-based tools/applications, Geographical Information System, Tourism Information System, Destination Management System, Environment Management Information System and Intelligent Transport System were identified as being used mostly by Regional Tourism Organisations. Computer Simulation, Economic Impact Analysis Software, Carbon Calculator and Weather, Climate and Ocean Change Forecasting Software were seen to be implemented mainly by National Tourist Organisations. Virtual Tourism and Global Positioning System were linked to Island Tourism Organisations whilst Location Based Services, Virtual Tourism and Community Informatics were deemed to have more uses by City Tourism Organisations as seen in Table 6.13.

**Table 6.13:** Type of ICT-based Tools/Applications most likely to be used by DMOs

Type of DMO	Type of ICT-based tools/applications most likely to be used (Percent)												
	CC	CI	CS	DMS	EIAS	EMIS	GIS	GPS	ITS	LBS	TIS	VT	WCOCFS
Continental	39	22	43	43	39	39	48	43	17	26	43	30	52
National	<b>65</b>	39	<b>74</b>	70	<b>78</b>	65	65	70	61	48	61	48	<b>78</b>
Regional	52	57	48	<b>87</b>	65	<b>78</b>	<b>87</b>	70	<b>65</b>	65	<b>78</b>	43	61
Island	39	52	35	65	43	65	52	<b>74</b>	35	57	57	<b>57</b>	61
City	43	<b>78</b>	39	74	52	48	61	70	61	<b>83</b>	65	<b>57</b>	65
County	39	65	30	65	43	39	48	61	48	61	52	48	65
Ski	30	43	35	57	22	30	57	61	30	57	52	43	61
Coastal	30	39	30	52	30	39	48	48	30	61	43	52	61
Local attraction	30	52	39	39	17	26	35	35	17	65	52	61	43

CC Carbon Calculator

CI Community Informatics

CS Computer Simulation

DMS Destination Management System

EIAS Economic Impact Analysis Software

EMIS Environment Management Information System

GIS Geographical Information System

GPS Global Positioning System

ITS Intelligent Transport System

LBS Location Based Services

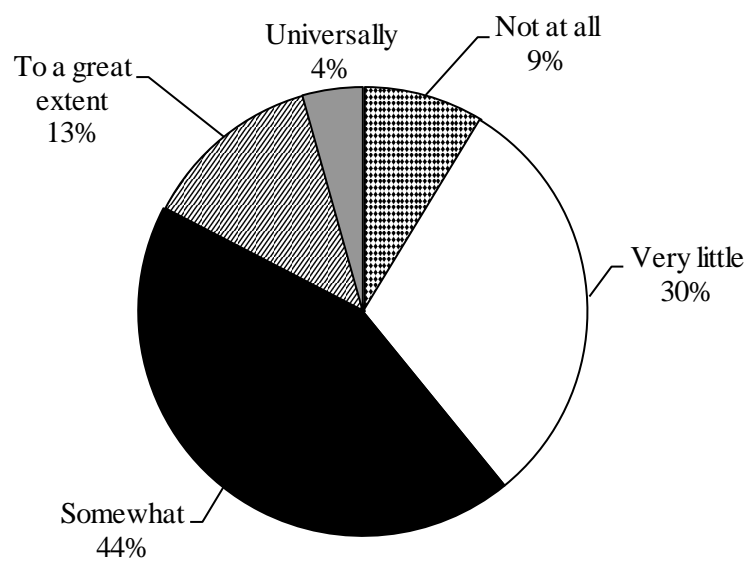
TIS Tourism Information System

VT Virtual Tourism

WCOCFS Weather, Climate and Ocean Change Forecasting Software

eTourism experts were asked to what extent they knew Destination System Providers were currently providing ICT-based tools to destinations. A Destination System Provider was defined as third party business which distributes ICT-based tools/applications to a DMO. Only 4% indicated that they universally provided these tools to destinations, whilst 13% identified that these tools were provided to a great extent as depicted in Figure 6.14.

**Figure 6.14:** Destination System Providers Provision of ICT-based Tools/Applications to DMOs



DMS was identified as the main ICT-based tool/application supplied by Destination System Providers. Geographical Information System, Tourism Information System and Virtual Tourism were being supplied to a lesser extent. The other tools were not being supplied.

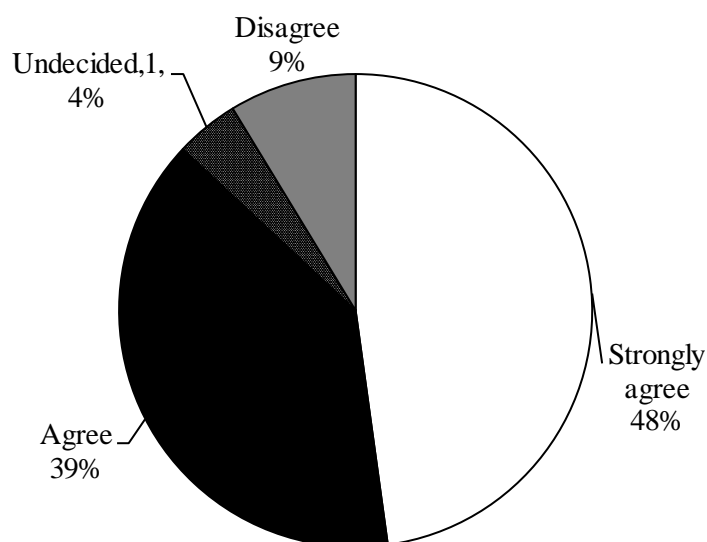
With reference to the opportunities for using these ICT-based tools/applications that were presented in the literature, information management was identified as the most useful area where ICT can have the greatest impact for sustainable tourism. Transport was ranked as the second most useful area, followed by community participation. Interpretation was ranked as the area where ICT would be least useful for managing sustainable tourism development as depicted in Table 6.14.

**Table 6.14:** Ranking of Areas ICT would be Most Useful

Area	Ranking
Information management	1
Transportation	2
Community participation	3
Tourist satisfaction	4
Energy consumption	5
Enabling partnership	6
Sustainable consumption	7
Interpretation	8

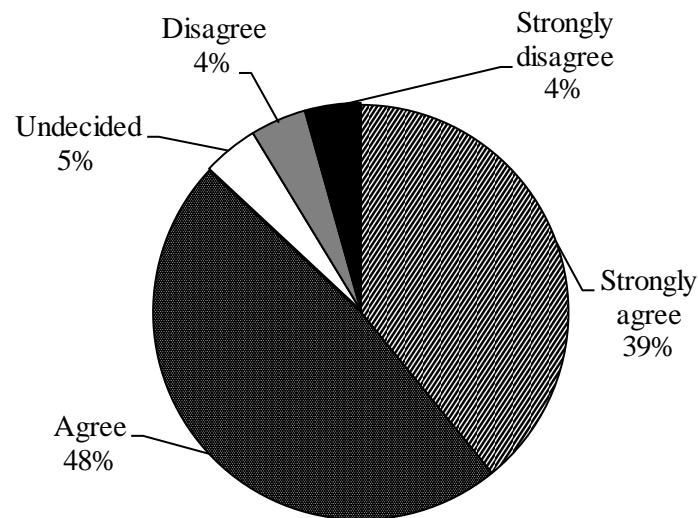
eTourism experts were also asked to rank the areas of sustainable tourism they felt were of most concern to destinations. Economic benefits of tourism was ranked as the most important area of concern for destinations. This was followed by effects of tourism on the host community, tourist seasonality, local satisfaction, energy management, tourist satisfaction, development control, water availability and consumption and wastewater management. The least ranked areas of concern were drinking water quality, solid waste management, and controlling use intensity.

**Figure 6.15:** eTourism Experts - ICT has led to the Better Management of Destinations



Almost half (48%) of eTourism experts strongly agreed that ICT for sustainable tourism has led to the better management of destinations, with about two-fifth (39%) agreeing. Only 9% disagreed, no one strongly disagreed and 4% were undecided as seen in the Figure 6.15

**Figure 6.16:** ICT an Innovative Approach to Sustainable Tourism Development – eTourism Experts



The majority of eTourism experts also agreed (strongly agree 39%, agree 49%) that ICT will be an innovative approach to solving some of the problems of sustainable tourism development as seen in Figure 6.16.

Similar to the DMOs, eTourism experts identified critical success factors and barriers to the uptake of ICT for sustainable tourism and some of which were similar as evidenced in Table 6.15. The similar critical success factors and barriers are identified with a dotted line.



**Table 6.15:** Critical Success Factors and Barriers for the Uptake of ICT for Sustainable Tourism Development – eTourism experts

Critical Success Factors	Barriers
Finance	
Knowledge and understanding of the ICT-based tools/applications	
DMO support, buy-in and co-operation by decision makers	
Employee training	
User friendliness	
Proven rate of return to justify the investment so that benefits exceeds the cost The value added needs to be made clear to DMOs	Economic interests being placed before sustainable tourism issues
Popularity	A lack of clear understanding of what sustainable tourism encompasses
Need to be targeted systems for the DMO rather than mega systems	Educating visitors and internal stakeholders

These eTourism experts were asked how they envisaged destinations using ICT for sustainable tourism. If used properly, ICT can offer great tools for sustainable tourism development. It will provide DMOs with the information required to make informed decisions through improved information sharing for planning a suitable course of action for managing sustainable tourism. These ICT-based tools/applications would aid in improving a destination manager's ability to search and measure the dispersion of information related to sustainable tourism and building conversational marketing techniques about sustainable tourism. These tools also aid in developing platforms around communities sharing their interests in tourism development. It also help DMOs participate in existing social networks and building relationships by ensuring stakeholders at the destination can contribute and listen to others on sustainable tourism-related matters.

## **6.4 Findings: Expert Interviews**

This section presents the findings of the thirteen expert interviews conducted. The transcriptions of these interviews were labelled E1 to E13 in random order. Results are presented under the four following themes: awareness and opportunities for using ICT for sustainable tourism, ICT-based tools/applications for sustainable tourism, selection of these ICT-based tools/applications and ICT being innovative for sustainable tourism.

### **6.4.1 Awareness and Opportunities on the uses of ICT for Sustainable Tourism**

The general opinion of these experts was that at present DMOs were generally unaware of the uses of ICT for sustainable tourism and were not widely engaging with ICT for managing the sustainability of their destinations. They however felt that this awareness will grow and lead to increased usage. They also indicated that DMOs did have the available technology required for managing sustainable tourism but it was not being exploited for this purpose (E3, E7).

*I don't think DMOs are doing very much in terms of using ICT for sustainable tourism development presently, but as they increase their focus on this area of tourism, they will use ICT rather than manual systems to increase visitation, yield and environmental monitoring and management of regions (E9).*

One of the main uses of ICT for sustainable tourism identified was information distribution, for both the tourists and the destination stakeholders (E7, E8).

*Sustainability is a lot about informing people about impacts and anything that presents information and gets information out to the tourists can be used for sustainability. A Website, I would say is a tool if it is about communicating something specifically to the visitor. So in that sense, from an information distribution perspective there is a lot to do. The other thing is informing the stakeholders at the destination, I think there is a lot that can be*

*used to getting the information out to the destination industry players and I guess to everyone. So anything that is information distributed (E8).*

Other uses identified were modelling and predicting trends of what tourism might look like under different circumstances (E13, E8), providing virtual experiences (E8), interpretation (E5, E7, E8), monitoring (E4), visitor management (E8) and tourist education (E7, E8).

ICT usage was felt to be critical for the sustainable tourism development of destinations.

*People/organizations/businesses who neglect ICT tools and applications will go out of business and will ultimately fail. There is no sustainable tourism development without ICT (E2).*

However, one expert indicated that he saw ICT as being important but not fundamental to sustainable tourism development.

*I don't understand why ICT is a fundamental importance in sustainable tourism. I think it's got a role to play but I think there are other issues at stake, much more important than ICT such as the philosophy of the city in the first place (E5).*

#### **6.4.2 ICT- based Tools/Applications**

One of the main tools identified by these experts for sustainable tourism development was *Geographical Information System (GIS)*. The main uses of GIS identified were monitoring of the destination (E4, E6, E7), mapping of tourist movement for better planning (E4, E6, E7), location identification (E6, E7) and assisting with visitor management techniques (E8).

*I think GIS can be used, for example, to monitor different regions of the destination, for example, where there are preserved regions or regions which*

*are suitable for specific activities. These can of course be planned in a more precise way with a GIS. For example, with better planned specific activities, the tourists can get equal contact with the nature or the history of the destination or all those things. This can be used quite heavily in the area of destination planning or planning of different activities which can be done in the destination. Therefore, I think GIS are quite important for sustainable tourism development (E3).*

GIS was also identified as being used for data integration so as to provide DMOs with a clearer picture of conditions at the destination for better decision making.

*We use GIS simply to layer information so that we can establish a clearer understanding between things like market segmentation in a physical sense and partnership working in an industry sense (E6).*

*Location Based Services (LBS)* was another ICT-based tool/application identified for use in sustainable tourism. Based on their geographic position, tourists can be provided with information relevant to their requirements (E3, E5, E7, E8, E12). Messages could be sent to tourists on their LBS about sensitive areas they should not visit or what behaviours are appropriate in particular areas of the destination (E3, E8). These devices are already being used at National Parks (E3) and the future prospect of LBS looks positive since more people are now accessing the Internet via their mobile phone.

*If you have an iPhone, it could completely revolutionise the way we talk about information, as mobile devices and smart phones get more ubiquitous. I think in 3-4 years the smart phone is going to be more or less the standard piece of equipment. The more sophisticated, upscale tourist has got it and they're just going to find it more convenient for getting information from their mobile than an actual PC cause they can pick it up in a nick of time and get back to it so easily (E12).*

Similarly another expert commented.

*I certainly don't think this sort of technology is going to go away at all (E5).*

One expert discussed that he was unsure of the contribution LBS would make besides saving of printed brochures (E5).

Another ICT-based tool/application that was identified for use in sustainable tourism development was a Destination Management System (E3, E5, E6, E7, E8, E12). These interviewed experts, however, held varying opinions on the uses of a DMS for sustainable tourism development. One expert saw it mainly as an economic tool and could not foresee it as being used for anything else (E8). Another saw it as playing an important role in educating people about the destination's sustainability policies (E7, E12). Other experts (E3, E6) were of the opinion that if it became a "true" DMS and merged with other aspects such as data integration, information distribution and co-operation with small and medium sized enterprises, then it can have great uses for sustainable tourism development.

*The point of a DMS is that it falls into two parts normally. The one part is that there is the online platform which is used by the customer, and of course there is less use for sustainable tourism. Most of the DMS are in fact online platforms. On the other hand, if it is really a DMS then this would have aspects of a decision support system and things like this where the stakeholders of a destination can co-operate. If this is the case then of course it can be used for sustainable tourism development. For example, the different stakeholders of a destination, could exchange information about how to reach sustainable tourism, how to improve the management of the destination and, of course, the DMO can better inform the stakeholders of different policies on how to reach sustainability. If it is really a DMS, it will be worthwhile but if it is just an online platform for informing the customer, of course, there will be less use for sustainable tourism development (E3).*

*Virtual Tourism (VT)* was also identified as another ICT-based tool/application which can have valuable uses in sustainable tourism development. The uses of VT revolved around complementing the actual physical experience (E2), educating the tourists prior to visiting the destination (E1) and being used at the local level for sites which have become fragile or in museums for helping the tourists with interpretation (E1, E2).

One expert had very optimistic views for VT.

*The best way to be green is to stay where you are because the minute you got transportation you're using carbon. I think that I can see a VT. In other words where you're not travelling but you're getting experience. This is going to develop as a product in the future. We might be talking 5-10-20 years ahead. But I can see a time when this will be happening. It won't be called tourism, its recreation, tend to change doesn't it. So what we're really talking about is if somebody wants to be in the jungle or half way up a mountain, you're doing a safari or whatever, there is going to come a time where you will get amazingly rich, real experiences with your partner or a friend or whatever so that the experiences you share as one. And I could see that emerging as a product but whether you call it tourism or entertainment or leisure, I don't know. I'm sure it will happen. I think it is quite likely that once we get flooding happening and famine and degraded environments and once we run out of enough energy and long haul flights become hugely expensive and people end up having kind of quotas of energy they're allowed to use for unnecessary travel, things like virtual reality could actually become a more significant part of people's recreation (E12).*

However one expert saw it only being used for marketing and public relations and not sustainability (E7). Whilst another commented that he failed to see how VT might be a replacement for visitor attraction or visiting a destination despite the discussions which are currently occurring. He stated that VT cannot really get of the

ground if you are speaking of the independent travellers such as the self-drive market whose destination is 3000-4000 km of track (E1).

Another ICT-based tool/application that was identified was *Computer Simulation (CS)*. One expert did not see any uses of this (E7) whilst another (E8) saw it as being worthwhile only if used for illustrating something to the visitor. One expert (E3) commented that CS can be important in forecasting the effects of investing in different areas of the region to improve the development and the attractiveness of destination.

*Carbon Calculator(CC)* was seen as more of an awareness and branding tool (E8) rather than a tool for sustainability. One expert (E12) was, however, quite keen on the use of CCs for sustainable tourism development.

*I know they already exist but I think a lot more effort could go into that. As you assemble the elements of your trip, each element has got its own footprint, carbon footprint. This goes into the itinerary planner and you can see probably your tons of CO<sub>2</sub> and you can change from one hotel which has got one kind of bed numbers, a kind of weighting to a different hotel that's different and you try changing from doing it by air to doing it by train or whatever. And I could see that that could be important. If you get to the stage where travel is rationed, you may actually be obliged to use a carbon calculator because that's the only way that you're allowed to use your ration. So how about that for a bit of future scoping as well. And obviously in short term responsible people, there don't seem to be many, people don't seem to have children, or they've forgotten they've got children and what about their children's children. But responsible people I think will jump at using carbon calculators (E12).*

*Environment Management Information System (EMIS)* was another ICT-based tool/application that was identified (E4, E6) for managing sensitive areas at the destination.

*We use an EMIS is to identify areas for zoning. For instance we have identified areas of tranquillity, high tranquillity and we would map those against habitat and try to identify no go areas where we want to keep people away to avoid their disturbance of habitat and special parts of the landscape which are delicate. We've also used this system to identify areas where we could generally identify where we would want to keep people out of cars but on bikes (E6).*

Another expert (E2) spoke of the use of *Tourism Information System (TIS)* stating that he saw it as a foundation tool for sustainable tourism programmes since it would be a very useful for research and statistics. *Intelligent Transport System (ITS)* was identified by one expert for saving energy (E3). *Weather, Climate and Ocean Change Forecasting Software (WCOOFS)* was identified for tourism planning around weather conditions (E7) however one expert (E8) did not see it as a tourism tool.

In terms of social sustainability, *Community Informatics (CI)* (E3, E6, E7) was identified as an ICT-based tool/application which can be used. This tool heightens awareness among the host community about sustainability of the destination in an online environment.

*They could exchange ideas about what you should do as a tourist in this area or what you shouldn't do in order to preserve the nature and the culture in this area. So I feel this could raise the awareness of tourists for specific needs in a destination and they can exchange their ideas in an online community (E3).*

It can also allow the community to play an important role in what messages are being communicated to the tourists. This gives the tourists a more unbiased impression of the destination and helps them better understand what to expect and how to behave whilst visiting.



*It can re-connect that information and make sure that the community has input in how they are being portrayed to the visitor and ensure they become part of their heritage rather than just selling it to the tourists. So in that sense technologies that can be used for the community can have a big impact (E8).*

#### **6.4.3 Selection of these ICT-based Tools/Applications for Sustainable Tourism**

These experts (E2, E3, E4, E6, E7, E8, E10, E13) felt that these ICT-based tools/applications would be selected based on how well they work in fulfilling the sustainable tourism objectives for each destination. Therefore, some tools would be more useful for some destination rather than others. Experts felt that if these ICT-based tools/applications had greater applicability over a larger number of sustainable tourism issues then there would be a greater likelihood of implementation. Therefore, these ICT-based tools/applications were seen to be linked to practical management and decision making at the destination.

*From my perspective, its just going to be people understanding which tools are right for them and what's going to work best for them. That's really the key. A sort of understanding of what's around and how it will work best for them in terms of meeting those different objectives, whether it's for marketing, whether it's for monitoring, or whether it's for education. It is understanding which tools are going to be best suited for the work that they want to do (E13).*

Likewise another expert said:

*I think it is making use of the technology. But it is not just about the technology but thinking about the principle of sustainable tourism in the first place and then seeing what tools are needed in order to be able to deliver it. I think that's the better way of looking at it rather than starting with the technology and then thinking how we can use the technology. You're better off to think what are the most important things we want to see and how can we*

*do that, that's where the technology solutions appear. Yes exactly, you start with what you need, what you plan to do and then you work out how we're trying to deliver it, that's where ICT comes in (E5).*

These experts were of the general opinion that once there was an important issue with regards to sustainability at the destination and ICT-based tools/applications were available to help remedy the situation then destination managers will be more willing to use the technology. This selection process is evident from the comments of another expert who discussed the choice of the ICT-based tools/applications based on the needs and objectives of the destination.

