Evaluating the Potential of Mobile Technology in Tourism Destination Marketing

By

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DECLARATION

I declare that this work has not previously been accepted in substance for any degree and is not being concurrently submitted for any other degree.

I further declare that this thesis is the result of my own independent work and investigation, except where otherwise stated (a bibliography is appended).

Finally, I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and abstract to be made available to outside organizations.

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Dr. Jason Williams (Director of Studies) ----------------------------------

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DEDICATION

The work is dedicated to my honourable mother and father, my dear wife Mona and my lovely daughter Haneen
ACKNOWLEDGMENTS

I would like primarily to praise and thank ALLAH, the most Gracious and the most Merciful, who gave me the ability to complete this work.

This thesis would not have been possible without the help and support of the kind people around me. I would like to extend my thanks to all individuals who stood by me throughout the years of my study, but I wish to particularly mention a number of people who have had a profound impact on my work. I would like to express my deepest gratitude and sincere thanks to my director of studies Dr. Jason Williams for his support, assistance and professional guidance continuing throughout this journey; my supervisor Richard Adlam for his dedication, intellectual advice and efforts. Their understanding, motivation and personal guidance have been really inspirational.

Above all, I am heartily thankful to my supervisor, Prof. Eleri Jones, whose encouragement, guidance and support from start to end enabled me to develop my research skills and understanding of the subject. Her wealth of knowledge, sincere advice and friendship with her students made this research fruitful as well as enjoyable. I would like to present my sincere thanks and appreciation to all experts who participated in this research for their time and their input. Indeed, I would like also to thank all staff members and colleagues of the Cardiff School of Management for their cooperation, best wishes and pleasant interaction since the first day of this journey. They made it worthwhile.

Last but by no means least, my special thanks goes to my country Egypt for sponsoring me during the study of this PhD here in the UK. Also, I owe my deepest gratitude to my parents, my dear wife Mona, and my daughter Haneen and my brothers and sisters for their unconditional support and patience from the beginning to the end of my study.
ABSTRACT

Tourism destinations face various challenges in the implementation of m-technologies and although mobile applications are used by some destinations, many are in their early stages of development. Few destinations have yet managed to develop credible mobile services. In particular, small and medium-sized enterprises (SMEs), which are the backbone of the tourism industry, have struggled to embrace new technologies, e.g. e-commerce applications, which has prevented them from benefiting from new technologies. It is unclear which business model will emerge to make mobile services viable. This study aims to explore the way that tourism destinations deal with these issues and will develop a mobile information model integrated with a mobile destination coding system to help tourism stakeholders optimise their exploitation of m-technologies.

This research comprised two phases. Phase one aimed to explore organizations that had implemented m-technologies. It employed a case study methodology utilising a variety of methods (semi-structured interviews, observation and document analysis). Phase two aimed to design a destination mobile information coding system. To achieve this paper prototyping interviews with m-technology and tourism experts were used.

Phase one involved two case studies: Innsbruck as a case study for a tourism destination that had already implemented many m-technology applications for visitors; Cardiff Bus and Traveline as organizations that had implemented m-technologies. Cross-case analysis informed the development of a model for tourism destination stakeholders, particularly SMEs, to encourage better m-technology practices in tourism destination marketing. It concludes with a model for mobile information provision for tourism destination.

The major contribution of this research is Tourism Mobile Information Coding System (TMICS) - a mobile coding information system which aims to provide tourists with destination information through their mobile phones. It is anticipated that the new system will enhance tourism destination stakeholders marketing efforts.
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<td>2G</td>
<td>Second-generation wireless telephone technology</td>
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<td>3G</td>
<td>Third-generation wireless system</td>
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<td>4G</td>
<td>Fourth-generation wireless system</td>
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<td>B2B</td>
<td>Business-to-Business</td>
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<td>B2C</td>
<td>Business-to-Customer</td>
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<td>CRS</td>
<td>Central Reservation System</td>
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<td>DMO</td>
<td>Destination Management Organization</td>
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<td>DMS</td>
<td>Destination Management System</td>
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<td>EC</td>
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<td>EDC</td>
<td>Electronic Distribution Channel</td>
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<td>E-marketplace</td>
<td>Electronic Marketplace</td>
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<td>GDS</td>
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<td>Mobile Technologies</td>
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<td>NTO</td>
<td>National Tourism Organization</td>
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<td>PC</td>
<td>Personal Computer</td>
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<td>RTO</td>
<td>Regional Provincial/state tourist organisation</td>
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<td>SCOOT</td>
<td>Split Cycle Offset Optimization Technique</td>
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Chapter One: Introduction

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1.1 Introduction

Mobile technologies (m-technologies) offer an immediacy to the way that destinations and businesses can inform consumers about products or services available at specific locations (Korhonen, 2001). This enables a new generation of services for customers and an enhanced potential for destination and business development (Jones and Haven-Tang, 2005). However, issues such as payments and security are key to the development of mobile commerce (Kumar and Zahn, 2003). Mobile operators have already started focusing on those problems and it is anticipated that soon there will be coherent solutions.

The aim of this study is to explore best practice in the exploitation of mobile tourism services and identify major obstacles to the adoption of mobile services in destination development. This chapter outlines the background to the study (Section 1.2) and identifies the research problem (Section 1.3) and the research questions (Section 1.4) and the objectives required to achieve the overall research aim (Section 1.5). The chapter concludes with a brief outline of the thesis structure and a summary of its chapters (Section 1.6).

1.2 Background

It is still in the living memory of people that the Internet was only a means for displaying information and communicating using electronic mail (e-mail). According to Bouras et al. (2009) and Schwartz et al. (2009) the Internet has become a household domestic device and its uses are becoming increasingly
common, especially after the recent development of broadband services, which has greatly facilitated easy, fast and low-cost access to the Internet.

The Internet is the most recent medium for both electronic commerce (e-commerce) and mobile commerce (m-commerce). At present, the Internet has become much more populated and a channel to undertake business. Porter (2001) mentioned that the greatest impact of the Internet was to enable the reconfiguration of existing industries that had been constrained by high costs of communicating. In addition the Internet has created some new industries, such as online auctions and virtual/digital marketing places (Turban et al., 2006; Rauniar et al., 2009).

Stangle and Weismayer (2008) have suggested that the potential of virtual communities will be particularly suitable for the tourism and hospitality industry. As a result, many tourism and hospitality enterprises aim to integrate virtual communities into their online booking systems to gain the following benefits: increased sales and website traffic; higher advertising; transaction fee revenue (Stangle and Weismayer, 2008).

These developments have changed and improved the structure of electronic business activities. Turban et al. (2006) pointed out that the facilitation of e-commerce is through the processes of electronic marketing which has been boosted by online technology and increased the number of electronic market participants as more organisations join the marketplace.
Hawk and Zheng (2009) highlighted the importance of e-commerce activities in changing enterprise business processes to increase speed and more efficiency, which leads to increased revenue and customer-satisfaction. They also stated that it also enables the creation of new business models. Turban et al. (2004) and Hu (2009) provide examples of new business models created by e-commerce, such as: price comparison; electronic tendering systems; name your price; electronic marketplace (e-marketplace) and exchanges. The e-marketplace involves a variety of business services. The tourism sector comes out on the top of these sectors for which revenues have increased as a result of participating in the e-marketplace.

Despite the benefits gained from e-commerce applications, there are many limitations. Huang et al. (2006) and Turban et al. (2006) classified these limitations in decreasing order of importance as security and fraud; trust in technology; lack of qualified personnel (technology application knowledge); business models; IT infrastructure. Additionally, there are many issues regarding the implementation of e-commerce applications. E-commerce activities increase revenue and reduce costs, such selling cost and customer services and as a result, e-commerce will affect competition between organizations, in particular for SMEs that participate in e-business activities (Braun, 2002). For many years, one of the major limitations of e-commerce was that consumers could only undertake e-commerce activities through a fixed Internet line. Currently, there are now many technologies available for e-commerce and one such technology for its use is through wireless technology.
This provides opportunities to enable e-business activities to occur anytime and anywhere on the condition that network coverage is available.

The rapid growth in wireless and mobile communication technologies, coupled with the impressive mass adoption of mobile phones and the increasing number of users that have other handheld devices, such as personal digital assistants (PDAs) and smart phones, have paved the way for the development of e-commerce to m-commerce (Benou and Bitos, 2009).

It is becoming increasingly difficult to ignore the contribution of ICT applications to tourism development and their impact on the way that tourism destinations can compete and this has increased with the growth of Internet applications (Buhalis and Licata, 2002). Tourism destination organizations may benefit from the use of Internet applications to distribute destination and product information in order to improve the destination image, attract potential customers and increase the loyalty of existing customers (Palmer and McCole, 2000; Ortega and Rodriguez, 2006).

Many destinations attempt to benefit from the positive opportunities presented by the e-business revolution to create a new business environment for e-tourism. For example, destinations develop Destination Management Systems (DMSs) as a new distribution channel to support destinations in their competitiveness and product marketing (Buhalis, 2003; Jones and Haven-Tang, 2005; Ndou and Petti, 2007). Additionally, Usoro (2007) and Shanker (2008)
clarify the influence of ICT applications on different aspects of the tourism industry that makes destination marketing techniques more innovative.

Moreover ICT, although a challenge, is an opportunity for SMEs as it contributes to internal efficiency, gives access to specific services, up-dated information and takes the advantage of internationalisation. Alternatively, to understand and apply complex technologies, to dedicate time and effort to the management communication between organizations by using new technologies an organization is required to take responsibility for managing the destination and developing partnerships with other stakeholders (Rastrollo and Alarcon, 2000).

1.3 Research Problem
Tourism destinations face a wide range of challenges in the implementation of m-technologies and few destinations have yet managed to develop credible mobile services. Although mobile applications are used by some destinations, many are in their early stages of development. In particular, small and medium-sized enterprises (SMEs), which are the backbone of the tourism industry, have often struggled to embrace new technologies, e.g. website development and e-commerce applications (Gupta et al., 2004; Gupta 2006). This has prevented many SMEs gaining from the opportunities offered by new technologies. Moreover, it is unclear which business models will emerge to make mobile services viable. This thesis explored the way that tourism destinations deal with these issues and developed a mobile information model integrated with mobile
coding system to help tourism destinations to optimise their exploitation of m-technologies.

1.4 Research Questions

The research described in this thesis sets out to answer two research questions:

1. What are the challenges of implementing mobile technology in tourism destinations?

2. What are the potential solutions to improve mobile information applications in tourism destination marketing?

1.5 Research Aim and Objectives

The aim of this study is to explore the development of a destination coding system and model for the delivery of mobile tourism information services and to identify the major obstacles to the adoption of m-technologies in destination development. This aim will be achieved through the following objectives:

1. Undertake a critical review of relevant literature on m-commerce and the potential problems relating to m-technology exploitation in tourism destination development and marketing through a consideration of the issues relating to the exploitation of new technologies by small tourism
businesses to develop a conceptual framework for mobile information provision for the tourism sector.

2. Develop case studies of m-commerce enabled solutions (e.g. Innsbruck, Cardiff Bus, Traveline) to identify key issues relating to m-technology implementation.

3. Develop a model for mobile information provision for tourism destinations.

4. Develop a destination coding system to underpin m-commerce enabled destination information provision.

1.6 The Structure of the Thesis

This thesis is broken down into nine chapters. Chapter One (introduction) is the current chapter and has addressed the research problem, presented the aim and objectives of the research, and shown the structure of the whole thesis. The thesis structure and objectives are summarised in Table 1.1 and discussed in the following paragraphs.
Table 1.1: Structure of the thesis

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Chapter Two (review of the literature) is divided into four sections. The first section discusses m-technology definitions, an overview of information and communication technologies (ICT) with more focus on e-commerce, m-commerce, the value of mobility and the structure of wireless networks. The second section discusses destination definitions and identifies the main stakeholders who are involved in tourism destination management with a specific focus on ICT influence on stakeholders’ marketing efforts. The third section considers the role of m-technologies in tourism. This section asserts that a number of issues face tourism destinations in adopting m-technologies, e.g. the slow adoption of mobile technologies as a result of many factors, such
as service costs, lack of human skills, technological problems – particularly in SMEs. The fourth section concludes with a conceptual framework or business model for a mobile destination technology platform comprising four elements: tourists; destination stakeholders; m-technology stakeholders; destination level m-technology platform.

**Chapter Three (research approach)** clarifies different aspects related to the research approach. The study adopted a qualitative approach to generate rich data. The epistemology and theoretical perspective adopted in the thesis are illustrated in Figure 3.1. The first two aspects comprise the theoretical approach; the last two comprise the practical approach. After achieving objective one, the practical approach adopted in this study aimed to achieve the other three objectives outlined in this chapter: objective two involves a case study methodology and was divided into two case studies. The methods adopted for data collection in the case study are semi-structured interviews, observation and document analysis. This research aimed to develop a model and design a destination coding system, and after designing an investigation to increase the validity of the system through a modified paper prototype method with m-technology and tourism experts. Chapter three concludes with a discussion of a sampling; accessibility; data analysis; validity and reliability. It finally discusses the potential for generalisation.

**Chapter Four (case studies of mobile technology implementation)** revises the conceptual mobile information model. A set of a multiple case study forms
the parts of Chapter Four. The case study allowed the researcher to investigate the problem from different perspectives focusing on relations and processes and using multiple sources of evidence, including: semi-structured interviews, direct observation and document analysis (Yin, 2003). This chapter explores the implementation of m-technologies and divides into two phases. Phase one explores Innsbruck as a case study for a tourism destination that already implemented many m-technology applications e.g. free SMS and WAP mobile applications for visitors. Phase Two aimed to investigate Cardiff Bus and Traveline as case studies of organizations that have implemented m-technologies. The results of the semi-structured interviews aimed to develop cross-case analysis to inform the development of a model for tourism destination stakeholders, particularly SMEs to encourage better m-technology practices in tourism destination marketing. It concludes with a model for mobile information provision for tourism destination.

**Chapter Five (foundation of TMICS)** discusses the development of a tourism mobile information coding system for enhancing the validly of the revised model and translates this model into a workable or practical model that would help tourism destinations to deal with large volumes of data, e.g. restaurants and hotels. The design process of the system undertakes many steps through an investigation of different types of electronic classification for a number of applications, such as website and mobile tourist guides. This chapter provides an investigation for a number of coding systems in different areas. It concludes with the initial Tourism Mobile Information Coding System (TMICS).
Chapter Six (TMICS a paper prototype) discusses the process involved in testing TMICS by utilising a modified paper prototype method. This method was developed to assess the usability of the new system. This chapter identifies a number of stages (e.g. creating and implementing) in order to provide an appropriate paper prototype. In order to reach the pre-final TMICS paper prototype a piloting exercise was undertaken to achieve consensus amongst the number of users who participated in the piloting stage.

Chapter Seven (TMICS usability test issues) consolidates the results of the usability test with m-technology and tourism experts, which helps to identify the strengths and weaknesses of the system. It investigates the needs of users and their perceptions of using mobile information search applications in relation to service classifications, information gathering, familiarity and previous experience. This chapter discusses users’ interactions with the TMICS paper prototype components, such as posters, content and classifications of information. It also considers a number of issues, e.g. service cost and advertising.

Chapter Eight (tourism destination mobile information SMS platform) evaluates and discusses the usability test issues. It also discusses the process involved in developing a tourism destination mobile information SMS platform and identifies challenges that face the revised model and modified TMICS.
Chapter Nine concludes this study on m-technology in tourism destination marketing. It presents a review of the research objectives and outlines the major research findings. It also highlights the thesis’ contributions, limitations and opportunities for future research.
Chapter Two
Literature Review
## Chapter Two: Literature Review

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Chapter Two: Literature Review

2.1 Introduction

This chapter reviews relevant literature on information and communication technology (ICT) and how these technologies play a vital role in tourism destination marketing especially mobile technologies. The chapter addresses the following issues: A general review of the ICT technologies is stated in Section 2.2. Brief information about tourism destination and ICT is explained in Section 2.3. The main issues related to the role of ICT applications in tourism are discussed in Section 2.4. The unified conceptual model for Mobile Technology in Tourism Marketing Destination is issued in Section 2.5 as a conclusion of this chapter.

2.2 Information and Communication Technology (ICT)

The Internet is the most recent medium for both electronic commerce (e-commerce) and mobile commerce (m-commerce). Before the Internet, electronic technologies, such as electronic data interchange (EDI), were used which were more costly and not as widely available as the Internet (Zhu et al., 2002; Hawk and Zheng, 2009). It is still in the living memory of people that the Internet was only a means for displaying information and communicating using electronic mail (e-mail). According to Bouras et al. (2009) and Schwartz et al. (2009) the Internet has recently become a household domestic device and its uses are becoming increasingly widespread, especially after the recent development of broadband services, which has greatly facilitated easy, fast and low-cost access to the Internet.
At present, the Internet has become immensely more populated and a channel to undertake business. Porter (2001) mentioned that the greatest impact of the Internet was to enable the reconfiguration of existing industries that had been constrained by high costs of communicating. Acosta et al. (2009) and Hawk and Zheng (2009) suggest that using Internet-based EDI may reduce the variable cost of manufacturing and distributing products and services.

In addition, the Internet has created some new industries, such as online auctions and virtual/digital marketing places (Turban et al., 2006; Rauniar et al., 2009). Shen and Eder (2009:94) describes virtual commerce (V-commerce) as “The integrative use of the three-dimensional (3-D) Internet and virtual worlds to market products and services”.

V-commerce is therefore a useful tool for tourism marketing. This industry has special features, such as selling intangible products e.g. visiting tourism destinations. V-commerce offers tourists the ability to explore the tourism destination attraction through virtual reality before buying any services. Stangle and Weismayer (2008) suggested that the potential of virtual communities will be more suitable for the hospitality industry. As a result, many enterprises aim to integrate virtual communities into their online booking system to gain the following benefits: increased sales and website traffic; higher advertising and transaction fee revenue (Stangle and Weismayer, 2008).
In addition, there are many factors that affect Internet growth. Bouras et al. (2009) emphasised some of these factors that supported Internet growth such as expansion of broadband services (e.g. WLAN, WiFi, digital television). These developments have changed and improved the structure of electronic business activities. Turban et al. (2006) noted that the facilitation of e-commerce is through the processes of electronic marketing which has been boosted by online technology and an increase in the electronic market participants as more organizations join the marketplace. As a result, e-commerce has become an interesting topic throughout the Internet community.

2.2.1 E-Commerce

E-commerce is a familiar term, even to those who do not use technology, in particular amongst the business community. There are several definitions of e-commerce used throughout the industry. Khatibi et al. (2007:2) mention the future of international business for all personal or commercial investment companies that involve e-commerce through the exchange of valuable information, goods and services online:

*E-commerce as a dynamic set of technologies, applications, and business processes that link enterprises, consumers, and communities through electronic transactions and the electronic exchange of goods and services.*

Turban et al. (2006:4) defined e-commerce from a services perspective:

*EC is a tool that addresses the desire of governments, firms, consumers, and management to cut service costs while improving the quality of customer service and increasing the speed of service delivery.*
Turban *et al.* (2006) stated that EC is a cost-effective tool which offers improved levels of customer service. This study has focussed on defining e-commerce from a service perspective. As a result, tourism products will be classified as services, for example, hotels and online travel agencies used online transaction businesses activities as a new tool for selling its services.

**Classification of E-commerce**

E-commerce can be classified according to the nature of the interactions and the nature of the participants in the e-commerce transaction. The major e-commerce categories which were found to fit tourism business activities are:

**Business-to-Business (B2B)**

E-commerce activity is interaction between businesses or other organizations such as Dell Computers applications which involve B2B with their suppliers. Business-to-business transactions are also more complex and have higher security needs (Turban *et al.*, 2004; Kim *et al.*, 2009).

**Business-to-Consumer (B2C)**

Includes retail transactions of products or services from business to individual shoppers, e.g. when customers buy online products or services from Amazon.com (Palvia and Aubeterre, 2007). According to Priestley and Stretton (2001) the largest impact of B2C e-commerce will be on SMEs. However, MacGregor (2009) argued that the SMEs participation in e-commerce activities will be lower than expected due to many factors such as shortage of technical
skills and IT knowledge between employees. On the other hand, Tjostheim and Boge (2001:2) mentioned that there will be a great demand for B2C e-commerce activities especially, with integration of mobile devices: “There are a number of reasons to believe that much of the future B2C e-commerce will change platform, from PCs to new mobile devices (mobile phones, PDAs with communication capability, etc).”

Business-to-Business-to-Consumer (B2B2C)

B2B2C refer to e-commerce activities that provide products or services to another client business without adding any value to it. One example of B2B2C is wholesaler-to-retailer-to-consumer, such as airlines and travel agencies that provide travel services, e.g. airline tickets and sightseeing tours, which are then sold to a customer (Turban et al., 2006).

Mobile Commerce

E-commerce transactions and activities conducted in full or in part in a wireless environment are referred to as mobile commerce, for example people can use their mobile phones to do various transactions (Marcussen, 2002).

Issues in E-commerce

The growth of e-commerce introduces some challenges, not only for organisations, but also for SMEs. SMEs that participate in e-commerce may need to adapt to the requirements of commerce activities to take full advantage of the opportunities available (Buhalis and Kaldis, 2008). For example, changes
to their business culture and different procedures for managing their employees (Karanasios, 2007). Some enterprises have tried to introduce new technology without changing any of the above; this may have adverse effects in the future.

Hawk and Zheng (2009) highlighted the importance of e-commerce activities in changing enterprise business processes to increase speed and efficiency, which leads to increased revenue and customer satisfaction. It also enables the creation of new business models. Truban et al. (2004) and Hu, (2009) provide examples for new business models created by e-commerce, such as: comparing prices; electronic tendering systems; name your price; electronic marketplaces and exchanges.

The electronic marketplace (e-marketplace) involves a variety of business services. The tourism sector comes out on the top of these sectors for which revenues have increased as a result of participating in the e-marketplace. A recent study conducted by Truong and Jitpaiboon (2008) shows that the wide Internet applications within the e-marketplace in North America continue to grow from US$ 343 billion in 2003 to US$ 2913 billion in 2006, and will capture more than 40 percent of online trade in many sectors, such as business services, computing and electronics. Additionally, e-commerce offers many benefits for individuals, SMEs and other organizations. According to Acosta and Cerdan (2009) these benefits can be summarised as global reach, cost reduction, ease of finding new business partners, simplified processes, and increased productivity.
Despite the benefits gained from e-commerce applications, there are many limitations. Huang et al. (2006) and Turban et al. (2006) classified these limitations in declining order of importance as: security and fraud; trust in technology; lack of qualified personnel.

Also, there are many issues regarding the implementation of e-commerce applications. E-commerce activities may increase revenue and cost reduction, such selling cost and customer services and as a result, e-commerce will affect competition between organizations, in particular SMEs that participate in e-business activities (Braun, 2002). They need to build an IT infrastructure in order to co-ordinate their online transactions and business activities as well as the potential linkages with other enterprises or organizations within the industry (Beheshti, 2004). One of the major limitations of e-commerce is that the consumer may not be able to undertake any e-commerce activities unless they are connected to the Internet.

There are many technologies available for e-commerce and its use could be developed through wireless technology. These technologies provide opportunities to enable e-commerce activities to occur anytime and anywhere.

2.2.2 Mobile Commerce

The rapid growth in wireless and mobile communication technologies, coupled with the impressive mass adoption of mobile phones and the increasing number of users that have other handheld devices, such as smart phones, have paved
the way for the development of e-commerce to m-commerce (Benou and Bitos, 2009).

Mobile commerce (m-commerce) has become a popular term between individuals and business organizations. Benou and Bitos (2009:74) defines m-commerce as:

*Any activity that is related with a commercial transaction (or a potential one) an exchange or services or goods for money and is conducted via wireless and mobile communication networks and uses wireless and mobile devices as user interface.*

M-commerce activities, such as exchange services and goods, are being delivered through the wireless environment. Craig *et al.* (2009) argues that the major difference between m-commerce and e-commerce is that m-commerce is associated with wireless technologies. However, Benou and Bitos (2009) suggest that m-commerce overcome some of the limitations associated with e-commerce. As a result, new products and services could be created according to m-commerce key characteristics. Craig *et al.* (2008:49) identifies three key characteristics for m-commerce: “portability, ubiquity and addressability”.

**Portability** refers to the freedom for using mobile devices or applications by users anywhere.

**Ubiquity** refers to construct comprising the two reach and accessibility, in other words, users can make contact at any time from anywhere.

**Addressability** refers to the ability for consumers and marketers to send and receive information in the context of where the consumer is located at that moment by using position services, e.g. Global Positioning System (GPS).
2.2.2.1 Mobile Commerce Market

The three characteristics (portability, ubiquity and addressability) help to define the conceptual significance of mobile commerce. To achieve these key mobile commerce characteristics, it is necessary to consider complex processes that involve a number of entities. Benou and Bitos (2008:75-76) identify the main actors who play a critical role in the m-commerce market as: mobile network operators; network equipment providers; device manufactures; wireless Internet service providers; wireless application service providers. In addition, Yen and Lancaster (2008:460-461) also added: application developers; content providers; customers (individual/organisational) as the main entities in m-commerce value chain market.

After highlighting the most significant components of the m-commerce market, it should be noted that technological innovation has been critical to the adoption of m-commerce, in particular wireless technologies. Mobile commerce market stakeholders aim to develop services to improve the wireless technology and satisfy end-users. In order to gain a better understanding of m-commerce, the technological aspects should be investigated further.

2.2.3 Mobile and Wireless Technologies

This section identifies the requirements needed from mobile and wireless technologies for mobile commerce. The section begins with a discussion of the value of mobility and the factors that effect mobility growth. It also explores the
major trends and characteristics of wireless networks, describing recent trend developments as well as future trends.

2.2.3.1 The Value of Mobility

One of the limitations of traditional e-commerce was that it had to be delivered through a fixed location. However, mobile services allow users to consume the services anytime and anyplace (Buhalis, 2008; Reuver et al., 2008). There is evidence of significant interest in mobility. Basole (2004) identifies some of this evidence such as the explosive growth in mobile devices; the emergence of convergence of ICTs and the increasing investment in wireless infrastructures. In addition, there is much interest from academic researchers, e.g. Haid et al. (2008) and Tjostheim and Fesennaier (2008), to develop issues related to the mobile technology area, such as: designing mobile information applications and mobile geographical information systems. Reuver et al. (2008) identifies the types of service that are enabled by mobile technologies. For example: information services which involve news, stock prices, advertisements and restaurant-locations can be delivered through Short Message System (SMS) or Multimedia Messaging Services (MMS). Currently, 3G operators have attracted attention by using video telephony services to reach potential consumers (Marcussen, 2002). In that regard, there are many network operators, such as Orange UK, who are starting to develop network capabilities qualified to use the latest mobile commerce applications (Marcussen, 2002). The following section presents a brief discussion on wireless network structure and provides an understanding of the issues involved in identifying possible problems and
benefits that affect mobile commerce in general and tourism marketing in particular.

2.2.3.2 Wireless Networks

Network infrastructure provides an essential voice and data communication capability for consumers and vendors. As a result, the wireless industry has witnessed a dramatic technological revolution starting from voice only switched to digital voice and data services (Reuver, 2008). There are two types of wireless access technology. Mobile networks (which cover large areas up to size of countries) and other wireless access technologies (which provide higher data rates but cover a smaller area, such as city centres or university campuses (Wright, 2009). Reuver et al. (2008) classified wireless access networks based on two dimensions: range of networks and data rate for the end-users (see Figure 2.1).

![Figure 2.1: Comparison of wireless access technologies](image-url)

Source: Reuver et al. (2008:95)
Mobile Networks

Mobile networks took many years to develop until reaching 3G capability and the initial stages for 4G. Every generation adds new features to mobile networks performance and increased competition amongst wired networks, such as the Internet. The first generation of mobile networks provided voice telephony with low rates. After launching, 2G mobile networks became more popular and were driven by the establishment of the Global System Mobile (GSM) in Europe which provide international roaming for users (Boadi and Shaik, 2006; Reuver et al., 2008).

Third-generation (3G) wireless systems, combined with standards such as Universal Mobile Telecommunications System (UMTS), allowed mobile networks to be efficient for broadband access and provided higher data rates. Universal Mobile Telecommunications System (UMTS) provided mobile networks with the possibilities of integrating fixed networks and short-range access networks, such as WiFi (Reuver et al. 2008).

Short-Range Technologies

In parallel with the involvement of mobile networks in the wireless market, short-range access technologies are emerging. Wright (2008) and Reuver et al. (2008) mentioned some of these technologies (such as WiFi) which reach around 50 metres with higher data rates. Compared to mobile networks, WiFi is faster, cheaper and more efficient when developed in urban areas. Wright (2008) added Worldwide Interoperability for Microwave Access (WiMAX) and
WiMobile as new access technologies offering wider coverage up to a few kilometres with higher data rates and allowing more secure direct access to the Internet. In addition, it can expand the coverage for WiMax when combined with mobile networks.

The advantage of previous short-range technologies was lower start up costs than mobile networks because there was no need for licenses or transceiver stations (Reuver et al., 2008). In contrast, Wright (2008) identified that mobile networks require high investment for infrastructure and operating licence. In addition, mobile networks have a complex partnership with other stakeholders competing in the wireless network industry, such as content providers, wireless operators and third-party service providers. Table 2.1 illustrates the main sources of revenue for wireless access network operators. These sources involve a variety of services. Multimedia message services (MMS) is the only service which provides revenue for all three stakeholders (e.g. wireless network operator, third party service provider and content provider.)
The Internet has created some new industries, such as virtual/ digital marketplaces, and virtual commerce which offers tourists the ability to explore the tourism destination with virtual reality. Due to the development of Internet services, the structure of electronic business activities has been changed. As a result, e-commerce has become a familiar term. Despite the benefits of e-commerce, it had a major limitation which is that consumers were confined by a need for a physical lined Internet connection and it is not possible to conduct e-commerce activities away from this connection. As a result, m-commerce has been developed to overcome this limitation as m-commerce is associated with wireless technologies. In parallel to the involvement of mobile networks to the
wireless market, technology such as short-range access is also emerging. Prior to considering how mobile and wireless technologies can play a role in the marketing of tourism destinations, it is important to review the current application of ICT within tourism destinations and the associated challenges.

2.3 Tourism Destinations and ICT

It is becoming increasingly difficult to ignore the contribution of ICT applications to tourism development and their impact on the way that tourism destinations can compete and this has increased with the growth of Internet applications (Buhalis and Licata, 2002). Tourism destination organizations may benefit from the use of Internet applications to distribute destination and product information in order to improve a destination’s image, attract potential customers and increase the loyalty of existing customers (Palmer and McCole, 2000; Ortega and Rodriguez, 2006).