*Definitely, the Environment Management Information System would be great. It would really assist me a lot with what I have to do, realising what the needs are, realising where I need to focus and stuff like that. A carbon calculator might not be bad as well because I am also a part of another project. We plan to start to plant trees to help sequester carbon dioxide so something like that would be good for us in terms of calculating how many trees, types of trees and in general to track our usefulness, cause if we're having a project to sequester carbon dioxide it would be good to know what our impact is. So something like that would probably be beneficial as well (E4).*

These experts (E3, E7, E8, E9) also felt that the stage of tourism development would influence the use of these ICT-based tools/applications. The general opinion was that ICT for sustainable tourism would have greater uses for developed and consolidated destinations than those in the exploration or involvement stage. Experts (E2, E11) were unsure if the stage of tourism development had a role to play, however, they felt that destinations in the involvement and exploration stage might have difficulty implementing these ICT-based tools/applications for sustainable tourism due to funding.

It was also identified that the nature of the DMO would play a role in the type/s of ICT-based tools/applications which were selected (E2, E7, E8). If DMOs were

membership based or operated for a profit then they were more accountable to their members for financing. Therefore, it would be more difficult for them to invest in these technologies (E7, E8). Similarly, if DMOs were commercially based they would be focused on revenue generation. Investment in technology for sustainable tourism might not factor into their priority list. However, if the DMO was supported by government funding then they had a broader responsibility to the community and the uptake of these ICT-based tools/applications would be easier. It was felt that the right model for the adoption of these ICT-based tools/applications for sustainable tourism would be the government taking a leading role (E2, E11).

*What we're seeing here in Western Europe is that a lot of the DMO have become commercial, they used to be government organisations but they're mostly organisations run on a profit and loss basis so they had to make money to survive. They need to use these things for sustainable tourism but they won't invest very much in buying tools to prove their case (E7).*

Not only the funding structure, but the type of destination a DMO was responsible for was seen to be a factor in the selection of these ICT-based tools/applications. One expert (E11) observed that it would be most useful and have its greatest value at the regional level. Another (E9) commented that DMOs at the national level were more concerned with marketing but DMOs at the local level would have better usage of these tools because they were able to gather more useful information.

*I think as you get closer and closer to the local level, I think you would find that they have richer information about products in there area. I think they would have the opportunity to gather better information on international customers as well. I think that they're dealing with a smaller range of organisations in terms of gathering the data, organising it in a form that can be used effectively, so you won't have the problems that you do when you're dealing with a National Level DMO (E9).*

One expert (E12) however did not see any difference in usage based on the type of DMO.

*I think the principles are pretty much the same whether you're talking about a National Tourism Organisation or a Regional Tourism Organisation or a city to a local body and irrespective of whether they are public sector or private sector or a mixture of the two. I think, to me, the usage seems to be very much of the same (E12).*

These experts (E7) also commented that if the tools became readily available, user-friendly and cost-effective there would be more usage. They also felt that popularity (E7, E8, E4) played a factor in the selection process.

*What we will also see is that if one big destination start using them like, for instance, London then you will immediately see that Paris, Amsterdam, New York will follow also. As soon as one destination start using these tools or a specific tool and starts publicising this on their Website then you will immediately see other destinations following ( E7).*

With regards to selection of the specific tools, one expert (E5) felt that Geographical Information System, Intelligent Transport System and Environmental Management Information System would be most used by a City, County or Regional DMO for planning and management. This expert stated that local tourism departments will not necessarily have this type of ICT, but it may be used by the larger DMOs. Another expert interviewed felt that GIS (E3) would be suited to more or less all types of destinations once they were large enough to use a GIS. For something like a castle or a smaller area, it might be less important.

It was felt that Economic Impact Analysis Software would rarely be used in the UK as most DMOs commission an external agency to carry out economic impact work for then based on the findings of a visitor survey. One expert (E2) commented that this would be more useful in developing countries. It was felt that Weather, Climate

and Ocean Change Forecasting Software would also be best suited to developing countries (E7).

Cost (E4, E7, E9, E11, E13) and availability of resources (E13) were identified as other reasons for the selection of tools. One expert commented:

*Even though buying a technologically advanced system would be great in terms of growing your industry or in terms of putting you on the map and allowing you to be a bit more advanced than some of the other countries, if something like that is going to break the bank and cripple you from doing other things then it wouldn't make sense. So something like that is dependent on solid investment decisions and deciding where you are and where you need to be and what you can afford right now (E4).*

These experts (E3, E4) strongly felt that cost was the key selector and if they could recover the investment in the technology then there would be greater uptake.

*It is of course the effort, the cost for getting the tools, the cost for using the tools, the cost for training of the employees to use those tools and then of course the expected benefits you would get out of those tools. Of course you might have external factors like if somebody else is using it, but the most important factor will of course be the cost on one side and the effort you have to put into those tools and the expected benefits of those tools (E3).*

With regards to the provision of these ICT-based tools/applications these experts stated that they were unaware of any Destination System Providers which were supplying these tools to DMOs.

#### *6.4.3.1 Critical Success Factors*

The technology being fit for purpose (E5) in that it meets the sustainability objective of what the destination is trying to achieve was identified as a critical success factor for the uptake of ICT. Ensuring DMOs were aware of the value added by using these

tools was emphasised by one expert as being very important to the uptake of ICT for sustainable tourism.

*The most important thing from my point of view would be the acceptance and of course the relationship between effort and expected benefit of those tools. Especially for tools like management tools, it is always a problem that the people are not persuaded about the benefits, they don't see the benefits and they don't know how big the effort they will have to put into use those tools. This could be a problem in using these tools (E3).*

Another critical success factor identified was that DMOs did not have a clear understanding of what sustainable tourism entailed with many believing it is only about environmental management. Moreover, it was not only understanding the principles of sustainable tourism but also considering how to apply these to destinations (E6). Experts felt these DMOs were unsure about whose responsibility sustainable tourism lay with at the destination and lacked awareness on what ICT can do for them with regards to sustainable tourism development (E1, E6, E7).

*People still think that sustainability is the role of individual organisations rather than of networks. When you talk to them about destination management, they talk of brochure writing and Website development. They don't necessarily see that broader purpose of sustainability (E1).*

Another expert commented:

*If you know what your doing, it is much more possible to produce a plan of what your trying to do and then argue for the proper funding of ICT solutions to support that plan. And I think that a lot of our problems in tourism are like that. They're not so much about technical stuff. It's about actually seeing the bigger picture and working out how it all fits together. There are to many quick fixes. That's the biggest problem and its always been the case and it will always be the case. Somehow the whole problem of everyone's tourism*

*wherever it is in the world, is understanding what they're trying to do at the local situation and understand how that connects to the regional and the national and the international picture and basically that's what United Nations World Tourism Organisation is trying to do. That is not necessarily the same as what the countries are trying to do and the country are not doing necessarily what the local destinations are trying to do. Tying all of that together is actually the answer not just to ICT but to the whole thing. Because at the moment it is a lot of conflict and a lot of confusion (E6).*

It was also identified that DMOs have not really evolved from being marketing organisations despite being responsible for the larger role of managing the overall destination (E1). It was felt that they talk a lot about sustainability but that is not really their core business (E3). This serves to limit their capacity in dealing with real sustainability issues since they are more concerned with awareness and branding.

*I remember talking to a CEO of one of the State Tourism Organisations and he said that his was the most successful tourism organisation because they had produced the most number of brochures. So you can see where their priorities lie (E1).*

Another expert said:

*Sustainable tourism is hardly managed. Each person sort of does their own little thing (E4).*

Some experts felt (E1,E3, E9) that at the end of the day it all depended on economics and if the benefits of these ICT-based tools/applications outweighed the costs then there would be better utilisation. Other experts discussed (E1, E9) that destinations can make great use of these tools but they do not possess enough data to engage in activities like scenario modelling and forecasting.

*I think the real secret to the whole thing is collecting the data, maturing of the data, actually getting hold of the data in the first place (E9).*

Moreover he observed that smaller destinations lacked confidence in their knowledge and the quality of data they have to build this capacity and make use of these ICT-based tools/applications.

Another critical success factor identified was partnership and co-operation (E1, E4, E8, E12). Different organisations need to work together to share their applications for mutual benefit. An example of this is transportation.

Other critical success factors identified were: user-friendliness (E4,E8, E10, E11), training of employees (E3, E4), expertise in using the ICT-based tools/applications (E3, E8), popularity of the tools (E8), consumer demanding greater use of technology by destinations (E9, E12), government policy, support and funding (E2), meeting the business requirements of the destination (E11) and ensuring the technology can be adapted to the destination (E11).

#### *6.4.3.2 Barriers*

The main barrier identified for the uptake of ICT for sustainable tourism was cost. The users of these ICT-based tools/applications was also seen as a barrier through lack of knowledge (E2,E4,E6, E7, E11) and lack of understanding (E2, E4, E7, E11). DMOs need to become aware and educated on what ICT means and what it can accomplish for them before that can start using it for sustainable tourism.

*I think the barriers are usually the users. So things like not having funds to buy the things in the first place, or not having funds to train people, or people just being afraid to use the thing, or not knowing how a piece of technology works properly. I think that's where the barriers come. They lie with the user and not necessarily with the technology (E4).*



Whilst another expert stated:

*We're still talking about people that have yet to embrace technology to its fullest level and other forms of technology in terms of benefitting their businesses and from a sustainability perspective (E11).*

Another barrier identified was that suppliers of these ICT-based tools/applications do not understand the language of the DMOs and hence cannot provide the needed ICT-application to help alleviate their problems (E6).

As stated by one expert:

*These people who are running tourist offices are real dinosaurs I'm afraid (E12).*

#### *6.4.3.3 Future use of ICT-based Tools/Applications*

These experts were asked to discuss how they saw ICT being used by destinations in the future. ICT was seen as an opportunity to deal with sustainability and the environmental issues and lead to the development of sustainable destinations. They saw it being used for increasing productivity and helping to build sustainable business models for destinations (E2). Also, it was seen as a means of measuring impacts, monitoring and reporting (E2, E4, E7, E11) and being used as an information tool to educate the tourists (E7). Another expert (E11) saw it as being used to complement the current approaches to sustainable tourism. Enabling co-ordination and engaging all stakeholders in sustainable tourism and supporting relationships (E2, E6) was another way of applying ICT to sustainable tourism.

*I can see it for destination management in terms of promotion, sales, inventory management and reporting and would involve the co-ordinators or leaders in the region be they a Regional Tourism Authority or at any level or/and operators. It would be an inclusive system that allows them all to*

*participate and work together and build awareness and promotion of the destination as well as for individual products (E2).*

Another expert envisioned it as forming part of a destination dashboard.

*I honestly see it like a dashboard whereby you would input various data and the results would be the internal fluctuations of where things are happening. You could have alerts as well as matching how well you prepare for the external environment and you can look into the ecology and see what's happening there. If you put up a hotel, you know what the impacts are and you could come up with maybe a few focus points at that moment to make certain decisions. This destination dashboard is really the way I see it. That would be a dashboard where you get all this information in one location (E10).*

Another expert discussed that they saw these ICT-based tools/applications being used for personalisation of services to the visitor.

*..is the ability to communicate with visitors through their own individual hand held technology to provide them with a map and route system. If we can do that then in terms of the development of sustainable tourism that would perhaps be the most important, because that is a personal Website in a sense. If we can get personal with all of our visitors, we can manage them all more effectively which would provide the businesses with the right level of visitors at the right time at the right place and it would provide visitors with a good quality of experience on the basis that we could produce it in such a way that it became personal to their requirements. We could make sure those people in doing all of those things were avoiding hot spots in terms of physical damage and erosion. We could ensure that these systems are linked with the public transport and appropriate transport connections. It is a tool for making all of the things that are relevant in sustainability work..... it's a very personal tool so it allows all of our visitors to be managed in a personal*

*way which would allow them to have the best possible time with the best possible economic impact but the smallest amount of environmental impact and social impact (E6).*

#### **6.4.4 ICT being Innovative for Sustainable Tourism**

All the experts except one saw ICT as being innovative for sustainable tourism development. They saw it as being innovative with regards to information management and distribution of this information for critical decision-making (E4, E8, E11, E13). It can also be innovative since it would lead to a better understanding of the tourism product (E4, E11), monitoring of the destination (E8, E12), measuring and evaluating (E10, E12), forecasting trends (E10), developing partnerships and engaging and supporting relationships amongst stakeholders (E6).

*I think very. I think its an area which I explained before has not yet been discovered so I think as soon as people start realising that they can apply ICT in this area that it will be next area (E7).*

Accordingly another expert commented:

*I think like anything new, it is something that people will need to get use to with regards to the different types of technology that are out there but I believe they will definitely be helpful. It can make the job easier, can make keeping information easier and processing information easier (E4).*

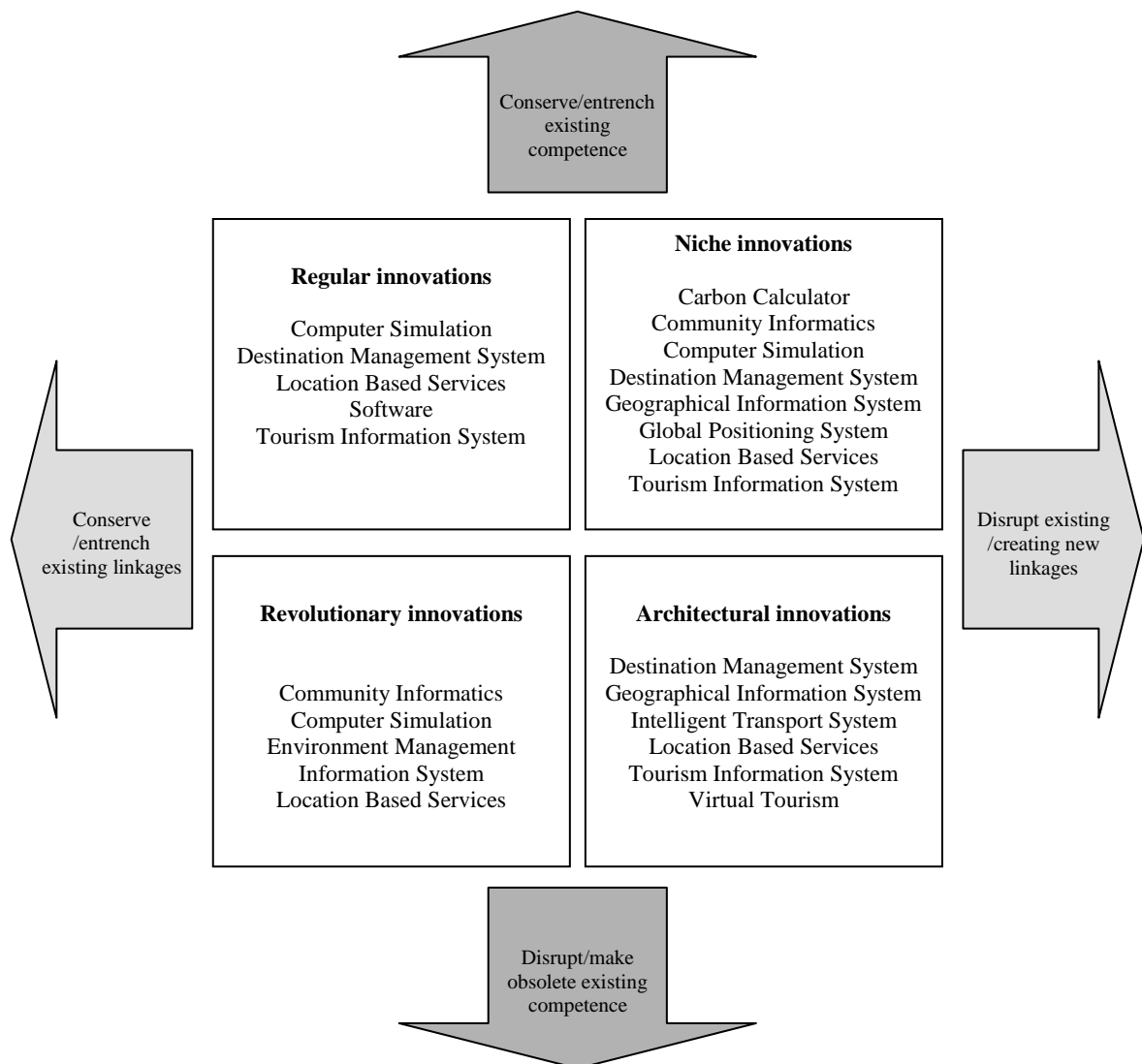
The expert who did not agree stated so because of the following:

*I think in the past we have stolen ideas from other sectors and tried to adapt them and that might be one of the reasons why things haven't gone so well and a lot of tourism research is 10-20 yrs behind the state of the art research in the underlying field be it geography, IT, economics so we tend to always be lagging. I don't think it will be very innovative. How innovative should it be? I think it should be a lot more innovative since tourism is such a different*

activity to a lot of the other industries that are building these types of systems (E1).

These experts were also asked to describe the uses of these ICT-based tools/applications in relation to the modified version of the Abernathy and Clark (1985) model presented earlier. Figure 6.17 presents a classification of these tools combining the results of the experts interviews as well as the findings from the destination managers and eTourism experts.

**Figure 6.17:** Classification of ICT-based Tools/Applications based on the Abernathy and Clark (1985) Model



## **6.5 Conclusion**

From the results presented it is evident that ICT can be used in a variety of ways for managing sustainable tourism development. It acknowledged that destination managers had some level of awareness of the use of ICT for sustainable tourism and they recognised the importance of doing so but yet in reality it was not being carried out in practice. These results also described a number of opportunities that exist in destination management for using ICT and a number of ICT-based tools/applications in support of these opportunities. It identified that the use of ICT for sustainable tourism can be a new, innovative approach for dealing with some of the negative impacts of tourism demonstrating that these applications can be classified according to the Abernathy and Clark (1985) model. Furthermore, these findings elucidated that factors exist which influence destination managers' selection and the type of DMOs that use these ICT-based tools/applications. The next chapter presents an analysis and interpretation of these findings.

## **Chapter Seven**

# Chapter Seven

## Analysis and Discussion

### 7.1 Introduction

At the outset, this thesis embarked on investigating the uses and applications of ICT for sustainable tourism and developing assessment procedures for destination managers' most appropriate selection of these ICT-based tools/applications. The previous chapter provided the findings of the two related research studies. The results of the questionnaires highlighted further areas for probing and this was accomplished through the use of semi-structured interviews with experts who were knowledgeable in this research domain. The purpose of this chapter is to make sense of these findings. Therefore it offers an analysis and discussion of these results and shows the relationship to the background literature discussed in earlier chapters. The researcher felt the best way to interpret these results would be to revolve the discussion around the objectives of this work. This was done so as not to lose sight of the intent of this research.

### 7.2 Literature on Sustainable Tourism and eTourism

The first objective of this thesis was to *review the background literature in sustainable tourism and eTourism*. This was accomplished in chapters two, three and four. Chapter two considered the literature in sustainable development and sustainable tourism. A discussion on sustainable development was important since sustainable tourism must have consideration for the larger, parental concept. With regards to sustainable tourism, chapter two focused on the main debates surrounding its definition and operationalisation and the current concepts and approaches used in applying the principles of sustainable tourism at the destination level. This chapter was integral to this thesis since it provided the research background in developing the proposition that ICT can be used for sustainable tourism and identified that ICT has not played a leading role for managing the sustainability of destinations.

Chapter three discussed ICT and its current applications in the tourism industry. It demonstrated, that despite no specific mention of the uses and applications of ICT for sustainable tourism in both the sustainable tourism and eTourism literature, that opportunities did exist in destination management for using ICT. There were also specific ICT-based tools/applications which can be used for these opportunities and these were identified in this chapter. Chapter four presented the theoretical foundation for this research by demonstrating how ICT can be a new, innovative approach for sustainable tourism development by presenting a modified version of the Abernathy and Clark (1985) model. Also established in this chapter was how some of these tools can be used in the dimensions identified in this model. These chapters were integral in laying the background for this research as well as importantly identifying the areas noteworthy of empirical research.

### **7.3 Surveys**

The second objective was to *conduct surveys of destination managers and eTourism experts with regards to their opinions and perspectives on the use of ICT for sustainable tourism*. This objective was developed after a review of the literature and was fulfilled when the research design was executed. The reasons for selection of these respondents for investigation were discussed in chapter five.

### **7.4 Examination of the ICT-based Tools/Applications**

This objective focused on *examining the ICT-based tools/applications and describing their potential uses in destination management for sustainable tourism development*. Comparing the results, DMOs used ICT primarily in the areas of marketing, information distribution and information gathering (Buhalis and Law 2008). DMOs used a wide variety ICT-based applications such as e-mail, Websites and databases to assist them with their organisations' activities (Yuan et al. 2006). This primary research provided evidence, in accordance with this, by identifying that ICT was being used by DMOs for purposes such as e-mail, online surveys, eNewsletters and social networking for information gathering, information distribution and marketing. The general consensus amongst respondents was that ICT possesses huge potential for assisting destinations in managing their



sustainability concerns (Liburd 2005) despite the low usage of ICT for sustainable tourism which currently exist.

Both the literature review and the primary research identified a collection of ICT-based tools/applications which can be used in sustainable tourism development. These tools were: Carbon Calculator, Community Informatics, Computer Simulation, Destination Management System, Economic Impact Analysis Software, Environment Management Information System, Geographical Information System, Global Positioning System, Location Based Services, Intelligent Transport System, Tourism Information System, Virtual Tourism and Weather, Climate and Ocean Change Forecasting Software. These ICT-based tools/applications will be discussed and their uses for sustainable tourism development demonstrated.

Carbon Calculators were seen by survey participants as more of an awareness tool which allowed tourists to monitor their CO<sub>2</sub> emissions. eTourism experts did not identify any current uses of carbon calculators but saw it as being incorporated into travel for emission measurements. Interviewees identified it more as a marketing and promotion tool for destinations wanting to advertise that they are “green” and environment friendly. However, it was felt that once concerns over climate change intensified destinations would make greater use of this tool to examine their emissions.

Community Informatics was used for community engagement, heritage preservation, interpretation and community cohesion (Gretzel et al. 2009). This tool truly engages with the socio-cultural aspect of sustainable tourism development. Through using ICT as the medium, it can connect the community by allowing them greater involvement in decisions relating to tourism development and planning at the destination. This is important since if the locals feel integrated in the tourism process then they will have greater buy-in. Strengthening community identity allows locals to develop stronger bonds with their culture and heritage. ICT usage also assists in the continuation of heritage, customs and traditions which may have been lost. Future generations can therefore learn from the present generation. Increasing

awareness through Community Informatics can support the host community in gaining a better appreciation of their neighbours, their community and their environment.

Computer Simulation was depicted as being used for predicting trends by simulating scenarios (Lawson 2006) such as climate change and illustrating changes to the environment from visitor usage. This provides the destination manager with realistic images of what proposed tourism developments would look like under varying conditions. This information can be used to make decisions which have a more favourable long-term impact on the environment and therefore contribute to the destination becoming more sustainable. There were other uses of CS identified in the literature but were not mentioned in the primary research. As discussed earlier in chapter one, there appears to be little knowledge transfer of academic knowledge for industry uses. These additional uses were monitoring indicators for sustainable tourism (Lawson 2006) and developing realistic models for use in community consultation exercises about tourism planning and development in their locale (Lawson and Manning 2003; Lawson et al. 2003).

DMS was identified by DMOs as the most important tool for sustainable tourism development. The main uses of DMS were identified in Table 6.7. This corresponds to the findings in the literature where DMS can be used for information management (Buhalis 1999), marketing (Horan and Frew 2007), enabling partnerships and information exchange amongst stakeholders (Buhalis 1999; Buhalis and Spada 2000, Belbaly et al. 2004), resource management, distribution, tourist education and satisfaction (Buhalis 1999) and sustainable consumption through the reduction of print material.

By encouraging partnerships, the destination manager, through the use of a DMS can build a comprehensive database of the resource inventory of the destination. This is accomplished by focusing not only on the accommodation providers but also on other aspects of the destination such as rentals, attractions, events and food and beverage providers. The DMO can use this inventory to imaginatively parcel and

market the destination's offerings via the DMS. This allows the destination to be more competitive and accrue economic benefits. Buhalis (1997) argued that this type of marketing draws intentional rather than incidental tourism and increases their willingness to pay. Additionally, the DMS acts as a distribution channel. This increases the selling power of the local tourism businesses, reduces the impact of travel agencies and tour operators and retains profits at the destination resulting in economic benefits.

A destination manager can use the DMS to work with local businesses especially the small and medium sized enterprises to provide them with managerial assistance in making their product offering more competitive. Assistance can be provided on market positioning, off-peak promotions and helping them form networks so that they can realise efficiencies of scale.

Through the management and distribution of information via the DMS, a DMO can increase tourist satisfaction. As discussed earlier in the literature at the heart of tourist satisfaction lies the process of receiving accurate information. Timely, concise and accurate information can be provided to facilitate informed decision-making about the destination. For example, the DMS can provide information on a variety of items which will be of interest to the tourists such as ease of access at the destination, accommodation, cuisine, culture, events, maps, safety and security. A DMS can engage with an eRating system to provide tourists with information about the level of sustainability of sites and attractions at the destination. A Community Based Information System, which forms part of the DMS, can be used by the tourists to interact with the host community before arrival. DMOs can also use the server log files from the DMS Website to identify areas of customer preferences and develop customer relationship strategies. A competitive advantage is accumulated to a destination which possesses a DMS with such capabilities since through this differentiation, tourist satisfaction is increased which leads to long-term economic rewards.

Cost benefits, savings and environmental benefits can also be realised through the production of less printed brochures. The DMS's Website functions as the brochure of the destination. No longer do DMOs and small and medium sized enterprises need to print thousands of brochures and mail them to prospective tourists. Rather, they can direct them to their Websites. This Website can also provide maps, directions and other much needed travel and safety information which the tourists can print themselves.

Environmental benefits can also be accrued by using the DMS to identify and track the destination's sensitive areas. This is important since through the monitoring of resources, destination managers can make sounder decision on areas which need development and improvements hence keeping the destination attractive and competitive. Added to this, it can inform on site capacity, overcrowded areas, event and traffic information. This information enlightens the tourists' and the locals on areas suitable for visiting and raises their general environmental consciousness. Off-season attractions can be encouraged by promoting them on the DMS. This facilitates dispersion of tourist activity at the destination.

By distributing information relating to the destination's culture, history, traditions and customs, tourists will be better educated on appropriate behaviour whilst visiting. This information can be shared through the use of rich media using videos and three-dimensional virtual tours of festivities, places, attractions, local customs and heritage sites. This supports the tourists in developing greater respect for the local heritage and influencing their attitudes and behaviour. This understanding helps to positively increase the socio-cultural interactions between the tourists and the host community. Through the use of a DMS, DMOs can achieve economic, environmental and socio-cultural benefits thereby progressing their destination along the sustainable tourism path.

Economic Impact Analysis Software was identified for economic modelling (Vogelsong and Graefe 2001). This ICT-based tool/application was mainly used to measure and monitor the economic benefits related to tourists' activities. Using this

economic data, destination managers can make sounder decisions regarding investments to ensure future prosperity.

From the primary research, Environment Management Information System was identified as being used for resource and information management (El-Gayar and Fritz 2006). Cost savings can be realised through the use of an EMIS. Labour cost is reduced since manual processes such as measuring waste, monitoring emissions and co-ordinating permits have now become computerised through the use of the EMIS. Environmental benefits are also achieved since destination managers now have wider access to environmental information and reliable metrics which improves the quality and timeliness of their decision-making ability. Stakeholders also need to be informed of how their activities are impacting the environment. Using the metrics generated from the EMIS, destination managers are now more aware of the impacts of tourism at the destination and can therefore take the necessary remedial action. This information helps to monitor and measure the environmental quality of the destination.

The results recognised that an Environment Management Information System can also be used for educating the tourists and encouraging more responsible behaviour by using the information produced from the Environment Management Information System analysis to showcase the destination's efforts in improving and managing the sustainability of the destination. This facilitates tourist awareness about their impacts at the destination, so when they arrive, they make a better effort to be more environmentally friendly.

Socio-cultural benefits can be realised from the DMO engaging in environmental stewardships programmes. By interpreting the metrics, DMOs can begin to take corrective action to alleviate some of tourism's negative impacts. For example, they can create more green spaces to help reduce carbon emissions and this also serve as a form of recreation for the host community.

From the literature and primary work, another ICT-based tool/application that was seen as having immense uses for managing the sustainable tourism was Geographical Information System. This was described as being used for mapping and profiling visitors to the destination (Lau and McKercher 2007). Using this information, destination managers can target the type of tourists they feel will be best suited to the destination. A GIS also assists a DMO in transport planning and route identification (Lew and McKercher 2005; Bahaire and Elliott-White 1999). This provides both the tourists and the locals with the safest and quickest routes at the destination. Economic benefits can also be realised from the co-ordination and management of information.

Environmental benefits are achieved from using integrated data to make important decisions about tourism planning in sensitive areas by identifying sites and attractions for development (Bahaire and Elliott-White 1999; McAdam 1999) and helping with visitor management techniques through zoning and identification of areas that require protection (Bahaire and Elliott-White 1999; United States Agency for International Development 2006).

Similar to Computer Simulation, there were other uses of GIS identified in the literature which were not illuminated in the primary research. Such uses were indicator identification and monitoring (Avdimiotis et al. 2006) which is important in ensuring destinations are progressing on target with their sustainable tourism development plans. Visual impact analysis (Bahaire and Elliott-White 1999) and getting the community involved in the tourism planning and development process (Hasse and Milne 2005) were also not mentioned as uses of GIS in the primary work. Visual impact analysis is important in providing realistic images of how future developments at the destination would appear. This assists in evaluating whether proposed developments are a right fit for the destination. It provides the local community with realistic images of prospective improvements and how the impacts of these will affect them. These uses along with those identified in the primary work demonstrates the vast potential of GIS in the sustainable tourism development process and destination managers need to become aware and make the best use of

GIS for protecting, preserving and maintaining tourism's invaluable resource base. This aligns with the findings where eTourism experts ranked this as the most important tool for sustainable tourism.

Global Positioning System was identified as being used for tracking and analysis of tourists movements (Shoval and Isaacson 2006) and location identification for tourists. A destination manager can use this information to develop tourism plans for dispersing tourists at different sites and attractions at the destination. This ensures that environmental impacts are better managed in a particular area.

Location Based Service was another ICT-based tool/application that was acknowledged as being very promising for managing sustainable tourism development, with a wide variety of uses. It was seen as being used for provision of information to the tourists regarding sites for visiting based on their geographic location in real time (Eriksson 2002; Berger et al. 2003; Flouri and Buhalis 2004; Liburd 2005; Buhalis and O'Connor 2006; Sharda et al. 2006). This advances a destination on a more sustainable path in several ways. Tourist satisfaction is increased through the provision of more accurate and reliable information whilst at the destination. Information can be provided on promotions, places to visit, accommodation and other general information such as safety and security and weather. This increases tourists' decision-making capacity and contributes to greater tourist spend, leading to economic benefits for the destination.

It aids in the management of the destination's resources since they can market and inform the tourists about which sites and attractions to visit, educate them on travelling to sensitive areas, how they can maintain the destination's environment and what is considered appropriate behaviour at the destination. This information can help tourists make sustainable choices about which products to consume whilst at the destination (Liburd 2005). It allows them to have a better awareness of the natural environment and develop a greater respect for the local community and their culture and heritage. It also reduces the volume of print material since maps and

information on the destination can now be retrieved through the Location Based Service.

Intelligent Transport System was also deemed to be another ICT-based tool/application for sustainable tourism in the primary research. It corresponds to the literature review where ITS was identified for tourist satisfaction by providing real time information and traffic management (Sheldon 1997; Diagle and Zimmerman 2004), leading to savings in energy (Erdmann and Behrendt 2003). Whether used in cars or public transport, ITS helps the tourist to find the safest and quickest route to their point of arrival. This type of information is important to the tourists since it helps them to navigate better whilst at the destination and have a more thorough enjoyment of the destination.

A better ground transport system allows tourists to be more aware of their exact travelling times at the destination. This makes them more inclined to use public transport rather than vehicle rentals at the destination. If this type of transport system is available, in areas such as National Parks and protected areas, then the ITS will undoubtedly lead to less environmental degradation since fewer vehicles results in less emissions in these sensitive areas. This leads to energy savings and protection of the environment. A better transport system also benefits the local community by reducing traffic congestion at the destination. It may also leads to less host-tourist antagonism since the locals will no longer be resentful of the tourist crowding the roads with their vehicle hire or not understanding the driving rules and regulations of the destination. People will feel more at ease since transport is relatively hassle free. ITS also provides information about accidents and the safest routes to take so it increases both the safety of the visitor and the host community. Destination managers ranked this as the second most important tool for use in sustainable tourism.

The uses of Tourism Information System were identified as research and statistics for destination managers decision making and information management (Carson and Sharma 2002, Wöber 2003). This is important for sustainable tourism development



since a destination manager can use the statistics generated from the TIS to support projects, invest in specific areas of the destination which need assistance and to calculate cost savings. This was ranked as the third most important tool for sustainable tourism by destination managers.

Virtual Tourism was identified as being useful in avoiding excess degradation to sites/attractions by reducing tourist numbers (Swarbrooke 1999). Through information distribution tourists can also be educated about the destination. It is debatable whether VT will replace physical travel in the future (Teo 2002). This may become a reality with advancements in technology. A number destinations are already using rich media on their Websites to remove the intangibility aspect of the tourism product. As climate change increases as a significant concern, the future may result in restrictions on air travel in order to protect and preserve the environment. These travel limitations will encourage more people to use VT to experience destinations they can no longer visit.

Weather, Climate and Ocean Change Forecasting Software was seen as being used for forecasting of weather and planning of events. For those destinations which are usually adversely affected by weather conditions, DMOs can use this ICT-based tool/application for ensuring the industry maximises its economic benefits and use this information for tourism planning and management.

Destination managers and eTourism experts were asked to rank these ICT-based tools/applications according to their importance for sustainable tourism. Table 6.8 and Table 6.12 displayed these ranking respectively. It is interesting to note that the top tools destination managers considered as being important for them were not the same as those identified by eTourism experts. Perhaps research from the eTourism community is not being disseminated to the destinations' decision-makers. In the literature, it is argued that despite the immense growth in tourism research there has been poor dissemination and usage of this research by tourism businesses (Cooper et al. 2004). This may be attributed to inadequate linkages between industry and academia (Stamboulis and Skayannis 2003) with tourism businesses viewing this

research as being difficult to access and irrelevant to their needs (Ruhanen 2008). Tourism stakeholders such as DMOs view such research as being quite complex and highly advanced when rather they are searching for uncomplicated techniques and easily applied solutions (Ritchie and Ritchie 2002; Xiao 2006).

Another reason behind this disparity in rankings is perhaps destination managers may have limited understanding and awareness of engaging with these tools for sustainable tourism. This was identified as both a barrier and a critical success factor by destination managers. Additionally, destination managers may not have knowledge of these tools and the possibilities for their destinations when implemented. Therefore they may have been unable to evaluate their importance.

From the list presented to respondents in the survey, no other tools/applications were identified. Experts felt initial list of ICT-based tools/applications presented was comprehensive. This was emphasised from the comments below.

*I am not aware of any other systems which you could use for sustainable tourism (E3).*

*The list looks fairly comprehensive (E8).*

All respondents uttered the benefits of destinations engaging with ICT for sustainable tourism. They saw it as being a positive solution for measuring and monitoring tourism's impacts, educating and influencing tourists' behaviour, facilitating co-ordination amongst stakeholders, engaging the community in the tourism development process and complementing the existing tools/mechanisms for sustainable tourism.

## **7.5 Sustainable Tourism, ICT and Innovation**

The fourth objective of this thesis was to “*demonstrate how ICT can be an innovative approach for sustainable tourism by using the Abernathy and Clark (1985) model in categorising these ICT-based tools/applications*”. Innovation in tourism has been

discussed in different forms by various tourism researchers (Hjalager 1995;1997; Volo 2005; Buhalis and Deimezi 2004; Yuan et al. 2006; Hall and Williams 2006). This thesis looked at it specifically from the perspective of applying ICT to sustainable tourism development and the suitability of the Abernathy and Clark (1985) model. Respondents generally agreed that ICT will be an innovative approach for sustainable tourism, justifying the stipulations made by the researcher in chapter four. Based on the literature review, questionnaires and the interviews, these ICT-based tools/applications were classified as seen in Figure 6.17 based on the dimensions of the Abernathy and Clark (1985) model in chapter four.

The Abernathy and Clark (1985) model is based on the concept of transilience which is the ability of the innovation to influence the firms' resources, skills and knowledge. This model was based on the premise of how firms increase their competitive advantage in the marketplace. In the introductory chapter, it was stated that this thesis would not focus on competition in order to set boundaries, make the work manageable and to be able to complete it in a set time frame. However, this does not exclude the researcher from recognising that the creative use of ICT for sustainable tourism can provide DMOs and their destinations with a competitive advantage. This in itself contributes to sustainable tourism development by leading to economic benefits for destinations.

It was evident that some ICT-based tools/applications can be grouped under more than one categorisations of innovation. The results brought to light that destinations were in different stages of using ICT for managing their general tourism industry as demonstrated in Figure 6.3. Therefore, some destinations were more advanced than others with regards to using ICT for sustainable tourism development thereby providing different categorisations of these tools. Also, a particular type of innovation for one destination may not be the same for another (Abernathy and Clark 1985). This illustrated that innovation is not a unified phenomenon as recognised by the Abernathy and Clark (1985) framework.

Figure 6.17 depicted the classification of these ICT-based tools/applications. Both DMS and Tourism Information System were identified as being regular, niche and architectural innovations. A destination already engaging with a DMS and a Tourism Information System would regard using these tools for sustainable tourism as primarily a new investment in the technology which the DMO already possess i.e. regular innovation. A destination which has never engaged with a DMS or a Tourism Information System, will view these tools as not only changing the nature and shape of managing sustainable tourism but also the general tourism industry, since they are now enlightened on the possibilities of these tools. It would help manage the tourism resource inventory, support small and medium sized enterprises and engage the community in the tourism development process i.e. architectural innovation. New sectors can be created through the use of ICT for sustainable tourism such as novel types of tourism promoted through the DMS or through community involvement. The use of a Tourism Information System can alter the shape of the industry by providing destination managers with critical information by standardising tourism statistics. Such standardisation is important since this is needed for measuring the enormity of tourism impacts, assisting in the tourism planning process, aiding in possible creation of new sectors or transforming old ones and for marketing and promotion of the destination (Wöber 2000).

These tools were also determined to be niche innovations. This type of classification aligned with some of the uses a DMS for sustainable tourism discussed prior. DMS can be used to create new businesses by forming partnerships and alliances with stakeholders at the destination and fostering greater co-operation and communication. By extending its uses for sustainable tourism, a DMS can offer creative products such as providing a Web space where the community and the visitor can interact, offering an avenue for the community to consult on proposed tourism plans and projects, supply sensitisation information to the tourists for better interpretation of the destination and encouraging more sustainable behaviours and attitudes at the destination.

Location Based Services (LBS) was identified in all four categories of innovation in the Abernathy and Clark (1985) model. This perhaps indicated that LBS potentially has the power to transform the entire industry with its usage for sustainable tourism. The increasing growth of wireless and mobile technologies facilitates efficient communication and allows for greater interaction between the tourists and the stakeholders at the destination by removing time and space constraints (Racherla et al. 2008). Through the use of LBS, destination managers can create innovative experiences for the tourist at each stage of their travel experience but providing them with information on a variety of activities at the destination that may be relevant to their needs (Liburd 2005). A LBS was perhaps denoted to be a regular innovation because some destinations are already using this tool for marketing and promotion such as destinations located throughout Australia (Sharda et al. 2006). Moreover, using a LBS is adding an ICT dimension to the existing approaches for managing sustainable tourism such as visitor management techniques and tourist education. It can be a niche innovation since it facilitates greater co-operation amongst stakeholders in promoting the destination to the tourists by using technology in a creative way to combine the destination offer to the tourists. New business opportunities will be realised such as agreements with mobile service providers in order to develop uses of the LBS at the destination.

An LBS can be a revolutionary innovation since it can have a transformative effect by presenting new opportunities for destinations to be more sustainable by reducing the level of printed materials and providing information to the tourists whilst on holiday. It is also architectural since it plays a pivotal role in not only how sustainable tourism is managed but also how tourism is managed from the uses and applications discussed earlier. Destination managers will now have the power to communicate seamlessly with the tourist whilst the tourist will be able to share and exchange information with the local community and other travellers. This builds rich and rewarding experiences which takes into consideration the environment. (Racherla et al. 2008). Developing consumer-centric technology such as LBS has been identified as critically important for DMOs (Buhalis and Law 2008).