Many destinations try to benefit from the positive opportunities presented by the e-business revolution to create a new business environment for e-tourism. For example destinations develop Destination Management Systems (DMSs) as a new distribution channel to support destinations in their competitiveness and product marketing (Buhalis, 2003; Jones and Haven-Tang, 2005; Ndou and Petti, 2007). Additionally, Usoro (2007) and Shanker (2008) clarify the influence of ICT applications on different aspects of the tourism industry that makes destination marketing techniques more innovative. For example, Web GIS is added as a function to the website for identification of tourist sites and
destinations, customer services are managed through online booking and information, such as weather, transport timetable, theatre, is easily accessible online.

In order to explore the full impact of ICT on tourism destination management the term destination needs to be explained together with the key problems related to adopting ICT and the difficulties facing destinations. To understand the problems destination management organizations encounter, it is necessary to consider specific nature of their business activities, which are explained in the following sections.

### 2.3.1 Destination

Many tourism researchers have attempted to clarify and define the nature of a tourism destination, and each has a slightly different perspective on a destination. For example, Presenza et al., (2005:1) conceptualised tourism destination as “a package of tourism facilities and services, which like any other consumer product, is composed of a number of multi-dimensional attributes”. Presenza et al. (2005) in their definition concentrate on facilities and services that should be offered without identifying any specific features, such as natural or artificial attractions. Usoro (2007) suggests that a destination is a combination of many attractions, e.g. sandy and sunny beaches, waterfalls, mountains and facilities that enable tourists to enjoy their visit. The key problem with previous definitions is identifying a destination as a set of products, services, facilities, attractions and activities that are able to attract tourists to a specific area without referring to geographical places.
Other researchers (Buhalis, 2003; Ritchie and Crouch, 2003) added more to the definition of destination and identify destinations as geographical areas, such as countries, islands or regions, which can offer a combination of tourism products including: infrastructure (e.g. water, electricity, roads) and superstructure (e.g. restaurants, hotels, information centres). Moreover, Buhalis (2003) suggested that the destination framework includes six components: attractions, accessibility, amenities, available packages, ancillary services and activities. Also, the same author suggests that these components may be considered as the main reason for tourism (Buhalis, 2003).

From previous definitions, a relationship exists between the destination and visitor’s experience, because if a visitor’s experience of a particular destination was positive, it should influence his/her decision to repeat the visit. Snepenger et al. (2007) argue that a tourism destination from a cultural perspective, can be viewed as a combination of storehouses that use and frame expectations for experiences.

Moreover, studies have described tourism destinations as a complex combination of independent companies, which are often made up from multinational businesses, family-run SMEs and micro-businesses (Jones and Haven-Tang, 2005). This view is supported by Presenza et al. (2005:10) who highlighted the importance of destination components:

*A destination coincides with the notion of a locality seen as a set of products/experiences, influenced in a critical way by the role of companies’ attitudes and their willingness to co-operate. By*
implication, one must then recognize that the destination is an entity whose component parts are interdependent whereby a change in one has ramifications for all of the others.

There seems to be no generally-accepted definition of a tourism destination. It is perhaps too wide and complex a concept, defying attempts to encapsulate it in universally-applicable definitions. Some authors view a destination as a package of facilities and services. Moreover, others add cultural aspects to the term of destination which is the visitor’s experience and describe destinations as storehouses. This study combines theories from previous researchers to form a working definition of a destination.

2.3.2 Destination Management

Destination presents complex challenges for management due to the multifaceted nature of tourism with a wide range of needs and businesses in addition to the local community and other industries. Destination management plays a key role in addressing the many and sometimes conflicting issues that appear with an increase in the direct competitiveness between destinations around the world. Prior to highlighting some of these issues and problems it is necessary to define and clarify destination management. In that relation Presenza et al. (2005:11) define destination management as

*The strategic, organizational and operative decisions taken to manage the process of definition, promotion and commercialization of the tourism product [originating from within the destination], to generate manageable flows of incoming tourists that are balanced, sustainable and sufficient to meet the economic needs of the local actors involved in the destination.*
When creating a brand image and marketing a tourism destination, one of the main problems is the management and leadership of a large number of stakeholders. The majority of stakeholders are often multinational businesses, family-run SMEs and micro-businesses; in addition there are destination marketing organizations. As a result, each one of them aims to achieve specific marketing strategies to differentiate themselves from other competitors, without concern about the promotion of the destination brand ahead of the other destinations (Palmer and McCoile, 2000). Jones and Haven-Tang (2005:5) mentioned that there is little or no competition from SMEs and other destination stakeholders:

*Despite the ability of SMEs to create unique selling propositions (USPs) through product customization and individualized services quality, the reality of the situation is that some large organizations face little or no competition from SMEs and, with their global brands maintained through strategic resource management (coherent property management, systematic approaches to quality management, well-developed training programmes and carefully coordinated marketing), become insular and detached from the destination.*

In contrast, a large number of stakeholders have a positive impact on destination marketing strategies because they have direct contact with tourists. Gupta (2006:100-101) suggests that in order to create a successful brand, an organization should: “*have the courage to be different; make an emotional connection with the consumers; ensure internalization of the brand by front-line employees, who represent the destination and directly influence the visitor’s experience*.”
As in any industry or business operation, tourism destinations have a Destination Management Organization (DMO) that is responsible for managing, organizing, promoting and marketing the products in the marketplace (Flouri, 2003). Gupta (2006) claims that DMOs are in fact governmental institutions with a political function to promote the destination by maintaining the social, cultural and economic foundation, which affect its decision for tourism products according to the political environment.

Destination Management Organizations (DMOs) can be established and developed at a local, regional or national level. They may be formed by a public-private partnership between tourism destination stakeholders within various levels (Buhalis, 2003; Gupta, 2006). Palmer (2002) and Gretzel (2006) argue that one of the largest challenges that face destinations in relation to creating a brand name and managing the destination is to involve all tourism destination stakeholders both private and public, all of them have one vision for the development of a consistent destination brand.

Gretzel et al. (2006:118) studied in depth the challenges faced by destination organizations and mentioned that managing expectations is one of these challenges but there are many factors beyond that, such as:

- Leadership role of destination organizations in the local communities
- Growing number of constituencies
- Communicating more effectively by recognizing changes in consumer’s behavior
• Need for community relations plan

Moreover, Dwyer et al. (2009) identified six segments: economic, political, environmental, technological, demographic, and social which can be a challenge to tourism stakeholders in both the private and public sectors. As a result, stakeholders have to account for these segments proactively to sustain the competitive advantages of their organizations. Dwyer et al. (2009) have recently developed a framework to explore the influence of these trends on tourism destination stakeholders (see Figure 2.2).

Figure 2.2: Influence of the global trends on tourism

![Diagram showing the influence of global trends on tourism]

Source: Dwyer et al. (2009:64)

The Dwyer et al. (2009) framework shows a relationship between the destination and tourism business enterprises to create new tourism products and tourist attitudes. He pointed out that the global trends, such as economic,
political and technological trends influence positively or negatively the whole tourism destination stakeholders relationship process. As a result, the ICT revolution in the tourism industry is successful in creating a business relationship across regions, and between different tourism business sectors, that help destinations to improve their brand names (Shanker, 2008).

Moreover ICT, although a challenge, is an opportunity for SMEs. It contributes to internal efficiency, gives access to specific services and up-dated information and takes advantage of internationalization. Alternatively, to understand and apply complex technologies, to dedicate time and effort to the management communication between organizations by using new technologies an organization is required to take responsibility for managing the destination and developing partnerships with other actors (Rastrollo and Alarcon, 2000).

It appears that a tourism destination comprises a complex combination of stakeholders at various levels. As a result, many issues face a destination in promoting its brand name. One of these issues is the coordination and cooperation between the large numbers of stakeholders often such issues can be resolved by a DMO. In contrast, SMEs represent the majority of tourism destination stakeholders that can help the destination organisations in their marketing strategies, especially with the growth in ICT applications. In summary, after defining the nature of destination management and identifying documented issues, it was found that it is necessary for an organization to manage and market the destination at various levels, especially with the revolution of ICT.
2.3.2.1 Destination Management Organizations (DMOs)

DMOs use many approaches for promoting and marketing their areas. With the growth of the Internet, it is important for DMOs to modify its approach according to critical factors such as: consumer’s behavior (especially when using DMO Web sites), appropriate Internet applications and sufficient funding (financial support) are seen as important factors. These factors vary from one DMO to another. It is beneficial to identify the nature of the DMOs and clarify the vital issues related to these factors which are presented below.

There are many different definitions of what constitutes a DMO that have been presented by researchers. Middleton (2001:327) identifies DMOs as “the marketing side of National Tourism Organizations (NTOs), responsible for the overall marketing functions of countries as tourist destinations”. According to Middleton’s (2001) definition, the DMOs were identified as a part of National Tourism Organizations (NTOs), its main function was the full responsibilities for most of tourism destination marketing strategies. While, Ortega and Rodriguez (2007:147) considered DMOs “behave as facilitators for reaching the strategic objectives of the destination”.

Furthermore, Gretzel et al. (2006:151) identifies the DMOs as marketing organizations that are funded by both the public and private sector to achieve a greater advertising for the destination image.

DMOs are primarily marketing organizations and providers of visitor services, with little actual power to plan and develop. Their rationale is that by pooling the marketing resources of the public
and private sectors, a greater advertising impact can be achieved than can in the case of dispersed effort.

This definition focuses on the functions of DMOs and places the marketing function as the first of these functions. Dore and Crouch (2002:137) suggest that “DMOs focus mainly on marketing as the principal management function”. Alternatively, Presenza et al. (2005) argue that point of view and added more to the DMO’s functionality, i.e. that: “the role of the DMO goes beyond marketing to include other activities that are important to the success of tourism in a destination from a competitive and sustainable perspective.” Buhalis and Spada (2000) and Paraskevas (2007) mention DMOs as powerful non-profit government bodies that have the authority and funds to achieve strategic objectives in terms of promoting and managing a destination. Also, they ensure that destination resources are being distributed in ways that help the tourism product.

Gretzel et al. (2006) refer to the importance of sufficient funding as success factor for DMOs to determine their marketing and promotional budget and suggest two examples for tourism destination organizations’ funding. The first main source is defined as hotel taxes and second one as stakeholder membership subscription.

Additionally, DMOs involve a wide variety of organizations at various levels, including NTOs which are responsible for management and marketing of tourism at a national level which established national tourist offices. At the next
level there is the Regional/State Tourist Originations (RTOs) that are responsible for managing destination at a geographic level, e.g. region state or province (Ritchie and Crouch, 2003; Presenza et al., 2005; Pike, 2009). The majority of DMOs and regional offices are representatives for government authorities. In many cases the involvement of the public sector in managing tourism destinations has positive impacts. Morrison (1998:192) confirms that “Government involvement in promoting economic and tourism development, providing hard and soft support.” It is important to involve the public sector in partnership with the private sector in the management of DMOs. This is important as it brings benefits, such as sufficient funding and direct contact with tourists.

Historically, providing Information and data to prospective customers was one of the responsibilities of DMOs which used traditional distribution channels to achieve its objectives (King, 2002). Recently, the complex structures for DMOs enhance the development of virtual tourism destinations, which are able to use e-business applications (Palmer and McCole, 2000). The development in Destination Management Systems (DMSs) which are considered as the key technological infrastructure of destinations’ e-business activity enables DMOs, NTOs and SMEs to coordinate their operations and relationships by using new distribution channels, e.g. online booking. Most of these issues affect consumers’ behavior and services. It creates a new consumer who is looking to make a purchase dependent on a variety of instant resources used for
information which enable the consumers to make comparisons between suppliers and choose the best services (Ndou and Petti, 2007).

2.3.2.2 National Tourism Organisations (NTOs)

Kotler et al. (1999, p.667) defined NTOs as “a central tourist agency, which may be public, quasi-public, non-profit”. Thus, the majority of NTOs are part of the public sector and aim to implement public policy according to government objectives (Page, 2000). Page also states that most NTOs are involved in destination promotion activities in order to increase the number of tourists from both the international and domestic market.

However, tourism destinations, as previously stated, face a wide range of challenges and adapting to technological change may be considered one of these challenges. Gretzel et al. (2006) argue that many destination organisations have not realized the full importance of ICT applications to improve organizational performance, particularly in relation to marketing approaches and developing relationships between DMO actors. Flouri (2003:8) states that “NTOs are challenged to undertake a new leadership role in the ‘New Information Technology Age’ and adopt pioneering and creative marketing methods” and suggests that NTOs should adopt dynamic practices that are consistent with a destination’s management approach.

Pease et al. (2004) provide an example of such dynamic practices by using ICT applications to establish virtual business networks between tourism destination
stakeholders in the local community to integrate its business activities. Additionally, Pease et al. (2004) focused on Internet applications as a basic element to achieve co-operation and integration between DMO members. These ICT applications, together with the partnership between public and private sectors, help to improve cooperation between destination organisation entities.

In summary, NTOs are considered as a central public tourism agency which is involved in destination promotion activities. Information and communication technology (ICT) presents technological challenges for NTOs but also offers opportunities regarding marketing and interaction between NTOs/DMOs.

2.3.2.3 Public Sector
After highlighting the tourism organizations that are responsible for managing the tourism destination, the majority of these organizations represent the public sector in their region. Destination Management Organizations (DMOs) and National Tourism Organisations (NTOs) have responsibility for planning, managing and marketing destinations, by establishing regional provincial/state tourist organisations (RTOs) (Ritchie and Crouch, 2003). There has been an ongoing debate amongst tourism researchers (Page, 2003; Jones and Haven Tang, 2005; Gupta, 2006) regarding the appropriateness of public sector involvement in managing tourism destination organizations.
Page (2003) indicated that the effective management of tourism destinations requires the involvement of the public sector in order to centralise policy-making and to create a suitable framework for the promotion and development of tourism. It would also enable destinations, at various levels, to obtain suitable funding to achieve their marketing strategies. Flouri (2003) argues that collaborations between public and private organisations are beneficial for the future of destination management.

Jones and Haven-Tang (2005:3) suggests the involvement of the public sector and other private tourism destination stakeholder

* A destination can be considered as a hierarchy of entities – ‘destination’, ‘tourism businesses including SMEs’ and ‘employee’ – together with the public-sector interventions that support and coordinate the strategic development of the destination to project a coherent image to potential customers.

Therefore, ICT enables destination stakeholders, both public and private to achieve better coordination and collaboration. Also, tourism destination businesses cannot take full advantage of ICT without the financial support of the public sector in order to create e-commerce initiatives and consequently learn and develop greater capabilities (Rastrollo and Alarcon, 2000).

In summary, there is much debate regarding the involvement of the public sector in DMO/NTO management. It could be beneficial for destination organisations to involve the public sector. Benefits include centralization regarding policymaking, a coordinated approach between public and private sectors and appropriate funding. Destination Management Organizations
(DMOs) and National Tourism Organisations (NTOs) need public sector funding to fully exploit ICT opportunities, e.g. e-commerce applications.

2.4 The Role of ICT Applications in Tourism

Information and communication technology (ICT) progress and tourism have developed in parallel for a number of years (Poon, 1993; Sheldon, 1997; Buhalis, 2002). The development of ICT has also changed tourism business practices, strategies and transform tourism globally (Porter, 2001), e.g. the establishment of Computer Reservation Systems (CRSs) and Global Distribution Systems (GDSs) and the development of the Internet (Buhalis, 2003; Alvarez et al., 2007). It has led to the development of a wide range of tools and services, e.g. web-based and wireless technology, that facilitate global interaction between tourism key stakeholders (Buhalis and Kaldis, 2008). The significance of new information communications access has brought the entire tourism industry to new levels of interactivity which have increased with the introduction of wireless technologies (Buhalis and O’Connor, 2005). It is well documented that ICTs play a critical role for the competitiveness of tourism organisations and destinations as well as for the industry as a whole (Jones et al., 2004). Information and communication technology (ICT) have changed the efficiency and effectiveness of tourism organizations, the way that business is conducted in the marketplace, as well as how consumers interact with organizations (Buhalis, 2003). Developments in search engines and the speed of the Internet have influenced the number of travelers around the world using
technologies for planning and experiencing their travels (Buhalis and Law, 2008).

However, ICT has gradually generated a new change and not only does it allow consumers to identify and purchase tourism products but also enhance the globalization of the industry by providing effective tools for suppliers to develop and distribute their services worldwide (Buhalis and Pistidda, 2008). Werthner and Klein (1999) suggest that information is required both by the demand side, i.e. the consumers, as well as the supply side and entails high search costs.

Information and communication technology (ICT) has a significant impact on the competitiveness of the tourism industry at an organizational and a destination level. Business processes have been adopted to improve the efficiency and effectiveness of tourism organizations in the marketplace, e.g. wide market coverage. Also, it generates new added value to the tourism product, e.g. lower cost, and also has changed how consumers interact with tourism organizations. The growth of ICTs has developed many specific applications in tourism marketing. Destination Management Systems (DMSs) are one of these applications as another electronic distribution channel but with new features which are used to promote tourism destinations and provide booking facilities for tourists. A brief discussion about the main features of DMSs is discussed in Section 2.4.1.
2.4.1 Destination Management Systems (DMSs)

A wide range of ICT applications are used in order to exchange information and to facilitate the daily operations of the tourism destination organizations, such as DMSs. Most of these technologies enable tourism stakeholders to communicate with each other (i.e. B2B and with B2C) in order to exchange information, contracts, reservations and payments (Buhalis and Licata, 2002).

Many tourism researchers used different terms in the literature in relation to tourism Electronic Distribution Channels. Recently, Elsayed (2008) used the term “Electronic Distribution Channels”. Also, Elsayed (2008:3.11) added the idea of “virtual reality” to the marketplace and “purchasing decision” to make his definition fit for any product, not only tourism products “The electronic mechanism to afford the sufficient information to the right people at the right time in the right quantities and in the right virtual place to allow the purchasing decision to be made”.

However, Elsayed (2008) identifies definitions for each EDC channel, such as Global Distribution Systems (GDSs); Websites based on GDSs and Websites based on Central Reservation Systems (CRS); Destination Management Systems (DMSs). The main objective of these systems is to make all suppliers accessible online and to provide end-users with information related to a particular area. All actors who participate in such e-commerce activities aim to increase the level of customer-satisfaction and to promote the whole destination
in global markets. However, in order to achieve that, they need a strong IT infrastructure (Gupta et al. 2004).

Daniele and Frew (2008:233) added that DMSs distribute a wide variety of tourism products and are focused primarily on a particular region using a mixture of distribution channels. Also, DMSs pay more attention to helping small and independent tourism suppliers improve their promotion and e-business activities.

*Destination Management Systems 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 organization within that region. Destination Management System (DMS) 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 suppliers.*

Recently, there has been a strong trend towards the formation of partnerships between private-sector companies, in particular SMEs and public sector organizations, in relation to the development and operation of DMS. In addition, it helps SMEs to gain more benefits by adopting new technology. Unfortunately, most of these systems have not been totally successful and have faced many problems (Gupta, 2006). To address some of these issues, a theoretical example of DMSs in context of SMEs within a framework of e-commerce is discussed in the following pages.
2.4.1.1 Framework for the adoption of e-commerce by SMEs

The implementation of a system for tourism mobile marketing using m-commerce in any destination will inevitably involve small-medium-and large-sized tourism enterprises working with the destination management organization. Such a system would require:

- Destination-level leadership.
- The participative of tourism enterprises of all sizes.
- Third-party technology solutions.

Probably the most analogous situation to developing a mobile marketing system is that of the development of a destination management system to promote e-commerce. One well-documented example of the implementation of an Internet-based destination management system was that of VisitWales (VW) from which potential lessons can be learned (Gupta, 2006).

In 2001, the Wales Tourist Board (WTB) tendered for the commissioning of the VW website. The tender was won by World.Net who specialized in developing website applications and technology solutions. Two of these applications were SupplierNet and CRMNet which enabled the distribution of worldwide tourism products via the Internet for suppliers, intermediaries and DMOs in the tourism and travel industry (Gupta et al., 2004; World.Net, 2008).

The main purpose of VW is to provide potential tourists who intend to visit Wales with a variety of information about accommodation, transportation, sight-
seeing, attractions etc. Thus, VW acts as a central tourism database that enables visitors to arrange a trip to Wales. Additionally, the role of VW is to provide the tourism industry in Wales with leadership by engaging the majority of Welsh tourism suppliers on the new DMS distribution channel that enables them to promote their products without charge (Gupta, 2006).

**Difficulties facing VW**

The VW implementation, which was commissioned by the WTB, encountered a number of difficulties. Some difficulties appeared in the initial stage before launching VW and others developed after launching.

**Inter-regional Coordination**

One of the problems appearing in the initial stage was that each region had its own independent regional tourism partnership which provided support for tourism businesses within the region. This operational independence of regions in Wales limited SME’s involvement with government activities. Another problem was that there was a database of accommodation, activities and information in each region, but there was no standardisation between the regions to classify and organize their databases. According to Gupta (2006), a centralized database would be the best method to gain the accuracy of data which would help to resolve any difficulties caused by multiple disparate systems.

**Selection of a partnership**
During the decision-making stage, to establish VW there were problems of how WTB would find a partnership that could develop and operate a successful DMS which could provide financial and technical support. In spite of WTB’s efforts to join with a partnership from another public or private organization to establish VW, various partners failed to achieve the WTB vision for its new DMS. For instance, Gupta (2006:243) describes the financial difficulties which occurred in a joint venture between WTB and banks by saying:

*The capital costs of the Wales DMS (approximately £1-2m) precluded the direct involvement of the big banks through non-resource financing as levels were too low.*

A partnership with an Austrian company (Tiscover) was suggested, which could have been successful, because Tiscover achieved approximately 75% of the WTB requirements and it used the latest technology applications for DMS. The partnership was refused by WTB due to Tiscover’s company policy which depended on using the Wales DMS to promote the company brand name rather than promoting Wales’s brand name (Gupta, 2006).

Other suggested partnerships, either private or public, focused on VW as a commercial project without considering the social aspects set up by the WTB. This was because the main goal of VW was to assist SMEs in becoming familiar with new technology applications in order to utilize them for promotional and marketing purposes. The other potential suppliers did not have the technical and the functional elements that enabled them to establish a complete system.
After analysing the options and approaches that the WTB used to create a partnership to obtain the fund for its new project, it was found that the WTB was satisfied with the option of “Buy it and operate/outsourc”. This option gave WTB full control and ownership of the data within VW and the flexibility to add or change it at any time. When the option was chosen, WTB decided to run a formal tendering process between four companies. Finally, as a result, World.Net won the opportunity to establish and develop the new Wales DMS project at an estimated capital cost of about £4m-£4.14m. It is arguable that, the reason behind the increased cost from £2m to £4m might be due to the lack of a partnership.

After launching VW, some stakeholders felt that the website had negative impacts on their work performance and operation. They saw VW as representing a big promotional and marketing tool which threatened their business (Gupta, 2006). In the following sections, these factors are considered further and e-destination model for Wales is proposed.

**Diagrammatical Model of VisitWales**

From the literature review, especially Gupta (2004; 2006) and World.Net (2008), an e-model for VisitWales has been developed to illustrate the VW development (see Figure 2.3). A brief discussion of the main elements of this model is presented.
World.Net

From the World.Net point of view, because it represented the developer of VW, it found many issues and problems during the development of the Wales DMS project. For example, this project included multiple stakeholders, particularly SMEs. Wales Tourism Board (WTB) did not have a deep understanding of the requirements and needs of SMEs who were involved in this project. Hence, before WTB intended to implement this project it should have had a clear idea about the requirements and the level of education of SMEs with regard to the new technology. This would have helped to avoid any misunderstanding. Large numbers of SMEs did not have e-mail or experience of using PCs. Gupta (2006)
argued that the main reason for this problem was unrealistic expectations of technology for both WTB and other Wales tourism suppliers.

In addition, during the development of VW it seems that there was no specific commercial plan, because WTB was thinking about the implementation of VW as a non-profit venture and as a promotional and marketing tool for Wales.

**Wales Tourist Board (WTB)**

There were many issues and problems facing WTB during the development of VW, especially for the project’s multiple users. Everyone had their own particular requirements therefore the problem was to see how WTB could gather all users into one circle. Thus, WTB considered the SMEs’ needs and demands when they initiated a market survey in the first stage of the new project, and maybe that caused confusion for WTB which impacted on their discussions with World.Net. Also, problems appeared after launching the system. Theses related to the online booking facilities, the quality of data and the fact that the system was not able to achieve the target number of bookings (3000 bookings per month). The reason for that, from WTB’s point of view was that a number of businesses had not updated their product price. This may be due to the size of these businesses, especially accommodation suppliers, because they thought it was unnecessary to go online and update their data. The contact centre of VW was responsible for managing data and services however VW could not fulfill this task because the system used ‘my business
option’ which meant that the suppliers had direct access to information in DMS system.

**Tourist**

Due to the lack of regular updating of prices, availability and accuracy of data provided by the DMS suppliers, problems occurred with the search ability of VW as there was insufficient information available. As a result, potential tourists could not obtain the correct data that enabled them to complete their booking. In addition, this gave a negative image for the Wales DMS in the consumers’ mind, and affected DMO profits because it received a fixed fee from every booking completed through the VW website.

**Small and Medium Enterprise (SME)**

There were many benefits earned from VW for the tourism business in Wales. For example, it was free to join VW, the main reason for establishing this project from the WTB’s point of view, was to support small and medium business which did not have enough financial resources to promote their products through the new technology tools for distribution channels. In contrast, the level of motivation of SMEs inconsistent after launching VW. Small and Medium Enterprises (SMEs) thought the system was very complicated, despite training programs which were organised by the WTB. Small and Medium Enterprises (SMEs) were inexperienced in using IT applications and e-commerce which caused many problems for the DMS system. Problems included updating prices and the availability of information which seriously affected booking.
2.4.2 Mobile Technologies in the Tourism Industry: A new phenomenon

As stated in Section 2.2, the Internet is becoming a very important medium for providing information about travel and tourism. With regards to the implementation of Internet e-commerce activities for the tourism sector there are many issues and problems that face destination stakeholders. For example, lack of IT infrastructure, cost of using the service, integration and partnership problems and DMS’s searching functionality. Marcussen (2002; 2003) suggests that the development of mobile technologies, in particular “mobile Internet”, and “WAP-sites” will improve tourism e-commerce activities. Elsayed (2008) mentioned the mobile delivery will be the sixth generation of distribution channels for marketing and selling hotel services.

M-commerce and wireless technologies are a new phenomenon which is undergoing constant changes and development. This phenomenon may facilitate and offer more opportunities for travel and tourism industry. A few examples of mobile commerce applications which could be used to promote a variety of tourism services are given in the following section.

2.4.2.1 M-commerce applications in tourism

According to Forrester Research (2006) mobile devices, such as mobile phones, PDAs, and laptop computers, will be used to distribute tourism services in multiple aspects. For example, mobile search marketing based on a user’s search criteria to bring relevant advertisements (see Figure 2.4).
Marcussen (2003) mentions that mobile commerce applications will offer information services such as:

Air Travel: many airlines companies provide wireless Internet access for their passengers during flights.

Rail: Passengers can obtain real-time rail information schedules and book mobile ticket and get mobile ticket by SMS.

Car: Passengers and drivers can obtain information on directions and traffic conditions.

Hotels: searching for Hotels, destinations, and Restaurants information.

Furthermore, Novak and Svensson (2001:102) highlighted the main advantages for SMS and MMS which are summarised in Table 2.2.
Table 2.2: The main advantages for SMS and MMS

<table>
<thead>
<tr>
<th>SMS</th>
<th>MMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMS is a stored-forward service which means messages are not send directly between users. This means enables instant delivery, international roaming without international fees.</td>
<td>MMS enables message to be easily and immediately between mobile devices (via the mobile network) without the need for Internet e-mail addresses or mail boxes.</td>
</tr>
<tr>
<td>In many situations one is relatively much more comfortable sending a message via SMS than talking over phone.</td>
<td>MMS does not require a network mailbox, so users do not have to log on to receive messages. Each message is automatically pushed to the users MMS enabled mobile device. Likewise, if the recipient on mobile device is switched off or temporarily out of coverage, the message is stored by the network until it can be safely delivered.</td>
</tr>
<tr>
<td></td>
<td>MMS overcomes the character limit of SMS. It also allows formatted text, photos, drawings, graphics, animations, audio samples, and video clips. For example, a message can include a photograph or video clip.</td>
</tr>
</tbody>
</table>

Source: Novak and Svensson (2001:102)

In addition, many m-commerce applications have been developed, such as barcode applications, which have increased the value of mobile business activities and enable e-businesses to expand beyond the limitations of the fixed line personal computer. For example, the consumers can buy a ticket using their mobile phone, make mobile payments and receive tickets as a message in the form of barcode numbers (Scronavacca and Barnes, 2009).

2.4.2.2 Future Wireless technology in tourism: (WiFi, WiMax)

Most countries now have major mobile operators, such Vodafone and Orange in the UK. These operators have the capabilities to the latest technological mobile services to its customers. In addition, there are a larger number of operators of WiFi networks for example British telecomm (BT).
In other cases, WiFi services are provided by smaller network operators, such as community associations and municipal governments. Many organizations offer WiFi free of charge as part of the hospitality service (see Table 2.3). On the other hand, mobile services offer unlimited, low data rate communications for mobile computing and commerce, while WiFi offers higher data rates, but less coverage (Wright, 2009). As a result, mobile technology could be a potential option for tourism destinations to improve destination marketing by taking the advantage from WiFi services at low costs to potential customers.

| Table 2.3: Strategy for wireless access network operators |
|---------------------------------|-----------------|-----------------|
| Mobile Operators                | Hospitality providers | Competitive Wireless Network Operators |
| Technologies                    | WiFi, WiMax, WiMobile | WiMax, WiMobile |
| Generate revenue from the full range of services | Provide Internet access for the full range of services | Generate revenue from the full range of services |
| Buy up competitors              | A void competing with other operators by a competitive bid process | Differentiate from incumbents by offering low cost services, focusing on IP, developing next generation services, e.g. location |

Source: Wright (2008:177)

The research described in this thesis has considered the advantages, disadvantages and challenges associated with implementation of the DMS through the case study of VisitWales documented by Gupta (2006). Subsequently, the current and future benefits of m-commerce and wireless
technologies were reviewed. The next section discusses how these findings can be combined to produce a conceptual model which will be beneficial for destination stakeholders, tourists and m-technology stakeholders.

2.5 A Unified Conceptual Model for Mobile Technology in Tourism Marketing Destination

The Internet phenomenon which has revolutionized information delivery, particularly for the tourism industry, could potentially be outstripped by developments based on m-technologies. According to the latest mobile statistics there are over 3 billion mobile users worldwide compared to just 1.3 billion PC users (Eyefortravel.com, 2008). Despite certain constraints, e.g. message size and cost, m-technologies offer destinations and businesses the opportunity to immediately inform consumers about products or services available at specific locations (Korhonen, 2001) and open the door to a new generation of services for customers and the potential for destination and business development (Jones and Haven-Tang, 2005). However issues, such as payments and security, are key to the development of m-commerce (Kumar and Zahn, 2003). Mobile phone operators have already started addressing these problems and an increasing number of mobile phone applications are leading to a range of new trading opportunities.

However tourism destinations still face many challenges with the implementation of new technologies, particularly where the destination is dominated by SMEs (Jones and Haven-Tang, 2005). Tourism is a fragmented
industry and SMEs are notorious for their slow adoption of new technologies as evidenced through the slow uptake of web-technologies and e-commerce by tourism-SMEs (Murphy, 2005; Gupta \textit{et al}., 2004; Gupta, 2006) who have not generally engaged directly with technology providers (see Figure 2.5). Figure 2.5 represents the interactions between SME’s and technology providers. The ‘n’ shows that there are many different SMEs interacting with many different technology providers.

![Figure 2.5: Individual SME engagement with technology providers](image)

\textit{Moustafa \textit{et al}. (2009:1878)}

To overcome the implications of slow technology adoption, and to ensure destination competitiveness, destination management organisations (DMOs) have often provided leadership through the development of a destination-level technology platform to facilitate technology exploitation (see Figure 2.6). Figure 2.6 represents the interactions between the destination level technology platform and the DMO with many SMEs. One example of such a platform is VisitWales – the Wales Tourist Board’s destination management system (Gupta 2006).
The implementation of VisitWales offers some valuable lessons for the potential development of a destination level m-technology platform which are likely to relate to three key challenges:

- Destination level leadership/coordination
Chapter Two: Literature Review

- SME participation
- Third party technology solutions

Thus a business model for m-destination technology platform development showing all key stakeholders, including tourists is likely to be similar to Figure 2.8 and comprises four key elements: tourists; destination stakeholders; m-technology stakeholders; destination level m-technology platform.

Figure 2.8: Conceptual model for mobile information provision for the tourism sector

Moustafa et al. (2009:1878)
2.6 Summary

Due to technological progress, ICT has transformed the tourism industry globally. The development of a wide range of new tools and services, e.g. web-based services, GDSs and wireless technology, encourage global relationships between stakeholders in the tourism industry. As a result, ICT has had a major impact on the competitiveness of the tourism industry at an organizational and a destination level.

The Internet is becoming a very important medium for providing information about travel and tourism. With regards to the implementation of Internet e-commerce activities for the tourism sector there are many issues and problems that face destination stakeholders. For example, the lack of IT infrastructure; cost of using the service; integration and partnership problems; DMS search functionality and the limitation of delivering e-commerce through fixed location.

The development of mobile technologies may increase the value of mobile business activities and enable e-business to expand the limitations of the fixed line personal computer. In addition, mobile technology could be a potential option for tourism destinations to improve destination marketing by taking advantage of WiFi services and other mobile applications at a relatively low cost to potential tourism and hospitality customers.
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3.1 Introduction
The previous chapter presented a critical review of the literature related to the implementation of m-technologies in tourism destination marketing. This chapter provides a justification for choosing the research approach used to achieve the research objectives outlined in Chapter One. It attempts to present both the theoretical approach (epistemology and theoretical perspective) adopted and the practical approach (methodology and methods) chosen to explore the research question and achieve the research objectives. The chapter begins by detailing the researcher’s epistemological stance to understand the theoretical perspective. Further, the chapter explains why case study is the preferred methodology as it is distinguished by its ability to investigate phenomena, such as the exploitation of mobile technology in tourism destinations from different perspectives and focuses on the relationships and processes which are a critical aspect of their adoption. The chapter discusses the various methods that were used in the research stages. The chapter culminates in a discussion of the validity, reliability and generalisability of the results.

3.2 Research Design: Qualitative versus Quantitative
There are various ways in which research methods can be classified. A popular method is to differentiate between quantitative and qualitative research methods. The differences have been explained by different authors (Holliday, 2002; Corbetta, 2003; Saunders et al., 2007). Corbetta, (2003) highlighted many differences between qualitative and quantitative research methods during the social research stages. For example, in the research planning stage of a
quantitative approach the theory-research relationship should be structured and the function of the literature is fundamental in defining theory and hypotheses. On the other hand, in the qualitative planning stage, the theory-research relationship could be open and interactive and the role of literature will be auxiliary.

Furthermore, Saunders et al. (2007:145) supported Corbetta’s (2003) findings and pointed out the key criteria for qualitative research design which aims to use multiple techniques, such as interviews, in collecting the data to generate non-numerical data, while quantitative research refers to the use of numerical data as:

A quantitative is predominantly used as a synonym for any data collection technique (such as questionnaire) or data analysis procedure (such as graphs or statistics) that generates or uses numerical data. In contrast, a qualitative is used predominantly as a synonym for any data collection technique (such as interview) or data analysis procedure (such as categorising data) that generates or uses non-numerical data.

Moreover, Silverman (2001) added one differentiation between qualitative and quantitative research approaches which was the nature of data. A quantitative research approach is hard (rigid), objective and standardised; a qualitative research approach is soft (flexible) and provides a rich, deep understanding of a social phenomena.
A qualitative approach was applied to the research described in this thesis. This was chosen due to the nature of the research circumstances which needs more depth and richness in collecting data to achieve the aim of the research. In addition, this richness would help to identify major obstacles in the implementation of mobile services in destination development which was reflected in the design of an appropriate model integrated with the tourism mobile coding system to underpin m-commerce and mobile technology enabled destination information provision.

3.3 Theoretical Approach

To solve the research problem and provide valid and convincing outcomes, it is necessary to use an appropriate method. Crotty (1998) identifies four key elements that inform each other and are helpful in justifying a researcher's decisions, these are: epistemology; theoretical perspective; methodology; and methods. Crotty's (1998) classification was adopted in this research to inform the research approach. Figure 3.1 highlights two divisions of the research approach: the theoretical approach and the practical approach. The choice and the justifications behind selecting the overall approach was discussed in detail in the following sections.
3.3.1 Thesis Epistemology – Constructionism

As a terminology, epistemology is derived from episteme a Greek word which refers to knowledge (Miller and Brewer, 2003). According to Grix (2002) epistemology is a research philosophy which is used to create knowledge in terms of its methods, validity and gaining understanding of social reality. This research adopts constructionism as its epistemological perspective which is seen to be reliable with the research nature and its aim and objectives. Crotty (1998:42) defined constructionism as:

*Constructionism is the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context.*
This research studied phenomena of the current key issues relating to the exploitation of new mobile technologies and m-commerce applications by tourism destination key stakeholders. In order to achieve this, a multiple case study approach was required to collect the information. Therefore a constructionist approach is appropriate in constructing and building data to explore the issues.

3.3.2 Theoretical Perspective – Interpretivism

The theoretical perspective is “the philosophical approach which underpins the methodology” (Crotty, 1998:3). Crotty (1998) added that the theoretical perspective is a method of looking at the world and making sense of it. Thus this can provide a context for the logic of the research.

There are a number of different theoretical perspectives, such as positivism and interpretivism which a researcher could utilise to form his/her methodology (Crotty, 1998). However, Saunders et al. (2003) pointed out that the distinction between these philosophical approaches does not mean that one is better than another but they are all better in doing different things. Saunders et al. (2007:106) highlighted the importance of interpretivism as a philosophy for the researcher to understand human interactions and it will be completely different when studying objects

Interpretivism is an epistemology that advocates that it is necessary for the researcher to understand differences between humans in our role as social actors. This emphasises the
difference between conducting research among people rather than objects such as trucks and computers.

This research aimed to explore the current issues facing tourism destinations in their attempts to exploit of the implementation of mobile technologies to develop a model for the delivery of tourism information. The research aim included different elements which were influenced by human beings (e.g. destination key stakeholders, DMO marketing managers, end users (tourists), mobile technology solution experts and mobile commerce companies). ‘Interpretive’ is an appropriate theoretical perspective in the context of the analysis of human knowledge. Therefore, an interpretive approach was used to investigate the key issues facing destination stakeholders in the design of a model for mobile information which integrates with a mobile information coding system. This provides reliable and valid research and avoids any bias as the researcher implements an interpretive approach in investigating the key stakeholders’ views regarding the research issues. To understand these issues, the next section describes a particular methodology to collect the data that was useful to achieve the research aim and objectives.

3.4 Practical Approach

The practical approach takes account of the methodology, and the method which has been selected for addressing the aims and objects of the research (Crotty, 1998). Therefore, this section illustrates the methodology and methods used to achieve the research objectives. The researcher used a multiple case
study approach and various methods, including semi-structured interviews, document analysis, observation, audio-visual materials and paper prototype (Snyder, 2003; Hair et al, 2007). This research is divided into two phases. Phase One aimed to explore mobile technology applications and identify key issues that face tourism destinations in adopting mobile information applications and developing a mobile information provision model (see Figure 4.14). The second phase focused on designing and testing the new mobile information coding system which can be applied in the model mentioned in Phase One.

3.4.1 Research methodology - Case study

Crotty (1998:3) defined research methodology as:

The strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes.

The methodology does not only take account of the particular features of the research, such as methods but also the philosophical perspectives of the researcher (Knight, 2006). The case study method is widely-used approach and many social researchers have used case studies as their preferred method to answer their research problems (Yin, 2003; Bryman, 2008; Eriksson and Kovalainen, 2008). According to Creswell (2008:74) the case study method could be a good approach for many researchers if “the inquirer has clearly identifiable cases with boundaries and seeks to provide an in-depth understanding of the cases or a comparison of several cases”.

Hair et al. (2007) states that a real-life example must be examined to obtain a complete picture of an entire situation in order to accomplish the logic of a case study. Also, Bryman (2008) identifies that the common use of the case study approach is associated specific locations, such as a community or an organisation. Robson (2002, p. 178) defined a case study as:

*A strategy for doing research which involves and empirical investigation of particular contemporary phenomenon within its real life context using multiple sources of evidence.*

Yin (2003) identifies two types of case study design: single case study and multiple-case study. Single-case studies can be used to decide if a theory’s propositions are correct or represent a unique case (Yin, 2003). A single case study could be a pilot for later multiple studies or it could contain a number of different units for analysis. These studies can be holistic or embedded (Gray, 2009). Multiple-case studies are needed to improve the reliability or generalisability of the study. Also, the main advantage of the multiple-case study approach is the possibilities of replicating the findings of one case across a number of cases to provide more detailed insights into the subject under investigation (Gray, 2009). On the other hand, the disadvantage of undertaking the multiple-case study approach is that it can be expensive and time consuming (Yin, 2003).

This research adopted a multiple-case study approach to investigate the implementation of mobile technology in tourism destination marketing, in order to explore and understand the key stakeholders’ points of view and opinions
with regard to developing a model for mobile information integrated with a mobile coding system to improve destination marketing. To do this numerous data collection methods or sources of evidence were used to answer the research questions and enhance the outcomes of the research. They included semi-structured interviews, document analysis, audio-visual materials and direct observation with mobile solution company managers and tourism experts (Yin, 2003; Creswell, 2007) (see Figure 3.2).

Figure 3.2: The adopted case study approach using multiple sources of evidence

3.4.2 Research methods and techniques

After determining the case study to be the main methodology for this research, it was important to use multiple sources of evidence to collect the data related to the research problem. This was to help provide a rich valuable data for this
study (Yin, 2003). There were different research methods applied in each phase of this research. These methods are described in the following sections.

3.4.2.1 Methods and techniques: Phase One

This section discusses the methods or techniques used to achieve Objectives Two and Three of this research (see Chapter One). This phase is based on two case studies which are Cardiff Bus/Traveline and ECCA in Innsbruck, which aimed to discover the key issues relating to m-technology implementation in order to develop a model for mobile information provision for tourism destination. Four techniques were adopted for this purpose including semi-structured interviews with mobile technology experts and document analysis as well as the use of observation and audio-visual materials related to the implementation of mobile technology in tourism marketing in Innsbruck, Austria and Cardiff, UK. The techniques which were used are described below (see Figure 3.3).
3.4.2.1.1 Semi-structured interviews

Miller and Brewer (2003) mentioned that the interview is one of the most widely used research methods in social research. It provides a way of generating data by asking individuals about their experience of a particular situation. Similarly, Gray (2009) identifies that the interview is the most logical research technique if the research objective intends to examine feelings or attitudes of other people regarding a particular phenomena. According to Saunders et al., (2007) there are three types of interview: structured interviews, semi-structured interviews and unstructured interviews. A structured interview is a standard interview utilising a prearranged list of questions. In contrast, an unstructured interview is the opposite of structured interview as there is no prearranged list of questions.
Semi-structured interviews combine the features of both structured and unstructured interviews as they have structured interview questions that can be changed according to the requirement of the interview. Dawson (2002) mentioned that the semi-structured interview, characterised by its flexibility, enables a researcher to add or remove questions from the schedule based on the results of each interview and the flow of the discussion. In addition, it provides the opportunity for the researcher to collect information regarding new issues that were not included in the original interview questions. Bryman and Bell (2007: 213) support this and they mentioned:

_Semi-structured interview is a term that covers a wide range of instances. It typically refers to a context in which the interviewer has a series of questions that are in the general form of an interview schedule but is able to vary the sequence of questions. The questions are frequently more general in their frame of reference than that typically found in a structured interview schedule. Also, the interviewer usually has some latitude to ask further questions in response to what are seen as significant replies._

In this phase of this study, one-to-one semi-structured interviews were conducted with mobile-technology experts in Innsbruck city and Cardiff city. There were two interviews undertaken in Innsbruck during ENTER conference 2008 in order to understand the Innsbruck experience in implementing mobile information applications. The schedule of questions used in the interviews is included at Appendix One. The first interview was conducted with one of the project leaders at eTourism Competence Centre Austria (ECCA) and the second was held with one of the well-known experts in tourism electronic and mobile applications among UK universities. The purpose of the interviews was
also to investigate the issues in the conceptual model from mobile technology experts' perspective (see Figure 2.8). Furthermore, a semi-structured interview was held with the Traveline project manager in Wales. This interview aimed to understand in depth how the mobile information service works from technical and management points of view.

3.4.2.1.2 Document analysis

Document analysis is one of data collection methods that aim to analyse and study existing material to develop a deep understanding of the problem being investigated (Gray, 2004). These documents could be classified in many different areas. For example, Burke and Larry (2005) classified documents into two categories: personal documents which are used for personal purpose (e.g. diaries\letters) and official or public documents (e.g. organisation reports) and electronic documents (e.g. websites). Yin (2003:87) asserted that “For case studies, the most important use of documents is to corroborate and augment evidence from other sources”.

In this study, a number of documents were analysed. For example, in the case of Innsbruck it began with analysing e-mails that had been received from the head of eTourism Competence Centre Austria (ECCA) which was useful to provide an overview regarding the main research interest of this centre as an organisation that developed a wide range of tourism mobile applications in Innsbruck. Additionally, the ECCA website was analysed to identify the service
and mobile applications that have been developed. Also, the researcher obtained some documents that were distributed during the ENTER conference which highlight the latest projects that had been developed by ECCA.

Regarding the Cardiff Bus and Traveline case study a number of documents were analysed. For example, the Cardiff Bus' website and other printed documents (e.g. Cardiff Bus scheme and the company guide). These documents were useful in identifying mobile information applications offered by Cardiff Bus. The outcomes of this analysis suggested that Cardiff Bus mobile information applications was developed and operated through another company. Therefore, an analysis of Traveline website was undertaken. Such document analysis was of great value to examine the study from different aspects and enrich the researcher's knowledge about the implementation of mobile information applications before conducting the interviews with participants.

3.4.2.1.3 Observation and audio-visual materials

Using a direct observation technique was one of the methods that enabled the researcher to notice some of the issues investigated in a realistic and unplanned situation. In this sense, the researcher was accompanied by a Traveline project manager to observe the process of building the database and how the information was used with mobile applications. In addition, to enhance the observation, the researcher attempted to undertake a trial for Traveline SMS
service by using his personal mobile phone and recording the outgoing and incoming SMS (see Figure 4.7). Unfortunately, the researcher could not complete his observation in the ECCA headquarters but the interviewee allowed only for the researcher to walk through reception and into the meeting room which he justified on the grounds of security.

This study also utilised audio-visual materials as tangible evidence to help understand the implementation of mobile applications from different aspects. For example, Harper (2000:730-731) discussed the importance of using photographs stating that:

*Photographs were a part of the unproblematic “Facts” that constituted the “truth” of these tales. The researchers came to the realisation that without photographs to indicate common understanding, their interviews did not make a great deal of sense, photographs made in the research became a bridge between the subjects and the researcher.*

Photos were taken at various locations in the city of Cardiff. These photos revealed the level of Cardiff Bus and Traveline information services, e.g. real-time travel information system (see Figure 4.4). Also, photos highlighted some vital issues for mobile technology which are discussed in Chapter Four. In order to achieve good-quality photos a good quality digital camera with high resolution was used.
3.4.2.2 Methods and techniques: Phase Two

This section discusses the methods and techniques used to achieve Objective Four of this research. This phase was based on two main stages. Stage one aimed to design the initial TMICS (see Figure 3.4). Stage Two attempted to examine the usability of the system. To do this, two techniques were adopted for this purpose, including documents analysis and a paper prototyping method integrated into semi-structured interviews with tourism and mobile technology experts in Cardiff.

![Figure 3.4: Research stages and evidence sources used in Phase Two](image-url)
3.4.2.2.1 Document analysis (Stage One)

This method was important to build the proposed system. It began with investigating the classification of tourism services from related literature to identify the most important services that meet tourists’ or users’ needs. A range of documents was analysed in the next step to support the evidence obtained through the usability test, these included.

**Tourism services via different electronic means**

In order to examine the useful and suitable electronic tourism services classification two good quality websites were investigated for this purpose (Expedia.com and Lastminute.com). In addition, one mobile guide application was analysed (VisitBritain mobile guide). The selection of websites which were examined was based on a number of criteria, such as accessibility, numbers of bookings, services and facilities available on the website.

**Examples of coding systems in different area**

After classifying the required tourism services the following stage aimed to choose a suitable code for each service. As a result, an investigation of coding systems was undertaken in order to identify the proper coding system that was deemed appropriate for this research. Hence, the researcher analysed websites and guides that contain information regarding UK car-number registration plates, Cardiff Bus codes and Airport codes (IATA). In addition, the researcher analysed information that was obtained by e-mail from IATA to provide the researcher with information related to the history of IATA airport codes. The
core issues reached by analysing these documents were linked to the classifications of tourism mobile information services which were identified in Section 5.5.1. As a result, a tourism mobile information coding system was devised (see Section 5.5.2).

3.4.2.2 Paper prototype method (Stage Two)

Snyder (2003:4) defined paper prototyping as:

Caption: Paper prototyping is a variation of usability testing where representative users perform realistic tasks by interacting with a paper version of the interface that is manipulated by a person “playing computer”, who doesn’t explain how the interface is intended to work.

Paper prototyping were widely used by many companies, such as Microsoft and IBM, as a powerful tool to develop their products in the early stages to meet users’ needs and requirements (Snyder, 2001). The paper prototype method was used in the second phase in this study in order to achieve suitable tourism mobile information coding system. It was necessary to examine the usability of the proposed coding system, to work with different mobile information applications such as SMS or WAP applications. It was beneficial to identify the strengths and weaknesses that could help in improving the system. This method saved time and effort, because it provided substantive feedback in the development process before implementation, also it does not require any technical skills, e.g. programming skills (Snyder, 2003).
The process of developing the TMICS a paper prototype

Despite the growing popularity and widespread applications of paper prototypes in many areas, the method often needed modification to suit the current study and achieve its objective. Thus, this research developed a paper prototype method through a number of stages. It began with the proposed TMICS and the identification of the users’ requirements for the prospective service. These two stages are discussed in Chapter Five. The following stage was to create the required paper prototype. After designing the TMICS paper prototype the next stage focused on the implementation which aimed to decide the way that this paper prototype would be presented in the usability test. To do this, the five scenarios were designed for this purpose. Each scenario aimed to achieve a realistic task (see Table 6.1). These scenarios were used in semi-structured questions list that aimed to evaluate the proposed system (see Appendix Two).

Piloting

A paper prototype was piloted with five users to identify any further essential modifications that may be needed to improve TMICS (for more details about the modified paper prototype method see Chapter Six).

Usability test and modified system

The process of implementing the TMICS paper prototype involved the end-users with realistic tasks that enabled them to interact with the new coding mobile information coding system. Following the usability test a series of semi-
structured interviews were conducted with fifteen users (mobile technology and tourism experts).

3.5 Sampling

Corbetta, (2003:210) defined sampling as “observing a part in order to glean information about the whole is an almost instinctive human act”. There are two principal types of sampling technique in social research: probability and non-probability sampling (Saunders et al. 2009). Probability sampling is usually used when each one in the population has an equal chance to get involved in a sample, which enables a researcher to form an overview about the whole population from the selected sample (Corbetta, 2003; Saunders et al, 2007). In contrast, non-probability sampling is used when not all elements of a sample have an equal chance of being selected (Finn et al. 2000). According to Burns (2000:465) “the non-probability sampling is more often applied in a case study”. There are five types of sampling which are: quota, purposive, snowball, self-selection and convenience. However, mainly three are common and can be utilised in qualitative research to identify a non-probability sampling which are purposive, quota and snowballing samples. These types are compatible with small-scale and in depth studies, or when a researcher is performing a preliminary, exploratory study (Saunders et al. 2009).

A non-probability approach was adopted using purposive and snowballing techniques in this research. This was due to the nature of this study where the selected techniques were found the most suitable sampling techniques that enabled the researcher to study cases that serve and meet the research
requirements as well as answering its questions. The sampling of this study was divided in two phases which described below (see Figure 3.5).

### Figure 3.5: The Fieldwork Timeline

<table>
<thead>
<tr>
<th>Fieldwork</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase One</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Study One</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Revised Model (Chapter Four)</td>
</tr>
<tr>
<td>Case Study Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Initial TMICS (Chapter Five)</td>
</tr>
<tr>
<td>Phase Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Modified TMICS (Chapters Six, Seven and Eight)</td>
</tr>
<tr>
<td>Stage One</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage Two</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3.5.1 Sampling for Phase One

After determining the case study to be the main methodology for this study, the researcher attempted to select the best case studies that could answer the research problem. Phase One was based on two case studies. The first case seeks to discover mobile technology practices in tourism destination and the second case aimed to provide an insight about mobile technology implementation. The sampling which was used in both cases was purposive and snowballing which were considered suitable sampling techniques in a case study approach. The researcher provided this integration to enhance the reliability and validity of the research.

**Case One**

The first case (Innsbruck) was developed through purposive and snowballing techniques by sending e-mails to authorities in Welsh Assembly Government (e.g. Wales Tourism Board (WTB) and some academic people from many UK
universities. This was to find out how tourism operators in Wales were using mobile technology to guide and attract tourists. The result of the use of snowballing technique showed that mobile technology was not widely used in Wales and the respondents lead the researcher to choose the case of Innsbruck. The main reason for choosing the destination of Innsbruck as a case study was that it already applied mobile technology in the provision of information to visitors. As a result, the researcher found this destination to be suitable for the case.

The best route of access to the Innsbruck case was found through searching for organisations that are responsible for using mobile technology which are used in tourism sector in Innsbruck city. Three local experts from ECCA in this field were found; however, only one was cooperative to be interviewed and the other two candidates were not able to provide valuable information. This is because of the confidentiality of ECCA policy that places restrictions on such issues. Also, a language barrier was the second reason for the respondents not to participate. The researcher was also able to conduct one additional interview with a well-known UK expert who was participating in ENTER 2008.

**Case Two**

Similarly a purposive sampling approach as well as snowballing was used in the second case study. Case One provided the research issues related to mobile technology in tourism and its development. However, there was a gap in how to implement this technology particularly the mobile information applications as it
is the core of the ECCA. Hence the issue of implementation was not completely clarified. Therefore, there was a need for more investigation to explore this issue. Thus the researcher used another case study which was Cardiff Bus and Traveline.

Due to the time constraints the researcher tried to find other organisations in different fields that had already implemented mobile information applications. After searching it was found that the Cardiff Bus Company could be an appropriate case study as the company applied a mobile applications using SMS technology to inform customers of bus times.

E-mails were sent and one telephone interview was conducted to find out how Cardiff Bus developed and operated these applications. The findings revealed that the company subcontracts to another company (Traveline) to operate and develop its mobile applications. The Traveline Company was contacted and one interview with the company project manager in Wales was undertaken. Accessibility was easier at this stage as the interviewee was very cooperative and provided valuable insights for this study. The aim for providing these case studies was to help revise the conceptual model of this thesis (see Figure 2.8).

**3.5.2 Sampling for Phase Two**

This phase was divided into two stages. Stage One was related to the design of the initial TMICS through investigating two websites and mobile guide in addition to three types of coding systems. The second stage aimed to test the
proposed system. In both stages purposive and snowballing techniques were applied.

**Stage One**

In this stage the sampling was important as the researcher used two well known websites and a mobile guide that contributed to the reliability and validity of this research. In order to examine the useful and suitable electronic tourism services classification, the sampling technique was based on certain criteria. For example, services and facilities available on the website, numbers of bookings and number of mobile guides downloaded. These tools provided a wider knowledge to the researcher and served the research purpose. After the required tourism services were obtained, suitable codes for each service were created through investigating three types of coding system (UK car numbers plates, Cardiff Bus coding system and IATA airport codes). The difficulty in accessing information through these tools was that the IATA airports codes have limited available information. However, the IATA was contacted and provided the required information.

**Stage Two**

This stage concluded with examining the TMICS. This was achieved through using usability test. Following the design of the usability test which combined a modified paper prototype, a series of semi-structured interviews were conducted with fifteen users (mobile technology and tourism experts). These interviewees were chosen using a snowballing technique. This is because the researcher tried first to contact interviewees using e-mail. However, there was
no response as the chosen participants were busy but few of them recommended other participants (experts). The three main organisations were identified: Welsh School of Hospitality, Tourism and Events; the School of Computing, Information Systems and International Studies; and the Mobile communication group (School of Computer Sciences, Cardiff University). They were cooperative and enriched this research with qualified expertise (eight experts in tourism and seven experts in mobile information technology). The reason for choosing these particular users was to enhance the proposed system performance by sharing their experience in this field in order to highlight the weaknesses and strengths of this system. The key issues addressed by users are presented in Chapter Seven and discussed in Chapter Eight.

Whilst this study tends to be qualitative, the size of each sample is controlled for the purpose of the study. Thus, the researcher decided to carry out semi-structured interviews for usability test until he achieved data saturation and was getting the same answers and no further changes were obtained.

3.6 Data Analysis

Data needs to be processed to make it useful and meaningful; the data collected needed to be grouped into categories prior to the process of analysis to make it more understandable (Saunders et al., 2007). Strauss and Corbin (1998:13) described the analysis process as “the interplay between researchers and data”. In qualitative analysis appropriate techniques of analysing data are
obtained from semi-structured interviews is called content analysis (Coolican, 1999). Marshall and Rossman (1995:85) defined content analysis as:

*an overall approach, a method, and an analytic strategy that entails the systematic examination of forms of communication to document patterns objectively.*

Most social researchers analyse qualitative data through using coding and identifying themes (Hruschka *et al.* 2004).

This study applied content analysis as an appropriate approach for analysing data. The reason behind using content analysis in this research is to deeply explore the data and get a real picture of the case study which strengthens the interpretation and enhances the outcomes of the research. Analysing the data is a vital task at this stage, so while research is qualitative, it is necessary to look for appropriate data analysis techniques in order to gain useful information. In Phase One the researcher used manual qualitative data analysis, semi-structured interviews were coded and transcribed. In this phase the semi-structured interviews were analysed using content analysis to identify the key issues identified by the experts in each case and cross-case analysis was used to identify similarity and discord between cases.

The analysis process in Phase Two started with transcribing fifteen usability test interviews, coding, categorising the data into different themes and then comparing them. Transcribing fifteen interviews produced more than 150 pages of transcription, as a result the researcher utilised NVivo 8 to manage and organise the data selected in this phase. Bazeley (2007) mentioned that NVivo
is useful software because it provides researchers with a set of tools to assist them in undertaking an analysis of qualitative data. All TMICS usability test interviews were entered into NVivo as sources, the nodes were divided according to the design of TMICS. Each node has a number of sub-nodes (themes) which are presented in Chapter Seven and discussed in detail in Chapter Eight.

### 3.7 Validity and Reliability

#### 3.7.1 Validity

Veal (1997:35) stated that “validity is the extent to which the information collected by the researcher truly reflects the phenomenon being studied”. Bernard (2000) and Saunders et al. (2007) support this and mentioned that the validity refers to ensuring that research reflects the true meaning of the concepts being investigated in this study and also it is concerned with the data collected and whether it reflects this reality or not. Creswell (2009) addressed some strategies in order to achieve research validity and suggested undertaking at least two of them in any study for this purpose. These strategies are: triangulation, peer review or debriefing, external audits, rich and thick description, participants’ views. These strategies were adopted in this study. Table 3.1 illustrates how they were adopted.
Table 3.1: The research validation strategies

<table>
<thead>
<tr>
<th>Validation Strategies</th>
<th>Adoption in the research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangulation</td>
<td>Different methods were adopted in this research for data triangulation. In each phase of research more than one method was used.</td>
</tr>
<tr>
<td>Peer review or debriefing</td>
<td>This research was supervised by three supervisors. Two of them have PhD. They all were keen to check it and discuss its results with the researcher.</td>
</tr>
<tr>
<td>Rich and thick description</td>
<td>Qualitative data e.g. interviews and observations were collected. A detailed description was used in the analysis (within the cases and usability test) of the results to give as much information as possible about the results.</td>
</tr>
<tr>
<td>External audit</td>
<td>This research was published and discussed in international and local conferences (The impact of mobile and new technologies: 2007 London, Small Business Marketing: 2008 Newport university, ENTER 2008: Austria, IBIMA 2009: Cairo) to obtain more feedback from the editors and conference audience to judge its accuracy and increase its credibility.</td>
</tr>
<tr>
<td>The researcher solicits</td>
<td>This research divided into two phases. The results of Phase One were tested in Phase Two.</td>
</tr>
<tr>
<td>participants’ views</td>
<td></td>
</tr>
</tbody>
</table>

Adopted from Creswell (2009)

3.7.2 Reliability

According to Yin (2003) the purpose of reliability is to reduce mistakes and bias. Coolican (2004) mentioned that reliability is the degree to which experiments provide similar results under constant situations all the time. However, tourism research as a social study seldom achieves that condition as it deals with people’s perceptions and attitudes (Veal, 2006). Therefore, it is difficult to repeat phenomenological research as it depends generally on unstructured data collection methods (Gray, 2004). Thus, a good practice of reliability can be improved through an aspect of indication that is “showing the audience of
research studies as much possible of the procedures that led to a particular set of conclusions” (Seale, 1999:158).