Computer Simulation was identified as being regular, niche and revolutionary but not architectural innovation. This may have been attributed to the different stages of destination development. However, it was not seen as an architectural innovation because the main uses were modelling, simulating and depicting changes or future scenarios. This is quite important for making the right decisions with regards to sustainable tourism development but this ICT-based tool/application may not have the ability to create new markets or new sectors or transform the way the tourism industry is managed.

Geographical Information System was seen as both a niche and architectural innovation. It can be classified as a niche innovation because it can open up new market opportunities through the identification of sites and attractions suitable for tourism development, best routes to use at the destination and provide better ways of monitoring indicators at the destination. GIS was also identified as being an architectural innovation since it has the power to change the way in which tourism is managed. New linkages are created by involving the community and by forming partnerships to collect data to feed into the system. Through proper analysis of the data, destination managers can make more informed decisions which can create new types of tourism products and services, rejuvenate old sites and attractions and develop parts of the destinations which are suitable for development and protect those which are not. It can also demonstrate to the community that the DMO is serious about tourism development hence having an architectural innovation impact.

Community Informatics was identified as both a niche and a revolutionary innovation. It was classified as a niche innovation since it opens up collaboration and co-operation with different community groups to share information and contribute to the tourism development process. It was identified as a revolutionary innovation since it can transform how the community is consulted in tourism matters, allow the community to play a leading role in how the destination is portrayed, help educate the tourists and preserve heritage and traditions. Even though community participation is deemed to be important for sustainable tourism, this rarely occurs in practice (Cole 2006).

The ICT-based tool/applications which were rated in one category were Environment Management Information System which was identified as a revolutionary innovation, software (Economic Impact Analysis Software and Weather, Climate and Ocean Change Forecasting Software) which was seen as a regular innovation. Global Positioning System and Carbon Calculator were both identified as niche innovations and Intelligent Transport System and Virtual Tourism as architectural innovations. Environment Management Information System may have been rated as a revolutionary innovation since many destinations are aware of the uses of an Environmental Management System (Lee 2001; Barrow 2006) but they have limited knowledge on the ICT aspect of this. Environment Management Information System can transform the way tourism is managed by monitoring emissions and waste management at the destination. This leads to sounder decision making as well as aids in current approaches such as alternatives to carrying capacity and indicator development and monitoring. Similarly, software was identified as a niche innovation since all destinations are already using software for their everyday uses and, therefore, it is a new investment in already existing technology. It also adds an ICT dimension for the methods currently used to monitor the economic impacts of tourism at the destination.

Intelligent Transport System and Virtual Tourism were identified as architectural innovation since they do possess the elements to transform the way tourism is managed. If a proper Intelligent Transport System is implemented, then destinations will be able to manage their energy consumption and contribute positively to the environment. With regards to Virtual Tourism, there is the lingering question as to whether it will replace travel as we know it today (Teo 2002). At the time of writing this thesis, there was a dismal outlook for the world's environment as climate change was increasing as a threat. A likely trend which may emerge is that more people may be keen to participate in a virtual holiday. Large virtual communities exist with many tourism businesses already having a presence in virtual worlds such as Second Life. DMOs can create stimulating online experiences combined with rich media with well-constructed narratives to guide the tourist through the destination and allow them to share this experience with others without physical travel.

Abernathy and Clark (1985) discussed that successful use of the different types of innovation requires different types of organisational and managerial skills. DMOs do possess these capabilities since in recent times their roles have been increasing from just a marketing function to overall management of tourism destinations (Ritchie and Crouch 2003). From the multiple classifications of these ICT-based tools/applications, it is evident that DMOs have to become technology experts and become generalist-specialist in how they manage their destinations. It should be noted that this modified version of the Abernathy and Clark (1985) model needs to be debated and tested for its ability to innovate tourism. As it stands, the model is still conceptual. This initial research initiative has sought to integrate innovation theory with the use of ICT for sustainable tourism, however, until these ICT-based tools/applications are implemented by DMOs, only then can this model be tested and accepted.

## **7.6 Sustainable Tourism and Destination Management**

The fifth objective of this thesis focused on “*determining the areas of sustainability where ICT-based tools/applications can be used in destination management*”. Destination managers and eTourism experts were asked to rank the areas where they felt ICT would be most useful for sustainable tourism development based on the findings in the literature. Both groups ranked information management as the most important area of applying ICT-based/tools applications for sustainable tourism development. As previously discussed in the literature, information management is key to developing destinations in a sustainable manner and all of the tools/applications identified above can contribute in some way to managing the information needs of destination managers. Tourism is an information-intensive industry and managing this information is crucial to the success of the industry (Sheldon 1997; Werthner and Klein 1999, Buhalis 2003). Through better information control, destination managers can better plan and manage the tourism industry.

Destination managers recognised tourist satisfaction as the second area where ICT-based tools/applications can be most useful. This may have been identified as being



critical since satisfaction is important to tourist returning to destinations and was ranked as being significant. Transport was ranked as third important because if sustainable solutions can be found for transportation, then destinations can reduce their CO<sub>2</sub> emissions (Lin 2009). eTourism experts identified transportation as the second area where ICT would be most useful for sustainable tourism development. In contrast to the destination managers these eTourism experts identified community participation as the third most useful area for ICT-based tools/application as compared to the destination managers who ranked this as their area of least importance. eTourism experts may have ranked this area high because in the literature there has been a lot of discussion on involving the community in the tourism development process and the necessity of accomplishing this. However in reality this is rarely happening and destinations may have prioritised other concerns. As mentioned before, destination managers may be unaware of this since such information may not be readily available in a form which they can use to engage the community in the tourism development process.

In retrospect of this objective, from the results and the literature, it was evident ICT has a prominent role to play in information management. However, this does not downplay the significance of using ICT for other areas identified despite the disparity in rankings. The uses of ICT are wide ranging and they should not just be limited to managing information but rather adopting a full spectrum approach to managing a destination's sustainability concern.

## **7.7 Approaches to Managing Sustainable Tourism Development**

The sixth objective of this thesis was to “*critically examine the current approaches in destination management for the use of ICT-based tools/applications for sustainable tourism development*”. In researching and surveying respondents, it was fair to postulate that all destinations were using ICT for sustainable tourism but at a very low level. Most destinations have Internet access and hence providing information online instead of a printed format can indeed be considered a sustainable activity. However, it appeared that these destinations were unknowingly using ICT for this purpose and were unaware that ICT can be used for sustainable tourism

based on the seemingly insufficient usage in the findings. With regards to more advanced uses of ICT, there were very few destinations that were readily engaging with ICT for this purpose. One destination interviewed was now considering this whilst another was readily using ICT for sustainable tourism. They followed the approach of using the ICT-based tools/applications which were best suited to their sustainability issues. For example, if a destination wanted to map visitor usage of an area so they can better manage capacity or zone areas, this destination would consider investing in a Geographical Information System to fulfil these purposes.

The researcher encountered difficulty in trying to accomplish this objective. In destination management, there did not appear to be any coherent approach towards using ICT for sustainable tourism development. Rather, it seemed to be used on an ad-hoc basis or as need basis. Moreover, respondents were unsure about the type of approaches DMOs were adopting in using ICT for sustainability. Due to the low level of usage of ICT for sustainable tourism, it was difficult to critically assess. Perhaps this objective would be better accomplished in future research when there is knowledge transfer of this work and destinations are engaging more with the technology. Despite these difficulties, the researcher was still able to consider how destination managers select these tools/applications as discussed in the subsequent section.

## **7.8 Assessing the Selection of ICT-based Tools/Applications**

The final objective of this research was to “*assess how destination managers select these ICT-based tools/applications for their destinations*”. In using ICT for sustainable tourism development, there will always be critical success factors and barriers to usage. The researcher admits that these factors do exist but in order for this work to be of real value to destinations there must be some type of selection process for the use of these tools.

The researcher tried to discern if there was any consistent pattern for use of tools by the particular types of DMOs. The findings of the destination managers demonstrated that DMS and TIS were used by all levels of DMOs which aligned to

earlier findings. In triangulating the results of destination managers, eTourism experts and expert interviews there were two streams of views on the types of DMOs which would use these ICT-based tools/applications. One group felt that there would be wider usage the more local the level of the DMO. This was demonstrated from the general usage of ICT-based tools/applications by the local level DMOs surveyed. From the DMOs surveyed the least use of these tools were by Continental Tourism Organisations. It was felt that the local level DMOs would have better usage of these tools since they had greater ability to gather more useful information at the ground level to be able to feed into these ICT systems. The general opinion was that higher level DMOs were more concerned with marketing and promotion of the overall destination whilst local level DMOs were more focused on operational and tactical matters. The other group felt that these ICT-based tools/applications would have the greatest value if used by Regional Tourism Organisations. These were of the opinion that Regional Tourism Organisations were not overly broad based and hence more focused on sustainability issues as compared to Continental Tourism Organisations. These Regional Tourism Organisations were also better positioned with funding and human resources capabilities to access and use these tools.

The stage of tourism development was also seen as being important in the selection of these ICT-based tools/applications. Despite no statistically significant relationship existing between the stage of tourism development and ICT usage for sustainable tourism, the general consensus from the experts interviewed was that ICT would be used more at the development and consolidation stage for sustainable tourism development. This was confirmed with the results of the destination managers survey. Even though it would have been better for destinations to use ICT for sustainable tourism during the early stages, it was during the development and/or consolidation stages where difficulties due to improper tourism planning and over-development were realised (Martin and Uysal 1990). This provided greater justification for use in the earlier phases as tourism's negative impacts become more advanced in the later stages of a destination's tourism development. Moreover, in the early stages of development, destinations many have problems in up-taking ICT for sustainable tourism due to funding. Their priority would be on marketing and

promoting and getting the destination known rather than on sustainable tourism development. An example of such a destination is Aruba which is a well established but only recently has begun to develop a sustainable tourism plan because they have now realised the problems of over-development. If destinations at the beginning of their tourism development, plan and grow their industry in a sustainable manner then they can prevent many of the problems which occur later on in the destination's life cycle (Manning and Dougherty 2000). ICT can help in this process. It was also discussed that the funding regime of the DMO has a role to play in the type of ICT-based tools/applications which were selected. Member-based DMOs were more accountable to their membership and therefore would be less likely to invest in these tools but government-based DMOs have a responsibility to the wider community and may be more inclined to invest in these technologies. They also tend to have access to greater funding.

Despite these specification criteria, the general consensus was that DMOs will select the ICT-based tools/applications based on the sustainability goals of their destinations. So if both a Local Attraction DMO and a Continental Tourism Organisation were experiencing problems of selecting areas for tourism development in order to ensure sustainability principles are reached, they would both consider the use of a Geographical Information System. If they were experiencing difficulties with the host community and wanted to engage them more in the tourism development process they might use the output from the GIS to explain proposed developments. They may also want to consider the use of Community Informatics. Likewise, if they wanted to track the movement of tourists at the destination so they can more efficiently plan tourist routes or identify areas of tourist concentration they may employ a GIS or a Global Positioning System. Based on the literature, results and analysis, Table 7.1 was developed to assist destination managers in selecting these ICT-based tools/applications for use at their destination. This table helps destination managers select which ICT-based tools/applications which are most applicable for them and help to classify the level of these tools as either micro or macro uses, multiple or single uses.

**Table 7.1:** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Inventorying tourism resource	Geographical information system	Information management	Alternatives to carrying capacity Indicator development	Controlling use intensity Development control
Identifying suitable locations for tourism development	Computer simulation Geographical information system	Information management	Alternatives to carrying capacity Codes of conduct Indicator development Visitor management techniques	Controlling use intensity Development control
Identifying damaged areas at the destination	Geographical information system	Information management	Alternatives to carrying capacity Indicator development	Development control
Managing the destination's resources	Destination management system Environment management information system Geographical information system Location based services	Information management	Alternative to carrying capacity Certification Indicator development Visitor management techniques	Controlling use intensity Development control
Managing sites and attractions	Geographical information system Location based service Tourism information system Virtual tourism	Information management	Indicator development Visitor management techniques	Controlling use intensity Development control

**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Zoning	Environment management information system	Information management	Indicator development Visitor management techniques	Controlling use intensity Development control
Visitor management	Environment management information system Geographical information system	Energy consumption Information management	Alternatives to carrying capacity Indicator development Visitor management techniques	Controlling use intensity Energy management
Managing tourist flows	Geographical information system Location based service Tourism information system Virtual tourism	Energy consumption Information management	Indicator development Visitor management techniques	Controlling use intensity Development control Energy management
Tracking tourist movements	Computer simulation Geographical information system Global positioning system	Energy consumption Information management	Codes of conduct Visitor management techniques	Development control
Profiling visitors	Geographical information system Global positioning system Virtual tourism	Information management Interpretation Tourist satisfaction	Indicator development Visitor management techniques	Controlling use intensity Developing control Economic benefits Tourist satisfaction

**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Location identification for tourists	Geographical information system Global positioning system Location based services	Energy consumption Interpretation Tourist satisfaction	Indicator development Visitor management techniques	Controlling use intensity Developing control Economic benefits Energy management Tourist satisfaction
Providing real time transport information	Intelligent transport system	Energy consumption Information management Tourist satisfaction	Indicator development Visitor management techniques	Controlling use intensity Economic benefits Energy management Local satisfaction Tourist satisfaction
Planning transport routes for optimising protection of the natural environment and reducing tourist traffic in sensitive areas	Computer simulation Geographical information system Global positioning system Location based services Intelligent transport system	Energy consumption Information management Tourist satisfaction	Indicator development Visitor management techniques	Controlling use intensity Economic benefits Energy management Tourist satisfaction
Identifying market segments	Destination management system Geographical information System Location based services Virtual tourism	Energy consumption Tourist satisfaction	De-marketing Visitor management techniques	Controlling use intensity Economic benefits Tourist satisfaction

**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Marketing the destination	Destination management system Geographical information system Location based services Virtual tourism	Energy consumption	De-marketing	Controlling use intensity Economic benefits Tourist satisfaction
Measuring how conditions of a particular indicator has changed over time	Geographical information system Computer simulation	Information management	Certification Indicator development Monitoring	Controlling use intensity
Identifying indicators	Geographical information system Computer simulation	Information management	Certification Indicator development	Development control
Measuring indicators	Computer simulation Geographical information system	Information management	Certification Monitoring	Development control
Data integration from a variety of sources	Destination management system Environment management information system Geographical information system	Information management	Alternative to carrying capacity Certification Indicator development Monitoring Visitor management techniques	Controlling use intensity Development control Economic benefits Energy management



**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Producing realistic images of what a proposed development would look like	Computer simulation Geographical information system	Community participation Information management	Indicator development	Controlling use intensity Development control Effects of tourism on host community Local satisfaction
Scenario testing and modelling	Computer simulation Geographical information system	Community participation Information management	Alternative to carrying capacity Indicator development Monitoring Visitor management techniques	Controlling use intensity Development control Effects of tourism on host community Local satisfaction
Providing information to the tourists	Destination management system Global positioning system Location based services Intelligent transport system Virtual tourism	Energy consumption Information management Interpretation Sustainable consumption Tourist satisfaction	Alternative to carrying capacity Codes of conduct Indicator development Monitoring Visitor management techniques	Economic benefits Effects of tourism on the host community Tourist satisfaction
Providing information to the local community	Computer simulation Destination management system Geographical information system Virtual tourism	Community participation	Indicator development	Economic benefits Effects of tourism on host community Local satisfaction

**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal of the Destination</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Engaging with the tourists	Destination management system Global positioning system Location based services Intelligent transport system Virtual tourism	Interpretation Tourist satisfaction	Codes of conduct	Economic benefits Effects of tourism on the host community Local satisfaction Tourist satisfaction
Sensitising tourists about the destination	Community informatics Destination management system Location based services Virtual tourism	Interpretation Tourist satisfaction	Codes of conduct Indicator development	Effects of tourism on host community Local satisfaction Tourist satisfaction
Influencing tourist behaviour	Carbon calculator Community informatics Destination management system Location based services Virtual tourism	Interpretation	Codes of conduct Indicator development	Effects of tourism on host community Local satisfaction Tourist satisfaction
Involving the community in the tourism development process	Community informatics Computer simulation Geographical information system	Community participation	Codes of conduct Indicator development	Effects of tourism on host community Local satisfaction

**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal of the Destination</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Providing safety and security information to the tourists	Destination management system Global positioning system Location based service Intelligent transport system	Interpretation Tourist satisfaction	Codes of conduct Indicator development	Effects of tourism on host community Local satisfaction Tourist satisfaction
Tourist education	Community informatics Destination management system Location based services Virtual tourism	Interpretation	Codes of conduct Indicator development	Effects of tourism on host community Local satisfaction Tourist satisfaction
Monitoring solid waste	Environment management information system	Information management	Awards Certification Indicator development	Solid waste management
Preserving culture and heritage of the destination	Community informatics Location based services Virtual tourism	Interpretation	Indicator development	Economic benefits Effects of tourism on host community Local satisfaction Tourist satisfaction

**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal of the Destination</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Collaboration with local businesses at the destination	Destination management system	Enabling partnerships	Certification Indicator development	Controlling use intensity Development control Economic benefit Effects of tourism on the host community Local satisfaction Tourist satisfaction
Monitoring emissions	Carbon calculator Environment management information system	Information management	Awards Certification Indicator development	Controlling use intensity Energy management
Reducing energy usage at the destination	Carbon calculator Environment management information system Intelligent transport system Location based services Virtual tourism	Energy consumption	Indicator development	Controlling use intensity Economic benefits Energy management
Determining the economic impact of tourism	Economic impact analysis software	Information management	Certification Indicator development	Economic benefits
Determining climate, weather and ocean change	Weather, climate and ocean change forecasting software	Information management	Certification Indicator development	Development control

**Table 7.1 (continued):** Assessing ICT-based Tools/Applications for Sustainable Tourism Development

<b>Sustainability Goal of the Destination</b>	<b>ICT-based tools/applications</b>	<b>Opportunity</b>	<b>Alignment to Current Tools/Mechanisms</b>	<b>Alignment with United Nations World Tourism Organisation's (2004) Baseline Indicator</b>
Reduce print material	Carbon calculator Destination management system Global positioning system Location based services Virtual tourism	Energy consumption	Awards Certification Indicator development	Controlling use intensity Economic benefits Energy management Solid waste management
Tourist statistics	Tourism information system	Information management	Alternatives to carrying capacity Indicator development Visitor management technique	Controlling use intensity Development control Economic benefits Effects of tourism on the host community Energy management Local satisfaction Tourist satisfaction

Most of these ICT-based tools/applications have a variety of uses. Only Weather, Climate and Ocean Change Forecasting Software and Environment Management Information System have single uses because they are software designed for specific purposes. This is very positive for destination managers since if they are to petition for funding for investing in these tools, having multiple uses would make a better case for them. As one of the experts interviewed identified:

*If it's something that's broad and addresses a lot of peoples needs and it has applicability across a number of issues or the tool could be used by someone else then we would have a lot better chance of getting funding for it (E13).*

All respondents identified a wide array of barriers and critical success factors for the uptake of ICT for sustainable tourism. These were similar to those in the literature for the general uptake of ICT for tourism as presented in the results. As mentioned earlier, many critical success factors were also identified as barriers. Due to this, from this point on in the analysis, instead of differentiating between critical success factors and barriers, the researcher will address it as the factors influencing the uptake of ICT for sustainable tourism.

All parties surveyed identified cost as an important factor influencing the uptake of ICT for sustainable tourism development. They felt that if DMOs did not have the finances to support the implementation of these tools then there would be little or no use of ICT (Nodder et al. 2003) for sustainable tourism development. These ICT-based tools/applications needed to demonstrate to destinations that the benefits of using them outweighed the costs. DMOs needed to be truly aware of the value added from implementation and that these ICT-based tools/applications were fit for purpose in meeting the sustainable tourism objectives of the destination. It might be feared that in times of economic uncertainty, investment in tools/mechanisms needed for promoting and maintaining the sustainability of the tourism industry will be low or non-existent. Bramwell and Lane (2009), however, commented that future cost savings to be realised from such investment might be more appealing to

organisations during this period of economic recession. It was also felt that government support was important with regards to funding and policy decisions.

Another influencing factor identified was the lack of knowledge and understanding of ICT-based tools/applications and how it can help DMOs (Yuan et al. 2006) with managing the sustainability of their destinations. Not only did DMOs need to understand the technology, but it was felt that they needed to have someone on staff who have developed expertise in using these tools/applications for the destination. Therefore the user and his/her appreciation of ICT for sustainability was an important influencing factor. Other concerns expressed were that many destination managers have a limited outlook of what sustainable tourism entails. They saw these destination managers as only viewing sustainable tourism as encompassing the natural environment and they were uncertain how to apply the principles to practice (Ruhanen 2008). They were also unsure whose responsibility the management of sustainability rest with at the destination level. Despite lots of discussion by destinations on pursuing a sustainability agenda, it was felt that this was not their core business but more of an awareness and branding tool as part of their marketing strategy.

From the results and the literature, it was seen that ICT can be used to create partnerships for managing sustainable tourism development which is important in the implementation of these tools. Since some of these tools had multiple applications and can benefit more than one stakeholder then forming partnerships would be integral for its success. Another influencing factor was DMO buy-in and support for use these tools. If DMOs become champions of applying ICT to sustainable tourism then they will work towards greater implementation.

Popularity of these ICT-based tools/applications was seen to be another influencing factor. DMOs were more willing to implement these ICT-based tools/applications if they saw other destinations engaging with them. Employees also needed to be trained so as to prevent resistance and improper usage of the technology (Nodder et al. 2007). Other factors influencing the uptake of ICT for sustainable tourism were

lack of data at the destination to feed in to the models, lack of confidence by destinations to engage in use of these ICT-based tools/applications, consumer demanding the use of technology (Buhalis and O'Connor 2006), accurate interpretation of data, producing measurable outputs and the generation of timely results.

Taking these factors into consideration as well as the factors that would influence destination managers' selection of these ICT-based tools/applications, from the researcher's understanding it was felt that the sustainability goal of the destination would outweigh these influencing factors in the use of ICT for sustainable tourism. Once destination managers understand that ICT can assist help alleviate some of their sustainability concerns and the ways in which this can be accomplished then they would argue for greater use of the technology.

## **7.9 Conclusion**

This chapter has presented an analysis and discussion of the primary research of this research. From above it is evident that ICT can be used for sustainable tourism development. It can also be used to manage all the elements of sustainable tourism: environment, economic and socio-cultural. For example, the environment aspects can be maintained through the use of an Environment Management Information System or a DMS, the economic aspect can be realised through using Economic Impact Analysis Software, Location Based Services and DMS whilst the socio-cultural elements are achieved through the use of Community Informatics. Returning to Table 2.4, ICT for sustainable tourism can further be used for making more effective the already existing concepts for sustainable tourism. This is evident based on the uses of these ICT-based tools/applications discussed earlier.

Moreover, this research has demonstrated how this approach can be innovative for the tourism industry. It also identified how these ICT-based tools/applications can be used for solving some of the problems of destination management. It should be noted that the researcher can only discuss these ICT-based tools/applications and examine how they can be used in destination management. Destination managers



and DMOs need to take the next steps. The true value of this work would be determined by DMOs ability to use the information provided to transform themselves. Buhalis and Deimezi (2004) commented that DMOs need to be catalysts for change, they need identify the technologies which can support their operational and strategic functions and re-engineer their role in destination management for the benefit of the destination. DMOs need to become learning organisations and use ICT to strengthen their activities and build their competences (Yuan et. al 2006). They need to be proactive and fully pursue the uses and development of these tools for managing the sustainable tourism development of their destinations. The next chapter brings this research to a conclusion.

## **Chapter Eight**

# Chapter Eight

## Conclusions

### 8.1 Introduction

The purpose of this chapter is to bring this overall research to a conclusion. It will provide an overview of the work by recognising key themes in the literature, identifying the methodology and data collection methods used and discussing the major findings and interpretation. This chapter then identifies the contribution of this research to theory and limitations which were encountered. It concludes by suggesting areas for future research and ways in which this study can be progressed into practical applications.

### 8.2 Research Overview

This thesis sought to investigate the uses and applications of ICT in mitigating tourism's negative impacts by adopting a destination focused perspective. The research in eTourism has mainly concentrated on consumer and demand dimensions, technological innovations and industry functions (Buhalis and Law 2008) whilst the research in sustainable tourism has been wide ranging focusing on different areas from the historical development (Hall and Lew 1998), definitional issues (Hunter 1995; 1997; Butler 1999; Garrod and Fyall 1998; Sharpley 2000) and conceptual and operational progression (Hardy et al. 2002). Recently, a content analysis of the articles published in the *Journal of Sustainable Tourism*, the only journal solely devoted to publishing sustainable tourism research over the past 15 years (1993–2007), revealed that research in sustainable tourism has shifted from niche to mass tourism and more focus is being placed on the private rather than the public sector. Interest has risen in cultural and heritage tourism and number of alternative concepts such as sex, community and TV-induced tourism, within the realm of sustainable tourism (Lu and Nepal 2009). The specific use of ICT for sustainable tourism development has been rather under-researched in both the eTourism and sustainable tourism disciplines. This research sought to combine these two dynamic research

areas, by developing the proposition that ICT can be a pragmatic approach to tackling the problems of sustainable tourism development for destination managers.

In undertaking this investigation, literature in the fields of both sustainable tourism and eTourism were surveyed. The sustainable tourism literature traced the concept back to its origins in the parental concept of sustainable development. It demonstrated how this notion has advanced and continues to be interpreted by the tourism industry (See Clarke 1997; Hall and Lew 1998; Hardy and Beeton 2001). The review also brought to light that the concept of sustainable tourism has been highly criticised in the tourism literature. Sharpley (2000) discussed that it can be regarded as an oxymoron since it is vague and has various interpretations by different groups. Added to this, there were various critics regarding its definition. One school of thought defined sustainable tourism as being very sector specific whilst the other viewed it in a much broader, multi-sectoral perspective which took account of its relationship with sustainable development (Hunter 1995; 1997; Butler 1999; Collins 1999; Sharpley 2000; Sheldon et al. 2005). Debates also arose as to what should be sustained, for whom, for how long and under what conditions (Berno and Bricker 2001; McCool et al. 2001; Liu 2003).

Destinations encountered a further challenge of finding the right equilibrium between the environmental, economic and socio-cultural resources that were needed for the industry to be considered sustainable i.e. triple-bottom line approach (Organisation of American States 1997). Today, destinations not only have to find the correct balance amongst these three elements but recently a fourth element has been thrown into the mix which is climate change. The United Nations World Tourism Organisation now refers to the triple bottom line as the quadruple bottom line (Lipman 2008). Therefore, destinations are encountering more difficulties in determining what this right balance is for them.

Moreover, the sustainable tourism literature has been criticised for being myopic by concentrating on conceptualisation issues rather than on practical applications (Garrod and Fyall 1998; Butler 1999; Swarbrooke 1999). Discussing sustainability

is simple, implementation is difficult, and this research is seeking to avoid sustainable tourism becoming an empty cliché. Academics have begun to understand that the development of practical tools and mechanisms for executing the principles of sustainable tourism must be given top priority, whilst the debate surrounding the discourse of the concept should be placed second (Liu 2003). Some progress has been reached in putting into practice the concept by using approaches such as visitor management techniques, alternatives to carrying capacity, sustainability indicators and monitoring, certification, accreditation, eco-labelling, awards, legislation, regulation and licensing, taxes, codes and conduct and de-marketing. The researcher intent was not to engage in a full discussion of the pros and cons of using these approaches in managing the industry. This would be a much larger endeavour than the work of a single PhD. Rather it was recognised that these approaches existed and demonstrated that ICT has never been developed as a concept to assist with managing tourism's impacts.

This took us to the eTourism literature. This section looked at the development of ICT in the tourism industry and discussed the current linkages with tourism in areas such as information processing, changing customer requirements, suppliers, virtual communities and DMOs engagement with ICT. The literature identified that despite no specific mention of the use of ICT for sustainable tourism, opportunities did exist in destination management for using ICT and there were specific ICT-based tools/applications which can be used for these purposes as summarised in Table 3.9.

This background in sustainable tourism and eTourism helped the researcher develop the theoretical framework for this research. Tourism has become innovative mainly through the use of ICT (Poon 1993; Sheldon 1997; Werthner and Klein 1999; Buhalis 2003). Seventy-eight percent (78%) of European tourism companies in 2006 stated that innovations were critically linked to ICT is supporting evidence of this (European Commission 2006). Racherla et al. (2008) argued that tourism destinations have not embraced the power of ICT to connect with innovation for tourism planning and development. Hjalager (2002) concurred by discussing that classical innovation theories have much to offer tourism but to date there has been

little research on their applications. This study applied the Abernathy and Clark (1985) model by examining ICT as an innovative approach in the management of sustainable tourism. This model was selected since it provided a clearer understanding of the nature of particular and well-defined innovations. This helped in classifying the wide-ranging ICT-based tools/applications found in the literature and the primary research. It also demonstrated that the application of ICT to sustainable tourism can be innovative for the industry. This aligned with the observations by Hall and Williams (2008) that tourism can be a driving force for transmitting innovation and growing the existing body of knowledge on tourism innovative and its practical applications.

The literature review, therefore, identified a variety of concepts and a number of tools/mechanisms directed towards reducing the negative impacts of tourism. It also demonstrated how the use of ICT can be an innovative approach in managing the sustainable tourism development of destinations. Furthermore, it illuminated that there has been limited empirical research on the uses and applications for sustainable tourism development, meriting further research. This led to the development of the aims and objectives, defining the research problem, identifying the research questions, determining the methodology and the research methods used. Due to the lack of empirical and theoretical research in the ICT-sustainable tourism domain, it was felt that the best approach to conducting the primary research was to adopt an inductive approach aligning itself to an interpretive stance. This guided the selection of the research methods of online questionnaires and semi-structured interviews.

Information was required from destination managers and eTourism experts. Destination managers were surveyed since they were identified as usually the key players charged with the responsibility for the holistic planning and management of tourism destinations and in essence, the sustainable tourism development of these destinations. eTourism experts were selected since they are forefront in researching the latest and cutting-edge applications of ICT for the tourism industry and therefore were instrumental in identifying current and potential tools and their uses in destination management. Using the database of TEAM Tourism and IFITT,

questionnaires were sent to these two populations. Due to the relative newness of this research domain, the response rates to the questionnaires were low since there are few people who possess expertise in this domain as the knowledge is now growing. To cater for this, the survey was administered worldwide to canvas general opinions and perspectives about the uses of ICT for sustainable tourism. It was also used to identify individuals who had acquired in-depth understanding in this field. When these participants were identified, they were invited to participate in a semi-structured interview. Following the execution of the research design, the collected data was analysed and interpreted using the objectives of the research as a guide.

This research had two overarching aims. The first of these was to investigate the uses of ICT-based tools/applications for destination managers in support of sustainable tourism development. The second aim focused on developing assessment procedures for the ICT-based tools/applications which can be used by destination managers for sustainable tourism development. Reviewing the first aim, the literature revealed a number of opportunities for using ICT and a variety of ICT-based tools/applications and the primary work confirmed usage of these for sustainable tourism development. The opportunities for use of these tools were information management, tourist satisfaction, interpretation, enabling partnerships, community participation and energy consumption. These ICT-based tools/applications were Carbon Calculator, Community Informatics, Computer Simulation, Destination Management System, Economic Impact Analysis Software, Environment Management Information System, Geographical Information System, Global Positioning System, Location Based Services, Intelligent Transport System, Tourism Information System, Virtual Tourism and Weather, Climate and Ocean Change Forecasting Software. This list was considered to be comprehensive since respondents did not identify any other ICT-based tools/mechanisms. Table 8.1 presents a collection of these ICT-based tools/applications and their main uses for sustainable tourism development.

**Table 8.1:** Collection of ICT-based Tools/Applications for Sustainable Tourism Development

ICT-based Tools/ Applications	Definition	Uses for Sustainable Tourism
Carbon Calculator	Used to determine carbon emissions based on the type and amount of energy consumed. The result of this calculation is known as the carbon footprint and is measured in tonnes of CO <sub>2</sub>	<p>Environmental benefits result from the monitoring of emissions</p> <p>Economic benefits can be realised if destinations demonstrate to the tourists that they are willing to pay more attention to the environment. They will gain more support from the environmentally-conscious traveller</p> <p>Socio-cultural benefits are created by having a cleaner environment for the host community through the monitoring of emissions</p>
Community Informatics	An ICT-based tool/application focused on the design and delivery of technological applications for enhancing community participation and development through the use of e-mail, bulleting boards and networks all based on the Internet.	<p>Socio-cultural benefits are enhanced through increased community participation in the decision making process</p> <p>This develops social capital by empowering individuals and strengthening community identity and creating opportunities for economic development</p>
Computer Simulation	A simulation of real world settings where models are designed to depict how a system operates over time	<p>Issues too complex for direct observation, manipulation or mathematical analysis are simulated to investigate the effectiveness of alternative management practices. This leads to better decision by destination managers and impacts on the economic, natural and socio-cultural environments</p> <p>Realistic images are produced for public consultation concerning visitor use of the community's space, rather than just identifying a hypothetical situation. This leads to better relationship with the tourist, tourist planner and host community and facilitates community participation in decisions which affect them</p>



**Table 8.1 (continued):** Collection of ICT-based Tools/Applications for Sustainable Tourism Development

ICT-based Tools/ Applications	Definition	Uses for Sustainable Tourism
Destination Management System	A system that consolidates and distributes a comprehensive range of tourism products through a variety of channels and platforms	Facilitates the establishment of platforms for promoting economic benefits for the local communities, reducing socio-cultural tensions and negative impacts and highlighting the fragile eco-systems of destinations  By providing co-ordinated online information, anywhere, anytime, DMS can lead to increased levels of tourist satisfaction by reducing search time and providing pertinent information about a destination
Economic Impact Analysis Software	Software used to monitor the economic impacts of tourism by providing information on the type and amount of spending	Information can be used to determine financial feasibility, choose among alternatives, increase the level of economic activity and lobby public support for tourism development
Environment Management Information Systems	A combination of computer hardware, software, and professional services that integrates disparate information about environmental issues in order to manage the environmental function within an organisation. EMIS systematically gathers, analyses and reports business information related to environmental management such as waste tracking and emissions monitoring. This allows a company to track, refine, and improve its environmental management practice.	Disparate information about environmental issues such as tracking waste, monitoring emissions and conducting cost/benefit analysis are connected and integrated by the EMIS for analysis. This leads to better decision by destination managers and impacts on the economic, natural and socio-cultural environments

**Table 8.1 (continued):** Collection of ICT-based Tools/Applications for Sustainable Tourism Development

ICT-based Tools/ Applications	Definition	Uses for Sustainable Tourism
Geographical Information Systems	An information system that can capture, store, manage, manipulate, analyse, integrate and display large amounts of geographical data	Indicators for sustainable tourism can be identified, defined and measured. Information provided for identifying and designating suitable locations for development and three-dimensional images can be produced for proposed developments to evaluate proposals
Global Positioning System	Satellite-based navigation system that provides positioning, navigation and timing services to users in any weather conditions around the world 24 hours a day	By tracking tourist movements, plans can be developed to distribute tourists throughout the destination or at different times of the year so that the impacts on the environment can be managed and minimised
Intelligent Transport System	Telematic systems which provide detailed information on traffic, information from independent locations, traffic guidance and dynamic routing	<p>A better ground transport system allows tourists to be more aware of their exact travelling times at the destination. This leads to wider usage of public transport rather than hiring private cars at the destination. This leads to energy savings and protection of the environment</p> <p>A better transport system also benefits the local community. This reduces traffic congestion at the destination. Host-tourist antagonism can decrease since locals may no longer be resentful of the tourist crowding the roads with their rentals or not understanding the driving rules and regulations of the destinations. People will feel more at ease since transport is relatively hassle free. ITS also provides information about accidents and the safest routes to take so it increases both the safety of the visitor and the host community</p>

**Table 8.1 (continued):** Collection of ICT-based Tools/Applications for Sustainable Tourism Development

ICT-based Tools/ Applications	Definition	Uses for Sustainable Tourism
Location Based Services	An ICT- based tool/application that can collect and deliver information to and from a mobile device depending on the automatic location of the user. The aim of a LBS is to provide targeted information to the user based on his/her geographic location. Such information include but is not limited to places to visit, eat and stay as well as emergency and health services	<p>Information can be provided on the LBS thereby reducing the need for print material</p> <p>Messages can be sent to the tourists to create awareness and familiarise them with the culture and customs of a destination. This information can help the tourists make sustainable choices about which products to consume whilst at the destination. It not only makes them environmentally aware but also more conscious of the socio-cultural environment. This information helps them to develop a better respect for the local community and their culture and heritage.</p> <p>Information can be provided on promotions, places to visit, accommodation and other general information such as safety and security and weather. This increases tourists' decision-making capacity and contributes to greater tourist spend, leading to economic benefits for the destination</p> <p>It also reduces the volume of print material since maps and information on the destination can now be retrieved through the Location Based Services</p>
Tourism Information System	Data warehouses that manage business critical information in order to provide quality information on hand to assist in decision making by serving as a decision support system for destination managers	Provides more quality information on hand to assist in decision making by serving as a decision support system for destination managers

**Table 8.1 (continued):** Collection of ICT-based Tools/Applications for Sustainable Tourism Development

ICT-based Tools/ Applications	Definition	Uses for Sustainable Tourism
Virtual Tourism	An ICT-based tool/application based on the Internet where anyone can experience the culture, history and other points of tourist interests in a visual and interactive manner without actually visiting the destination. An example of this include on-line guided tours of museums and heritage sites where the visitor can experience the destination without actually visiting the destination	<p>It can be used as a substitute for destinations that have exceeded their carrying capacity, are fragile and in danger of being damaged by tourist activities. Tourists can be informed about a destination prior to their visit by having them do a virtual tours of the destination. It can also act as a substitute for activities which are usually regarded as socially unacceptable such as hunting or sex tourism</p> <p>Reduce tourist transport and hence have positive effect on carbon emissions</p>
Weather, Climate and Ocean Change Forecasting Software	Software used to monitor changes in the weather, climate and ocean	This information can be useful for destination managers in bidding for events, making decisions about proposed development, putting measures in place for hazards and risks associated with bad weather, provide tourists with updated information, energy management and other issues

The results displayed that all destinations were using ICT for sustainable tourism but at a low level by providing online information through destinations' Websites. However, very few destinations were aware of the more sophisticated uses of these ICT-based tools/applications for sustainable tourism development. For example, the primary research revealed that tools such as Geographical Information System and Computer Simulation were not being used to their full potential as described in the literature. For those destinations which were engaging with the use of ICT for sustainable tourism, there was no clear approach as to how they were using these tools. It appeared to be on an ad-hoc or as need basis or using what technology was presented to them or following the lead of other destinations.

The application of ICT was found to be a new and innovative approach for tackling the problems of sustainable tourism development. The researcher sought to use the dimensions of the Abernathy and Clark (1985) model in categorising these ICT-based tools/applications and demonstrating the types of innovation each of these tools can produce for the destination. In the discussion, the researcher stated that this model needed to be tested and refined and this investigation can only occur once DMOs begin to engage fully with ICT for sustainable tourism development. Currently, the use of ICT for sustainable tourism by destinations is quite low. The model, as it stands now, is based on the literature findings and the primary research and therefore cannot be used for robust generalisations about the different types of ICT and the types of innovation they will produce. This model needs to be empirically tested on destinations which are fully engaging with ICT. Few destinations were not readily employing ICT when the primary work was executed. Those destinations which were using ICT were not using it to an advanced level to enable sufficient generation of data.

The second aim of this work tried to assess how destination managers select these ICT-based tools/applications. It was found that the most important factor was the sustainability goal/s of the destination. Based on this, a table was developed which acknowledged the specific problems of sustainable tourism development and the corresponding ICT-based tools/applications which can be applied. Each of these

specific problem and corresponding ICT-based tools/applications were linked to the current approaches for managing sustainable tourism and alignment to United Nations World Tourism Organisation's (2004a) baseline indicators. Other factors recognised in assessing the selection of these tools were the stage of tourism development and the funding regime of the DMO. It was also determined that the more uses these tools have, the greater the likelihood that they will be used by a DMO. The results identified that in addition to these factors that there were several other factors influencing the uptake of ICT for sustainable tourism such as government support, user-friendliness, cost, understanding of sustainable tourism and co-operation and partnership.

Taking these factors into consideration as well as the factors that would influence destination managers' selection of these ICT-based tools/applications, from the researcher's understanding, it was felt that the sustainability goal of the destination would outweigh these influencing factors in the use of ICT for sustainable tourism. Once destination managers' understand that ICT can help alleviate some of their sustainability concerns and the ways in which this can be accomplished then they would argue for greater use of the technology.

The creation of partnerships and co-operation was also seen as being important (Milne and Altejevic 2001; Buhalis and O'Connor 2006) in the implementation of these tools. Since most of these tools had multiple applications and can benefit more than one stakeholder then forming such enterprises would be integral for its success and this would allow DMOs to creatively use ICT for the sustainable tourism development of destinations.