In this study a number of measures were conducted to ensure reliability of the collected data and minimise subjectivity including: all interviews were recorded to present sufficient evidence and avoid any subjectivity that might happen if the researcher attempted to remember the conversation. The interview questions were designed to support the research objectives. Each question was explained to each participant and all of them were asked the same questions to ensure that all issues were covered. However, they were given the opportunity to explain their view freely without any interference from the researcher. This is to avoid any subjectivity which would affect the response to the question being asked. Also, to reduce reliability error in conducting the interviews, these questions were pilot studied with five different interviewees. Moreover, to overcome the time taken to collect data which may differ from time to another, the researcher contacted the interviewees via e-mail to arrange an appointment that suited them to participate. Additionally, methodological triangulation was considered an appropriate solution to increase the reliability and validity, therefore, this study adopted four sources of evidence (semi-structured interviews, observation, document analysis and audio-visual materials).

3.8 Generalisability

Various social researchers discussed whether research project results are generalisable to wider situations. While some scholars such as Guba and
Lincoln, (1994) argued it is impracticable to generalise a qualitative study. Some other scholars hesitated about the generalisability of the qualitative case study research (Kalof et al., 2008). However, Yin (2009) stated that the results in a qualitative research could be general in respect to theory, not population. In contrast, Williams (2002) argues that reasonable generalisations are possible even in a single case study.

Moreover, Schofield (2002) suggested two ways for increasing generalisability of the findings in a small-sized sample in the case of qualitative research which includes: studying and investigating multiple case studies. The results obtained are more powerful and credible than those studied in a single case study.

The current study applied a multiple case study approach to enhance the generalisability of the research findings. This thesis produced a generic model integrated with a tourism mobile information coding system for tourism to encourage tourism destination stakeholders particularly SMEs to utilise mobile technology effectively in their marketing. The results of this study may be possibly used in other similar tourism cases in the UK or outside in destinations that are similar to that of the UK or even to newly emerging tourism destinations. Regardless of adopting these tactics the current research results had some limitations which are discussed in Chapter Nine.
3.9 Summary

A qualitative research approach was adopted in this study to provide rich data about the phenomenon that had been researched as well as to investigate certain issues in detail. This chapter has presented the research epistemology, theoretical perspective, methodology and methods. The research took a multiple case study approach and used many sources of evidence which included: semi-structured interviews, document analysis, observation, audio-visual materials and paper prototype to enhance and strengthen the results of this study. The research was divided into two phases. Phase One included multiple case study of mobile technology implementation in both the city of Innsbruck and Cardiff city. The second phase used a modified paper prototype method to develop and test a mobile information coding system via usability test interviews. The reliability and validity of this research were ensured using methodological triangulation and checking the collected data and instruments. Finally, the generalisability of the results was also discussed.
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Chapter Four: Case Studies of Mobile Technology Implementation: Mobile Innsbruck and Cardiff Bus

4.1 Introduction

This chapter presents the results obtained from a case study of mobile technology applications in Cardiff, UK and Innsbruck, Austria. It uses the conceptual model developed in Chapter Two to analyse the implementation of mobile technologies in tourism destinations with regard to the development of a model for mobile information provision for tourism destinations. The case studies are based on secondary data from Cardiff Bus reports and the Traveline website. Also, supporting information from websites and documents were used in the case of Innsbruck. The secondary data is supported by semi-structured interviews with key industry stakeholders. The rationale for choosing these particular case studies was explained in Chapter Three.

4.2 Mobile Innsbruck

The city of Innsbruck has implemented a wide range of mobile technology applications. E-tourism Competence Centre Austria, (ECCA) is considered one of the main organisations responsible for developing a number of tourism mobile information applications, within a partnership of a number of organisations in Innsbruck. For example, the centre developed a mobile guide which is called (etPlanner) that aims to help tourists organise their journeys during their visit to Innsbruck. Users can use this guide via their mobile phones to obtain required information such as: weather and events, although users have to connect to the Internet to use this guide. In order to understand the Innsbruck experience in implementing mobile information applications the
researcher visited Innsbruck during the ENTER conference in 2008. Two semi-structured interviews were held, the first interview was conducted with one of the project leaders at ECCA (EXP1) and the second was held with one of the well-known experts in tourism electronic and mobile applications among UK universities (EXP2). The results of these interviews are discussed in the following sections.

4.2.1 The Vision of Mobile Technology from a Destination Prospective

This part explores how tourism destinations interact with mobile technology in order to attract visitors and enhance information services. The interviewee (EXP2) highlighted that mobile technology applications, i.e. the development of SMS and mobile devices can play a vital role in tourism destination marketing. However he argued that a number of tourism destinations do not totally understand how they can benefit from the implementation of mobile technology in tourism, as he commented:

… Mobile technologies have got lots of different aspects you can have some low technology for example SMS technologies that actually can be implemented today in determined what we try to do vision to reality. You can go all the way to more advanced technologies, mobile devices technologies, smart phones, navigator and 3G whatever and there are a lot of technologies out there with huge different purposes. Now, destinations have got to understand what they need to use these technologies for and go with that, implementing it …

( EXP2\Quote 1 )

Furthermore, EXP1 added that tourism destinations used mobile services in the during-trip phase of a visit because tourists would be close to components of
the destination value chain, such as hotels, restaurants and tourist attractions. As a result, mobile services could enhance the visit by offering the required information regarding these components. Conversely, he argued it would be difficult to undertake marketing for a destination via mobile information services before the pre-trip phase and the majority of DMOs depend on different types of distribution channel, such as DMSs, as he stated:

... We have been involved in tourist destination mobile services for about three and a half years now and what has been experienced is the destination of Innsbruck. In the first place we want to know the benefits of mobile services for the tourists. Ok, there is a benefit for the tourist because he is in a destination already, he/she can receive information, he/she can be close to the value chain he/she can integrate into the value change services value chain. look let’s say is the services time and trip phases we got pre-trip phase, here we got the trip, here we got after trip and here we got decision-making phase’ Let’s see my experiences, what do destination management organizations (DMOs) where do they try to make their marketing? This is what DMOs focus on marketing of DMOs why is that? Because players in the destination, there are hotels, restaurants, events whatever, they pay money to the DMOs. So they propagate the destination itself to attract more people so they can increase their overnights, they can increase their revenues. So DMOs use their marketing budgets to propagate the destination in the pre-trip phase and what we have experience is that pre-trip phase, mobile services up to now (not talking about the future) in this stage they are not interesting ...

(Quote 2)

4.2.2 Destination Stakeholders and the Development of Mobile Services

As EXP1 stated, the DMO was the destination key stakeholder involved in developing mobile services. In addition, EXP2 identified a number of stakeholders, engaged in developing mobile information services, for example mobile networks. Also, he referred to the destination content providers, such as
restaurants and travel agencies, as the main destination stakeholders as they provide the DMO with the basic information needed for its database. In addition, two stakeholders were mentioned by interviewee EXP2, namely the mobile manufactures and tourists. He justified mobile phone manufacturers as an important part of the provision as they develop mobile phones according to the consumers’ needs and requirements, as he explained:

... The key stakeholders are those people who are providing the networks, so the mobile networks are critical stakeholders then the content providers, in sometimes the content providers of destination, in sometimes content providers can be tour guides for example and the element of aggregation of information content to platforms and that also is another stakeholder aggregation of basically information. Mobile manufacturers are also stakeholders because may need to have specific features on their phones. Consumers become a stakeholder because they got interested in this ...

(EXP2)Quote 3

4.2.2.1 Challenges facing SMEs to adopt mobile services

There are two issues mentioned that can be considered as barriers for SMEs in order to adopt mobile services. The interviewees identified cost as the main barrier to the adoption of mobile information services. For example, EXP2 mentioned that one of the challenges that face SMEs is how they can provide mobile information services at a reasonable cost to the prospective consumers. This was is especially relevant if there is a large volume of information provided by SMEs, which can affect the download time:

... The main challenge is not the technology but the business modelling because the content belongs to a lot of different providers that it’s really about aggregating this content and making it available to people cost effectively. So the cost of downloads is considerable still one pound per page and, specially if goes to roaming when people are travelling, its much more. So really to getting this kind of things to understand how the business model
can operate. Now a lot of companies start playing with it and destination also start playing with it but they will not pay it. It might be we need to understand the consumer and what the consumer wants from that and provide appropriate facilities to do the cost effectively …

(EXP2\Quote 4)

Additionally, the interviewee (EXP2) highlighted a technical problem with the mobile phone’s screen size which prevents users browsing a particular website. However, there are small numbers of companies, such as Google, that optimise their website to work with the latest smart mobile phones as he explained:

… The technology is still problematic because on mobile phones a screen is quite small and you need large phones to be able to browse things. Now, there are a lot of smart phones now they coming up but they still most of the web pages are not optimized for this kind of website. So it’s basically Google very few other players who have got optimized sites. The challenges are technical, delivering some kind content, its content, its aggregation of content and source of businesses, its how much you charge …

(EXP2\Quote 5)

Briefly, it can be noted that the cost and the technical problems were considered as the main barriers facing tourism destinations in general and in particular SMEs. The need to provide large amounts of data by SMEs could be a problem for these organisations, especially if they cannot deliver information that users need at a cost effective price.

4.2.3 Innsbruck Mobile

As stated earlier, ECCA was the main organisation responsible for developing different types of mobile service applications. The Innsbruck project is a WAP mobile application that provides tourists with information. E-tourism
Competence Centre Austria (ECCA) is responsible for storing the database and operating the services through mobile network providers, such as A1 and T-mobile. These operators offer the ECCA with a connection to the Internet and users could use the service via their mobile phones by inserting the website link for Innsbruck mobile. Figure 4.1 illustrates the processes of data flow for the mobile Innsbruck service.

Moreover, EXP1 mentioned that they could identify the number of users who already access their website and the system could recognise if the users are a tourist or resident via a mobile phone number:

… We can provide data work for mobile services we have here in Innsbruck which is this mobile services project we are operating this projects, we are operating Innsbruck mobile from here. The services over here and also we have data about how many people access and which people access and so on. By identifies the foreign numbers…we are the technical side, the operators in Austria like this you have operators like there is A1 (Orange) and there is Three and we have T-mobile and then we have Vodafone,
and we set on top so we provide the services, the mobile service you know how its work. Somebody has A1 as provider’s access and he have access to us. So the service provider does not be necessary at the telephone operators don’t have to be the services provider they can be just as an intermediate. This is just a network provider we don’t get involved in this, this isn’t our business. They provide connection to the internet ok and we provide the information. Let’s say I know http://www.innsbruck-mobile.at/ that’s Innsbruck mobile. He grabs his mobile phone and just put the address and he gets the answers …

(EXP1\Quote 6)

In summary, Innsbruck is considered as one of the tourist destinations that have implemented mobile tourism information applications, e.g. ePlaner and Innsbruck Mobile by ECCA. These applications enabled tourists to search for different types of information, such as weather, events and tourist attractions. E-tourism Competence Centre Austria (ECCA) specialise in developing and operating mobile tourism information applications to enhance tourists’ visits and provide them with the required information.

There are ongoing debates about how mobile information applications improve tourist destination marketing in general and SMEs in particular. One of the interviewees argued that tourism destinations should study how they could benefit from mobile information applications before implementing considering three main issues, the cost of the service, the technical issues and the end users. The cost and the end user are linked together, because when a tourism destination provides mobile information services at an appropriate price this will impact on usage of these services.
It was also found that the ECCA focused on designing its mobile information services according to the level of information needed by tourists, which increased during the trip phase and was lower in the pre-trip and after-trip phases. As a result, the majority of tourism destinations concentrated on using other distribution channels. After studying Innsbruck experience in implementing mobile applications it was found there were a number of stakeholders involved, namely DMOs, SMEs and mobile network providers.

Innsbruck was a good example of mobile destination that had implemented a number of mobile information applications, however there are some issues such as language problems and ECCA policy that prevented the discovery of the whole vision for implementing mobile information applications in order to establish an appropriate destination mobile information platform.

4.3 A Brief History of Cardiff Bus

Cardiff Bus was established in 1986 as a private company owned by Cardiff Council who hold all the shares of Cardiff Bus and is represented on the Board of Directors (Cardiff Bus, 2005). The main objective of Cardiff Bus is to offer stable bus services for the benefit of its passengers, shareholders and employees (Cardiff Bus, 2008). In order to compete with other providers of public transport, Cardiff Bus runs a number of successful commercial lines. It operates network bus services within the City of Cardiff and routes to Penarth and Newport. More recently routes to Barry and the Vale of Glamorgan have
been added (Cardiff Bus, 2005). Each weekday around 100,000 passenger journeys are made with Cardiff Bus (Cardiff Bus, 2008).

### 4.4 Cardiff Bus and ICT

Cardiff Bus has adopted the Internet to provide a large number of passengers with information about journey times and routes. The company also uses various tools to supply consumers with a range of information, e.g. timetables at bus stops. To benefit from new technology, especially the Internet, the company has established a website (http://www.cardiffbus.com/) which offers customers comprehensive information about its services and enables consumers to pre-plan their journeys (see Figure 4.2). It also gives users useful information, e.g. about shopping centres, entertainment and tourist attractions in Cardiff.

![Figure 4.2: The official site of Cardiff Bus Company (http://www.cardiffbus.com/)](image)
4.4.1 Cardiff Bus’ Real-Time Information System

To provide Cardiff Bus passengers with accurate travel information, the company has successfully developed a new information system using GPS facilities. It was launched for the first time during the 1999 Rugby World Cup, which was hosted in Cardiff (Hill, 2000). As a result, the Cardiff Bus new travel information system was able to give real-time information about the next bus to arrive at any of its bus stops.

Figure 4.3 illustrates the various elements of the real-time system and explains how the process works. Global Positioning System (GPS) is the key feature of the system, and gives an extremely accurate automatic vehicle location for the bus unit at any time. Using differential correction radio transmissions the system is accurate to within five metres (Hill, 2000).

Adopted from Hill (2000)
A signal is sent from the bus to the control centre and from the control centre to an electronic sign display at the bus stop. Thus, real-time travel information is available for passengers and includes route number, destination and estimated arrival time of the service at the bus stop (see Figure 4.4). In case of any delay for services, the sign displays the route number, destination and estimated waiting time before the services will arrive at the bus stop (see Figure 4.5).

**Figure 4.4: Travel information display at bus stop sign owned by Cardiff Bus**

**Figure 4.5: Travel information change according to traffic condition**
4.4.2 Cardiff Bus SMS Service

More recently, in 2005 Cardiff Bus further enhanced its information provision to passengers through the introduction of a new service using SMS technology to inform customers of bus times at any time, in any place. A passenger can use his/her mobile phone to query the system by sending a text that includes the bus stop code to a particular telephone number (84268) (see Section 4.5.3). This results in a message being returned that shows the next four buses due for that bus stop (see Figures 4.6 and 4.7).

![Diagram of Cardiff Bus SMS travel information system](image)

**Figure 4.6: Cardiff Bus SMS travel information system**

User sends SMS with the bus code stop e.g. (CDITAGM) to 84268

The information system responds by sending a reply SMS contain next four buses

![Diagram of sending and receiving message to Traveline by using mobile phone](image)

**Figure 4.7: Sending and receiving message to Traveline by using mobile phone**

Outgoing message from passenger’s phone.

Incoming message from Traveline to the passenger.
This SMS service is not operated by Cardiff Bus but by another company Traveline that is responsible for running the service nationally across the UK. To understand how the service works from a technical and management viewpoint, a semi-structured interview was held with the Traveline project manager in Wales (TLPMW). The results of this interview are discussed in the following section.

4.5 Traveline’s Integrated Transport Information System

Traveline started operating in 2000 as a partnership of transport operators and local authorities to provide impartial and comprehensive information about public transport in each region of the country (traveline.info, 2010). These partnerships have made arrangements to run Traveline in their particular areas in Scotland, England and Wales. The company involves representatives from the following organizations (traveline.info, 2010):

- Confederation of Passenger Transport (CPT)
- Association of Train Operating Companies (ATOC)
- Local Government Association (LGA)
- Confederation of Scottish Local Authorities (CoSLA)
- Transport for London (TfL)
- Passenger Transport Executives’ Group (PTEG)
- Association of Transport Co-ordinating Officers (ATCO)
- Welsh Assembly Government (WAG)
- Scottish Government
- Department for Transport (DIT)
- Translink (integrated transport system for Northern Ireland)
The main function of Traveline is to provide a data support service for local authorities and transport operators who prepare timetable data for the Traveline information service (traveline.info, 2010). After collecting the requisite information, Traveline organizes all timetable information into a central database system. To inform customers about transport information in Wales, Traveline uses different distribution channels (TLPMW). It started with the telephone service in Traveline’s eleven regions across the UK then moved to providing Internet services. Traveline is continuously developing its mobile information services and is now introducing SMS and WAP facilities. Each of these services are discussed in the following pages.

4.5.1 Telephone Service

The sequence of developing the Traveline information service started with a call centre’ provision which means the users can get any transportation information on timetables and routes for eleven regions across the UK by using a unified phone number (08712002233).

... Where there was one number you could phone from anywhere in country and get, you know, bus times. So the travel lines were set up, as like I say, 11 regions through the UK, of which Wales is one …

(TLPMW\ Quote 7)

... At that point it was purely called a centre-based system, there is one single number you rang up, it looked at your STD and the operator put you through to the correct call centre for that call …

(TLPMW\ Quote 8)
This number is widely displayed, in places like bus stops and websites. For example, one of the bus stops owned by Cardiff Bus Company in the city of Cardiff displayed the phone number for travel information telephone service on the bus stop flag (see Figure 4.8).

4.5.2 Internet Service

In addition to a telephone call service, Traveline had arranged to provide self-service journey planners on the company website (traveline.info, 2010). The website enables passengers to plan their journey by integrated transport information using either a bus, train or coach. For flexibility when using the search option, the main Traveline official website contains a coloured map for its eleven regions. Each region has a specific colour and the first letter of that region is written on that coloured part of the map. For example, if a passenger
would like to obtain travel information for Cardiff, he/she will click on (W) which represents Wales and the system will link automatically to the Traveline website in Wales (see Figure 4.9).

Figure 4.9: The official website of Traveline (http://www.traveline.org.uk/index.htm)
4.5.2.1 Current problems and future Web opportunities

The interviewee mentioned several technical limitations for the Traveline website, such as search options and the accuracy of entering data. In addition, he suggested a few solutions that could solve these limitations in the future. The following section discusses these issues in detail.

**Search Option**

The interviewee (TLPMW) stated that the search option in the website was a problem as it was designed as a timetable finder and the users needed to know the bus service number to find the departure time. If a tourist was not familiar with the bus service number and he/she just wanted to know bus times and destination name it would not be possible to extract the requisite information. The interviewee suggested a combination between timetables and journey plan option which would enable users to type bus number or the destination name.

... We do quite a lot of usability testing early in the year and a lot of we doing is silly things if you take our timetable. For example you got timetable finder and ask you to put the services number you put the services number you got whole list of different time table and click on it. Do you know the service number for the bus you want? Specially for the tourist you don't. So why can't you type in where going from. Now the argument back from the industry well if you type in where going to, its journey plan it is not timetable it's journey planner. My argument back is 'ok' maybe it's a journey planner with a timetable at the end ...

(TLPMW\Quote 9)

**Accuracy of entering data**
A further problem appeared with the accuracy of data that was inserted by users using the company’s website. For example, if a user misspelt any words the search option would not work at all or give an incorrect answer.

The interviewee also mentioned that tourists would be likely to face problems in relation to the Welsh language. When inserting the names of towns/cities in Wales if a name was incorrectly spelled when entered, then the company website would not respond to his/her query or would give an alternative answer. Also the interviewee in the quote below gave an example of names in Wales that were difficult for both tourists and local people to type in correctly.

… Now, again from a tourist point of view, if you want a journey plan from town Penrhyneddudraeth to Gwaun-Cae-Gerwen you’re on wrong spelling and nothing to do. Again our supplier back why should people that what we are trying to do they place no one know it as Gwaun-Cu-Gernuen, names in Wales which even locals known town, Gwaun-Cae-Gwen- it is known as GCG. Penrhyneddraeth is known as Penrhyn. It is just too long a word …

(TLPMW\Quote 10)

**Navigation**

The interviewee argued that one of the main problems with the Traveline website was the long number of pages which users have to navigate through to get the right information.

… Currently within the system, you have to enter the origin and the destination and the time and date of travel then you go onto a (select location page) then you go to (select the destination page) then you go to a (high level journey plan). People aren’t interested in that, they want to type in I want to go from here to here they don’t care how the system works they want an answer. So we do have a lot of frustration at moment because of the number of pages and clicks you have to go through. So we’re looking to trying to develop it further to make it a lot easier for users …
Accessibility of Data

Passengers faced another technical problem with pre-plan journey options. Users can only plan their journeys in advance before travelling while mobile information services provide transport information in real-time during the journey.

… We started off with SMS. We became aware, you know, basically you could use the journey planner we had and you can pre-plan the journey and all the rest of it. But really speaking that is for planning in advance …

4.5.3 Traveline SMS Service

Traveline enhanced their information system by launching a new service to inform customers of bus times by using an SMS mobile application (TLPMW). Traveline makes a decision to use SMS services to overcome the difficulty of using the pre-plan journey option on the company website. The interviewee argued that the idea for the SMS service is driven from the ‘mobility’ of people during their daily life, which means users can use services when they are walking to obtain travel information at any place “If you’re on the move and you need to know the bus time of the bus or whatever it is difficult to use website or Internet or even the call centre”.

4.5.3.1 Main features of Traveline SMS service

Traveline enhanced its transport information system by launching an SMS service. The main components of the service were based on a database, bus
stop coding system, mobile technology partnership (Kizoom) and mobile technology Platform (mBlox) (see Figure 4.10), which are detailed below.

![Figure 4.10: Main components of Traveline SMS service](image)

1. Database

To operate the new service the company established a national database called National Public Transport Access Notes (NPTAN) for bus stops. Also, this database contains information, e.g. rail stations, entrances and interchange points for all eleven Traveline regions.

... *We came up with the SMS scheme this is what we called NPTAN (National Public Transport Access Notes) basically it’s bus stops but it includes things like railway station, entrances, interchange points, etc. So there is a national database setup of these bus stops ...*

(TLPMW\Quote 13)
Chapter Four: Case Studies of Mobile Technology Implementation: Mobile Innsbruck and Cardiff Bus

2. Bus Stop Coding System

A coding system is defined as “a system of signals used to represent letters or numbers in transmitting messages” (Lewis, 1996:68). Thus, after setting up the bus stop information in the central database, Traveline used a coding system for the whole of Wales which was based on a unique code (TLPMW).

The speed and simplicity of using the system was the main aspect for designing the bus stop coding system. The interviewee described the basic structure for designing the code which contains two types of alphabetical letters. The first three letters usually represent the town which the bus stop is located in Cardiff would be (CDI) and he argued that there was no alternative solution to this. The second part of the code (four letters) is designed to be input by a single key press on the users’ mobile. Consecutive letters appearing on the same key are not used e.g. ‘B’ which requires the key to be pressed twice to skip past letter ‘A’, which appears first on the key (TLPMW). Also, the number of letters was varied and the code could be 6, 7 or 8 characters in length. Table 4.1 presents some examples for bus stop codes for popular stops in Cardiff city. Cardiff Bus Company serves these bus stops.

<table>
<thead>
<tr>
<th>Name of Bus Stop</th>
<th>Bus stop code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millennium Centre</td>
<td>CDITAGM</td>
</tr>
<tr>
<td>Cardiff Sports Village</td>
<td>CDITDWA</td>
</tr>
<tr>
<td>UWIC Llandaff North</td>
<td>CDIJGAM</td>
</tr>
<tr>
<td>UWIC Cyncoed</td>
<td>CDIATD</td>
</tr>
<tr>
<td>Cardiff University North/West</td>
<td>CDIDAPT</td>
</tr>
</tbody>
</table>

Adopted from Cardiff Bus (2008)
From a technical viewpoint and to make the SMS service more useable, passengers send their text message to number which is 84268. The interviewee argued that the reason for choosing these specific digits is because they appear in a circle position around a mobile phone keypad

... It was just designed for speed of use. The numbers itself we find, you know what I mean, we have a quite a lot of numbers but we choose 8 42 68 because it does a circle on the keypad. So it easier to go around. That was the basis of it, it was speed and ease of use ...

(TLPMW\Quote 14)

Moreover, the interviewee added that many local authorities and bus companies have been helpful in promoting this number. For example Cardiff Bus makes great effort to display this number in many places, such as at bus stops and on the back of buses (see Figure 4.11).
The interviewee (TLPMW) identified that Traveline dealt with a huge number of bus stops (approx. 23000) in Wales, which is a different situation from dealing with airlines and rail services which operate from a small number of fixed points, i.e. airports and railway stations. The company designed a unique code for each bus stop which is quick and simple to use. On the other hand, with the large number of bus stops codes this can cause problems for users because it is difficult to remember the code for each bus stop and to identify details of the next bus, particularly if they are on the move and not at the bus stop they want information for.

3. Mobile partnership and platform opportunities
Traveline is involved in a partnership with different organizations and mobile technology solution companies to design and operate mobile information services to distribute travel information to potential passengers.

**Mobile technology partnership (Kizoom)**

Kizoom is the key partner with Traveline in designing and maintains both SMS and WAP mobile information services. In addition, Kizoom maintains a backup of the Traveline database to use in case Traveline faces any technical problems under which circumstances the mobile information services will continue to work through Kizoom (TLPMW).

**Mobile technology platform (mBlox)**
mBlox established a telecommunication network to facilitate the transaction process between mobile content providers and mobile network operators (see Figure 4.12).

![Figure 4.12: mBlox mobile telecommunication network](image)

Source: mBlox.com, 2009

The manager of mBlox described the main objective of mBlox as:

… There are many mobile content providers and there are many mobile carriers they have to interact by creating a completely a new kind of telecommunication network. Our job is to make it simple for them to connect, simple for them to transact, simple for them to interact. We called this a mobile transaction network and we believe we are the largest in the world …

(Quote 15)

mBlox works as a platform between Traveline and mobile networks, e.g. Orange, Vodafone and O2. It deals with all sorts of SMS systems and TV programmes. The interviewee (TLPMW) described mBlox as a “middleman” handling SMS messages from all operators and communicating with the
Traveline server. They charge both Traveline and the mobile network providers for this service. In addition mBlox charges Traveline to maintain the company server.

… Oh yes, as I say from the call costs x number of pence per SMS goes to mBlox. I think it costs about 4 pence per text. That’s a negotiated service. The higher your volumes the lower you can pull the price down the moment that’s what it costs us. They are a commercial service and make money out of this. The advantage is we don’t have to contract individually there …

(TLPMW\Quote 16)

… They charge as a provider plus there is a small annual maintenance fee for maintaining the server, etc. But again that’s a shared cost nationally. Basically we pay for our call charges at the rate that they are in Wales. Now the 25p that covers those costs and these is a small rebate. If it was decided by the Assembly well then that’s fine by me …

(TLPMW\Quote 17)

4.5.3.2 Limitations of SMS Service

The researcher tried the SMS service and found it useful but there are some limitations. Users must know in advance the code number for each bus stop and the SMS service provides a limited amount of information. The information that is provided relates to one bus stop only, it does not cover a wider geographical area.

… That’s where we’ve coming from as I said we can give you pretty good accurate information to pre-plan your journey. We need to move on and give you real information when you’re actually making your journey and you say if you have that delay you are not going to make your planed connection, now what I do? What next? That is the basis of where the SMS scheme started from. The limitations of it, is you have to know what your code for your bus stop (coding for every bus stop). So physically you got get to bus stop and type in the code to see if that is the bus stop you need. So that it is a limitation …

(TLPMW\Quote 18)
Moreover, Traveline faced technical problems with the screen size which can only display a limited number of characters and as a result will reduce the SMS information content. A study on SMS messages (Gupta, 2009) identified that the actual limit of a SMS message is 160 characters if the Latin alphabet is used and is reduced to 70 characters for non-Latin characters, e.g. Arabic and Chinese characters.

... Number of characters on the screen that is the biggest problem because we have tried do full journey planning on the mobile phone. Yes we can do it, yes technically we can do it, but you intend to find that the information is so small and compressed you need bloody good eye sight to read it. It is the screen size that is the limitation ...

(TLPMW\Quote 19)

TLPMW mentioned that Traveline aims to apply a full journey planning facility in its mobile information services by using new technology (Internet), fore example there are specific sites which allow users to use the Internet from their mobile phone to identify their locations. Despite these new features for mobile technologies, the screen size is still a problem for users. (TLPMW) commented:

... It can be done we have done it we’ve got MOBI sites which basically scale down your website and allow people to use it. But that’s where we would like be, full journey planning capability, at any point on the move, but there is limitation with screen size. It’s getting better, you what I mean more Map-based things are starting to work ...

(TLPMW\Quote 20)

4.5.4 NEXT BUSES: WAP mobile application

After identifying the main features of the SMS service, TLPMW clarified that the Traveline Company intended to develop its mobile information services by adding a new service called “NEXT BUSES” by using WAP mobile Internet
application technology. Marcussen (2002) suggested that the development of mobile technologies, in particular mobile Internet and WAP-sites, will improve e-commerce activities. With “NEXT BUSES” users will use mobile Internet capability from their phones to browse company mobile information service links.

… NEXT BUSES? Basically if you text the word ‘Traveline’ to 84268 they will send you back a link and book mark so you can use it straight away …

(TLPMW\Quote 21)

Traveline will use a GPS facility to identify the user’s location. When users need to know travel information, such as a bus time, they will insert the area postcode or street name. In a recent study for Eyefortravel.com (2009) GPS was mentioned as one of the location-based services (LBS). Location-based services (LBS) provide access to information services via mobile devices through a wireless network that have the ability to identify the geographical position of a mobile device (Eyefortravel.com, 2009).

The new mobile information service will display map images that highlight the nearest bus stop at specific geographical areas and after that users can click on any bus stop icon on the map to find out the time for the next bus.

… We want to develop that further so you that you’ve got GPS on your phone then basically you just got to ask the question through the phone and we’ll send you down the information these are the bus stops nearest to you …

(TLPMW\Quote 22)

… What we were developed now is the NEXT BUSES where you have an entry point where you can type your location. So you know the town or the area or whatever you’ve got and it comes up
Moreover, Traveline will provide the new mobile service free of charge for customers. It was designed to be user-friendly and does not require much information from the user, only the postcode for the area or city name or bus name. Despite the advantages of the new mobile information services (NEXT BUSES) and the efforts that have been done by Traveline to develop SMS and website services, it was found that Traveline faced many problems during implementation of both the current and prospective mobile services.

4.5.4.1 Limitations of NEXT BUSES

Within the interview, it was discovered that the prospective mobile service for NEXT BUSES had limitations:

- It is more expensive for users than sending an SMS (user’s mobile network provider will charge them for Internet browsing).
- The postcode for some areas can be extremely large especially in rural areas, e.g. CF279LT.
- It is difficult to identify a user’s location if mobile phones are used which are not compatible with GPS functionality.