The findings of this research demonstrated that if ICT is adopted by destinations for use in sustainable tourism development it can lead to great improvements in how the sustainability is managed. It can be used for monitoring, reporting and measuring tourism's impacts. Destination managers would be provided with readily available and concise information on key issues for important sustainable tourism decision

making. By having this information easily accessible to them they can now focus on truly developing the destination in a sustainable manner.

Using ICT for sustainable tourism will enhance communication with the visitor and tourism businesses by building platforms where the community, tourist businesses and the tourists can share interests and contribute information to benefit the destination on sustainable tourism-related matters. This not only leads to tourist satisfaction but serves as a way of educating them. One such platform which can be developed is a destination dashboard which can facilitate a DMO in managing a network of stakeholders at the destination whereby these ICT-based tools/applications can be shared with tourism businesses. Request and queries can also be sent to the DMO via this destination dashboard so that they are more aware of the issues of the wide-ranging stakeholders and what is happening at the destination and thereby better able to manage and monitor. This facilitates coordination and engagement of diversified stakeholders in sustainable tourism and supporting relationships.

ICT can be also be used in implementing the other existing approaches used in managing sustainable tourism development. For example, Computer Simulation and Geographical Information System can help with measuring and monitoring indicators. Location Based Services and Destination Management Systems can be used for marketing and de-marketing the destination and educating the tourists.

### **8.3 Contributions of this Research**

This thesis contributes to theory by demonstrating the usefulness of classical innovation theory, the Abernathy and Clark (1985) model, in classifying these ICT-based tools/applications. It not only explained that the use of ICT can be innovative for the tourism industry but it also disclosed how it can be innovative. Tourism innovation research is in its infancy and this thesis sought to progress its development. Addressing the age old question of how to make the tourism industry more sustainable, it approached this challenge by not focusing on the existing debates and the current approaches for managing sustainable tourism but rather

suggesting a new strategy through the use of ICT. Moreover it sought to extend the research in eTourism beyond Web marketing, distribution, social networking, virtual communities and consumers use of the technology. It also identified a new stream of research for the sustainable tourism literature. This research asked researchers to question their current ways of thinking and to seek out more radical concepts, methods and practical solutions to make sustainable tourism a more workable reality for destinations through the use of ICT.

A contribution to knowledge was made through the identification of a collection of ICT-based tools/applications and their respective uses in destination management as depicted in Table 7.1 and 8.1. These tables confirmed that ICT can have wide-ranging uses for sustainable tourism as well as it can be used to progress the already existing approaches for sustainable tourism such as visitor management techniques and indicator development. In the literature, there has been published research on these ICT-based tools/applications and their uses but they have not been specifically looked at from the overall goal of sustainable tourism. They have been looked at from specific applications, such as the use of Geographical Information System for tracking tourist movements (Lau and McKercher 2007), or utilising Geographical Information System for marketing (Elliott-White and Finn 1998), and from specific case studies such as employing Computer Simulation in managing Acadia National Park (Manning 2005). There were some ICT-based tools/applications which were identified in the literature in other fields but were not considered in the sustainable tourism or eTourism literature such as Environment Management Information System and Weather, Climate and Ocean Change Forecasting Software. Therefore, this thesis helps to draw some perspective on the ICT-sustainable tourism domain. It serves as a reference point where both academics and industry can identify and build on the uses of these ICT-based tools/applications tools in destinations management. It was stated earlier that the uses and applications of ICT for sustainable tourism is a relatively ignored area of research by academics despite the talks of the benefits of engaging in research in this area. This thesis sought to redress this imbalance.



This work has made a contribution to the tourism field with published conference papers, a book chapter and journal articles in progress (Please refer to Appendix 7). This adds to the tourism literature by exploring an area of research that was previously neglected. However, its contribution can be extended beyond the tourism field due to the wide ranging applications ICT can have for sustainable tourism. It can be extended to such fields as information technology in order to develop ICT-based tools/applications for use by destination managers, making these tools more user-friendly and widening access. The uses of ICT for sustainable tourism can be applied to the wider management literature by looking at the applications of innovation theory or the literature in human development by engaging in research which links a sustainable tourism industry to the larger goal of sustainable development.

This research has practical applications for the tourism industry. One contribution to industry can be seen from the immense support the project has received from industry groups such as Destination Performance:UK, TEAM Tourism and the International Federation for IT in Travel and Tourism (IFITT). To acquire this type of support, the researcher not only had to demonstrate the quality and the rigour of this piece of research but also display to these stakeholders the immense potential of this study for their businesses.

The benefits of using ICT for sustainable tourism for stakeholders were identified in section 1.5.1. Figure 7.1, destination managers can identify their particular sustainability problems and choose the ICT-based tools/applications which can offer them the greatest benefits. They now have at their disposal a collection of ICT-based tools/applications which can help alleviate some of their sustainable tourism issues.

With regards to implementation of this research, there are short to medium term steps which can be taken. Destination managers identified Destination Management Systems as the most important tool for sustainable tourism development. It was demonstrated that a DMS can help with all aspects of sustainability; economic, environmental and socio-cultural. Since most destinations have a DMS, perhaps the

most logical progression would be to develop these more sophisticated uses of the DMS. Additionally, Geographical Information System was ranked highest by eTourism experts. As discussed in Chapter 7, the potential of GIS is vast for sustainable tourism development but this ICT-based tool/application is not being used to its full potential. The findings, however, revealed that some DMOs are already engaging with GIS but mainly for mapping tourists movements and route identification. Since DMOs already have this technology at their disposal, the way forward will be to investigate the other uses of the GIS and put this into action for destinations. Destination System Providers could also use the results of this research to develop a comprehensive package of these ICT-based tools/applications which they can supply to DMOs for use in sustainable tourism.

In the long term, DMOs need to be educated on sustainable tourism, what it means for their destinations and how these ICT-based tools/applications can help in the better management of tourism impacts. It is fair to postulate that DMOs are concerned with the bottom-line and economic concerns tend to outweigh the environmental and socio-cultural effects. However, as demonstrated, most of these tools do impact on the economic environment directly and indirectly. If destination managers truly understand the value of using ICT for sustainable tourism then it will have greater uses in the tourism industry.

#### **8.4 Limitations**

As with any research, this one also encountered some limitations and therefore the findings must be interpreted in this context. Firstly, with the questionnaires, respondents may have based their responses on how they think the survey should be answered rather than on their “real” opinions. There may have been possible design errors in the questionnaires. Perhaps the questionnaires should have been shortened or asked in a different way so that more interval and ratio data were received rather than categorical.

Another limitation identified was low response rate to the questionnaires. The main reason for this was the lack of knowledge in this specialist domain. A convenience

sample was used and these questionnaires were administered to all members of the identified databases used. These characteristics have implications for the generalisability of the findings. A probability sampling method such as systematic sampling might have been used to obtain the sample to add more rigor into the data collection stage. This may have also increased the response rate. If this study should be repeated using a larger sample size then the results from this study will improve the reliability and generalisability of this research. It may have been useful if a focus group could have been arranged which comprised of destination managers and eTourism experts to fully discuss the use of ICT for sustainable tourism development. This would have led to richer results and develop an agenda for moving forward. However, budgetary constraints prevented this. Engaging in a discussion with Destination System Providers might have enriched the data. Such a dialogue would have drawn attention to the ICT-based tools/applications that were being provided to destinations and how these destinations were engaging with the use of these tools. The researcher did not explore this avenue based on the results for the eTourism experts' survey which identified that these providers were mainly supplying DMSs to destinations. The method of analysis used needs to be evaluated. Perhaps more rigorous statistical techniques could have been used if the response rates to the questionnaires were higher. Also the model developed and the ICT-based tools/applications identified were not tested on destination managers to determine if they were appropriate for their needs in managing the sustainability of their tourism industry.

It should be noted that this study represented an initial attempt to investigate the uses of ICT for sustainable tourism. The results clearly showed that currently there are thirteen ICT-based tools/applications which can be used for managing various aspects of the tourism industry. Therefore ICT might just be the practical approach that destinations managers require for mitigating tourism's negative impacts.

## **8.5 Areas for Future Research**

This research laid the foundation for future research in the domain of ICT and sustainable tourism. Using this existing theoretical research, tourism researchers

may start developing a more co-ordinated approach to theory development, potentially engage in more empirical research to address tourism challenges, with regards to sustainable tourism development.

A starting point for advancing this research would be to use the results presented earlier to determine the suitability, applicability and feasibility of this ICT-based tools/applications for destination managers. The results of this work will be used for refinement of Table 7.1. Another area of research could focus on tracing the history of these ICT-based tools/and and document their uses in the tourism industry. Future research could look at each of these ICT-based tools/application in-depth and their specific uses for sustainable tourism development. There has been a lot of research on GIS in the tourism literature but researchers need to start focusing on the other tools and their benefits for destination management such as Carbon Calculators, Community Informatics, Computer Simulation and Environment Management Information System.

More research is required in looking at the opportunities for using ICT for sustainable tourism. Climate change and transport are currently “hot” topics and areas where ICT can have a valuable contribution to lessening tourism’s negative impacts, but they were largely under-researched in the tourism literature. Added to these, other potential areas of research for the application of ICT to sustainable tourism are sustainable production, energy management, water availability and consumption, and wastewater management. No mention was made of these in the analysed literature.

This research sought to look at the uses and applications of ICT from the perspective of DMOs. A further area of research would be to look at the application of ICT from the perspective of the individual tourism businesses at the destination. Different categorisation of tourism businesses can be identified such as accommodation, airlines and cruise lines. The accommodation sector can be further broken down into different classifications. The consumer perspective and their motivations to visit a destination engaging with technology for assisting the destination to become more

sustainable can be considered. It might also be worthwhile to explore how consumers make use of the Internet in promotion of the principles for sustainable tourism development.

Additionally, this thesis specifically focused on the use of ICT. It did not focus on the use of clean technology in the sustainable tourism process. Other types of technology such as wind power, geothermal, small scale hydro, bio energy and solar cells/ solar photovoltaic and its applications to the tourism industry are warranted further research.

Building from this research, a longitudinal study could be developed which focuses on specific destinations which engage in the uptake of ICT for sustainable tourism and using the theory of innovation diffusion (Rogers 1983) determine how these innovations are applied. Research could focus on testing destination managers use of this technology and determining how it works in managing sustainable tourism and truly assessing their approach in applying ICT for sustainable tourism. Additionally, once there is greater use by destinations, the Modified Abernathy and Clark (1985), model can be tested and refined.

Lastly, future research could focus on the current approaches in managing sustainable tourism, and undertaking research revolving around how many destinations actually use these techniques, such as visitor management, alternatives to carrying capacity or codes of conduct, and what they are using them for and if they are experiencing success with these current approaches.

## **8.6 Concluding Comments**

Significant pressures are being placed on destinations today to account for the environment in their business operations (Moore and Bordeleau 2001). Destinations need to adopt ICT and become technology experts, eco-efficient and environmentally innovative in their operations with reference to sustainable tourism development. Not doing this will lead to the economic and environmental deterioration of destinations.

This research has accomplished its aims and objectives. It has identified a collection of ICT-based tools/applications for use by destination managers and developed assessment procedures for use of these tools. The hope is that sustainable tourism will become more pragmatic through the innovative use of ICT for destinations. This thesis has sought to integrate a practical approach to managing sustainable tourism by identifying the critical importance of the use of ICT and demonstrated the benefits the tourism industry can receive from such adoption. It is hoped that this study has been presented in a form not only for understanding by the academic community but also by industry and therefore serves as a resource for destination managers. Despite sustainable tourism and eTourism being core subjects in academic research, the knowledge transfer to tourism practitioners has been limited (Garrod and Fyall 1998; Swarbrooke 1999, Ruhanen 2008). The hope is that the knowledge presented here will be diffused to industry and used for the better management of the tourism industry hence curing many of the ills destinations have long suffered.

The researcher hopes that this research has painted a representative landscape of the current research of ICT and sustainable tourism, laid the foundation for future research efforts to enhance this body of knowledge and the theoretical progression of ICT and sustainable tourism. This research broadens and deepens the existing knowledge and understanding of mechanisms for sustainable tourism of destinations by applying ICT, with the anticipation that the results will be used by destination managers and DMOs as part of their strategy in dealing with the sustainability concerns of tourism destinations.

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## **Appendices**

## Appendix One: Destination Managers' Survey

Kindly note that this survey was converted from the Web-based survey on [www.surveymonkey.com](http://www.surveymonkey.com) The terms italicised are those which were presented in the glossary.

**Survey Title: Information and Communication Technology for Sustainable Tourism Development**

### Introduction

Thank you for taking the time to complete this survey. This survey investigates the uses and applications of ICT-based tools/applications for the sustainable tourism development of destinations. This is becoming an increasingly important area of study regarding how destinations are able to manage tourism's negative impacts.

Your input will prove invaluable in developing a reliable body of knowledge on the uses and application of ICT in support of the sustainable tourism development of destinations. It is anticipated that the practical results of this research will contribute to the solutions of many of the challenges encountered in sustainable tourism development. This survey should take fifteen (15) minutes to complete and consists mostly of tick boxes. **If there is any terms in this survey that are unclear, please click the underlined term and you will be directed to a glossary.**

Further information on this project can be found on the following link: [www.qmu.ac.uk/alisha](http://www.qmu.ac.uk/alisha) or by contacting the researcher at [aali@qmu.ac.uk](mailto:aali@qmu.ac.uk).

Survey participants will be presented with the opportunity to participate further with this research as well as receive a summary of the findings at the end of the research. If you would like to participate further or receive this summary, please add your e-mail at the end of this survey.

Thank you very much for your participation.

**Alisha Ali**  
**Ph.D Candidate**

## Organisation Details

1. Which one of the following terms best describes the role of your organisation?

- Continental tourism organisation i.e transnational
  - National tourism organisation
  - Regional tourism organisation
  - Island tourism organisation
  - County tourism organisation
  - City tourism organisation
  - Ski or other sports resort organisation
  - Coastal resort organisation
  - Local attraction organisation
  - Other (please specify)
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2. Which one of the following best describes the status of your organisation?

- A national government department
  - A department of a regional, provincial/state or local government organisation
  - An agency accountable to a national government
  - An agency accountable to a regional, provincial/state or local government organisation
  - A "not-for-profit" public-private partnership
  - A "not-for-profit" association of tourism businesses
  - A profit driven company
  - Other (please specify)
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3. Which one of the following best identifies the stage of tourism development of your destination?

- Exploration
- Involvement
- Development
- Consolidation
- Stagnation
- Decline
- Rejuvenation

4. Overall, please state the extent to which *information and communication technology (ICT)* is used in your business operations.

- Universally
- To a Great Extent
- Somewhat
- Very Little
- Not at All

5. Please identify which of the following areas ICT is currently used for by your organisation. (*Please tick ALL that are used by your organisation*).

- Information gathering
- Marketing
- Performance monitoring
- Forecasting
- Product planning
- Distribution channel selection
- Information distribution
- Site selection
- Customer relationship management



- ﺝ Administrative operations
- ﺝ Site maintenance
- ﺝ Sustainable tourism development
- ﺝ Other (please specify)

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6. Based on the areas identified in question 5, please indicate the specific *ICT based tools/applications* that are used by your organisation.

- ﺝ Information gathering

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- ﺝ Marketing

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- ﺝ Performance monitoring

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- ﺝ Forecasting

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ج Product planning

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ج Distribution channel selection

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ج Information distribution

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ج Site selection

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ج Customer relationship management

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ج Administrative operations

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⌋ Site maintenance

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⌋ Sustainable tourism development

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⌋ Other (please specify)

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7. To what extent is *sustainable tourism development* a responsibility of your organisation?

- ⌋ Full responsibility
- ⌋ A considerable degree of responsibility
- ⌋ Somewhat responsible
- ⌋ Little responsibility
- ⌋ No responsibility

8. Please identify which of the following is/are currently used by your organisation for managing *sustainable tourism development*. (Please tick ALL that applies to your destination).

- ⌋ *Visitor management techniques*
- Certification*
- Eco-labelling*
- Awards*

- Legislation, regulation or licensing*
- Taxes*
- Fiscal incentives*
- Environmental impact assessment*
- Codes of conduct*
- Tourist education*
- Sustainability indicators and monitoring*
- Marketing*
- De-marketing*
- Carrying capacity techniques*
- ⌋ *Other (please specify)*

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9. The World Tourism Organization identified the areas below as *baseline issues* for *sustainable tourism development* of destinations. Based on this, please rank the areas of sustainable tourism development that are of most concern to your destination.

Place the number 1 next to the area of MOST CONCERN, number 2 by the second choice, and so forth. Rank values must be between 1 and 12.

<i>Local satisfaction</i>	<input type="text"/>
<i>Tourist satisfaction</i>	<input type="text"/>
<i>Effects of tourism on host communities</i>	<input type="text"/>
<i>Tourist seasonality</i>	<input type="text"/>
<i>Economic benefits</i>	<input type="text"/>
<i>Energy management</i>	<input type="text"/>
<i>Water availability and consumption</i>	<input type="text"/>

<i>Drinking water quality</i>	<input type="checkbox"/>
<i>Wastewater management</i>	<input type="checkbox"/>
<i>Solid waste management</i>	<input type="checkbox"/>
<i>Development control</i>	<input type="checkbox"/>
<i>Controlling use intensity</i>	<input type="checkbox"/>

10. Apart for those areas identified in question 9, are there other areas of *sustainable tourism development* that concerns your destination?

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11. To what extent is ICT used by your organisation to manage the *sustainable tourism development* of your destination?

- ⌋ Universally
- ⌋ To a Great Extent
- ⌋ Somewhat
- ⌋ Very Little
- ⌋ Not at All

12. Which of the following *ICT based tools/applications* are currently used for managing the *sustainable tourism development* of your destination? (*Please tick ALL of the ICT-based tools/applications that are used by your destination*).

- ⌋ *Geographical information system*
- ⌋ *Computer simulation*
- ⌋ *Tourism information system*
- ⌋ *Destination management system*
- ⌋ *Environment management information system*
- ⌋ *Economic impact analysis software*
- ⌋ *Virtual tourism*
- ⌋ *Location based services*
- ⌋ *Intelligent transport system*
- ⌋ *eRating system*
- ⌋ *Internet*
- ⌋ *Carbon calculators*
- ⌋ *Community informatics*
- ⌋ *Weather, climate and ocean change forecasting software*
- ⌋ *Global positioning system*

13. For those *ICT based tools/applications* identified in question 12, please identify their **CURRENT** uses in your destination. (Please scroll to the top of this page for reference to question 12).

♪ *Geographical information system*

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♪ *Computer simulation*

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♪ *Tourism information system*

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♪ *Destination management system*

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♪ *Environment management information system*

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♪ *Economic impact analysis software*

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♪ *Virtual tourism*

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♪ *Location based services*

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♪ *Intelligent transport system*

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ج *eRating system*

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ج *Internet*

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ج *Carbon calculators*

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ج *Community informatics*

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ج *Weather, climate and ocean change forecasting software*

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ج *Global positioning system*

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14. Please identify other POTENTIAL uses of these *ICT based tools/applications* for your destination.

ج *Geographical information system*

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ج *Computer simulation*

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ج *Tourism information system*

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ﺝ *Destination management system*

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ﺝ *Environment management information system*

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ﺝ *Economic impact analysis software*

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ﺝ *Virtual tourism*

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ﺝ *Location based services*

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ﺝ *Intelligent transport system*

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ﺝ *eRating system*

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ﺝ *Internet*

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ﺝ *Carbon calculators*

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3 Community informatics

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3 Weather, climate and ocean change forecasting software

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3 Global positioning system

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I do not see any other potential uses (please write No in the box if this option is selected) \_\_\_\_\_

15. Please state the key factors which have led to your selection of the *ICT based tools/applications* identified in question 12. (Please scroll to the top of this page for reference to question 12).

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16. Apart from those *ICT based tools/applications* identified in question 12 please describe ANY OTHER ICT based tools/applications you think can be used for *sustainable tourism development*. (Please scroll to the top of this page for reference to question 12).

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17. Please describe the **IMPORTANCE** of these other *ICT based tools/applications* identified in question 16 for managing the *sustainable tourism development* of destinations.

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**Hello Participant,**

**You are probably wondering how much longer you have to go until the end of this survey.**

**Only a few more questions left and I guarantee you will be finished.**

**I do understand that this survey is long but all of these questions are necessary in order to get the data required to develop a reliable body of knowledge on the uses and application of ICT for sustainable tourism development.**

**Thank you for taking time out of your busy schedule to complete this survey. Without your assistance, this research would not be possible.**

**Just click on the next button to complete the last few questions.**

**Alisha Ali**

18. How important do you think the future use of *ICT* will be in managing *sustainable tourism development*?

- ⌋ Very Important
- ⌋ Important
- ⌋ Moderately Important
- ⌋ Of Little Importance
- ⌋ Unimportant

19. How important will the following *ICT based tools/applications* be for the continued *sustainable tourism development* of destinations?

	Very Important	Important	Moderately Important	Of Little Importance	Unimportant	Not applicable
<i>Geographical information system</i>	3	3	3	3	3	3
<i>Computer simulation</i>	3	3	3	3	3	3
<i>Tourism information system</i>	3	3	3	3	3	3
<i>Destination management system</i>	3	3	3	3	3	3
<i>Environment management information system</i>	3	3	3	3	3	3
<i>Economic impact analysis software</i>	3	3	3	3	3	3
<i>Virtual tourism</i>	3	3	3	3	3	3
<i>Location based services</i>	3	3	3	3	3	3
<i>Intelligent transport system</i>	3	3	3	3	3	3
<i>eRating system</i>	3	3	3	3	3	3
<i>Internet</i>	3	3	3	3	3	3
<i>Carbon calculators</i>	3	3	3	3	3	3

	Very Important	Important	Moderately Important	Of Little Importance	Unimportant	Not applicable
<i>Community informatics</i>	3	3	3	3	3	3
<i>Weather, climate and ocean change forecasting software</i>	3	3	3	3	3	3
<i>Global positioning system</i>	3	3	3	3	3	3

20. Please rank the areas identified below that you think *ICT* would be most useful for managing *sustainable tourism* development.

Place the number 1 next to the area of HIGHEST usefulness, number 2 by the second choice, and so forth. Rank values must be between 1 and 8.

- Information management*
- Tourist satisfaction*
- Interpretation*
- Enabling partnerships*
- Community participation*
- Energy consumption*
- Sustainable consumption*
- Transportation*

21. Apart from the areas identified in question 20, are there any OTHER areas you think *ICT* can be useful in managing *sustainable tourism development*.

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22. What do you think are the critical success factors for using *ICT based tools/applications* for *sustainable tourism development*?

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23. What do you think are the barriers to using *ICT based tools/applications* for *sustainable tourism development*?

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24. To what extent do you agree with the following statements.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
The use of <i>ICT</i> will be an innovative approach to solving some of the problems of <i>sustainable tourism development</i> .	☺	☺	☺	☺	☺
The use of <i>ICT</i> has led to the better management of the <i>sustainable tourism development</i> of my destination	☺	☺	☺	☺	☺

25. Please describe how you envision your organisation increasing its use of *ICT based tools/applications* for the *sustainable tourism development* of your destination, if they became readily available.

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26. Gender

- Male
- Female

27. Age

- 20 and under
- 21-30
- 31-40
- 41-50
- 51-60
- 60 and over

28. Please tick which region of the world you are located.

- Asia
- Africa
- Australia
- Europe
- North America
- South America

29. If you would like to participate further in this research please enter your e-mail address.

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30. You can receive a summary of the results of this research. If you would like to receive feedback, please enter your e-mail address.

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## Appendix Two: eTourism Expert's Survey

Kindly note that this survey was converted from the Web-based survey on [www.surveymonkey.com](http://www.surveymonkey.com) The terms italicised are those which were presented in the glossary.

**Survey Title: ICT-Based Applications for Sustainable Tourism Development**

### **Introduction**

Thank you for taking the time to complete this survey. This survey investigates the uses and applications of ICT-based tools/applications for the sustainable tourism development of destinations. This is becoming an increasingly important area of study regarding how destinations are able to manage tourism's negative impacts.

Your input will prove invaluable in developing a reliable body of knowledge on the uses and application of ICT in support of the sustainable tourism development of destinations. It is anticipated that the practical results of this research will contribute to the solutions of many of the challenges encountered in sustainable tourism development. This survey should take fifteen (15) minutes to complete and consists mostly of tick boxes. **If there are any terms in this survey that are unclear, please click the underlined term and you will be directed to a glossary.**

Further information on this project can be found on the following link: [www.qmu.ac.uk/alisha](http://www.qmu.ac.uk/alisha) or by contacting the researcher at [aali@qmu.ac.uk](mailto:aali@qmu.ac.uk).

Survey participants will be presented with the opportunity to participate further with this research as well as receive a summary of the findings at the end of the research. If you would like to participate further or receive this summary, please add your e-mail at the end of this survey.

Thank you very much for your participation.

**Alisha Ali**  
**Ph.D Candidate**

## ICT Usage

1. Please identify in which of the following areas *information and communication technology (ICT)* is currently used by MOST *Destination Management Organisations (DMOs)*. (Please tick ALL that apply).

- ☐ *Information gathering*
- ☐ *Marketing*
- ☐ *Performance monitoring*
- ☐ *Forecasting*
- ☐ *Product planning*
- ☐ *Distribution channel selection*
- ☐ *Information distribution*
- ☐ *Site selection*
- ☐ *Customer relationship management*
- ☐ *Administrative operations*
- ☐ *Site maintenance*
- ☐ *Sustainable tourism development*
- ☐ *Other (please specify)*

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2. Based on the areas identified in question 1, please indicate the specific *ICT* based tools/applications that are being used by *DMOs*. (Please scroll to the top of this page for reference to question 1).

- ☐ *Information gathering*

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- ☐ *Marketing*

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- ☐ *Performance monitoring*

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- ☐ *Forecasting*

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ﺝ *Product planning*

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ﺝ *Distribution channel selection*

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ﺝ *Information distribution*

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ﺝ *Site selection*

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ﺝ *Customer relationship management*

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ﺝ *Administrative operations*

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ﺝ *Site maintenance*

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ﺝ *Sustainable tourism development*

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ﺝ *Other (please specify)*

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3. Please identify to what extent *ICT* can be used for managing *sustainable tourism development*.

- Universally
- To a Great Extent
- Somewhat
- Very Little
- Not at All

4. Please identify to what extent *DMOs* are currently using *ICT* for managing *sustainable tourism development*.

- Universally
- To a Great Extent
- Somewhat
- Very Little
- Not at All

### **ICT-based tools/applications for Sustainable Tourism Development**

5. Which of the following *ICT* based tools/applications are being used by *DMOs* for managing *sustainable tourism development*? (Please tick ALL that you think are being used by *DMOs*).

- Geographical information system*
- Computer simulation*
- Tourism information system*
- Destination management system*
- Environment management information system*
- Economic impact analysis software*
- Virtual tourism*
- Location based services*
- Intelligent transport system*
- eRating system*
- Internet*
- Carbon calculators*
- Community informatics*
- Weather, climate and ocean change forecasting software*
- Global positioning system*

6. For those *ICT based tools/applications* identified in question 5, please state how they are being used for *sustainable tourism development*. (Please scroll to the top of this page for reference to question 5).

↳ *Geographical information system*

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↳ *Computer simulation*

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↳ *Tourism information system*

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↳ *Destination management system*

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↳ *Environment management information system*

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↳ *Economic impact analysis software*

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↳ *Virtual tourism*

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↳ *Location based services*

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↳ *Intelligent transport system*

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j *eRating system*

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j *Internet*

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j *Carbon calculators*

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j *Community informatics*

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j *Weather, climate and ocean change forecasting software*

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j *Global positioning system*

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7. Please identify other **POTENTIAL** uses of these *ICT based tools/applications* for *sustainable tourism development*.

j *Geographical information system*

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j *Computer simulation*

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j *Tourism information system*

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ﺝ *Destination management system*

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ﺝ *Environment management information system*

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ﺝ *Economic impact analysis software*

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ﺝ *Virtual tourism*

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ﺝ *Location based services*

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ﺝ *Intelligent transport system*

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ﺝ *eRating system*

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ﺝ *Internet*

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ﺝ *Carbon calculators*

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10. Please rank the areas identified below where *ICT* would be most useful for managing *sustainable tourism development*.

Place the number 1 next to the area of **HIGHEST** usefulness, number 2 by the second choice, and so forth. Rank values must be between 1 and 8.

<i>Information management</i>	<input type="text"/>
<i>Tourist satisfaction</i>	<input type="text"/>
<i>Interpretation</i>	<input type="text"/>
<i>Enabling partnerships</i>	<input type="text"/>
<i>Community participation</i>	<input type="text"/>
<i>Energy consumption</i>	<input type="text"/>
<i>Sustainable consumption</i>	<input type="text"/>
<i>Transportation</i>	<input type="text"/>

11. Apart from the areas identified in question 10, are there any **OTHER** areas where *ICT* can be useful in managing the *sustainable tourism development* of destinations?

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12. Please identify how important the use of *ICT* will be in *managing sustainable tourism development*.

- 3 Very Important
- 3 Important
- 3 Moderately Important
- 3 Of Little Importance
- 3 Unimportant

13. How important will the following *ICT based tools/applications* be for the continued *sustainable tourism development* of destinations?

	Very Important	Important	Moderately Important	Of Little Importance	Unimportant
<i>Geographical information system</i>	3	3	3	3	3
<i>Computer simulation</i>	3	3	3	3	3
<i>Tourism information system</i>	3	3	3	3	3
<i>Destination management system</i>	3	3	3	3	3
<i>Environment management information system</i>	3	3	3	3	3
<i>Economic impact analysis software</i>	3	3	3	3	3
<i>Virtual tourism</i>	3	3	3	3	3
<i>Location based services</i>	3	3	3	3	3



	Very Important	Important	Moderately Important	Of Little Importance	Unimportant
<i>Intelligent transport system</i>	3	3	3	3	3
<i>eRating system</i>	3	3	3	3	3
<i>Internet</i>	3	3	3	3	3
<i>Carbon calculators</i>	3	3	3	3	3
<i>Community informatics</i>	3	3	3	3	3
<i>Weather, climate and ocean change forecasting software</i>	3	3	3	3	3
<i>Global positioning system</i>	3	3	3	3	3

14. For each of the following *ICT based tools/applications*, please identify the type of *DMOs* that would be most likely use them. (Please tick ALL that apply).

	<i>Continental</i>	<i>National</i>	<i>Regional</i>	<i>Island</i>	<i>City</i>	<i>County</i>	<i>Ski or other sport resort</i>	<i>Coastal resort</i>	<i>Local attraction</i>
<i>Geographical information system</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Computer simulation</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Tourism information system</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Destination management system</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

15. For each of the following *ICT based tools/applications*, please identify the type of *DMOs* that would be most likely use them. (Please tick ALL that apply).

	<i>Continental</i>	<i>National</i>	<i>Regional</i>	<i>Island</i>	<i>City</i>	<i>County</i>	<i>Ski or other sport resort</i>	<i>Coastal resort</i>	<i>Local attraction</i>
<i>Environment management information system</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Economic impact analysis software</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Virtual tourism</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Location based services</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

16. For each of the following *ICT based tools/applications*, please identify the type of *DMOs* that would be most likely use them. (Please tick ALL that apply).

	<i>Continental</i>	<i>National</i>	<i>Regional</i>	<i>Island</i>	<i>City</i>	<i>County</i>	<i>Ski or other sport resort</i>	<i>Coastal resort</i>	<i>Local attraction</i>
<i>Intelligent transport system</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>eRating system</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Internet</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Carbon calculators</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

17. For each of the following *ICT based tools/applications*, please identify the type of *DMOs* that would be most likely use them. (Please tick ALL that apply).

	<i>Continental</i>	<i>National</i>	<i>Regional</i>	<i>Island</i>	<i>City</i>	<i>County</i>	<i>Ski or other sport resort</i>	<i>Coastal resort</i>	<i>Local attraction</i>
<i>Community informatics</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Weather, climate and ocean change forecasting software</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Global positioning system</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

18. What do you think are the **CRITICAL SUCCESS FACTORS** for using *ICT based tools/applications* for sustainable tourism development by *DMOs*?

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19. What do you think are the BARRIERS to using *ICT based tools/applications* for *sustainable tourism development* by *DMOs*?

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**Hello Participant,**

**You are probably wondering how much longer you have to go until the end of this survey.**

**Only a few more questions left and I guarantee you will be finished!!!!**

**Thank you for taking time out of your busy schedule to complete this survey.**

**Without your assistance, this research would not be possible.**

**Just click on the next button to complete the last few questions.**

**Alisha Ali**

20. Please identify to what extent *Destination System Providers* are currently providing *ICT based tools/applications* to *DMOs* for managing *sustainable tourism development*.

- ⌋ Universally
- ⌋ To a Great Extent
- ⌋ Somewhat
- ⌋ Very Little
- ⌋ Not at All

21. Please identify the *ICT based tools/applications* that are provided by *Destination System Providers* to *DMOs* (Please tick ALL that apply).

- ⌋ *Geographical information system*
- ⌋ *Computer simulation*
- ⌋ *Tourism information system*
- ⌋ *Destination management system*
- ⌋ *Environment management information system*

- ♪ *Economic impact analysis software*
- ♪ *Virtual tourism*
- ♪ *Location based services*
- ♪ *Intelligent transport system*
- ♪ *eRating system*
- ♪ *Internet*
- ♪ *Carbon calculators*
- ♪ *Community informatics*
- ♪ *Weather, climate and ocean change forecasting software*
- ♪ *Global positioning system*

22. Apart from those *ICT based tools/applications* identified in question 18, please describe any OTHER *ICT based tools/applications* that are provided by *Destination System Providers* to *DMOs*? (Please scroll to the top of this page for reference to question 18).

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23. The World Tourism Organization identified the areas below as *baseline issues* for *sustainable tourism development* of destinations.

Based on this, please rank the areas of sustainable tourism development you think are of most concern to destinations.

Place the number 1 next to the area of MOST CONCERN, number 2 by the second choice, and so forth. Rank values must be between 1 and 12.

- |   |                      |
|---|----------------------|
| <i>Local satisfaction</i>                     | <input type="text"/> |
| <i>Tourist satisfaction</i>                   | <input type="text"/> |
| <i>Effects of tourism on host communities</i> | <input type="text"/> |
| <i>Tourist seasonality</i>                    | <input type="text"/> |
| <i>Economic benefits</i>                      | <input type="text"/> |

<i>Energy management</i>	<input type="checkbox"/>
<i>Water availability and consumption</i>	<input type="checkbox"/>
<i>Drinking water quality</i>	<input type="checkbox"/>
<i>Wastewater management</i>	<input type="checkbox"/>
<i>Solid waste management</i>	<input type="checkbox"/>
<i>Development control</i>	<input type="checkbox"/>
<i>Controlling use intensity</i>	<input type="checkbox"/>

24. Apart from those areas identified in question 20, please state any other areas of *sustainable tourism development* that are of concern to destinations. (Please scroll to the top of this page for reference to question 20).

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25. To what extent do you agree with the following statements.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
The use of <i>ICT</i> will lead to the better management of the <i>sustainable tourism development</i> of destinations.	☺	☺	☺	☺	☺
The use of <i>ICT</i> will be an innovative approach to solving some of the problems of <i>sustainable tourism development</i> .	☺	☺	☺	☺	☺

26. Please describe how you envisage *DMOs* increasing their use of *ICT* based tools/applications for the *sustainable tourism development* of destinations, if they became readily available.

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27. Gender

- Male
- Female

28. Age

- 20 and under
- 21-30
- 31-40
- 41-50
- 51-60
- 60 and over

29. Please tick which region of the world you are located.

- Asia
- Africa
- Australia
- Europe
- North America
- South America

30. If you would like to participate further in this research please enter your e-mail address.

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31. You can receive a summary of the results of this research. If you would like to receive feedback, please enter your e-mail address.

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## **Appendix Three: E-mail sent to Experts Requesting an Interview**

Dear Participant,

I would like to extend a heartfelt thanks for completing my survey on the applications of ICT for sustainable tourism development.

As part of this research, I need to gather further evidence on developing a reliable body of knowledge on the applications of ICT for sustainability and was hoping that you would be willing to participate in a telephone interview at your time and convenience.

Please find attached the information sheet outlining the interview procedure.

Additionally if you need to have a look at the interview questions before the interview, I would be more than happy to forward this to you.

Should you require further information or have any questions, please do not hesitate to contact me.

I do look forward to hearing from you.

Many thanks and have a great day.

Kind regards,  
Alisha

Alisha Ali, MSc.  
Ph.D Student, eTourism  
SITI Research Centre  
School of Business, Enterprise and Management  
Queen Margaret University  
Edinburgh, EH21 6UU  
UK

## Appendix Four: Information Sheet – Interview



Queen Margaret University

EDINBURGH

### **An Investigation into Information and Communication Technologies-Based Applications for Sustainable Tourism Development of Destinations**

My name is Alisha Ali and I am conducting Ph.D. research in the School of Business Enterprise and Management at Queen Margaret University in Edinburgh, UK. The study will investigate the uses of ICT-based tools/applications for destination managers in the management of sustainable tourism development.

The practical results of this work should prove invaluable given the current lack of either tools or application in this area. This research will address this gap by developing a wide-ranging collection of ICT-based tools for use in sustainable tourism development and a process to help destination managers select those that are best suited to their needs. It is anticipated that this contribute to the solutions of many of the challenges encountered in sustainable destination management.

A large part of this research involves obtaining the opinions and perspectives of experts like yourselves on the uses of ICT for sustainable tourism development. Therefore, I would very much welcome your assistance in permitting me to interview you. The whole procedure should take no longer than 30 minutes and participating in this interview is voluntary and if for any reason you do not wish to participate, please feel free to decline. You will also be free to withdraw from the study at any stage and you would not have to give a reason. The researcher is not aware of any risks associated with this interview. Please note that this is *not* an examination and there are no right or wrong answers – the real value lies in your considered responses and it is therefore important that you try to respond to all questions if possible.

All data will be anonymised as much as possible, but you may be identifiable from tape recordings of your voice. Your name will be replaced with a participant number, and it will thus not be possible for you to be identified in any reporting of the data gathered. Additionally, your responses will only be used for the purposes of this study but the (anonymous) results of this survey may be published in a journal or presented at a conference.

If you would like to contact an independent person, who knows about this project but is not directly involved in it, you are welcome to get in touch with Professor Andrew J. Frew. His contact details are given below.

If you have read and understood this information sheet and any questions that you had have been answered, and you would like to be a participant in the study, please contact me at [aali@qmu.ac.uk](mailto:aali@qmu.ac.uk). I do look forward to interviewing you.

#### **Contact Details of the Researcher**

**Name of Researcher:** Alisha Ali

**Address:** School of Business, Enterprise and Management  
Queen Margaret University  
Edinburgh, EH 21 6UU

**Email / Telephone:** [aali@qmu.ac.uk](mailto:aali@qmu.ac.uk) / +44 (0)131 474 0000

#### **Contact Details of the Independent Adviser**

**Name of Adviser:** Professor Andrew J. Frew, Ph.D  
Professorial Chair in IT and Tourism  
Director, SITI  
Director of Research, Knowledge Transfer and  
Commercialisation

**Address:** School of Business, Enterprise and Management  
Queen Margaret University  
Edinburgh, EH21 6UU

**Email / Telephone:** [afrew@qmu.ac.uk](mailto:afrew@qmu.ac.uk) / +44 (0)131 474 0000

## Appendix Five: Interview Questions

1. From the questionnaire completed, you identified the following ICT-based tools/applications that are used for sustainable tourism (Researcher to list the ICT-based tools identified by the respondent in the survey from the list below). Can you elaborate on the uses of this tool?
  - *Geographical information systems*
  - *Computer simulation*
  - *Tourism information system*
  - *Destination management system*
  - *Environment management information system*
  - *Economic impact analysis software*
  - *Virtual tourism*
  - *Location based services*
  - *Intelligent transport system*
  - *eRating system*
  - *Internet*
  - *Carbon calculators*
  - *Community informatics*
  - *Weather, climate and ocean change forecasting software*
  - *Global positioning system*
2. Do you see the potential of using any of these other tools? If yes to any, please describe how you would use these tools at the destination.
3. In what ways might ICT for sustainable tourism become a valuable proposition to mitigating some of tourism's negative impacts?
4. In what ways would the type of DMO influence the type of ICT-based tools that are used?
5. How might the stage of a destination in tourism development process influence the type of ICT-based tools that are used?
6. What do you consider to be the critical success factors for the uptake of ICT for sustainable tourism?
7. What do you consider to be the barriers for the uptake of ICT for sustainable tourism?
8. What factors would influence a destination manager's selection of the tools identified?
9. Can you describe how you envisage how DMOs will increase its use of ICT based tools/applications for the sustainable tourism development?

10. Are you aware of any destinations that is/are using ICT for sustainable tourism?
11. Are you aware of any destination system providers that is/are providing ICT to destinations to be used for sustainable tourism?
12. How innovative do you think ICT will be for sustainable tourism?
13. Can you describe the ways in which ICT will be innovative?