The interviewee (TLPMW) claimed that the company provided this service free of charge for users. On the other hand, users’ mobile network providers will charge them. A mobile network provider, such as Vodafone, Orange and 3UK, cannot cancel the rates of Internet download because they are dependent on user usage and the price plan. In addition, the interviewee argued that the cost will increase according with the time spent downloading the related information.
… It is free to users. Whatever your provider will charge you. In this instance it is a web service so it is slightly more expensive than just sending a text. Obviously it’s true dependent so it depends on how long you log into the system and obviously that’s only of our control. We can’t do anything about that …

(MLPMW\Quote 24)

4.5.5 Issues Affecting the Traveline Integrated Transport Information System

There are certain barriers for electronic and mobile services at Traveline. The interviewee was asked about electronic and mobile implementation barriers. He argued that there are technical limitations in relation to using SMS services, such as the screen size in addition to other barriers, such as cost, GPS capabilities and accuracy of entering data. Management issues and lack of funding from local authorities’ were the main drivers for developing new services. In this section, each issue of electronic and mobile services at Traveline are discussed to provide a deeper understanding of the real situation of these services and its effect on Traveline in Wales.

4.5.5.1 Management issues

**Local authorities and Administration procedures**

Traveline faces many problems with local authorities. One of these problems is related to the difficulty in collecting data as each region has its own rules in relation to providing travel information within the region. As a result, Traveline failed to obtain the travel information needed. The interviewee gave an example of obstacles for local authorities that prevented the company from developing a
new information service. Cardiff and Swansea Council, for example, put a restriction on collecting information for cyclists. The interviewee argued that each local authority tries to keep a limit for using travel data and not allow the transfer of this information to another region and in the meantime the company aims to integrate all information into one database.

… We are currently working with city and council of Swansea and Cardiff Council. What we’re collecting cycling information. Now the problem with the local authority-led sort of things is they tend to be blinkered once it comes to the county boundary. They hold information for their own little county only if you’re a user of that cycle route you don’t care what county you’re in …

(TLPMW\Quote 25)

When local bus companies decide to make any changes to their bus service, they have to inform the local authorities. This procedure takes a long time (about 52 days) and then they have to inform Traveline to update its system which takes another ten days. The Traveline manager in Wales suggested that to save time it should change the current updating system with a new updating system knowing as the Daily feed which would enable the company to update the database system every day.

… Oh yes we had a huge problems. The way that the buses work for example, every local bus services has to fill in a registration form which goes to traffic commissioners who then ok the journey and say yes. Theoretically that takes 52 days, you have 52 days of any change. If the operator feels that is in public interest then you can get a letter of support from the local authority which cuts that time dramatically. So a lot of instances they’ll make a decision today and they’ll change the bus services next week. Now we have to get that information to update our system. We have to plough our way through it to build in and we have to update the system which currently takes ten days. That is simply a limitation in what we call the data factory which is the bit of technology that
crunches together all the databases and throws it out. With the new system what we want able to do is a Daily feed …

(TLPMW\Quote 26)

**Planning management**

The researcher asked the interviewee if decisions to change or add new services were made by a steering committee or by individuals. The interviewee stated that there is a monthly national meeting held in London with a committee of 11 Traveline project managers to solve all technical and marketing aspects. Also, TLPMW highlighted that costs and funding significantly affect the committee’s decisions to change or add new services.

Traveline managers in each region also have different viewpoints, so it was difficult to find the correct decisions to resolve problems. As a result some managers do not follow the national scheme and ask the local authority in their region to fund the potential service which they really need in their own region.

… It can do because you do not always have everybody agreeing with (yes that’s the way forward). With 11 regions we’ve got 11 different ideas and you’ve got really battle things out before you come to solution. Now, in Scotland, and more soon now in Wales we’re tending not to go with the national schemes as much. We tend to say right that’s what we want, we’ve done our research, and we know what the customer is asking for, let’s go ahead and develop it and we go to the welsh assembly and say we need to move this forward we need to do something about it …

(TLPMW\Quote 27)

**4.5.5.2 Publicity**

**Advertising for the Traveline mobile services**

In many cases local authorities advertise their Traveline mobile services and include information on bus-stop codes in their publicity, e.g. Cardiff bus
advertise the Traveline SMS service on each bus stop around Cardiff city (see Figure 4.6).

Additionally, many local authorities and bus companies do not advertise or pay any attention to the bus stop itself. Other bus operators use various tools for advertising e.g. flags and the back of vehicles to advertise and increase the usage of the SMS service (see Figure 4.13).

… A lot of the regions built them onto the flag, but when the flag is not there and how many people looking up the flag. You also have on the flag various other numbers and bits and pieces. Many people did not recognize what the code was know, so the key to it is as you say I have a good service letting people it is there and how to use it. So but we certainly did see with good publicity, an increase the usage …

(TLPMW\Quote 28)

**Figure 4.13: Advertising for Traveline electronic and mobile service on a Cardiff Bus vehicle**

**Revenue from advertising**
Currently, Traveline do not use mobile services to provide commercial promotion for other products and the main reason for that is because Traveline is a not-for-profit organization and does not allow any commercial activities which could earn money for the company, the interviewee (TLPMW) commented:

... We have thought about it yes. The main problem that we have with advertising is that because we are a not-for-profit organization and we contract with open survey for a lot of back data. We get that license under government agreement through the Welsh Assembly which makes it a reasonable cost. As soon we put any advertising or anything like that on our services that makes it commercial issue and those costs are astronomical, in excess of 100000 pound a year for just for base mapping. Now with the kind of advertising what you try to do to tailor to your market, to make 100000 of profit before even you start...you know raking you the money ...

(TLPMW\Quote 29)

4.5.5.3 Finance

Funding of services

Most mobile services (SMS and WAP) are provided by Traveline to the end user free of charge and Traveline information services in Wales were fully funded by the Welsh Assembly Government (TLPMW). Mobile network providers charge users for SMS sent to Traveline and this varies according to each user’s price plan. Sometimes it will be 25 pence and sometime 12 pence.

... Yes, whatever some network takes 12 pence sometime 10 pence and sometimes you have free bundles of texts, you know what I mean on whatever your provider does ...

(TLPMW\Quote 30)

In addition, Traveline pay a small fee for the SMS platform provider to run the service at a rate of 8 pence per message. When comparing the cost of the SMS
service and WAP it was found that SMS is cheaper than WAP applications because mobile network providers charge higher rates for Internet browsing from mobile phones.

4.5.5.4 Other issues

Tourist and Traveline mobile services

Many tourists face a problem during their visit to tourist attractions in Wales. When they use the bus service it can be difficult for the tourist to know when to alight the bus, if they are not familiar with the area. The interviewee suggested that the mobile phone services could send the tourists a message to alert and inform them when they have to alight.

Ramblers’ Association

Traveline has been involved with the Ramblers’ Association in a partnership to improve the journey planner system by adding a new service “Walk planner”. Walk planner will guide users and direct them to the right roads during their walk with the support of GPS. This kind of service will save time and can be used in tourist areas.

... We got the Walk planer within the journey planner it is tied to what they call OSCAR which is O.S. central alignment of roads so it will follow the road. So if you got for example a park, you’ve got the road going down there and got a path across there, our planner will walk you that way. When actually there is a perfectly good path through there which cuts off a lot of time …

(TLPMW\Quote 31)
4.6 Cross-case Analysis and Discussion

This part combines, analyses and discusses the implementation of mobile technology issues obtained from the two case studies undertaken in this research, involving Innsbruck as m-destination and Cardiff bus (Traveline) as technical platform for implementing mobile technology in Cardiff. It also links the results obtained from the International Business Information Management Association (IBMIA) conference audience in Cairo. This has led to the development of the mobile information conceptual model (see Section 4.5.4).

4.6.1 Tourism Destinations and the Adoption of Mobile Technology

Gretzel et al. (2006) mentioned that many tourism destinations have not realised the full importance of ICT applications to improve organisations marketing approaches. For example, despite the development of mobile technology in general and the mobile information applications in particular, many tourism destinations do not fully implement these applications in the right direction that would help their marketing approach and attract more visitors. This view was supported by EXP2 who highlighted that mobile technology would be a successful tool for tourism destination marketing, to do this destinations need to determine in advance which mobile technology applications could support their marketing strategy.

The results showed that the level of service usage as a significant factor that influences the use of mobile technology in many tourism destinations, e.g. Mobile Innsbruck and Traveline, in relation to developing a number of mobile
information search applications to support tourists especially in the trip phase, while other electronic distribution channels such as DMSs were used in the pre-trip and post-trip phases. This result agreed with previous research (Huang et al., 2006; Turban et al., 2006; Buhalis, 2005; Rasinger et al., 2007) which showed that the Internet was one of the sources used in obtaining information for travel purpose in the pre-trip phase. Thus mobile information applications, due to their ubiquitous nature, may overcome many of the limitations, such as the lack of qualified personal and IT infrastructure of traditional electronic services. Additionally, Elsayed (2008) argued that the mobile delivery will be the sixth generation of distribution channels for marketing and selling hotels.

4.6.1.1 Tourism destination key stakeholders and the implementation of mobile applications

It appears from the literature that a tourism destination comprises a complex combination of stakeholders at various levels. As a result, destinations face many challenges in the managing and marketing of tourism. One of these challenges is the implementation of mobile technology between the large numbers of stakeholders as often such issues can be resolved by DMOs. According to King (2002), providing Information and data to prospective customers was one of the responsibilities of DMOs by using distribution channels to achieve its objectives. Palmer and McCole (2000) mentioned that the complex structures for DMOs helps to develop virtual tourism destinations, which are predestined for the use of e-business and m-business applications.
The findings addressed two groups of stakeholders who are involved in developing mobile information services. Group One was tourism destination organisations that consist of DMOs and SMEs and Group Two includes mobile network providers, mobile manufacturers, mobile applications developers and local mobile network providers as the main stakeholders involved in the implementation of mobile information applications.

There were many issues highlighted during the investigation of the implementation of mobile applications from a mobile technology participant’s point of view. The role of each mobile stakeholder varied according to the mobile information service provided and the cost to launch these mobile services via this stakeholder. For example, ECCA developed and operated Innsbruck WAP mobile application and the mobile network provider responsibility was providing Internet connection through its mobile network to enable tourists to use this service.

On the other hand, the Traveline SMS service consists of two mobile stakeholders, the mobile technology partnership (Kizoom) which helped Traveline in developing and maintaining its mobile services. As TLPMW commented “so through a company called Kizoom, who are London based we contracted with them to provide this service”. mBlox was the mobile technology platform for Traveline mobile information services which deals with other mobile network providers, on behalf of Traveline for sending and receiving SMS. The mBlox manager described the main objective of the company as “a mobile transaction network” (see Figure 4.10). mBlox charge both Traveline and mobile
network operators specific fees for this service. A part of the cost of sharing a mobile technology platform for Traveline mobile information service was covered by government funding. The Traveline project manager said:

... They charge as a provider plus there is a small annual maintenance fee for maintaining the server, etc. But again that’s a shared cost nationally. Basically we pay for our call charges at the rate that they are in Wales. Now the 25 pence that covers those costs and there is a small rebate. If it was decided by the Assembly well then that’s fair by me ...

(Quote 32)

4.6.2 Lessons from the Case Studies for the Implementation of Mobile Information Applications

This section highlights significant lessons that are driven by the implementation of electronic and mobile applications in the two case studies. It starts with the vision of Cardiff Bus developing its information system by adopting electronic and mobile applications.

The findings indicated that Cardiff Bus used a number of distribution channels to inform a large number of passengers with information about journey times and routes. Cardiff Bus started with the traditional channels e.g. printed timetables at bus stops followed by utilising the Internet through the company website which offers customers comprehensive information e.g. shopping centres and tourist attractions and this enables them to pre-plan their journeys (see Figure 4.1). Additionally, Hill (2009) identified that Cardiff Bus had successfully developed a new travel information system by using GPS facilities
which was able to give real-time information about the next bus at any of its bus stops (see Section 4.3.1).

A location-based service would be useful for advertising where it is possible to target advertisements to an individual. This has some potential particularly, when location, advertising and mobile search are linked together (Eyefortravel.com, 2009). The company continues in developing its information distribution system by adopting the mobile channel as it now means to deliver transport information to its customers. As stated, the development of Cardiff bus mobile information services has been done by Traveline as a non-profit organisation. Similarly, Gupta (2006) mentioned that the majority of DMOs engaged with a partnership with technological solution companies to develop their websites and enable SMEs to distribute their services.

4.6.2.1 Traveline Web and SMS service

Organisations such as hotels, DMOs and transportation companies, consider their websites to be one of the main sources for collecting information and data for users (Elsayed, 2008). Nassar (2002) and Gupta (2006) argued that despite the improvement on website design, many organisations could not develop many aspects of their websites, for example, searching the site, product availability and on-line advertising. The interviewee (TLPMW) supported that, and mentioned several technical limitations for Traveline website, such as search option, accuracy of entering data, navigation and accessibility of data.
SMS application

Traveline made a decision to use SMS services to overcome the difficulty of using the pre-plan journey option on its website. The interviewees agreed that mobility was the key factor behind adopting mobile information applications. For example, one of the interviewees mentioned that the idea for the SMS service is driven from the ‘mobility’ of people during their daily life, which means users can use services when they are walking to obtain travel information at any place, as he (TLPMW) said: “If you’re on the move and you need to know the bus time of the bus or whatever it is difficult to use the website or the Internet or even the call centre”. These findings agreed with Craig et al. (2008:49) who identifies ‘ubiquity’ as one of the characteristics for mobile services which refers to a construct comprising reach and accessibility, in other words, users can make contact at anytime from anywhere where networks coverage are available.

Moreover, the viewpoint of the interviewees coincide with those reported by Buhalis (2008) and Reuver et al. (2008) who stated that mobile services allow users to consume services with flexibility of location. Reuver et al. (2008) identified the types of services enabled by mobile technologies, for example, information services which involve news, stock prices, advertisements, restaurant locations can be delivered through text messages (SMS) or Multimedia Messaging Services (MMS).

Gupta (2006) mentioned that there are a number of requirements needed to operate electronic or mobile information service and these requirements varied
according to the provided products and services. The interviewee (EXP1) identified the database and mobile network platform as the main components to run and operate the Innsbruck WAP mobile application. Conversely, Traveline based its SMS application on three components: the database, the bus stop coding system and the mobile platform.

The most significant component that enhanced the Traveline SMS service was the coding system. The simplicity and flexibility of using SMS were the main principles in designing this coding system. In addition, the company increased the speed of sending SMS by designing a number that appeared in a circular position around a mobile phone keypad. One of the interviewees explained the reason for choosing this particular number as

... *It was just designed for speed of use. The numbers itself we find, you know what I mean, we have a quite a lot of numbers but we choose 8 42 68 because it does a circle on the key pad. So it easier to go around. That was the basis of it, it was speed and ease of use ...*  

(TLPMW\Quote 33)

**WAP mobile applications as tool in delivering tourist information**

This study supported Marcussen (2002) and Elsayed (2008) arguing the development of mobile applications, particularly WAP applications, will improve tourism e-commerce activities. The findings showed a general concurrence between the respondents of Traveline and Innsbruck experts regarding the development of mobile applications to notify tourists of different types of information. The main aim of the Innsbruck mobile application was to provide tourists with a wide range of information during their visit. Alternatively, Traveline developed a WAP application to overcome the limitations of the SMS
service and the company website. This is best explained in the following statement:

… We want to develop that further so you that you’ve got GPS on your phone then basically you just got to ask the question through the phone and we’ll send you down the information these are the bus stops nearest to you …

(Quote 34)

4.6.3 Electronic and Mobile Information Applications Barriers

The main purpose of establishing electronic and mobile applications in the two case studies was to provide consumers with the required information. The difference between these services was the content of the provided information. For example, mobile Innsbruck aimed to provide tourists with a wide range of information for different types of service, such as transport, weather and tourist attractions during their stay. While, Cardiff Bus’s Traveline mobile information application focused on presenting transport information, such as timetables and route directions for a large number of passengers. Despite the limitations found for this services (see Section 4.4.3.2), the two companies succeeded in delivering the required information and the few barriers that were found are discussed below.

4.6.3.1 Management barriers

4.6.3.1.1 Partnership with the local authorities

The findings indicate that involving Traveline in a partnership with the local authorities and transport operators was the key factor that affected the development of Traveline’s integrated transport information system. The regional coordination between Traveline and the local authorities in the same
region was one of the barriers that faced Traveline in order to develop a database that could be used for future electronic or mobile information services. One of the interviewees argued that each local authority kept a restriction on using travel data and did not allow the transfer of this information to another region. Gupta (2006) suggested a centralised database would be the best way to resolve any difficulties caused by a multiple database system.

The administration procedures were considered to be one of the barriers that prevented Traveline from updating its database. For example, when changing a bus service route, it takes 52 days to inform Traveline to update their database system. TLPMW recommend changing the current updating system with a new one that enabled the company to update the database system every day. This disagreed with literature that provided an example of failed updates in the VisitWales website database, where there is an option that gives SMEs the ability to update their relevant information on the database directly and daily without contacting the technology solution platform company. However SMEs reported that they could not update their database for many reasons (see Section 2.4.1.1). Alternatively, on many occasions the local authorities were one of the factors that helped in the promoting and marketing for new electronic and mobile information applications, as one of the interviewees highlighted in Quote 28.
4.6.3.1.2 Leadership level

The findings highlighted that the implementation of electronic and mobile applications in tourism destination would not be successful without appropriate leadership that is responsible for the operation of these applications. Traveline was a clear example of providing leadership. It established this jointly with a third party of technology solution stakeholders to develop and operate current and future electronic and mobile information services. However, the main issue/obstacle faced by Traveline was to do with the planning management at a leadership level.

The two main reasons which affected the planning policy of the leadership level were to do with the cost and the large number of stakeholders. They were sharing the decision with the unified leadership group regarding developing new services. As a result, the Traveline national leadership level was divided into regional leadership levels, this meant each Traveline manager in the eleven regions worked individually and according to his/her own vision which was based on consumers’ needs. An explanation for this is in Quote 27.

Similarly, as stated in the literature, SMEs represent the majority of tourism destination stakeholders that can help the destination organisations in their marketing strategies, especially with the growth in ICT applications. Gupta (2006) pointed out that DMOs were unsuccessful in achieving their leadership aim in adopting new technology in partnership with SMEs and she presented VisitWales as an example of this. However, Moustafa et al. (2009) argued that
DMOs could provide leadership through the development of a destination-level technology platform to facilitate technology exploitation, taking into account three main challenges of destination level m-technology platform, destination-level leadership/coordination, SME participation and third-party technology solutions (see Appendix Five).

4.6.3.1.3 Cost

The findings identified that the cost played an important role in the implementation of electronic and mobile applications for DMOs and SMEs. It was apparent that the cost influenced SMEs’ decision to develop mobile applications in order to deliver the required information to their prospective customers, particularly with the increasing cost of establishing and operating these applications with mobile network providers. One of the interviewees mentioned that SMEs face a challenge by providing mobile information services with reasonable price to their consumers as he commented in Quote 4.

Additionally, the results highlighted a number of issues that helped in reducing the cost of implementing mobile applications and encouraged users to use them. Governmental financial support was one of the factors that covered a part of the cost for operating the mobile applications. For example, one of the interviewees mentioned that the mobile information services they provided were fully funded by the Welsh Assembly Government and enabled Traveline to provide this service free of charge. This result supported Rastrollo and Alarcon (2000) who indicated that the financial support of the public sector is an
essential step for tourism destination businesses to take the full advantage of ICT.

It was noted that mobile network platforms play a vital role in reducing the cost. For example the cost of operating and using SMS applications was lower than the cost of WAP applications, as when users exploit mobile WAP application the mobile network providers charge them higher rates for Internet browsing from their mobile devises, as one of the interviewees explained in Quote 24.

A mobile network provider can not cancel the rates of Internet downloads because it is dependent on the user’s usage and their price plan. In addition, the cost will be increased according to the time spent to download the information needed. However, the literature points out the short-range access wireless technologies as an alternative cheaper method to browse the Internet from mobile devices than through using mobile network providers (see Section 2.2.3.2).

4.6.3.2 Technical barriers
A range of barriers had been mentioned by participants regarding the development and operation of electronic or mobile information services that were investigated in the two case studies. For example, the search option and accuracy of entering data was one of the limitations that prevented users in obtaining required information. For example, Quote 10 gives an example of
names in Wales that were difficult for both tourist and local people to type in correctly.

Alternatively, clear distinction had been revealed between experts in terms of screen size. One of the interviewees mentioned that the screen size is considered one of barriers that prevents the end-users from browsing a particular website from their mobile phones, despite the optimisation which had been done by different companies to overcome this problem. As he commented in Quote 5.

Additionally, one of the interviewees mentioned that screen size could be one of the problems that face SMS if more information is pushed in one message, it would be difficult for a user to read the content of SMS. However, many mobile manufacturers solve this problem by expanding their handset screen size, for example Wang et al. (2009) mentioned that the Apple Company provides an open platform for mobile applications developers by launched in the market the fourth generation of iPhone, which will enhance the information services presented to users by increasing amount of information.

Moreover, the findings identify limitations for implementing Traveline SMS service, such as users having to be physically standing at the bus stop to know the bus stop code. In addition, the information provided was limited and only covered the current bus stop:

... The limitations of it, is you have to know what your code for your bus stop (coding for every bus stop). So physically you have
got get to the bus stop and type in the code to see if that is the bus stop you need. So that it is a limitation ...

(TLPMW\Quote 35)

This study identified several limitations for the WAP mobile application, such as difficulty in using postcodes as search options to assist users in finding the bus stop, because the postcode for some areas can be extremely large, especially in rural areas. Also, due to the incompatibility of mobile devices with GPS functionality it is difficult to identify user’s location. Kenteris and Gavalas (2010) stressed the importance of GPS functionality on mobile devices in order to running the mobile navigational assistants’ applications.

4.6.4 Revised Model

The cross-case analysis has facilitated the process of developing a revised model for mobile information provision for tourism destinations. It evaluates and discusses all the steps of the model from the perspectives of different associated stakeholders, including tourism destination organisations and mobile technology platform experts. The developed model builds upon the findings obtained throughout the field work, the theoretical model for mobile information provision for tourism destination (see Figure 2.8) and the key mobile technology issues identified in the literature. During the field work, the theoretical model was explored and modified according to the results in order to develop a model for mobile information provision for tourism destinations.
The initial conceptual model was presented at the 11th International Conference of Innovation and Knowledge Management in Twin Track Economies (IBIMA 2009) (Moustafa et al. 2009). The audience feedback was concerned with the cost and the debate was about enhancing destination marketing via mobile technology platforms, service cost and the final price for the end-user. As a result, the model was developed based on these issues and the findings obtained from the case studies. The model identifies three entities (Tourism destination stakeholders, Destination Mobile Platform and tourist) responsible for handling sending and receiving the information.

**Tourism destination stakeholders**

**SMEs:** the model starts with the SME database. The content of the client database includes a large volume of information, such as hotels and restaurants. According to the Traveline case study, the process of establishing a central database starts from a large number of transport operators’ companies. These companies provided Traveline with a wide range of information such as bus timetables. Traveline organised and classified this information and entered it into the main database. In addition, of SMEs represent the majority of tourism destination stakeholders (Gupta, 2006) and as a result, in this model SMEs database was separated from the DMO database.

**DMO:** the next stage in developing the platform central database was done by the DMO. The DMO added more information, such as tourist attractions to the client data, then the DMO classified and organised this information and entered
the information into the platform data store. Destination Management Organisations (DMOs) as one of the government organisations play a key role in developing various instruments that influence SME practices in order to achieve its marketing strategies (Page, 2007).

**Destination Mobile Platform**

The destination mobile technology platform was the main core of the model. It is responsible for managing the data flow between the end-users and the platform central data store. Also, the platform is responsible for coordination between the key stakeholders who are involved in this model. Moustafa *et al.* (2009) identify the significance of leadership and coordination when forming the destination level of the m-technology platform. The mobile service providers e.g. Vodafone and Orange were utilised as a transaction tool in the destination platform to deliver required information to the end-users via different mobile applications. The other two mobile technology stakeholders which have been mentioned in the conceptual model (mobile phone manufacturers and mobile software application developers) were deleted in the revised model. The reason for this was to enhance the destination mobile platform leadership performance and reduce the operational cost of the platform. Also, from a technological prospective, it is not necessary to have advanced technological the manufacturing process related to mobile phones and mobile software application developers. This is because if appropriate and flexible mobile applications were applied and had the capabilities to work with basic mobile phones models, the platform would operated successfully.
Evidence from the two case studies has supported these changes and, by investigating the Innsbruck mobile application, it was noted that the ECCA was responsible for operating and developing the service with no integration with the mobile phone manufacturers or mobile software developers. In addition, the Traveline SMS application was successful in coping with any type of mobile phone. The last and possibly the most important entity in the model was the tourist who receives the required information at the end of an information transaction (see Figure 4.14). To increase the model’s validity, a visibility study was required to achieve this purpose and the chapters (Five, Six, Seven and Eight) will explore this in detail.

Figure 4.14: The revised model for mobile information provision for tourism destination

- **Tourist**
  - Request for details
  - Returned details

- **Destination Stakeholders**
  - DMO
  - Client (SMEs)
  - Client’s data store

- **Destination m-technology platform**
  - Key tourism destination stakeholders (DMO/SME) and local mobile network providers (e.g. Orange or Vodafone)

- **Data store**
  - Details
  - Destination details
  - Client details
  - Details from client
4.7 Summary

The case studies presented in this chapter highlighted differences in Traveline’s integrated transport information systems and mobile Innsbruck. The implementation of Traveline's electronic and mobile information services faced many technical problems such as limitations of the functionality of Traveline’s website, e.g. accuracy of entering data and flexibility of navigation. Amongst the most significant technical limitation is accessibility of data. When using the company website, passengers can only plan their journey in advance before travelling, however mobile information services give information before travelling and during journeys.

In terms of management issues, it was apparent from the Innsbruck case study that the high cost of using WAP application is considered one of the main barriers to users and DMOs. In addition, issues such as local authority cooperation and funding of services were barriers in developing Traveline’s electronic and mobile service.

The research found that Cardiff Bus Company and Traveline was an appropriate example of a mobile technical platform which could be used for tourism destination marketing. It could provide tourists with a wide range of information, e.g. restaurants, hotels and tourist attractions, via their mobile phones which offer a greater degree of convenience and flexibility compared to other types of information service platforms.
A mobile coding system was considered the main feature for that platform in order to deal with the large volume of data relating to tourism destinations. This is similar to the large volume of data relating to bus stops etc which is managed by Traveline’s transport information coding system. Also, the SMS service played a critical role in delivering the required information to end-users at an acceptable price. Despite the limitations found for Traveline SMS mobile coding system, the results implied that the mobile coding system could play a significant role in supporting and enhancing tourism marketing destinations via the revised model. Therefore, it is necessary to explore suitable mobile coding systems for tourism destinations. Consequently, the research focuses on designing a mobile coding system for tourism destination mobile technology platform, which constitutes a significant part of this study (see Chapter Five). In addition, to increase the validity of the revised model a usability test will be conducted after designing an appropriate mobile coding system (see Chapters Six and Seven).
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5.1 Introduction

Chapter Four involved the development of a set of multiple case studies which allowed the researcher to investigate mobile technology implementation from different perspectives. As a result the conceptual model for mobile information provision in tourism destinations was revised. One of the major findings was to consider a mobile coding system as a critical feature for a mobile technical platform which in turn would support and enhance tourism marketing via the revised model. Therefore, this chapter focuses on designing the proposed TMICS. It investigates two main issues. First, the different types of electronic classification of tourism services for a number of applications such as websites and mobile tourist guide. Second, examples of coding systems applied in different contexts. The chapter concludes by creating an initial TMICS. The following sections discuss these issues in detail.

5.2 Tourism Products

As stated in Section 2.3.1 tourism attractions and facilities play a vital role in the promotion of tourism destinations. The combination of facilities and attractions in a destination enables tourists to enjoy their visit. To inform tourists about these services and facilities, the destinations’ management organizations use a wide range of distribution channels to deliver specific information to end-users, such as DMSs and travel companies. The following section provides a brief discussion about the essential elements of the tourism product classification. This is in order to ensure that the proposed tourism mobile information coding system matches/covers the most important services for end-users.
5.2.1 Classification of Tourism Services

There is an ongoing debate among tourism researchers (e.g. Page, 2007; Cooper et al., 2008) regarding the most important elements and structures that form a tourism product, as well as considerations of the substantial economic impact of the tourism industry tourist destinations. One of the more comprehensive lists of these essential elements was produced by the Canadian Tourism Human Resource Council (CTHRC) (2009). The CTHRC’s ongoing practical engagement with the tourism industry and tourist/consumer would suggest that these categorizations are tried and tested elements of successful tourist products. The Canadian Tourism Human Resource Council (CTHRC) (2009) divided the tourism industry into eight sectors as follows: accommodation, adventure tourism and recreation, attractions, events and conference, food and beverage, tourism services, transportation and travel trade.

The CTHRC study only provides a general classification for tourism services without mentioning the organisations that support, operate and deliver them. Indeed, Cooper et al. (1995) refer to the necessary and important facilities that are required to ensure tourists’ needs are fully met. Cooper et al. (1995:81) considered that the elements of a successful destination would be characterised by four essential (As) which mirror and reflect the needs and desires of the tourist: “attractions; access (local transport, transport terminals); amenities (accommodation, food and beverage outlets, entertainment, retailing and other services); ancillary services, in the form of the local organizations”.

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Jacob *et al.* (2003:284) added a further dimension to this debate. They argued that the tourism industry and its provision is more intricate than any industry. The categorisations they developed are based on a set of subcategories. There are five main categories and under each category is a second level of classification which includes the organizations (companies) that provide a wide range of services to tourists and travellers such as:

- *travel organisation* - including travel agencies
- *lodging and accommodation* - firms involved in lodging activities such as hotels, rural houses, etc
- *Restaurants* - firms in the restaurant industry
- *leisure and recreation* - firms that offer leisure and recreation activities for tourists, such as golf courses, aquatic parks
- *transport* - airlines, bus companies and organizations providing services to tourism firms, such as private trade associations or catering companies servicing airlines

Each one of these categorizations is reliant on each other and they are all equally important (*Jacob et al.*, 2003). Moreover, Page (2007) presents a comprehensive vision for the tourism services supply chain that enables the end destination to present a successful tourism product. Figure 5.1 illustrates the stages that contain a mix of services and facilities that are consumed by tourists within different stages i.e. pre-trip, during trip and post-trip.
Figure 5.1 outlines the process of supply chain in the tourism industry and highlights the importance of consumers’ access to information relating to this supply chain. Thus, the need emerges to capture, filter, classify and distribute the information, especially during the trip stage, ideally in a mobile format delivered to tourists (Rasinger et al. 2007). The previous chapter also supports the importance of the availability of information regarding tourism services at a destination in order to enhance tourists’ mobile search for information and the promotion of the destinations.

In order to examine the useful categorizations of tourism services this research has focused on electronic means of classification as it fits the research purpose.
Thus, a number of electronic systems, such as websites and mobile applications, were investigated to obtain the ideal electronic tourism services classification. This formed the basis of designing the tourism mobile information coding system and identifies factors (options) which help tourists in searching for information on the Internet or mobile tourist guides. The selection of websites to be examined was based on a number of criteria, such as accessibility, numbers of bookings, services and facilities available on the website.

### 5.3 Examples of Classification of Tourism Services through Electronic Means

As mentioned earlier in Section 2.4, ICT has an impact on the competitiveness of the tourism industry at an organizational and a destination level. The growth of ICT has developed many specific applications in tourism marketing. Developments in search engines and the increase in internet speed have influenced the number of travellers around the world to use technology for planning their travels.

As a result, tourists use many electronic sources to obtain information related to the potential tourism destinations they intend to visit. Destination Management Organisations (DMSs) and online booking companies are the main electronic distribution channels which have a wide range of information related to tourism services. These websites classify tourism services according to users’ requirements by using a set of options that make searching for information
easier and reduce the time that is spent in navigating websites. In this section a selection of popular online travel company websites were examined to develop the different classifications of tourism services.

5.3.1. Expedia.co.uk

Expedia UK is one of the largest online travel providers in the UK, it is operated by Expedia Inc. the world’s largest online travel company (Expedia.co.uk, 2010). Expedia offers a wide range of information for many services to travellers via the company website, such as:

- Published and discounted fares on over 450 airlines
- A directory of more than 80,000 international accommodation properties and 4 million rooms
- Car hire services from top rental companies
- A choice of pre-package holidays
- Destination guides and maps
- Holiday insurance

Expedia provides travellers with a plethora of travel information and, in particular, information on accommodation which is considered the main service needed by travellers (Cooper et al. 2008). Expedia has established a set of search options which enhance the users’ ability to find suitable information according to their needs and preferences.
Figure 5.2 highlights Expedia’s UK main search options that are used to find a specific hotel by end-users. There are five options that enable users to set up a filter mechanism for searching results.

**Hotel Name:** The first search option is searching by inserting a hotel name if the user knows the hotel name he/she is looking for.

**City Name (location):** The second is searching by the name of the city which is being visited, for example, if the user types Cardiff city the system will provide a list with hotels located in Cardiff.

**Star Rating:** A star rating is the third searching option that classifies hotels according to its star rating which is divided into five main categories one, two, three, four and five star hotels.

**Guest Rating:** The fourth option is guest rating which depends on the guests’ feedback (user satisfaction) after being accommodated in particular hotels. Currently the majority of hotels provide guests with a questionnaire when they are due to check out, in order to know guests’ feedback regarding the hotel’s facilities during their stay. Guest ratings start from (lower) 1 to 5 (higher). Good hotels obtain a higher rating, e.g. 4.5 or 5. Guests’ ratings in many cases are not an accurate method to choose a certain hotel because it varies from user to user. Expedia added to the previous search options additional facilities which contain special preferences for travellers, such as Internet facilities, air conditioning, swimming pool and other leisure facilities and business services.
5.3.2 Lastminute.com

Lastminute.com is an online travel company and is currently owned by Sabre Holdings, with its headquarters in London (Timhowgego.com, 2010). The idea behind establishing Lastminute.com was to fill empty hotel rooms and restaurant tables by reselling them cheaper at the last minute. It was developed further to resell everything (including travel, theatre tickets). This was one of the main reasons for Lastminute.com’s rapid growth to become a top online travel company (Timhowgego.com, 2010).

Lastminute.com services cover many areas around the world. For example, it has travel operations in 14 countries in Europe (Abcmoney.co.uk, 2010). As a result, the number of Lastminute.com visitors continues to increase. Currently, a study noted that the number of Lastminute.com visitors was 1.65 million each week (Marketingweek.co.uk, 2010).
Possibly one of the main reasons for Lastminute.com's success is the additional facilities provided for users of the service. At a glance they can find restaurants, health treatments, spas, theatres and a variety of other useful information. Figure 5.3 shows Lastminute.com service relating to tourism and the travel industry.

Figure 5.3: Lastminute.com services in tourism and travel industry

![Lastminute.com services in tourism and travel industry](image)

Source Lastminute.com, 2010

In summary, comparing the services provided by Expedia.com and Lastminute.com, it was found that Lastminute.com provided a broad range of services that helped customers to organize their trips. Search options have been used to find a hotel in both websites it was found that the star rating was the most appropriate option to find a hotel because other options have limitations, e.g. often users insert the incorrect hotel name, which affects the search results and gives inaccurate information. After identifying the classification of tourism services in the previous websites, it is beneficial to
explore these classifications in mobile applications to ensure that the classification system is well examined by different types of electronic means.

### 5.3.3 VisitBritain Mobile Guide Application

VisitBritain is Britain’s national tourism agency and is responsible for marketing Britain as a tourist destination (VisitBritain.org, 2010). It works in partnership with thousands of organisations in the UK to market British destinations to visitors from around the world. Also it would work to promote the tourism industry within the UK itself (VisitBritain.org, 2010).

VisitBritain launched a mobile application which served as a travel guide as an alternative to traditional guide books. The new mobile application contains a wide range of information, e.g. interactive maps, London tube map, sights, lists of pubs, restaurants and hotels. This application covers Northern Ireland, Wales, Scotland and England. Users have to be connected to the Internet when they try to use this mobile guide (VisitBritain, 2010). A study for Eyefortravel.com (2009:58) highlighted some examples of novelty mobile guide applications in the travel industry. One of these applications was (MobiExplore) which was developed by Gideon Multimedia:

>Gideon Multimedia went about developing MobiExplore- a new kind of travel guide for mobile phone. The first MobiExplore edition launched for Croatia (a country with close to 10 million tourists annually) were beyond even the most optimistic projection. In the first 12 months more than 500,000 travellers downloaded MobiExplore Croatia and used it on their mobile phone to find information, such as attractions, restaurants and hotels.
According to Eyefortravel.com study (2009:58) “30% of travellers using MobiExplore Croatia had never been to Croatia before and over 61% of them spent more money than an average traveller”. As a result, the company has expanded the MobiExplore application to include the UK and Italy in addition to six major European travel destinations. Consequently, this research examined the MobiExplore UK version as an example of electronic applications that assisted in designing the initial tourism mobile information coding system in this study.

Users are able to download the mobile guide directly to their mobile phones (this guide is compatible with the majority of mobile phone brands) by visiting the VisitBritain website. In this research an example of this application was downloaded for the city of Cardiff to identify the classification of services covered by this mobile guide that could be helpful in designing the initial mobile information coding system.
Chapter Five: Foundation of Tourism Mobile Information Coding System (TMICS)

Figure 5.4: The services provided in city of Cardiff in VisitBritain mobile guide

VisiBritain
Cardiff Mobile Guide

Nights
1-Nightlife
2-Concerts
3-Cinema
4-Theatre
5-Festivals
6-Exhibitions
7-Sport

Rooms
1-Hotels
2-B&Bs
3-Inns
4-Pubs
5-Hostels
6-Camping

Spas
1-Bath Spa
2-Health Centre
3-Thermal Pool

Information
1-Cars
2-Taxis
3-Cab Coaches
4-Railway
5-Airport
6-Coach
7-Taxi
8-Timetable
9-Tickets
10-Local Guides
11-Visitor Centres

Issues
1-Weather
2-Nature
3-Animals
4-Environment
5-Safety

Explore
1-History
2-Culture
3-Museums
4-Art
5-Culture
6-Festivals
7-Carnivals
8-Theatre
9-Opera
10-Music

Gourmet
1-South Africa
2-Generally
3-Indian
4-Chinese
5-Italian
6-Mexican
7-Japanese
8-Thai
9-Swedish
10-Indian
11-Japanese
12-Swedish
13-Indian
14-Japanese
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Chapter Five: Foundation of Tourism Mobile Information Coding System (TMICS)

- **Gastro**
  This classification aims to provide users with information regarding different types of eating places. A list of restaurants was displayed to users to choose which restaurant they prefer. Restaurants were identified according to the cuisine, e.g. British, Italian and Chinese restaurants, the response that users receive contains the restaurant name, address and price range. In addition to restaurants lists there is a selection of pubs, café bars and fast food shops.

- **Explore**
  This option enables users to find information about six sub-categories e.g. Museums, shopping centres and nature places to visit.

- **News**
  Under this classification there are three main categories. The first category contains information for events which includes cinema, concerts, theatre, exhibitions and festivals. The second category contains information for weather and the third category provides the latest travel company offers.

- **Information**
  In this category useful information was divided into eight sub-categories. Transportation was the first of these categories where users can find information for different types of transportation. In addition there is more available information on car hire, local customs and shopping centres.

- **Sights**
  This option provides information for the most popular tourist attractions to visit in Cardiff. It gives eight places that tourists could visit and included attractions such as, historical places and art centres.
• **Rooms**

A wide range of accommodation types is presented in this category. For example, the first type of accommodation is a hotel, which is classified according to star ratings. The majority of online travel booking companies use star rating as an option in searching for hotels e.g. Expedia and Lastminute.com. The second type of accommodation is hostel and the third accommodation facility is camping.

• **Nightlife**

This classification displays information that enables a tourist to choose from a selection of places to visit at night e.g. festivals, cinema and theatre. Also, in this option users can obtain information related to sports centres.

Despite the richness of information of the VisitBritain mobile guide, it was noted that there are many problems in the structure of the classification of the services and using the system itself, these issues are highlighted below:

- There is a crossover for many sub-categories, e.g. events, concerts and festivals which are located in the ‘News’ classification, the same categories were found under ‘Nightlife’ classification. This will confuse users and will lead to failure in using this guide in an efficient way. As a result, this will affect the time that could be spent to find their answer, consequently this may increase the cost of using this service.

- Many responses received were not accurate or incomplete, e.g. restaurants and hotels.
• Users need to be connected to the Internet via their mobile phones to enable them to use this mobile application. Users who do not have an Internet option on their mobile phone for many reasons, such as it is not included in their monthly price plan or they are pay as you go customers which means they may have a limitation in using Internet according to their balance.

This has led to the idea of the potential tourism mobile information coding system being adopted to enable users to access information at:

• Acceptable rate, any time/place.
• Does not require the user to be connected to the Internet.
• The product should be easy to use.

This new mobile information service requires an appropriate coding system to support the service for end-users. Therefore, an investigation is needed of different types of coding classification in order to develop a coding system that can be utilized for the new tourism mobile information service.

5.4 Coding System

Coding concepts can be represented and described in many ways. Consequently, standards for coding terminology have become an essential element in the development of health care, manufacturing products and transport services. In this section, a number of coding classification systems and coding definitions are introduced.
5.4.1 Definition of Coding

Some authors identify coding as a combination of symbols which contains a number of letters or digits. This combination helps customers to choose a wide range of products and services from an organization’s catalogue. MacConnell (1973:4) defined coding “as an allocation of symbols (alphanumeric, etc.)”. Furthermore, Mosier and Janaro (1990:46) mentioned coding as a process of choosing a random number of symbols to form the code by “the arbitrary assignment of one or more symbols to a part, which when deciphered communicates specific meaning or intelligence”. This view is supported by Lewis (1996:68) who defined a coding system as “a system of signals used to represent letters or numbers in transmitting messages”.

Coding systems act as an instrument to enable designers to deliver specific messages to end users by using symbols (letters/digits) presented in a specific order. To classify data in the right order there are basic elements that help designers to develop a coding system.

Clifton (1983:222) mentioned that to design “anything, be it physical, artistic or social, is a creative process” and to design a system that works for everyone it needs the combination of creativity and logic. He highlighted the basic elements that can help in designing any coding system, which are: practicality, efficiency, cost and flexibility. While, Mosier and Janaro (1990) added to the previous elements: balanced distribution and consistent point of view. These elements are summarized in Table 5.1.
Table 5.1: Essential elements in designing coding systems

<table>
<thead>
<tr>
<th>Essential elements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practicality</td>
<td>The system must be able to operate over a long period by competent but average persons.</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Efficiency also involves the accuracy, timeliness and comprehensiveness of the system’s output.</td>
</tr>
<tr>
<td>Cost</td>
<td>It is obviously desirable to aim for minimum cost provided the system fulfills other requirements. It is essential when comparing different systems cost.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>A system needs to be responsive to the changes inevitably requested by the end-users. It should be sufficiently flexible to allow or update and include new items not currently in the population.</td>
</tr>
<tr>
<td>Balanced distribution</td>
<td>When a user seeks a specific group family, there must be enough items to provide reasonable selection. On the other hand, too many items results in the final search and retrieval time becoming difficult to the user.</td>
</tr>
<tr>
<td>Consistent point of view</td>
<td>A classification system should have a design directed at the ultimate objectives of the user. If a classification system is to be accepted and used, it must be humanly engineered</td>
</tr>
</tbody>
</table>

5.4.2 Classification of Coding Systems

According to MacConnell (1973:4) the term classification is defined as “the systematic arrangement of similar items into suitably selected categories”. On the other hand, Mosier and Janaro (1990:46) added a set of criteria to the classification of the coding systems which can be helpful in organizing related data in suitable code combinations.

*Classification is a technique to organize related data into logical and systematic order using a specific set of criteria that categorizes similar items together.*

Generally, a coding classification is a systematic technique that enables designers and users to arrange data related to any products or services in the right order. Clifton (1983) suggests before adopting any coding system and applying it to an area/data set, it is advisable to have an overview of the data that needs to be coded before starting classification. Thus, in this research a
wide range of classification of tourism services has been investigated in order to obtain an appropriate classification. The following stage, after classifying the required data is to choose a suitable code for each product or service (Clifton, 1983). Therefore, an investigation was undertaken to identify a suitable coding system.

5.5 Examples of Coding Systems

This part highlights some examples of coding systems which were investigated, such as the United Kingdom’s unified system for car number plates, Cardiff Bus SMS codes and the International Air Transport Association (IATA) airport codes. These coding systems are applied in different contexts and could help in designing a coding system for the tourism mobile information coding system (see Figure 5.5).

5.5.1 Car Number Plates

The coding system used for car number plates allows buyers of used cars to check the history and legality of these cars (Department of the Environment, Transport and Regions, 2010).
On 1 September 2001 the current numbering system for registration plates in Great Britain was introduced, each registration plate consists of a combination of seven characters with a distinct format (see Figure 5.6) (Londonbusroutes.net, 2008). The code consists of three parts from left to right and the first part (two letters is kept for the regional area identifier), part two includes the age identifier (two numbers) and the third part includes three random letters. These codes are explained further as follows:

![Figure 5.6: Example of UK unified system for car number plates](image)

**Part One: Regional area identifier code (two letters)**

The first part of the code consists of two letters which indicates the local registration office. The first of these two letters is the name of the broad area where the registration office is located and the second letter represents the Driver and Vehicle Licensing Agency (DVLA) local office. This is intended to make the registration more memorable than a random code. For example, ‘C’ is used as the first character in all registrations issued by the three offices located in Wales. Table 5.2 shows an example of both the official local mnemonic and
the local registration office codes across the UK. The letters (I, Q and Z) are not used as local office identifiers, Z can be used as a random letter (Image-reg.com, 2010).

<table>
<thead>
<tr>
<th>First letter</th>
<th>Official local mnemonic</th>
<th>DVLA office</th>
<th>Second letter (local office identifier)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Anglia</td>
<td>Peterborough</td>
<td>A B C D E F G H J K L M N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Norwich</td>
<td>O P R S T U</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ipswich</td>
<td>V W X Y</td>
</tr>
<tr>
<td>B</td>
<td>Birmingham</td>
<td>Birmingham</td>
<td>A-Y</td>
</tr>
<tr>
<td>C</td>
<td>Cymru (Wales)</td>
<td>Cardiff</td>
<td>A B C D E F G H J K L M N O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Swansea</td>
<td>P R S T U V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bangor</td>
<td>W X Y</td>
</tr>
</tbody>
</table>

Source: nationalnumbers.co.uk

**Part Two: Age identifier (two numbers)**

These two numbers change every six months, in March and September (Department of the Environment, Transport and Regions, 2010). For example, ‘09’ represents registrations issued between 1 March and 31 August 2009 (see Figure 5.6). For vehicles registered later in the year, between 1st September and 28 February in the following calendar year, the two numbers which act as age identifier changes, and ‘50’ is added to the value representing the year. For example, vehicles registered between 1st September 2010 and 28 February 2010 will be represented by ‘59’ (09+50) (see Table 5.3).
### Table 5.3: Examples of age identifier numbers

<table>
<thead>
<tr>
<th>Year</th>
<th>1 March–31 August</th>
<th>1 September–28 February</th>
<th>Year</th>
<th>1 March–31 August</th>
<th>1 September–28 February</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001/02</td>
<td>—</td>
<td>51</td>
<td>2006/07</td>
<td>06</td>
<td>56</td>
</tr>
<tr>
<td>2002/03</td>
<td>02</td>
<td>52</td>
<td>2007/08</td>
<td>07</td>
<td>57</td>
</tr>
<tr>
<td>2003/04</td>
<td>03</td>
<td>53</td>
<td>2008/09</td>
<td>08</td>
<td>58</td>
</tr>
<tr>
<td>2004/05</td>
<td>04</td>
<td>54</td>
<td>2009/10</td>
<td>09</td>
<td>59</td>
</tr>
<tr>
<td>2005/06</td>
<td>05</td>
<td>55</td>
<td>2010/11</td>
<td>10</td>
<td>60</td>
</tr>
</tbody>
</table>

Source: regtransfer.co.uk

**Part Three: Three random letters**

The three random letters uniquely differentiate each of the vehicles displaying the same regional area identifier code and age identifier sequence. The letters I and Q are excluded from the three random letters, as a combination of letters using these may cause offensive words (Image-reg.com, 2010).

### 5.5.2 Cardiff Bus Coding System

Chapter Four investigated Cardiff Bus’s experience of implementing mobile technology, using a coding system for sending SMS (see Section 4.5.3.1). It was found that speed and simplicity was the main priority when designing the bus-stop coding system. The basic structure of the code is that it contains two sets of alphabetical letters with the first three letters representing the town\location in which the bus-stop is located (see Table 4.1). The second part of the code comprises of a combination of random letters which represent the bus stop, these letters were designed to be input by a single key press on users’ mobile, e.g. ‘A’. Passengers send their text message to a single number
which is 84268. The reason for choosing these specific numbers is because they appear in a circle around mobile phone keypad.

### 5.5.3 International Air Transport Association (IATA) Airport Codes

The IATA three-letter airport codes uniquely identify individual airports around the world. There are about 10,000 commercial airports around the world with three-letter codes (Bates, 2006). These codes are used in timetables, baggage tags and ticketing reservation systems (Air-ticket.us, 2010). For example, if a passenger is travelling from Cairo International Airport the IATA code for Cairo airport will be printed on the passenger’s ticket and the luggage tags attached at the airport check-in desks.

The airport three-letter code system was launched after the Second World War. The initiative was American, the idea coming from the use of navigation beacons which were developed before the war. This system was based on two letters and clearly would not work for airports as there were over 900 in commercial use worldwide in 1939 (Ross, 2010). Consequently, the three-letter system was developed to give around 17,576 different combinations (Air-ticket.us, 2010). Many airport codes are the first three letters of the city name, e.g. Atlanta (ATL), Singapore (SIN) and Sydney (SYD), Australia. The first letter of multiple cities served forms other codes e.g. DFW for Dallas Fort Worth, USA and AAI for Arraias, Brazil (see Table 5.4).
One of the negatives of IATA airport codes is if one only knows the name of the airport rather than the city served there may be confusion. A good example is Orly airport (ORY) and Charles De Gaulle airport (CDG) both of which serve Paris, France (Ross, 2010). Many USA organizations set special codes which have been deliberately reserved, such as ‘N’, ‘K’, ‘Q’, ‘Z’. For example, the Navy use ‘N’ (Skygod.com. 2010). The Federal communications committee set aside the ‘W’ and ‘K’ codes for radio stations East and West of the Mississippi. The shortage of these letters creates a problem in the logic of some codes, e.g. if the city starts with an ‘N’, ‘W’ or ‘K’. Many airports attempt to solve this problem by ignoring these letters (Skygod.com. 2010).

The continued growth of airports world-wide has meant that three letter combinations were insufficient to identify every airport. As a result, the system expanded, allowing numbers and four digits combinations (Ross, 2010).

<table>
<thead>
<tr>
<th>Airport code</th>
<th>Airport name</th>
<th>Country Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>Anaa</td>
<td>French Polynesia</td>
</tr>
<tr>
<td>AAB</td>
<td>Arrabury</td>
<td>Australia</td>
</tr>
<tr>
<td>AAC</td>
<td>Al Arish International Airport</td>
<td>Egypt</td>
</tr>
<tr>
<td>AAD</td>
<td>Ad-Dabbah</td>
<td>Sudan</td>
</tr>
<tr>
<td>AAE</td>
<td>Les Salines</td>
<td>Algeria</td>
</tr>
<tr>
<td>AAF</td>
<td>Municipal</td>
<td>United States</td>
</tr>
<tr>
<td>AAG</td>
<td>Arapoti</td>
<td>Brazil</td>
</tr>
<tr>
<td>AAH</td>
<td>Aachen/Merzbruck</td>
<td>Germany</td>
</tr>
<tr>
<td>AAI</td>
<td>Arraias</td>
<td>Brazil</td>
</tr>
</tbody>
</table>

Chapter Five: Foundation of Tourism Mobile Information Coding System (TMICS)

5.6 Initial Tourism Mobile Information Coding System (TMICS)

After studying different types of classification of tourism services and coding system applications, as well as identifying the main issues that could be helpful in designing TMICS, the research has led to the decision that TMICS would be based on two parts: the first part containing the classification of different type of services and the second part classifying services according to a certain coding system.

5.6.1 Classifications of Tourism Mobile Information Services

Based on Section (5.2.1) it was found that there are five main categories for tourism services and under each category there are sub-categories. Figure 5.7 summarizes the structure of tourism mobile services.

Figure 5.7: Structure of the initial tourism mobile services
Hotels

The first TMICS classification of the services is Hotels. According to Expedia.com and Lastminute.com classifications, hotels are the top priority for tourists. In this research hotels are classified according to a star rating, which was found to be the widely-used searching options to find a hotel among online travel companies and the VisitBritain mobile guide. However, places such as guest houses and hostels, will be located under non-classified hotels to gives users more flexibility.

Restaurants

In the VisitBritain mobile guide, restaurants are classified according to the type of cuisine. This is the most popular factor that encourages people to choose a particular restaurant. A study by Sobaih et al. (2008a, 2008b) mentioned that food type is considered to be one of six indicators that help to classify the main types of restaurant in the city of Cardiff. As a result, five sub-categories of restaurant were chosen to be the basis of the restaurant classifications. In addition, two sub-categories (café bar and fast food) were added to ensure that most types of restaurants are covered.

Things To do

This category contains a selection of sub-categories of services that tourists prefer to do during their visit. To solve the crossover issue found with the VisitBritain mobile guide, this research creates a new group of services in a logical order.
**Nightlife**

These places were classified to be the most popular places that tourists wished to visit at night. There are two sub-categories for nightlife. The reason for putting these two services into different sub-categories is because each one provides a different service. For example pubs and night clubs provide for their customers food and drink while bars tend to provide drink only.

**Information**

In this category, tourists can access many different types of service that may be useful during their visit. For example information regarding weather will be available under a weather sub-category. In case users need information regarding different types of transportation at their destination, this category is located under a transportation sub-category. Special numbers, such as emergency and police stations are classified under important numbers.

**5.6.1.1 Services location**

This searching option is widely used by online travel companies as discussed in Section 5.2.1.1 after users select specific services. Therefore, it is important to add this searching option to TMICS because it will increase the accuracy of information obtained and reduce the time spent searching.

**5.6.2 Tourism Mobile Information Services Coding System**

After identifying the initial classification for the tourism services, it is important to design a coding system which works with this classification to enable
users/tourists to obtain information through SMS. Therefore, the second part of TMICS aimed to develop a coding system that covers the whole classification of the services described in Section 5.6.1. To achieve this aim, an appropriate coding system had to be devised.

Based on the conducted research into existing coding systems, a number of factors were considered in the design of TMICS to ensure accuracy, efficiency and usability. The British vehicle number plate system uses an alphanumeric code to provide information about the location the vehicle was registered when new and the age of the vehicle, as well as a unique identifier. This combination of letter and numbers would not make for an efficient text-based service as it can prove to be confusing to the user and complicated to input due to the varying nature of mobile phone handsets, e.g. Qwerty-type keypads are increasingly used on smart phones and the classic keypad, where a combination of three letters and a number per key are used. In addition, the UK number plate system lacks consistency where the first alphabetic combination represents a location of registration, whereas the final three letters are randomly generated to create a unique identifier. The design of TMICS ensured that only letters are used in the codes. This should make the system easier to use and less complicated for users.

The successes achieved by the IATA codes (as discussed in Section 5.5.3) were as a result of a simple design which utilized mnemonics to help users associate airport codes with city names. Despite this, there remained a number
of limitations, which resulted in a significant proportion of airport codes which did not necessarily represent the location name. This problem was developed by the fact that some letters were reserved for use by the military or other organizations. The design of TMICS had to consider the length of codes and try to be short in the number of letters used.

Cardiff Bus has implemented an easy-to-use SMS-based information service, after a period of intensive usability testing and the coding system they adopted offers flexibility and efficiency. The strongest design benefit of this system is that it requires that the user only presses each key once. There is no requirement for the user to depress the key more than once to obtain a particular letter or number, e.g. the users would not need to press (B) or (E) in their mobile phone keypad.

Consequently, TMICS is designed to be easily used by the end-user. In this research single keypad letters were chosen as the basis to create mobile tourism services codes. There are eight letters A, D, G, J, M, P, T and W which need only a single keypad press on a conventional mobile phone keyboard. By using these eight letters in this research 64 combinations were produced that are enough to classify most tourism services identified in this research.

These combinations form the initial coding system is divided into three parts. TMICS codes were designed to be in a hierarchical structure. The first part refers to the five main service types which are designed to be mnemonic codes
to assist the user in memorizing the codes. (H) for hotels, (R) for Restaurants, (T) for Things To do, N for Nightlife and (I) for Information. The second part represents the service sub-categories, e.g. 5 star hotel (AA), 4 star hotel (AD) etc. as seen in the last column of Table 5.5.

<table>
<thead>
<tr>
<th>Main Categories service</th>
<th>Codes</th>
<th>Sub-categories service</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotels</td>
<td>H</td>
<td>5 Star</td>
<td>AA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Star</td>
<td>AD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Star</td>
<td>AG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Star</td>
<td>AJ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 Star</td>
<td>AM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not classified</td>
<td>AP</td>
</tr>
<tr>
<td>Restaurants</td>
<td>R</td>
<td>British</td>
<td>AT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Italian</td>
<td>AW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chinese</td>
<td>DA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mexican</td>
<td>DD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indian</td>
<td>DG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Café bar</td>
<td>DJ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fast-food</td>
<td>DM</td>
</tr>
<tr>
<td>Things To do</td>
<td>T</td>
<td>Shopping</td>
<td>DP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Museums</td>
<td>DT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spa</td>
<td>DW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tourism Attraction</td>
<td>GA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cinemas</td>
<td>GJ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concerts</td>
<td>GM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Theatre</td>
<td>GP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exhibitions</td>
<td>GT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Festivals and fairs</td>
<td>GW</td>
</tr>
<tr>
<td>Night Life</td>
<td>N</td>
<td>Pubs &amp; Night Clubs</td>
<td>GD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bars</td>
<td>GG</td>
</tr>
<tr>
<td>Information</td>
<td>I</td>
<td>Weather</td>
<td>JA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>History &amp; Culture</td>
<td>JD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transport</td>
<td>JG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Local Customs</td>
<td>JJ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Travel Agency</td>
<td>JM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Important numbers</td>
<td>JP</td>
</tr>
</tbody>
</table>
In addition, it is flexible enough to accommodate an increase in the number of code digits if there are more services which needed to be added at a later time. The coding system combination could be increased from three to eight letters if necessary. The third part includes the area codes that are covered by the coding system services, for example (A) for city centre, (D) for North of the city, (G) for East and (J) for West. Figure 5.8 illustrates a complete entry via the keypad of the phone.

<table>
<thead>
<tr>
<th>Figure 5.8: Example of a complete entry codes via the keypad of the phone for TMICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 2 (service sub-categories e.g. AA for 5 star hotel)</td>
</tr>
<tr>
<td>Part 1 (Service Types e.g. H for hotels) Part 3 (Area codes e.g. A for City Centre)</td>
</tr>
</tbody>
</table>

### 5.7 Summary

This chapter has introduced the design of the proposed TMICS, discussing the two main issues of different types of electronic classification and demonstrating coding examples in different contexts. In order to achieve a tourism mobile information coding system it is necessary to examine the usability of the proposed coding system, to work with the SMS service. Therefore a further investigation was required to address this need. The next chapter describes the methods used to test the coding system and to identify to what extent any further essential modifications would be needed to improve TMICS.
Chapter Six
Evaluating TMICS using a Paper Prototype
6.1 Introduction

After designing TMICS in Chapter Five it was essential for the current study to test this system. This chapter focuses on the evaluation and testing processes that were used in assessing the usability of TMICS. The usability analysis begins with the design and implementation of a modified paper-prototyping method that helps to assess the usability of the proposed system from the users’ perspective.

6.2 Paper Prototyping Methods

Many companies, such as Microsoft and IBM, widely use paper prototyping as a powerful tool to develop their products in the early stages to meet users’ needs and requirements (Snyder, 2001). There are a number of definitions for a paper prototype, for example Houde and Hill (2010:3) provide a general definition for prototype and argued that prototypes are any type of format that are used to develop a certain product or service “any representation of a design idea, regardless of medium”. On other hand, Snyder (2003:4) defined the paper prototyping method as:

"Paper prototyping is a variation of usability testing where representative users perform realistic tasks by interacting with a paper version of the interface that is manipulated by a person “playing computer”, who doesn’t explain how the interface is intended to work."

According to Snyder’s (2003) definition, paper prototypes are initially used to examine software products and services before launching on the market design simulations on paper. The main aim for this method is to measure the usability of a particular service from the users’ viewpoint. This research adopts this
method as TMICS was designed to assist the end-users in finding information, therefore it is important observe their performance while interacting with the system. This view was supported by Sharp et al. (2007:5) who identified that:

*The mobile industry created products with a technology-first approach. This has meant products being created by engineers and technologists rather than user-experience designers or usability experts.*

They argued that paper-prototyping enables a ‘user-first’ approach. It enhances the design of the user-experience and interface before any software engineering commences. In addition, there are many benefits of using paper prototyping, for example Snyder (2003:12) summarises these below:

- *Saves time and money because it provides substantive feedback early in the development process before implementation. This allows product developers to modify existing designs.*
- *Promotes rapid iterative development. Experiment with many ideas rather than basing something on one idea.*
- *Does not require advanced technological to create and design a paper prototype.*

### 6.2.1 Creating Paper Prototypes

To develop a paper prototype for products or services, there are specific procedures that need consideration. Snyder (2003) identifies four dimensions of a paper prototype which need to be included in the design process:

1. **Breadth**: a prototype should be fit for purpose to achieve the correct results.