**End of Interview**  
**Thank you very much for your time!!!**

## Appendix Six: Glossary

Term	Definition
Administrative operations	Routine, day-to-day work undertaken in the organisation such as sending and receiving e-mails, database management and using word processing software.
Application programme interface	These are a set of functions, routines, resources, protocols and tools for developing software applications.
Avatar	Used by a computer user to represent himself/herself in an online environment and can be personalised to the user preferences.
Awards	Presented to tourism businesses, by a recognised body, as prizes of excellence in recognition of their efforts in becoming more sustainable. Examples of these include: Tourism for Tomorrow Awards organised by the World Travel and Tourism Council, Environmental Award organised by American Society of Travel Agents and Virgin Holidays Responsible Travel Awards organised by ResponsibleTravel.com.
Baseline issue	A main issue set as a benchmark to be used as a basis for comparison. In sustainable tourism development these issues are chosen based on their applicability to the issues of sustainability and the relative ease of measuring and understanding.
Blog	It is a personalised website which contains updated entries of events, commentaries and other items such as videos, music, sketches and photos. Blogs are usually arranged in chronological order and most allow for the reader to leave comments.
Broadband	It is a high bandwidth connection to the Internet which allows large amounts of information to be transmitted at high speed to your computer.
Carbon calculators	The impact of individuals or organisations on the climate can be calculated by measuring the amount of carbon emissions and other greenhouse gases produced, as a result of their choices and activities by consuming different products and services, by using a carbon calculator.

Carrying capacity	Refers to the number of visitors a destination can sustain without damage to the environment, community or visitor experience. Once this number is exceeded negative impacts are thought to occur at the destination.
Certification	A process that ensures there is some criteria by which organisations can conform in order to meet certain requirements or standards. When organisations or businesses become certified they are usually given an eco-label.
Codes of conduct	Codes of conduct serve as guidelines outlining the proper practices and the responsibilities of how the tourism industry should operate. These codes are not enforced, nor are they enforceable but are adopted voluntarily by the stakeholders in the tourism industry. Therefore, there are no statutory requirements for the adoption of these codes of conduct. There are different types of codes ranging from general tourism industry codes, codes that address specific sectors and activities, codes for the tourists and codes directed to local communities. Some examples of codes of conduct in tourism include: United Nations World Tourism Organisation's Globe Code of Ethics for Tourism (2001) and World Travel and Tourism Council's Corporate Social Leadership in Tourism (2003).
Community informatics	An ICT-based tool/application focused on the design and delivery of technological applications for enhancing community participation and development through the use of e-mail, bulleting boards and networks all based on the Internet.
Community participation	This refers to communities being involved in the decision-making process in matters of tourism that affect them. For example, if there is a proposal for the development of a hotel in a community, the community's views should be obtained since this proposed development will have both positive and negative impacts on their lives.
Computer simulation	An ICT-based tool/application that is used to simulate real world settings by demonstrating how a system operates over time. In sustainable tourism development, this can be used for simulation of issues which are too complex for direct observation, manipulation or statistical analysis.

Consolidation	This stage of tourism development at the destination is characterised by increases in tourist arrivals with the total number of tourists to the destination being greater than population of the destination. However, the rate of increase in tourist numbers will begin to decline. At this stage, the economy will be heavily dependent on tourism, with extensive marketing and promotion activities focusing on extending the tourist season. A large number of visitor facilities will be provided and major franchises and chains will be present. The local community may pose some opposition to tourism development.
Controlling use intensity	Refers to stresses placed on sites and systems at the destination relative to the desired level of use brought about by the increase in tourist numbers placed on the use of these sites and systems.
Critical success factors	Essential factors that must be in place or essential areas of activity that must be performed in order to achieve the desired result. For example, in sustainable tourism development, a critical success factor is community participation and involvement.
Customer relationship management	This term describes the strategies, processes, people and technologies used by organisations to manage their relationship with customers in an organised manner for profit maximisation and customer satisfaction. It usually involves the capturing, processing, storing and archiving of customer data. For example, an organisation can build a database of its customers so that members of the organisation or the customer themselves can access this information and match the customer's requirements with the product offerings.
Decline	This stage of tourism development at the destination is characterised by the destination facing a decline in tourist numbers due to losing its appeal and its inability to compete with newer destinations. Tourist facilities at the destination begin to disappear as the financial viability of tourist establishments are questioned with the destination being mainly visited for weekend and day trips. Local involvement might increase at this stage since local may purchase declining tourist facilities and put them towards other uses.
De-marketing	An aspect of marketing that relates to generally discouraging customers or discouraging a certain class of customers on a temporary or permanent basis in using a product/service. In sustainable tourism, de-marketing is focused on dissuading tourists from visiting a destination.



Destination	A physical space/geographical area which contains tourism products and services to be consumed by the tourists as part of the experience and which is promoted and marketed by an organisation such as a DMO.
Destination management organisation (DMO)	An organisation responsible for the holistic management of tourism at the destination level which encompasses a range of tourism development, planning and marketing activities.
Destination manager	The person responsible for the overall management of a DMO.
Destination management system (DMS)	A system that consolidates and distributes a comprehensive range of tourism products through a variety of channels and platforms, generally catering for a specific region. This is an internet protocol based application which supports the activities of a DMO in the region by marketing and selling the destination to customers.
Destination system provider (DSP)	Third party business that distributes ICT-based tools/applications to a DMO across a network from a central data centre. DSP distribute such ICT-based tools/applications such as a DMS. This type of business provides a way for a DMO to outsource its ICT requirements.
Development	This stage of tourism development at the destination is characterised by a well-defined tourist area that is marketed and promoted to tourists. Natural and artificial attractions will be developed and marketed to tourists; the physical appearance will be changed with some local facilities disappearing and being replaced by larger and more modern facilities. Local involvement and control in the tourism development process will become less.
Development control	Measures put in place to guide the tourism development process towards achieving the desired outcomes of the destination and the host community. These measures should be aligned with the greater development plan of the destination. It includes placing controls on the location of a development, the type and the size of the development.
Distribution channel selection	Refers to the selection of the appropriate channel/s to get the tourism product/service to the customers. Organisations can choose to distribute directly to the customer or by using direct mail, telemarketing, the Internet, travel agents, tour wholesalers or retailers.

Drinking water quality	Purity of the drinking water supply at the destination. This is important to tourists since a poor water quality at the destination may lead to negative effects on tourists' health. This may decrease tourist arrivals to the destination since they will not want to travel to a destination that they perceive as putting them at health risks.
eCommerce	The buying and selling of products over the Internet.
Eco-labelling	A marketable logo or seal that a business receives after it has successfully completed the certification process. Some examples of eco-labels include Green Globe and Blue Flag.
Economic impact analysis software	Software used to measure and monitor the economic impacts of tourism by providing such information as the type and amount of tourist spending. Examples of this software include IMPLAN, RIMS II (Regional Input-Output Multipliers), REMI (Regional Economic Models Inc.), and the Fiscal Tool.
Economic benefit	Viability and competitiveness of tourism destinations and businesses so that they provide tangible benefits to the local community in the long term. Some examples of this are increasing employment opportunities, better standard of living and greater business opportunities for the local community.
Effect of tourism on host community	Refers to the positive and negative impacts of tourism development and tourist activities on the local community. This includes but is not limited to the local community satisfaction with tourism, social costs and benefits associated with tourism and impacts on the lives of members of the community.
Energy consumption	This refers to the amount of energy consumed in undertaking activities associated with tourism such as transportation to and from and at the destination as well as the provision of facilities and services at the destination.
Energy management	This refers to strategies adopted in reducing the amount of energy consumed in undertaking tourism activities. Some of these strategies include: reducing energy use and encouraging conservation of resources by reducing consumption of natural resources, lowering carbon emissions and using renewable energy sources. Reducing energy consumption will reduce cost for the tourist business, reduce the pressures placed on utilities and have positive results on the environment.

Environment	A broad perspective of the environment will be adopted which encompasses the environmental, economic and the socio-cultural aspects.
Environmental impact assessment (EIA)	A planning tool used in projects to determine the approach to sustainability by assessing whether the perceived economic benefits are aligned with the environmental, social and cultural costs.
Environmental management information system (EMIS)	A combination of computer hardware, software, and professional services that integrates disparate information about environmental issues in order to manage the environmental function within an organisation. EMIS systematically gathers, analyses and reports business information related to environmental management such as waste tracking and emissions monitoring. This allows a company to track, refine, and improve its environmental management practice.
eRating system	<p>An Internet-based sustainable tourism rating expert system which provides a rating of a destination based on a common definition of sustainable tourism and considers different categories of sustainable tourism. This rating can be done by three groups which include a person who has visited the site, the destination manager and a sustainable tourism auditor or sustainable tourism expert, based on a specific set of criteria.</p> <p>This serves as a form of monitoring and compliance for destinations and can aid them in aligning themselves to the principles of sustainable tourism development. This approach can be useful in that the information is available through a variety of mediums, transparency of rating via different raters, accountability of a person who use the system and incorporation of knowledge from experts and field data.</p>
Exploration	This stage of tourism development at the destination is characterised by a small number of tourist visiting the destination, with these tourist being attracted to the destination because of its unique features. These tourists tend to make their own travel arrangements, use local facilities, interact with the local community and do not contribute much to the economic prosperity of the destination or affect the social life of the local community.

Extranet	A private network which utilises world wide Web technologies, Internet protocol, connectivity and the public telecommunication system to securely share an organisation's information and enable communication with business partners. It is usually considered an extension of an organisation's Intranet.
Folksonomy	This is also referred to as tagging where the user categorise the content on Web pages using their own words.
Fiscal incentives	Economic instruments such as financial support or commercial opportunities can be used to influence the behaviour of tourism organisations to align themselves to the principles of sustainable tourism development.
Forecasting	Refers to predicting or calculating in advance. For example, destination managers may want to forecast tourist arrivals or tourist revenues for a particular period. This helps them develop plans, actions and strategies for their destination.
Geographical information systems (GIS)	A computer based system that can collect, store, manage, map, analyse, transform, integrate and display large amounts of geographic data.
Geo-tagging	Refers to adding geographical coordinates to photos, videos and Websites.
Global positioning system (GPS)	Satellite-based navigation system that provides positioning, navigation and timing services to users in any weather conditions around the world 24 hours a day.
Greenhouse gases	Gases that trap heat in the atmosphere.
Information and communication technology (ICT)	This is the umbrella term used to describe the use of computers and computer based devices and technologies for gathering, storing, retrieving, processing, analysing, manipulating and transmitting information; and how these different applications work with each other. Some examples of ICT-based tools/applications include: geographical information systems (GIS), geographical positioning systems (GPS), location based services (LBS) and environmental management information systems (EMIS).
Information distribution	Distributing information to stakeholders and customers in order to ensure that the right people have the right information at the right time. For example, tourists may request information about the destination and they should receive relevant and correct information on this in a timely manner.

Information gathering	The collection of information from various sources and the evaluation of this information for its usefulness, accuracy and its relevance in order to assist in formulating plans, strategies and actions. For example, a DMO may collect data on the tourists that visit the destination in order to build a solid customer base and use this information for marketing and promotion activities.
Information management	Managing the quantity and quality of information needed by destination managers to ensure that the best decisions are made for all stakeholders involved in the tourism development process at the destination. Destination managers are faced on a daily basis with vast amounts of information from different sources. ICT can be used to collect, store, manage, analyse and deliver the information to support them in their operational, tactical and strategic decision making.
Intelligent transport system (ITS)	<p>An ICT-based tool/application that can manage ground transportation at a destination as well as providing useful travel information to the tourists at the destination. Different technologies can be built into an ITS but with specific reference to tourism, ITS can include route guidance systems, traveller information systems, automated vehicle locations, fleet management systems and automated traffic management systems.</p> <p>In cars, ITS can help a driver navigate and find the best routes and avoid traffic and collisions. In trains and buses, it can be used for managing operations, providing passengers with automatic ticketing and traffic information. On the roads, it can be used in coordinating traffic signals, detecting and managing incidents and displaying information for drivers, passengers and pedestrians.</p>
Internet	A world wide computer network which works by using a common set of communication protocols know as internet protocols.
Internet Protocol (IP)	Standards which are used to code the information that supports computer-to-computer communication over the Internet.

Interpretation	This refers to informing the tourist about the importance of a destination, so that he/she has better enjoyment of the destination, with the ultimate aim of creating a positive attitude towards conservation, preservation, history, culture and landscape. Interpretation can be achieved through such methods as education, objects, media, signage, trained guides, maps and first hand experiences.
Intranet	An organisation's internal network which uses world wide Web technologies to distribute information throughout the organisation.
Involvement	This stage of tourism development at the destination is characterised by an increase in tourist arrivals where tourists visit the destination more regularly than in the exploration stage. Facilities are beginning to be provided at the destination mainly for tourists and marketing activities promoting of the destination has begun. Pressures are also being placed on local government authority for more and/or better infrastructure and the locals are beginning to become involved in tourism activities and maintain strong interactions with the tourists.
Legislation, regulation or licensing	Used by a government authority to aid in sustainable tourism development by ensuring requirements are complied to and enforcing penalties if they are not. For example, the ruling government at the destination can specific laws relating to sustainable tourism development.
Local satisfaction	Local communities act as the host for the tourists when they visit a destination. They must be contented with tourism development and tourist activities in their community since if the locals are not pleased, they will not encourage tourists to visit the destination.
Location based services (LBS)	An ICT- based tool/application that can collect and deliver information to and from a mobile device depending on the automatic location of the user. The aim of a LBS is to provide targeted information to the user based on his/her geographic location. Such information include but is not limited to places to visit, eat and stay as well as emergency and health services.

Marketing	Marketing is a process that involves identifying customers' needs and wants and focusing on the design and delivery of products and services to satisfy these needs and wants. For sustainable tourism, marketing can assist destinations in becoming more sustainable by: destinations market segmenting in order to attract the types of tourists they want, promoting particular forms of tourism, influencing tourist's behaviour by enlightening them about sustainability, promoting product offerings of small and medium sized enterprises, reducing seasonality by promoting off-season opportunities, promoting alternative destinations hence dispersing the benefits, increasing spend per head and per stay and promoting the use of more sustainable forms of transport.
mCommerce	Transactions that take place with a wireless where users of mobile services can make airline, hotel, car rental and restaurant bookings.
Partnerships	Collaboration between the various stakeholders in the tourism industry. For example, a partnership may be formed between accommodation providers and transport operators to provide an integrated product to the tourist.
Performance monitoring	Process used to ascertain how the organisation is performing based on its mission, vision, goals and objectives.
Product planning	Integrated and strategic approach to planning the tourism product. In planning the tourism product issues to be considered include but are not limited to the type of product to offer, where accommodation should be located, how to develop the attractions, the effects on the community, access to and from the destination and obtaining the views of the stakeholders involved.
Recommender systems	Applications that can provide suggestions to customers based on their needs and constraints on product and services and influence the decision making process.
Rejuvenation	A rejuvenation of the destination can occur if the destination changes the focus of the tourist product which is currently offered in order to re-create interest in the destination.
Site selection	Selection of an area for tourism development. For example a site can be selected for the development of a resort, attraction, conference centre or for the staging of an event.
Site maintenance	Maintenance of an area after it has been developed for tourism.

Solid waste management	Refers to the management of the quantity and quality of garbage and hazardous substances produced, reused, recycled and scattered in public places at the destination.
Stagnation	This stage of tourism development at the destination is characterised by a peak in visitor numbers with carrying capacity levels been reached or exceeded with many social, cultural and economic problems existing at the destination as a result of tourism. The destination has a well established image but it is no longer fashionable with more artificial attractions existing than natural ones. The destinations is very dependent on repeat visitors and conventions with greater efforts being placed on trying to retain visitor numbers.
Sustainable consumption	The consumption of goods and services to satisfy basic needs and improve the quality of life but minimises the use of non-renewable natural resources and by-products of toxic materials, waste, and pollution.
Sustainability indicators and monitoring	<p>Indicators can be used to measure the existence of a current issue or the severity of this issue, the risk associated with an issue and the potential need for action. They can also signal upcoming situations or problems and identify and measure and monitor the results of these actions.</p> <p>For sustainable tourism development, indicators can aid destinations in setting their sustainable tourism objectives by acting as a baseline assessment of a condition or issue, track how they are progressing, target setting for policies, assessment of actions and evaluation and reviewing and modification of policies. Indicators are intended to provide information in a straightforward, numerical and easy to understand format.</p>
Sustainable tourism development	<p>A positive, comprehensive and integrated approach to tourism development which involves resource management and working together with stakeholders for the long-term viability and quality of the social, economic and environmental resources.</p> <p>There are many facets to sustainable tourism development with some examples including reducing tourism's negative impacts, minimising tourism leakages, environmental management and protection, infrastructure development and investment, co-operation between public and private sector, host community involvement in tourism development, host community benefiting from tourism, respecting cultures and tourist education.</p>



Tagging	See folksonomy.
Tax	Usually levied on a tourism business, the tourist or on resources such as an effluent charge or waste to influence demand for the product or to change the behaviour of the tourist or the user of the resource. The funds from the taxes can be used to develop sustainable activities at the destination.
Tourist education	Method of providing information to the tourists to foster a deeper appreciation of the destination the visit, which includes appropriate behaviour, experiences and values. These education programmes are designed to allow the tourists to contemplate the effects of their actions on the environment and to modify their behaviour.
Tourism information system (TIS)	Data warehouses that manage business critical information in order to provide quality information on hand to assist in decision making by serving as a decision support system for destination managers.
Tourist satisfaction	Refers to whether the tourist expectations were matched with their experiences at the destination. Satisfaction is a subjective concept and is determined by many influencing factors such as safety and security, quality of sites and attractions and hospitality at the destination. This is critical in whether a tourist returns to a destination or encourages others to visit or not visit.
Tourist seasonality	Fluctuations in tourist arrivals throughout the year with most destinations experiencing a high and a low season.
Transportation	Movement of people to and from the destination and in and around the destination.
Versthen	Empathic understanding the worldview of the populations being investigated.
Virtual tourism	An ICT-based tool/application based on the Internet where anyone can experience the culture, history and other points of tourist interests in a visual and interactive manner without actually visiting the destination. An example of this include on-line guided tours of museums and heritage sites where the visitor can experience the destination without actually visiting the destination.

Visitor management techniques	These techniques are used to monitor visitor flows and control tourists' numbers and aim to provide visitor satisfaction whilst protecting the environment. They include but are not limited to queues, reservations, lottery, pricing, timed entry, zoning, permits and setting up of protected areas.
Wastewater management	Management of sewage at tourist establishments at destinations. Inappropriate management of wastewater can lead to pollution of beaches, rivers, lakes, ground water, damage to flora and fauna and contribute to the spread of diseases.
Water availability and consumption	Overall use of water in relation to its supply and the water saving measures implemented to conserve water. Water is essential for tourism and in areas where water shortages exist, development can be constrained.
Weather, climate and ocean change forecasting software	Software used to monitor changes in the weather, climate and ocean. Such software is provided by the Science Application International Corporation.
Web 2.0	It is "the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform" (O'Reilly 2006). This has led to the development web-based services such as social networking sites, video-sharing sites, blogs, wikis and folksonomies.
Wiki	Websites which allows for the easy creation and editing of Web pages by any user.

## Appendix Seven: Researcher's Publications

Ali, A. and Frew, A. J. 2009. ICT and Sustainable Tourism Development: A Literature Review. Paper presented at *Hospitality Information Technology Association Conference*, June 21-22<sup>nd</sup> 2009, Anaheim Convention Center, Anaheim CA, USA.

Ali, A. and Carson, D. (Forthcoming book chapter in 2009). Information and Communications Technology (ICT) and the Challenge of Sustainable Self Drive Tourism. In: Carson, D. and B. Prideaux (Eds.) *Self- Drive Tourism*.

Ali, A. and Frew, A. J. (Under Review). Innovation, ICT and Sustainable Tourism Development. *Paper submitted to Journal of Hospitality Application & Research*.

Ali, A. and Frew, A. J. 2009. ICT and Sustainable Tourism Development: An Analysis of the Literature. *Paper presented at ENTER 2009*, January 29th-30th 2009, Amsterdam, The Netherlands.

Ali, A. and Frew, A. J. 2008. Innovation, ICT and Sustainable Tourism Development. *Paper presented at the 2008 International Society for Travel and Tourism Educators Conference (ISTTE)*, September 30th-October 2nd 2008, Dublin, Ireland.

Ali, A. and Frew, A. J. 2008. ICT for Sustainable Tourism Development – An Emergent Framework. In M. Sigala (Ed.), *Proceedings of the 2nd International Scientific Conference of the e-Business Forum: E-Business in Travel, Tourism and Hospitality 2008*. Athens: University of Aegean.