   Products and services functionality requires a specific Breadth. Snyder
(2003:100) defines breadth as the “percentage of the product’s functionality that is presented in the prototype”.

2. **Depth**: Another dimension Snyder (2003) considers is depth, or the amount of investigation a researcher can carry out. The deeper the investigation goes the more information the researcher obtains.

3. **The Look**: In a visual world it is important to have a prototype that is fit for purpose but also is visually appealing and makes good use of colours and graphics.

4. **Interaction**: Snyder (2003:262) refers to the importance of the interaction with the prototype as “the way that the prototype handles the inputs and outputs with the user are the I/O methods simulated in a realistic manner”.

Sharp *et al.* (2007) describe the two steps needed to create a paper prototype. First, it is necessary to identify the end-users’ goals that the service is to support. The users’ goals provide a design reference point throughout the paper prototyping work. Second, the features and the content of the system should be ascertained. In addition to considering users’ goals, it is important to detail the content and features of the product or the service. This includes identifying the available content, the desired features and the overall users’ experience the operator wants to achieve. For this research, some of the areas to consider were:
• Enabling users to select codes to retrieve the correct information;
• Choosing correct codes for the required services;
• Navigation of the services and its contents.

6.2.2 Implementing Paper Prototypes

The next stage after creating a paper prototype is its application. This is initiated with transferring the designed prototype to a working prototype that supports the tasks needed for the usability testing. To do this, a number of user tasks need to be designed so that the user can attempt to use the system through undertaking pre-defined tasks. Snyder (2003:121-122) recommends some characteristics that lead to designing a good task: The user profile goal, has an appropriate scope, has a finite and predictable set of possible solutions, has a clear end point that the user can recognize, elicits action, not just opinion.

Consequently, after designing a good task, the next step in the implementation was the revision of the proposed-paper prototype and its tasks before the usability test. Following this, it was then be possible to commence the usability test to reach the final design for potential services or products. The following section presents an overview for the TMICS paper prototype.

6.3 TMICS Paper-Prototyping Method

Firstly it was important to present the number of steps needed to create and implement a paper-prototype technique. This helps in developing a wide range
of services and products such as website interface and mobile applications. This research utilised a paper-prototype method in order to develop an appropriate TMICS. To achieve this, the TMICS paper-prototype adopted many stages as shown in Figure 6.1. The following section details these stages.

### Figure 6.1: Overview of paper prototyping for TMICS

1: Proposed TMICS  
2: User Profile  
3: Prototype creation  
4: Prototype presentation  
5: Paper prototype refining

#### 6.3.1 Proposed TMICS (early stage)

The aim of this stage was to identify users’ requirements and needs and the majority of these requirements were covered in Chapter Five such as:

- Provide information for a number of services at any time any place by using a specific code.
- Ease of use for the end-users.
6.3.2 User Profiles

After identifying users' goals in Chapter Five, the proposed system needed to select prospective users. As this system is designed for all users, one of the required characteristics for the potential users is the ability to use SMS via their mobile phones. To enhance the usability test the researcher selected a group of interviewees that have a mobile phone technology experience (see Section 3.4.2.2).

6.3.3 Prototype Creation

This stage aimed to transfer the initial design of TMICS into a specific format that could work with SMS for a system based in Cardiff. As a result, the researcher tried to identify a design for the TMICS paper prototype. It was recognised that a poster design would be a suitable medium to present TMICS for the majority of users. The poster method was chosen as it would follow a similar format to other approaches, such as Cardiff bus who published their bus routes on a poster format and displayed it on each bus stop (see Chapter Four).

This poster provided a visual guide in using the mobile system and it could be displayed in a variety of places. Figure 6.2 outlines the proposed poster before any piloting or usability test. The poster consists of four parts:
Part One: the heading

This part contains the suggested name for the tourism mobile information coding system which reflects the nature of the service provided followed by the number to which users send their SMS. The number 42682 was chosen because of the visual nature of the mobile phone keyboard, with numbers starting at 4 and continuing in a clockwise order. This is easy to remember and it is easy for users to send SMS to this number.

Part Two: the location map
Users need to identify the location of the services they are looking for. After searching for a suitable map it was found that the Cardiff Bus routes map could be used as it covers the majority of Cardiff city areas. Also, users can benefit from using this map to find the bus number that leads to their destination. The researcher modified the map and divided it into five main areas West, East, North, Cardiff Bay, Cardiff City Centre.

**Part Three: Services and location tables**

This part includes two tables. The first contains two levels of service category, the first level includes the main service, e.g. hotels and restaurants, the second level contains sub-categories for the service types that users chose between them. Each main category and sub-categories are combined with the codes that are needed to type in to the SMS. The second table refers to the service locations and the codes.

**Part Four: an example**

This part presents a practical example on how to use the new system and to find required information. If the users are looking for a four-star hotel in the Cardiff Bay area, they would type H for hotels, followed by AD which represents the services type followed by D which refers to the location of that service.

**6.3.4 Presenting Paper-Prototype**

The next stage after designing the initial poster was the creation of realistic tasks that enable users to interact with the initial poster. Thus, this research
considered the characteristics of a good task that was mentioned in the study of Snyder (2003) in order to develop suitable tasks. In order to apply TMICS to a paper prototype, there were a number of steps that lead to the final task.

### 6.3.4.1 Scenarios

The first step in the implementation of TMICS prototypes was developing a number of scenarios. Five scenarios which were created in order to work with the initial poster. Each scenario was intended to achieve a realistic task that the new system supported Table 6.1 shows an example for TMICS proposed scenario.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario 1</strong></td>
<td>In the first scenario the interviewee acts as a tourist who arrives at the City of Cardiff and wants to find a four-star hotel by using the new mobile information service via the poster. Also, this scenario was developed to give the ability to the user to choose a four-star hotel from any location in the City of Cardiff.</td>
</tr>
<tr>
<td><strong>Scenario 2</strong></td>
<td>In the second scenario the user used the system to find information about preferred restaurants from the restaurant categories, in the evening, at any place in the City of Cardiff five main areas.</td>
</tr>
<tr>
<td><strong>Scenario 3</strong></td>
<td>In the third scenario the user asked to find a museum to visit during the day in west Cardiff.</td>
</tr>
<tr>
<td><strong>Scenario 4</strong></td>
<td>In the fourth scenario the user used the system to find a bar to visit at night in North Cardiff.</td>
</tr>
<tr>
<td><strong>Scenario 5</strong></td>
<td>In the last scenario the user chose a tour guide to help in organizing his/her trip, they found this information available in the services table. The design of the last three scenarios’ was more specific than scenarios one and two in order to examine the zone areas options.</td>
</tr>
</tbody>
</table>

The following pictures highlight the sequences of the process of sending and receiving SMS for the first scenario by using TMICS a paper prototype.
**Picture One** To enhance the usability test the participant was provided with a blank picture for a mobile phone that was used as the input/output method to send and deliver the requested information. The user inserted the service code, which is ‘H’ for Hotel and ‘AD’ for four star hotels, followed by the location code ‘A’ for the City Centre of Cardiff, and then he/she presses send to 42682.

**Picture Two** This is an alert for the incoming message to the user’s mobile phone that has been sent by TMICS.
**Picture Three** Shows the content of the incoming message which contains information about the four-star hotels located in the city centre. It was noted that there is more information to follow for this request and the system stated that this information will continue on a second SMS.

**Picture Four** Contains the second incoming SMS that includes information regarding a four-star hotel, which is located in Cardiff city centre. If the user would like more information about one of these hotels another message can be sent to the same number that was used in the first request in ‘M’ should be type which refers to more information and then a number should be typed which corresponds to the selected item.
**Picture Five** Shows an example of the more information option which enables the user to obtain information about a specific hotel. In this example a message was sent to the new system to obtain information about ‘Parc’ hotel.

**Picture Six** Presents the reply message that contains information such as the address of the hotel, contact phone number and the price range per night.
6.3.4.2 Prototype contents

After designing the TMICS tasks that the user undertook during the usability test, it was important to fill in the services content that the new service supports. As stated, this research chose the City of Cardiff as an example to apply the TMICS paper prototype, and the researcher developed a database that contained information for each service category that is presented in the poster. This database adopted its information from the Cardiff tourist information official guide book. One of the problems that appeared during the building of the database was that information available in this guide was not updated and not fully complete. As a result, the researcher solved this problem by developing the database from another source, which was the Cardiff tourist information official website which was more organised and contained a large volume of information for a wide range of services (see Appendix Four).

6.3.4.3 Prototype questions

These questions were divided into four groups and each group aimed to identify a number of issues that helped the development of the proposed system.

Section One intended to explore users’ interaction with the mobile search information in general and identify if the users’ have ever used a similar application before.

Sections Two focused on evaluating TMICS and identifying any obstacles that were found in the new service such as the codes used and the quality of the information provided.
Sections Three dealt with users’ feedback regarding TMICS poster and intended to discover if there were any visual barriers that prevented them from using the poster.

Section Four examined the database of TMICS which contained the information for the provided services in the new mobile coding system. Finally, the TMICS paper prototype was ready to use for the usability test and a pilot study was conducted to revise the paper prototype. The results of this piloting are described below.

6.3.5 Paper-Prototype Refining (piloting)

It is essential to examine the initial TMICS paper prototype before conducting the actual usability test to identify any weaknesses, particularly the poster because it is the backbone for the TMICS paper prototype. Therefore, the researcher undertook a series of piloting studies with five users in order to develop the initial prototypes. After displaying the prototypes, each user offered some feedback regarding the parts that form TMICS paper prototype which is discussed below.

Poster

This research took the users’ feedback into consideration in order to modify the TMICS paper prototype. Figure 6.3 presents the revised poster and an overview of the changes made for each section of the poster.

Part One: the heading
During the pilot phase four of five users agreed that the contents and the headings were suitable and they liked the title of the service because it is reflected the nature of the service. Conversely, three users commented that the title should be more attractive and that there should be a logo for a mobile phone. As a result, a logo for mobile phone with an ‘i’ which represent information was added. Additionally, they commented that the colour of the heading background needed to be lighter. As a result, the researcher changed the colour of the heading background.

Figure 6.3: TMICS poster-revised a paper prototype after piloting
Part Two: the location map

Some changes were made to the location map to meet the users’ requirements. For example, they suggested that the main area of Cardiff was not clear, so the researcher outlined five main areas (East, West, North, Cardiff Bay, Cardiff City Centre) to address this point and identify each area with a different colour. Also, they were confused about the small map beside the Cardiff city map and they thought it was a separate map and not a zoom out for the City centre of Cardiff. As a result, the layout for the zoom out of City centre was changed to be a circle and to be the same colour as the city centre zone.

Part Three: Services and location tables

The majority (four users) of users agreed with the sequence of the service categories table but they suggested adding some visual queues to the services table to help users to choose a service even if their English was not his/her first language. The researcher added icons that are considered to be a familiar metaphor for everyone. In addition, the users suggested changing the colour of the table. They suggested each service category should have an individual colour and each zone location should match its colour on the map. One note box was added under the location table to inform users that if they wished to receive additional information about services re-text to 42682.

Part Four: an example

Most users found difficulty in understanding the example provided in the poster and mentioned that it was not clear and they thought that the code sequence
represented a single word. Thus, the way of presenting the example changed and the codes were split into two circles and a note added on the top of each to show the differences between them and each was also given a different colour.

The questions of TMICS usability test were modified (see Appendix Two).

### 6.4 Summary

This chapter discussed the tool that was used to examine the usability of TMICS. It also evaluated the process that was used in assessing the usability of the proposed system. The chapter has analysed the usability with a modified paper prototyping method which was created to support the usability of the proposed system from the users’ perspective. There were five stages of the TMICS paper prototype which were: proposed system; selecting prospective users; creating a prototype; presenting paper prototype; refining the proposed TMICS paper prototype. After completing the mentioned stages, the TMICS paper prototype was set to be ready for the proposed usability test.
Chapter Seven
TMICS Usability Test Issues
Chapter Seven: TMICS Usability Test Issues

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7.1 Introduction

Chapters Five and Six discussed the foundation of TMICS and the tool (paper prototype) that was utilised to assess its usability. This chapter focuses on issues related to the usability of the proposed system (TMICS). There are four main issues that are addressed in the following sections. These are: user knowledge when using mobile information search applications, process of use of the proposed system, content and classifications of information and other issues related to TMICS usability, such as service, cost and advertising. For clarity of presentation where reference is made to the users who participates in the usability test, a simple coding will identify the user replacing user 1 as (U1) and user 2 as (U2) up to the fifteenth user (U15). The demographic data of the users is giving in Appendix Three.

7.2 User Knowledge When Using Mobile Information Search Applications

The aim of this section is to investigate users' knowledge in relation to mobile search information applications, for example, SMS car park services. This includes tourism services classifications which were identified by users. Additionally, this section identifies sources of information which were utilised to collect information for such tourism service classification. The importance of a mobile application as a tool to obtain information is also highlighted. The barriers that may prevent the use of mobile phones to access the required information are also discussed.
7.2.1 Tourism Services classification (Places to visit)

This stage explored the different aspects of tourism and the main areas of interest were for tourists. Three out of fifteen users (Users 4, 5 and 12) mentioned that they were interested in visiting historical and recreational places, such as castles, museums and theme parks. Two of the users commented that:

... Cardiff Castle, Welsh Assembly Centre, the Millennium Stadium, the Cricket Ground, I've been to, so I'm quite interested in the culture of Cardiff ...

(U5)

... In Cardiff, I would like to go to Cardiff Bay around Cardiff, inside Cardiff as well there's the Welsh Life Museum, and there are some other places as well. It varies between recreational and historical places ...

(U12)

Moreover, some users (e.g. Users 6 and 8) mentioned that shopping activities were considered as one of their main preferences, therefore they were looking for shopping centres located in Cardiff city centre. This finding is supported by two of the interviewees, for example U6 explained “I've seen the night-life, which is quite interesting, and St Mary Street and Queen Street, which are the shopping places. That's about it really”. While U8 commented that:

... In Cardiff I went to see the Dr Who exhibition, so that's the Bay area, Sophia Gardens up through the park in that direction, and obviously the shopping area, looking at the restaurants etc ...

(U8)

In addition, four out of fifteen users (Users 8, 9, 10 and 15) added that there are many places that provide food and beverage services such as restaurants, pubs
and clubs. U10 supports this and said “Right, so I usually go to pubs, clubs, and restaurants”. In addition, U11 supported this finding and stated “outside Cardiff I usually go to outdoor places and trips, climbing, I do some climbing as well, which is usually outdoors outside Cardiff”.

Conversely one user claimed that a number of restrictions can affect their ability to visit new places in the city and he commented that:

... In Cardiff, actually I’m here for a short period of time, and I’m here for business, for my study, so the places which I visit are a little bit limited, it’s not that much ...

(U7)

Based on the previous findings it was noted that the majority of users (93.3%, N=15) were interested in historical places, shopping centres and places that provide food and drink.

7.2.2 Historical Process of Information Gathering

This section intended to identify how the participants found information on tourism services prior to testing the TMICS. Table 7.1 summaries the previous methods used to obtain data. In regards to the word of mouth (e.g. friends) as a source of information ten users (U3, U4, U6, U7, U9, U10, U11, U12, U14 and U15) mentioned that they frequently access the required information via this source. This finding is supported by one of the users who commented that:

... Usually friends, I don’t go alone, so I go with a number of people, a group, and usually its word of mouth. People know the place; somebody has been to the place, or something ...

(U11)
Table 7.1: Sources of information

<table>
<thead>
<tr>
<th>Type of source</th>
<th>Freq.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word of Mouth</td>
<td>10</td>
<td>66.7</td>
</tr>
<tr>
<td>Websites</td>
<td>14</td>
<td>93.3</td>
</tr>
<tr>
<td>Printed Materials</td>
<td>4</td>
<td>26.7</td>
</tr>
</tbody>
</table>

Fourteen of the fifteen users claimed that they were dependent on websites as a source to access information, in addition to word of mouth, e.g. U3 who commented:

… I found the information through the internet, through tourist websites giving you all the attraction sites here in the UK and some of it through my friends …

(U3)

Furthermore, U2 and U5 mentioned that they used local and regional websites (e.g. VisitWales.com) to find information about specific places located in Cardiff and they commented that:

… I suppose you could go to Visitwales.com, you could have a look on the Internet or ask friends or people what they recommend …

(U2)

… Generally, from information provided on Cardiff's website. I generally go to Cardiff City Council's website and get the information from there on what to do in Cardiff …

(U5)

However; four out of fifteen users (Users 1, 10, 12 and 14) stated that they depended on printed materials (e.g. leaflets and tourist guide) as well as
websites and word of mouth to obtain the required information. These findings are supported by the following quote from one of the users:

... I guess in a variety of ways. Sometimes by talking to friends, sometimes by looking at websites to see what there is, sometimes by getting some kind of tourist leaflet that shows what exists, sometimes by seeing something in the newspaper. So a variety of different methods ...

(U10)

7.2.3 Role of Mobile Applications as Tool to Obtain Information

This section identifies the importance of mobile applications as a tool to assist in finding information. It begins with exploring the participants’ familiarity of using mobile applications and then identifies the barriers that prevent using mobile applications and then concludes with some examples of these applications.

7.2.3.1 The familiarities of using mobile applications

The interviewees were asked if they were interested in using mobile phone applications to find specific information. Eight users (U1, U2, U3, U6, U7, U11, U13 and U15) mentioned that they were familiar with using mobile applications for weather forecasts or finding out addresses but not for tourism purposes. This finding was supported by U11 who stated that “I use the weather service very frequently on my mobile device” while U13 commented that:

... I use GPS and things like that, but I don't use it for tourism purposes. Yes, or where am I, I'm lost, and I need to go there. But I could use it in the context of your interest, if I was going somewhere and I didn't know where I was ...

(U13)
One of the users argued that she was familiar with using mobile applications; however she uses a mobile phone for limited functions such as calling or sending e-mails, as she commented:

… I am familiar with using a mobile phone, when I generally use mobiles it’s just for calling or texting. I use a business smart phone and a Blackberry, so I get my emails and my calendars, but those are the only functions I tend to use. I don’t do much surfing on the Internet using my mobile. Occasionally if I’m stuck I would, but that’s it …

(U1)

On the other hand, users (U10, U4, U5, U8, U9, and U12) mentioned that they were familiar with mobile applications via their mobile phones but argued that they could not try it for a number of reasons. For example, user four despite having the function on his mobile phone to browse the Internet, could not use it and described it as uncomfortable and too complicated a process, he commented:

… I do have the Internet service on my mobile but I hardly use it. Because, I am not familiar with it I am not really comfortable using the mobile phone to browse through the Internet and also I think it is very complicated. Frankly, I am not that into hi-tech gadgets. However, if I really need to and have the option I would …

(U4)

Two users (U10 and U12) mentioned that that they preferred to use the Internet to find specific information from their personal desktop computer rather than using a mobile phone. For example, U10 preferred to plan for his journey in advance through his PC at home to obtain the required information instead of using a mobile phone on the move. While U12 mentioned some reasons that prevented him from using a mobile phone to access the required information.
He stated that it requires a high level of hi-tech skills and secondly he felt comfortable obtaining information via friends or the Internet. This is finding supported by the following comments:

... Well I have a mobile phone, but I don't have a smart phone, I only have a ‘dumb’ phone, so if I want to access information I will probably look on the Web at home the previous evening and make a plan, rather than trying to do something as I'm going out ...

(U10)

... Yes, I'm familiar, but to be honest I didn't use any. First of all, I'm not like a technician or an IT man, so this is one thing, the other thing is that it's easier for me to obtain information from friends or online, rather than from SMS. Online, you can get more details. This is one thing, and in SMS I think you can't get all the details, the description of the place, what it contains, the opening times, all the information about that place. The other thing, when someone visits the place, they will tell you what is good and what is bad, and about the details of the place. I believe that friends and the Internet will be better for me at least ...

(U12)

7.2.3.2 Previous experience of mobile applications in tourism

The interviewees were asked if they had ever used any type of mobile application that enabled them to find the required information, or to find tourist information. No evidence was found in using any applications for tourist information purposes, but the majority of users used mobile phone applications that have different purposes. These findings are supported by one of the users who commented that:

... I use the GPS and with the GPS I can find quite a few things around – the different venues, tourist information centres. I use the Internet on the phone as well, but I don't actually use mobile phone applications as such, specifically for tourists, for information ...

(U6)
Two users (U1 and U2) mentioned that they had experiences of using car park services which allowed them to park their car at Cardiff central station and pay for this parking through an automated mobile phone service. For example, user one used this service and found it useful especially when she did not have time to find the nearest car park pay machine and she commented:

... I've used is when I have been in a hurry for a train and I've parked my car at Cardiff central and I telephoned a number to pay for my parking when I was on the train. So I parked my car, ran for the train, got on the train to London and called a number to say this is my car, it's in Cardiff car park and I've paid for my parking with a Debit card it's automated ...

(U1)

While U2 argued that the parking service was slow and inefficient for her because she had to follow lots of instructions to use the service and commented:

... I have done that, yeah, at Cardiff station. I found it quite long and drawn out – It wasn't quick. But maybe that's just because of the level of information they needed from me, so I found it a little bit frustrating. Because I kept on following the instructions they were giving me, and it still didn't work, so it might be me, I don't know ...

(U2)

Interestingly, one of the users (U7) mentioned that in his country (Oman) he used mobile phone applications to book an appointment with the doctor and bank, and received a SMS that confirmed the booking or received an SMS from his bank which informed him about his current balance. This finding is supported by the following quote:

... I use it, but I didn't use it for tourism things, I use it for something else, like banking. I use the mobile application even in the health field in my country, because before we go to visit a
doctor or something we search and we make the appointment using our mobiles …

(U7)

Briefly, it can be concluded from the above findings that Eight users (U1, U2, U3, U6, U7, U11, U13 and U15) used mobile phone applications for different purposes, such as finding a location or to make a payment for parking their car.

7.3 Process of Use

7.3.1 Physical Actions

After asking users about their experience when using mobile applications, they were asked to undertake specific tasks by using the TMICS paper prototype. The main aim of these tasks was to provide users with a realistic task that reflected the process for TMICS in the actual environment.

7.3.1.1 Users’ interaction with TMICS paper prototype

Before using the TMICS paper prototype it was essential to give users an introduction about the aim of this prototype test in order to enable them to feel more comfortable during the actual test. The next step of the process was to provide users with a blank paper mobile phone as well as a poster, to complete the task, and to identify the interaction of the user with the system. Table 7.2 illustrates a general step that a TMICS process user needs to follow in order to use TMICS.
Table 7.2: The general steps of TMICS process

<table>
<thead>
<tr>
<th>Steps</th>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1     | Users’ actions | 1-select a suitable four-star hotel and location codes from the poster.  
2-Type the selected code in the supplied mobile phone picture and text to 42682 |
| 2     | System response | Send a message that contains information about the user’s enquiry |
| 3     | Users’ action | 1-open the received message.  
2-send another message if more information is needed |
| 4     | System response | Send a message that contains further information regarding a specific service (e.g. hotel and restaurant) |
| 5     | Users’ action | Open the received message |

Based on the interviews and previous table it was found that the majority of users (86.7%, N=15) were able to work their way through the process. For example, Scenario One, U13 supports this finding and states:

… Ok, so I can see here first I have to send this number, then I should type AD and I should type A. New message, yes. OK, so now I guess I just have to choose one of these at random, so I dial 42682 and I put in Marriott sounds ok, so I put M4. Well I can see where it is, and I can see how to contact them to see if they have space or not, and I can also see how much it is. I guess if I don't like the price I can try another one …

(U13)

Similarly, U1 found it easy to work with TMICS, for example in Scenario Two she commented here interaction with the new system:

… So I think I will go for the Chinese one. So I have to send a message with DA, the service, and for the location, I think the only place I'm interested to visit is the city centre. I have to see what it says. So for the city centre Chinese restaurants, I received 4 different restaurants, so I think I need to go for Noodle House, which sounds interesting for me. I need more details, I think, so I'm going to send another message, as it says here 'For more information regarding any displayed service, re-text 42682 by M plus'. Now I have experience using the system, so I'm going to send the message M4. Good, so the address is there, St David's House, CF10 1ER, good …

(U7)
7.3.1.2 Users’ satisfaction

This part highlights the user’s observations and their satisfaction after conducting the usability test. The majority of users (93.3%, N=15) mentioned that they were satisfied with using the new system and indicated that it was very simple and uncomplicated. This finding was supported by U12 who stated that the new system did not require a highly-qualified person to use the mobile applications, any person able to use the mobile phone could easily use the new mobile information coding system and commented:

... It's very simple, very easy. I think nobody can have an excuse not to use it. Even non-technical people they can easily find it and use it. It doesn't need anyone who is quite specific in IT to use it. It's very very simple ...

(U12)

Moreover, U2 mentioned that this service would be ideal for elderly people because it is very simple and not complicated in comparison with the Internet and she states that:

... older women might not find anything complicated, as me as a middle aged woman, if it was too complicated I wouldn't use it, but this is so simple that it just gives brief information back which is better than being bombarded with irrelevant information like you can sometimes be if you use the Internet, so that seems good ...

(U2)

In addition, U5 highlighted the simplicity in using TMICS and its accessibility especially if there was no Internet connection. This finding is supported by the following quote:

... I think it's a very good idea. I think it's quite easy to use, and if I was new to Cardiff, and not having access to my laptop or computer, it would probably be a good way to find information ...

(U5)
Conversely, U7 argued that this system would be easier to use if users were familiar with using mobile applications. He commented that:

... Actually, it would be easy to use. It's easy to use, it's not difficult, and this is number one. Especially for the people who daily use the text messages, so it's very easy to use, but again it would be very easy to use for the people who are using the mobile applications and it will be more and more easier if I'm going to use it more than once ...

(U7)

U1 claimed that she preferred to use SMS to obtain the required information rather than talking to a person and commented:

... Yeah I think it’s going to be quite beneficial, obviously for example it's going to be good to have a text service rather than talking to someone for example if my understanding of written English is better then perhaps I am able to talk about, I may feel more confident using a text-based system than I would having to phone someone up. So I think the idea of using an anonymous text-based service its probably quite appealing ...

(U1)

7.3.2 Poster Issues

The poster is considered an important part of the proposed system because it represents the first stage of a user’s interaction with the new service. The poster works as a visual guide that supports users with instructions about how to use a system in addition to providing a direction map for localising the service. This section explores the users’ impression of the poster and identifies any visual barriers that might affect the users’ interaction with the application.

7.3.2.1 Users’ impression of the poster

The users were asked about their first impression of the poster and if they
understood the instructions that the poster provided. The majority of users (80%, N=15) indicated that the poster was clear, attractive and easy to understand. This finding is supported by U5 who mentioned that the poster was quite attractive and the amount of information was not excessive:

... It's very eye-catching. That's the first thing. It's incredibly eye-catching and it's very well laid out. It gives you the information you need to know without overloading you. The rest of it is very easy to read, and it's very easy to understand …

(U5)

Additionally, three users (U9, U10 and U11) supported this point of view and they identified the main characteristics for the poster, such as, ease of understanding and clarity. For example, U10 stated “I think the poster is generally well laid out and easy to understand. There's a clear list of things here. The city is divided up into zones” while U9 commented:

... It's clear, it's easy to use I think. Obviously I didn't very much on the map, because I know Cardiff quite well, but the map is obviously clear as well. No, it was easy to use, it was in good categories simple to use …

(U9)

It can be noted from previous findings that the poster outline is well designed and easy to understand. In order to achieve a comprehensive assessment of the interface, further investigation was needed to explore each individual part of the poster.

7.3.2.2 Heading

The heading consists of three elements: the text number, the service title and the logo. Users identified visual barriers that prevented them fully understanding
the heading of the poster.

**Service title**

Six of the fifteen users (U3, U7, U10, U11, U12 and U14) mentioned that the title was clear and they were familiar with the words used. This finding is supported by U12 who stated that:

> ... It's very clear, I'm not an English speaker, and I find it easy to use and easy to understand, there's no problem with the language at all. They are familiar to me, and I think it's familiar to anyone, because it's the normal word that anybody in the streets uses, so I think it's familiar to me and to anyone else ...

(U12)

Alternatively, four users (U1, U4, U6 and U15) argued that the title was not clear and there was no relationship between the codes and the information which was obtained via the mobile phone. This confused the users and when they read the heading they thought that they had to text the number (42682) to get the required information. This finding was supported by U15 who commented:

> ... I don't know. Obviously you've got all the codes, because that's really handy. Immediately, the first thing I saw was that 'text 42682 for the information'. But other people might just text that, and then what happens? It's not immediately obvious that you have to use these codes ...

(U15)

In addition, three users (U6, U9 and U13) suggested modifying the title to reflect the purpose of the service, which was to use SMS via the mobile phone to find tourist information:

> ... I don't know really. If I saw that I'd be like 'oh? What?' like it was tourism information moving. You might want to say something like 'Tourism information to your mobile' or something like that
might be a little bit clearer …

(U9)

… The only thing I was thinking about is, you've got for mobile tourist information, which is correct, I understand that. But perhaps tourist information via mobiles. But it is clear …

(U13)

**Text number**

The majority of the users (93.3%, N=15) mentioned that the text number (42682) was easy to use during sending the SMS and was easy to remember. This finding is supported by U15 who claimed that “42682? Yes, any 5 digit number is fine. It’s nicer to have easy to remember numbers, but that’s not hard to remember”. However, three users (U4, U7 and U9) suggested developing this number to make the process easier, for example U7 suggested to change the last digit (2) to be (4) because this will represent a full circle shape on the user’s mobile keypad:

… 42682. It looks like there is a square or something, like a circle. You start with 4 then 2 and then 6 and then 8. But remember, it’s not a full circle because you start with 2, going to 4, you’re going to 2, then 6 then 8 then 6, and then you’re going to 2 back again. If you want it to be a full circle, you have to end it with 4, going back again. I think people cannot recognise this from the first or the second time. I used the system for 5 or 4 different services, and I didn’t catch this until after you told me about it …

(U7)

On the other hand, U8 was interested in the logo and mentioned that the logo was acceptable for using the “i” symbol which is presented as delivering information through a mobile phone. However, as the new system only covers the local area (the City of Cardiff) it is not acceptable to use the world map:
… I can see that the concept is there, but it's losing a little bit for me because you've got the world there, and although that makes sense, it also doesn't, because I want it localised. It's like, this main concept of the phone with the information, yes, that makes perfect sense to me. But it's when you add the world in, I'd almost want it country by country. If this system was in Egypt, then I'd want an outline of Egypt. If it was in the UK, then an outline of the whole UK, if it's only Wales, I'd just want the Welsh logo …

(U8)

For the service title Six users (U3, U7, U10, U12 and U14) stated that the title is clear, however, five users were confused as the title did not reflect the supported system. With regards to the text number, most users mentioned that the number was easy to use; conversely three users suggested modifying the number to be even easier to use.

The map

For the service map six users of fifteen (U1, U4, U5, U9, U10 and U11) mentioned that the map was very useful and particularly helpful, it is the integration the services location and directions. This finding is supported by U11 who commented:

… I think the poster if very good. I think the fact that you used the Cardiff Bus map is very good thing, because you're not only telling me the map of Cardiff, but you're also telling me how to go there, which is very good …

(U11)

Alternatively, five users (U6, U7, U10, U12 and U13) addressed a visual barrier on the map, such as zones, colour and bus service routes. This finding is supported by U12 and U13 who argued there is a similarity in the colour of the zones that could cause a problem for visually-impaired people and suggested
changing the colour of the zones and stated:

… I think the colour is quite similar, so if you could change the colours a little bit, different colours would be better? So if you could make this zone for example with green colour, and this one with a different colour, and maybe this one with another colour. I’m colour blind, so maybe I can’t see the colours, but if you could make it with completely different colours, it would be easier for the customer to understand …

(U12)

… Change the colours perhaps. If you can keep the colours without losing the information underneath. Just make it different. Because you've got blue here, and blue here, and green there, so they need to stand out a little bit more. So I would use green and blue perhaps. Keep the green there. You need to emphasise the areas a little bit more …

(U13)

Poster example

Most of users argued that they found the poster example was not clear and identified a few visual barriers, such as position and words. This finding is supported by U3 who mentioned that there are no instructions on how to use the system and added that it was not clear how users could write the code into the message do they insert (+) or space between code parts:

… If you can change the samples here to make it more clear to the user and if you can give instructions on how to use the coding system, then it would be simple and better way of making people understand. While writing the code, do I have to write it like AG+D, AG D or AGD …

(U3)

Moreover, two users (U8 and U9) mentioned that the example was not clear as the telephone number was not included; in addition U8 argued that if the system will accept or ignore the case of letters (capital or small) and he stated:

… The example isn't, to me, because the telephone number's not there as part of the example. I think your codes there, doing it by
letters is fine, particularly when you're texting because the letters come up before the numbers, so I think you're quite fine on that. You might need to do something about do you have to do them in upper-case? Will it accept it as lower-case as well? …because I'm likely to only put it as lower-case Well, the first letter will be capital, and the rest lower-case, and what I want to know is it's going to work, because I've done my JP... now if you send it back to me, saying it should be capital J and capital P, I won't be happy …

(U8)

Additionally, six users (U2, U3, U7, U8, U12 and U13) argued that the position of the example was not in the right place on the poster and they could not see it. For example U12 suggested moving the example to the top of the poster to be more visible and commented:

... I couldn't see it to be honest. But this is quite good. If you move this one here, or here, something here will be better I think...If the example moves to the front, because for anyone to use it, they will look at the example at the beginning and then have to use this system. And finally, he or she will look at how to send this text message. The other thing, if you could put something, for example here as well, in this corner, showing the mobile or SMS in this corner. You can benefit from this square as well by moving this here and this here, and you can expand this map here ...

(U12)

U13 supported changing the example, however addressed that the colours used for the codes in the given example is not equivalent to the colours of the same service and location in the tables:

... The only thing I thought about there is, on this example, what you could do is have that colour there should be the same as the colour there. Yes, in the zones. I think at the very least you need a blue. If you're going to have D blue, then you need a blue there. Yes, exactly, make that a matching colour ...

Briefly, for the map, the users mentioned that it was very useful and helpful however, some users stated a number of visual barriers such as the zone colour. For the poster example eight users (U1, U2, U3, U7, U8, U9, U12 and
U13) found the example unclear, in addition to some visual barriers such as position and description.

**Poster Table**

U13 commented that the heading of the services table was not clear and confusing for the end-user and stated that:

... *What if you put 'text'? Type? Yes, it is slightly confusing. Codes could be more confusing for the average user, perhaps. You could put 'text code', I suppose. Like that there. Text... first of all, that. They need to be the same, whatever they are, that and that. So either that needs to be text, or that needs to be type. It's inconsistent, I think. You could say 'type' could be 5 star 4 star 3 star 2 star 1 star. It could be a category as opposed to an option. I wouldn't write type. I would probably write 'text'. If you're going to put 'text' there in the example, then you definitely need 'text' there ...

In addition, two users (U9 and U12) highlighted visual barriers in the table colour and mentioned that it was too dark, particularly in the hotel and restaurant categories and suggested modifying the colours. For example, U9 stated “They're fine. But they're not that obvious in the corner there, so it might be better if they were a bit more obvious, really. Like if they were a lighter colour”. While U12 commented:

... *These tables? The colours in the tables as well, if you could make them slightly. They're quite dark, so if you could make it slightly lighter, it will be better, I think. This one is quite good, because you can see the letters easily ...

(U12)

7.3.3 Codes Issues

This part discussed the users’ point view regarding the TMICS codes which were presented in the poster in order to achieve an appropriate coding system.
Users were asked if the codes were easy to use. Eleven users (U2, U3, U4, U5, U6, U7, U9, U11, U12, U14 and U15) found the code easy to use and liked the idea of using a single key press, making the code easy to use and reducing mistakes. This finding is supported by user seven who stated:

... I think it's very easy. The other thing that will make it more easy, if we take an example of the four star hotels, it's AD, so if you see the mobile, it's the first, you have to press number 2 only once, and you have to press number 3 only once, which is very easy. I don't need to press the button more than once to get the code ...

However, some of the users (e.g. U6, U8, U13 and U10) found it hard to memorise the code as it does not represent the first part of the service’s word. This finding is supported by U8 who highlighted:

... The codes this part is fine. They don't seem to have any pattern to them. It's not intuitive. But I'd put in something like SH for shopping, MU for museum ...

U10 suggested to modify the codes to be make them more logical such as using (H) instead of Hotels and (5) for five stars, and he explained:

... I think the codes might be easier to use if they were a little more logical, in the sense that you could put H for a hotel, H5 for a 5 star hotel, H4 for a 4 star hotel, that would be easier to remember and easier to use than AD or whatever. For restaurant you could put RB for British and RI for Italian, and then M for museum. So I think the codes could be a little more memorable ...

On the other hand, U1 supported another idea of using the first letter of the code to be constant for each group of service (e.g. for accommodation the first letter of the code is (A), for Restaurant is (D) and she commented:

... I like them, the only thing I would say is, I'm not fussed on the fact that the letters change within groups, so for example in information we get J, J, J, J, J which is great but in some categories like things to do, the first letters change, and it might be
better if accommodation was all A, restaurants were all E or D, things to do were all G, nightlife and clubs could perhaps be all B or something like that so that the first letter in the 2 letter code is the same within each category, so there is some consistency and would probably help the user remember the codes better, it would just make it a little more fluent so that when they saw a code I would go that's for accommodation because it begins with an A …

Another issue was raised according to combining letters and numbers together on the code and the interviewees had different points of view. Some of them (U10, U12, U15 and U13) liked the idea of using numbers with letters in the code. This finding is supported by U13 who suggest replacing the location letter with a number

… I think these are ok. It would be nice to have different numbers there to show the location. I know you've got two digits, but you can have... it's just a thought. Something to indicate the difference between the location and the service. Yes, that would be it. You wouldn't want to use two letters, so it would be 1 2 3 4 5, or whatever it is. But again, I emphasise that once I'm used to this system, it's perfect. It's just a question of that first time …

(U13)

U12 supported this and commented:

… I think the good thing is, if you can do this one as letters, and this one as numbers, it would be good, but I think you have to keep one as letters and one as numbers, or you keep it as it is here, all letters. You can do the location here as 1 2 3 4 and 5, because there are five locations, but I think this is easy if you keep it as letters here …

(U12)

However, three users (U7, U8 and U14) did not like to use numbers in the code and thought it would be too complicated if they used numbers as well. This finding is supported by U14 who said “I would keep it as letters, I think because you're going to be dealing with lots of phone numbers anyway. It's just very
straightforward the way it is”. Two users (U9 and U15) argued that it is difficult to use the codes without the poster and they commented that:

… But that means that you need to remember those codes and you need to have them in front of you when you request that information as the whole idea of the mobile service would be that you have the mobile with you, the number stored in your contacts, and you would just request, ‘shopping centre Cardiff Bay’. But if you want to do it this way, then you have the mobile with you, but you need the codes! It’s not mobile any more, unless you have it in front of you on the bus stop …

(U9)

… I suppose the major strength is that you’ve got all the major, the key areas that people will want. You’ve got accommodation, places to eat, things to do, and how they are distributed geographically. I suppose the only weakness is the fact that people need some sort of reminder of the codes to use the system, whereas, as another layer, if I had my mobile phone, if I knew all the codes then it would probably be quite quick, but if I don’t know the codes, if I have to look at something else, then it’s probably quicker just to Google ‘restaurant’ or ‘four star hotel Cardiff’ …

(U15)

7.4 Content and Classification of Information

7.4.1 Content Issues

This section identifies the strengths and weaknesses of the TMICS content. As mentioned earlier, the information provided was based on the official guide from the Cardiff tourist information centre. There were a number of issues raised during the test. These issues these are discussed below.

7.4.1.1 The effectiveness of information

This section is intended to identify the effectiveness of the information provided. During the usability test, participants received a number of SMS templates that
contained the required information. After completing the proposed tasks users were asked if the supplied information was of good quality or helpful. Some users (e.g. U4, U7, and U9) mentioned that the information they received was quite useful and helpful however they noted that it had a few limitations e.g. contact details and price range. This finding is supported by two users who stated that despite the restriction in length of the SMS, there was a possibility to add more information in the second message, for example the opening times for museums and price range for each hotel:

... I think it's useful, it will be more helpful with a little more information. I think the main thing is that the information coming back is limited, so maybe it would be helpful to have more information. I know these are SMS messages, so you can't put a lot of information, but it could, for example, show you the price range for each hotel, or the time when the museum is open. I little bit of extra information on what is already there ...

(U10)

... Most of the replies are quite efficient and helpful. The only issue is, as I said, that I need more information about the facilities provided by these services, either hotels or restaurants or museums or bars and information about for example travel agencies or museums. So if you could provide more details like the services and facilities they provide, this would be better, I think ...

(U12)

In contrast, U15 suggested that if there were any contact details available, such as, a phone numbers for service providers, this could enhance the information and enable users to contact the service providers directly:

... I suppose for example for the hotel you're asking for a specific class of hotel, so you obviously want to know the price, and then the contact details, and then you'd contact them for further information ...

(U15)
Moreover, U4 suggests adding the e-mail address or a link for the service provider website “It is very helpful apart from the information is not enough to enquire. For example the email address or the site information would be very helpful”. U7 highlighted the benefit of the website, users could have a virtual tour to see hotel rooms and he commented:

... Yes, it's useful and it's helpful, but the only thing is for the hotels I need the websites of the hotels. Sometimes, you know I need to have a view of the hotel, they will have a view of the rooms on the website. The second thing is for the restaurants there are not any phone numbers, there are not any websites, so I think we need more information, we need more details in these messages ...

(U7)

U13 supported this and claimed that the website was a useful tool to find more information any time at any place, particularly as there is a large number of mobile phones which have the functionality to enable users to do this.

... The only other thing I thought about in the information that you give. When you give the address, perhaps you could give a website. Well, sometimes these places have their own website, and some phones are enabled for that, so it's just an option you could add... perhaps they want to find out more about it rather than just the address, without going there, so the website might give more information, or the tourist information site ...

(U13)

In addition, U8 claimed that it was beneficial to use the content of TMICS as a marketing or promotional tool to include different types of accommodation organizations, such as SMEs, and not focus on a particular type of accommodation. Also, he suggested improving the information provided by identifying the users' location which could be added to the basic information:

... Why would I go to this hotel over that hotel? What are you telling me? That they're all four-star hotels, ok, I know that means I
know what the facilities are, but now I need to know if one hotel is an art nouveau hotel, is it a very simplistic hotel, is it a very modern hotel? You get it, I need something to sell it to me. I sold it to myself, because I said 'oh, I'll take the Metropol' because I went for the chain. That's fine, but in many towns you're going to get many small hotels where it's not part of a chain … (U8)

... I think basic information, that's fine, but as I said, you're not selling me those places to go to. I need more information about why I would want to go to those hotels, what differentiates them and then I felt I needed more idea of how far away it was from where I am. That would be some of the basic information I would expect to have there … (U8)

Conversely, user ten argued that the comprehensive information for each hotel will affect the length of SMS and cause a problem for the end-user. He suggested having comparisons between the services providers.

... So if I have to ask it to send the information for each hotel in turn that will be quite a long, slow interchange, so in some sense maybe some basic comparisons or some extra information would be useful … (U10)

Briefly, it can be noted that the amount of information received via TMICS was limited, the lack of information can affect a user’s decision to choose a particular service. To solve this problem a number of issues have been raised. For example, it would be beneficial to add to the e-mail address, service provider website and identify the users’ location which enables users to obtain the necessary information.

7.4.1.2 Information clarity

This section discusses the clarity of the information provided in order to improve
the content of TMICS. The interviewees were asked if they found unnecessary or irrelevant information. Nine users out of fifteen (U3, U4, U7, U8, U9, U10, U12, U14 and U15) mentioned that the information they obtained via SMS templates was necessary and appropriate. This finding is supported by U14 who mentioned that “I think the information is very good” as well as user four supports this and states that “I think the information was exact and perfect”.

However, user five argued that unnecessary information was found in the reply SMS (see Picture Four in Page 202) particularly the note at the end of the message that informed end-users if more information was needed that they needed to re-text (M) followed by the contact number 42682. He described this part as repetitive and caused an increase in the length of the SMS which impacted on the time spent to send a reply message; as a result he suggested modifying this note and excluding this number from the message:

... If you want more information, send this back to this same number again. What comes up as the reply part, when the text comes, if I went just to reply to it, wouldn't that come up with the 42682 anyway? So could you reduce it, and not have all the detail of the number, and just say 'reply to this text with M plus the number that you wanted to type’ or ‘for more information regarding any of these displayed services reply to text with M plus the service number listed above’. You don’t need the 426 because it would be more time consuming ...

(U5)

While, U13 claimed that there was a visual obstacle related to this note, he thought it was separate from the service provider information and suggested differentiating it from other information by changing the font:

... I understand why you put ‘any displayed service’. What you
could do, perhaps, is put that in a different font. Put that in italics. Because at the moment you look at it, and it's a lot of information. I'm just thinking visually, to make that slightly different to that. You could try it and see how it looks in italics. If it doesn't look any good, then you could try that in bold. I don't know you need to look and see how it looks …

(U13)

Furthermore, U10 highlighted the importance of updating the information provided and argued it would save users’ time:

… I think the information needs to be up to date. So if I ask about the museum, maybe the museum is closed on Mondays, what is should say is not only here is museum, here’s the address, here’s the phone number, it costs this much to go in and it’s closed today’. So if you say it’s closed today’ that saves somebody making the trip to the museum and then finding that it’s closed. Or it should say the opening hours from 10 o’clock to 5 o’clock or something. So it should give you the information for the day that you are making the inquiry …

(U10)

7.4.2 Classification Issues

This section highlights classification issues in terms of the clarity of classification, and strengths and weaknesses of the classification of the services.

7.4.2.1 Clarity of classification

This section focuses on the clarity of the service classification from users’ perspective and address any confusion between the service categories. Thirteen users out of fifteen (e.g. U2, U4, U6 and U8) mentioned that the classification of the services was clear and understandable. This finding is supported by U15 who highlight that the service were categorised well and he commented:
... I think that's a fair grouping, you've got accommodation, things to do, you've got sights to see, that's not bad at all, and then general information. It's a good grouping. Quite a lot of content as well ...

(U15)

In addition, two users (U9 and U14) found that the system was easy to use. For example, U9 stated that “I found that easy. When you told me to do a certain task it was quick to find with no problem”.

On the other hand, a number classifications crossed over in terms service classifications. This finding is supported by user (U10) who claims that the concerts could be categorised as night-life and he commented:

... Concerts might go under night-life, but it may not be worth having a separate section for night-life, it could be under things to do. But I think that's a very minor point, generally it seems to be very clear ...

(U10)

In addition, user nine thought the cinema and theatre might be better placed in both ‘things to do’ and ‘night-life’ categories but he argued that the current classification would be suitable for all users:

... I suppose there’s a crossover between things to do and night-life, possible if you looking for theatre and the cinema, but it's simple, really. You only have to read the two boxes. It's not too complicated. Could you not put cinema and theatre in both, so if somebody was looking there they’d find them there and if they looked there they find them there. I think it's good to keep them separate, because night-life is quite specific, isn't. People go out for night-life. Different generation and all that. So no, I don’t think there’s a problem ...

(U9)

U7 commented that he preferred going to the cinema at night, as a result he
suggested adding the cinema to night-life and he stated:

... I prefer to go to the cinema at night, and I don't like to go to pubs and clubs and bars and all of these things at night. So I think that there are a lot of activities that have to be added to the night-life ...

(U7)

However, U3 suggested moving pubs and nightclubs to things to do and commented:

... Categories are perfectly divided. Maybe you can add pubs and nightclubs to this list. It can be added to things to do along with museum, parks, shopping, cinemas etc ...

(U3)

U8 disagreed with this and stated that the classification of services was well designed and suitable for all types of users, such as families and single people, as he explained:

... I think you've got it right where you've separated them off. I can see this is me and my kids, family almost. This is me, night-life, single person maybe, going out to meet other people ...

(U8)

U5 identified a crossover in classification between the travel agency and the tour guide and he claimed that there was a difference between the two:

... The only thing I didn't like was the travel agency referring to tour guides. Tour guides and travel agents are completely separate things to me, and maybe that's a personal thing, but I do think that most people wouldn't think of a tour guide being a travel agency ...

(U5)

7.4.2.2 Classification strengths and weaknesses

Users were asked to highlight the strengths and weaknesses of the service
categories. Four users (U7, U9, U12 and U13) mentioned that the classification of the services covered the majority of users’ needs. This finding was supported by U9 who stated that the classifications also included the basic categories of service and argued that if any additional types of restaurant were added it would affect the length of the list:

... Well, the strengths, I think you've picked the main things that people would want from a city, and as I say, well obviously the hotels are quite straightforward. And the restaurants, you've got all the major types. Well not all of them, I suppose if I was looking for Thai food I wouldn't find it there but then your list could be very long if you add every type of food ...  

(U9)

Four of the fifteen users (U1, U4, U10 and U11) identified that the classification of services was quick to access and would be compatible with any phone:

... If I've got a sophisticated phone, I'm probably going to want to go to a web page. I can go to the hotel's web page and look at the hotel, or I can go to Cardiff Castle web page to look at the castle. So I think if I've got a smart phone I could just use the Internet to check all this stuff. But I think this service could be useful for people who've got a simple phone. I think basically it looks ok and I think it certainly could be useful to start off with, but, for example, if I want to book a hotel, I guess it might be easier to find a hotel with this than trying to phone the tourist agency, and ask them about hotels and having a long conversation with them. So I think it's got an advantage that you probably don't need long discussions with someone to get the information, you get it quite quickly and automatically ...

(U10)

There were a number of additional suggested services, for example, two users (U5 and U12) suggested the addition of Bed and Breakfasts to the hotel main categories. U12 addressed the importance of adding this category as a subcategory under (not classified hotels list), because it usually attracts a large number of people (particular young people). In addition he argued that it is
cheaper than classified hotels:

… If you keep it not classified, if you would like you can add B&B, because the majority of people who travel now, especially young people or teenagers, they can’t spend a lot of money in the classified hotels, so they will normally go for the bed and breakfasts. The majority of bed and breakfasts are not classified, the good ones are two stars. You can keep it as it is, but when you show the message, you say this is bed and breakfasts average price, for example, 25 pounds, or 20 pounds …

(U12)

U5 supported this and mentioned that this type of hotel was operated and managed by families. Furthermore, U5 suggested replacing this sub-category with a “not classified” sub-category in the hotel main list.

… But that’s not classified a hotel, we’re talking about B&Bs. B&Bs tend to be more family oriented and family run, and a lot of people like B&Bs rather than hotels. I would prefer to have a B&B classification rather than not classified. B&Bs are classified, they do have the crown and diamond system so they are classified. These are hotels, and you could have the classification B&B as well ...

(U5)

Four users suggested adding more restaurants to the restaurants classification. For example, U7 preferred to add sub-category for the vegetarian restaurants “if it is possible, to mention that the vegetarian restaurants, if you can keep one eye out for the vegetarian restaurants and this is possible on the database”.

While U8 suggested the addition of the Japanese restaurant as a sub-category of the main restaurants and said “Other cuisine. I want Japanese, because I like sushi, and I know we’ve got two or three sushi bars”. However, U12 suggested modifying the restaurants classification based on the service type, for example, casual dining or fast food and commented:
… There's one point here regarding the restaurants classification. It's good if you can classify the restaurants as you have here, according to the cuisine, according to the kitchen types, British, Italian, Chinese, Mexican, Indian, but the other thing is that you can divide it according to the level of service or the service type. If it is casual dining, fine dining or a fast food operation or family restaurant. Most people who live in Cardiff will go with their families or friends, I think, so if you can provide something here ...

(U12)

Interestingly, U12 preferred to add family restaurants as a sub-category to the current restaurants classifications because it provides special facilities for children and explained:

… Family it will include all the restaurants that provide facilities and services and menus or food and drinks for families, like, for example, in some restaurants, they provide high-chairs and children's menus, and they have an area for kids. So if you can provide family restaurants here in this category, you will get more people interested in this one ...

(12)

U5 suggested splitting the night-life sub-categories to create more specific sub-categories for example, he preferred to divide pubs and nightclubs according to age or gender and he commented that:

… You're splitting down the restaurants. You've got all the different types of restaurant, but once you keep going down and down, you go into things to do with night-life, every one of these could be split down into different categories. Pubs and nightclubs, is it a 20-30 year old nightclub, or is it a 30-50 year old nightclub where people go who are very much older. Is it a gay bar, is it a straight bar, is it busy at the weekend and quiet during the week? ...

(U5)

… Maybe there could be a third text. The first text could say 'type of bar you're looking for, is it straight or gay, quiet or busy, young or mixed crowd'. From my point of view, if I came to the city and I was 62 years of age, and I wanted to go have a nice pint in a city centre bar and you sent me a text message saying go to Flares on
Mary Street. I walk down St Mary's street, I walk into Flares, and suddenly I'm surrounded by a bunch of 20 to probably 28 year olds who are absolutely drunk out of their brains, I don't think I would be very impressed. I would need to know that the bar you're sending me to is suitable for me, not suitable for someone else...

(U5)

U15 suggested it was beneficial to have specific categories because it produced a long list for the services classification on the displayed poster.

... I think you have to be careful of trying to be too specific, because otherwise, you don't want to have a list of a hundred options, because it's too much. It was on a sheet, on a poster on the wall, if there are a hundred options, it's too much...

(U15)

Cardiff is considered one of the major cities in the UK that has previously hosted national and international rugby matches. Two users (U10 and U11) highlighted that it is very important to have sport and outdoor activities in the services classification and they commented:

... Under things to do, too, you need another category. I don't know, maybe ten pin bowling, or go carting. Activities. That's another thing. There's two sorts of thing. Where is the rugby ground to go and watch the rugby, and where is the place where you can go and do the sport yourself, so where are the swimming pools. Activity centres where you can go and participate, and then sports centres where you can go and watch. If people are here, they're going to want to go to the activities. You've already shown the buses, but maybe you could have a list of taxi companies or a number for the taxis...

(U10)

... Sorry, where are the parks? There's nothing about outdoor things...Because there are many outdoor places in Cardiff, in the city. Lakes, parks that is very nice. I would rather see something that tells about parks...

(U11)
Chapter Seven: TMICS Usability Test Issues

U1 suggested dividing the shopping category to be more specific, e.g. clothes shopping and food shopping and stated:

... I thought maybe shopping could be further broken down, into sort of clothes shopping, food shopping, electronics or something like that, because I imagine if I text D, P, A for shopping in Cardiff city centre, I could get a list that’s 2000 items long ...

(U1)

U9 disagreed and claimed that it was not helpful for tourists to split the shopping option because they usually look for large shopping centres nearby:

... I think that the problem with shopping is that it's enormous isn't it. How would you provide all that information? I also think that for shopping for tourists it's quite unusual for them to get to the smaller little area, and most of the shops are in the city centre and shopping is quite easy for tourists because the shops are just there, in your face. I think the main shopping centres. I think tourists aren't looking for a specific type of shop, they just want to look at the shops that are available. Otherwise it gets quite complicated, so I think it's ok ...

(U9)

Furthermore, U13 claimed that if there was any possibility to find a specific hotel or restaurant by name:

... What I’d want is mostly a hotel, the restaurant and information. That would be my main things, if I were in an area ... Because this could be useful not just for tourism, but for business people as well. If I just want a hotel, and I want to find a place. Is there anything else you could add another thing on where you could actually find someone. Would that be a possibility? A specific place, I mean. By name or something. Would that be possible? ...

(U13)

There was information available for the emergency on the poster, however U7 highlighted that emergency information should be presented it was suggested that hospital numbers should be added to the service list. He stated:
… If you keep in the information, hospitals, it would be good. I'm a person who comes to visit Cardiff, and you don't know what will happen to me. Maybe I need a doctor, or something. So if it's there in the information it would be helpful. I know you give me some important numbers, but I'd then like to know what important numbers I will get. Is it emergency, is it the ambulance, the fire, doctors? I don't know. So I think if you keep in information some hospital numbers, it would be much better …

(U7)

7.5 Other Issues

This section identifies a number of issues that were raised during the usability test. It starts with the service cost. Most of users would like to know how much the new service will cost them. The second issue was advertising, a number of users suggested different ideas to promote the new service, and this linked to the third issue that aimed to identify who will be the potential user. The last issue addressed any similar services that may have the same features in order to improve TMICS.

7.5.1 Service Cost

The majority of users (73%, N=15) highlighted the importance of the cost of the new service in order to attract a large number of users. For example, three users (U7, U2 and U11) claimed that if this service was free or cheap they would use it, otherwise they would intend to use the Internet as an alternative method to find the required information. This finding is supported by U11 who suggested that the cost of TMICS should be free of charge and commented:

… To be honest, this is a very major issue, because if it’s not free, I will not use it, because I have Internet in mobile and I can get all the information I need through other ways, say through a web browser …

(U11)
U10 argued that the cost issue would not be a problem for a number of users who have free text bundles on their mobile phone contracts, and suggested that they would benefit from these free texts. In addition, U10 mentioned an important issue which is the clarity of the service cost on the poster. He claimed if there are any charges applied for using TMICS it would be beneficial for users to know in advance how much it would cost and how many SMSs they would need to send to obtain the correct information:

... I know a lot of people will have some kind of contract for their phone, and they'll have a lot of free text messages as part of that contract, and they're not going to worry about sending text messages. So I think it's probably fine for most people. Because I pay 10p for every message, I'm probably not going to be so keen to use it. I think another piece of information that is missing, is how many messages you will need to send to get the information. Because already you say 'send this first' then you choose one and send another message to say which one you choose, so with some of these things you need 3 or 4 messages to get the information. So you probably need something that says 'most queries will require no more than 5 messages' or something, just so that people know how much. What they're letting themselves in for ...

(U10)

Two users supported this and mentioned that the cost of the service had to be clearly displayed on the poster. As a result, this will restrict the number of messages that users have to send according to their budget:

... actually, I would want to know how much it cost, because I think that it needs to be clear how much it is. Like some thing you expect in your mind you know how much you are willing to pay for information. So if this was a pound maybe I'd use it, but if it was less, I would use it more ...

(U2)

... It's got to be clear how much each text costs and it's got to be clear that more than one text is necessary to get the full information...if it charged me just 15 pence or 20 pence, then yes.
But that would have to be made very clear on the literature as on this poster, so before I even sent you the first text I would know how much it's charging. And it would also need to tell me that each text will require you to send and receive more than one text. So it's not just going to charge me 20p, is it. So if I need more information it's going to charge me another 20p. Each text I send is 20p or 15p …

(U5)

However, U15 suggested reducing the cost problem by applying subscription fees that could be taken from the stakeholders who advertise on the new service and he commented “well exactly, you can get a sort of sponsored listing as well. If they bought a paid listing then they could come higher in the results”.

7.5.2 Advertising

Advertising for the new service was raised as an issue during the usability test. The majority of users mentioned that it could be useful to display the poster in different areas, such as bus stops, railway stations, restaurants and hotels. This finding is supported by U7 who said “if it's all over everywhere, it would be helpful to me. If it's in the hotels, if it's in the buses, in the taxis, railway stations, I think yes, it's helpful”. Further, U5 suggested distributing the poster as a brochure in hotel rooms.

Moreover, seven users out of fifteen (U1, U3, U5, U7, U9, U11 and U13) suggested distributing the poster as a leaflet or brochure to keep the codes with them everywhere, such as hotel rooms and restaurants, in addition it could be sold in bookshops or tourist information centres. This finding is supported by U5 who commented:

… It doesn't have to be a poster, does it. It could be a brochure. You could have a brochure in a hotel room. Why can't you have a
brochure in hotel rooms with all this, in a normal brochure style that people can take out with them, they can actually carry it around with them, so that when they’re out and about in Cardiff, they’ve picked it up in the hotel, and they can think ‘right, well I want to do something now, I’ll send a text message’. So you could split it down, keep it as the poster as well, it’s very eye-catching with the poster, but it could be brought down to a brochure style so that people could actually carry it around with them …

(U5)

Also, U15 suggested transferring the poster to a Web search for ease of use and he commented:

… Why would you use this over a straight web search. I think compared to modern smart phones, where you have to make sure that for Internet you have quite a bit of signal. You need 3G, pretty much. Whereas this would work with just a standard network signal, because it’s a text message …

(U15)

7.5.3 Prospective User

The majority of users (86.7%, N=15) agreed that this system would be very useful for tourists but maybe it would not be so useful for local residents. This finding is supported by U5 and U9 who commented:

… I think for people already in Cardiff there would be very little take up on the service, because they already have access to the internet and brochures and things that they get through their doors and things like that. Most people, if they want a take-away, go into their local area and they already know what's in their local area. Most people who go to a pub, who already live in Cardiff, will go to a pub that they know and like and already know. So for people already in Cardiff itself, I don't think there'll be much take up, but for people from outside Cardiff, I think it will be a very good service …

(U5)

… I don’t think they’d use it as much as tourists, because they’ve got access probably to the Internet at home, to the phone directory, but then when you’re out and about, if you suddenly want to book a restaurant it would be very useful, because you haven’t got access to the internet if you’re just in town shopping,
so I think they would use it, but perhaps not as much as tourists …

(U9)

7.5.4 Similar Services

None of the interviewees used, or were aware of a mobile tourism information system similar to the proposed system. For example, U4 mentioned that in his home country (Oman) there is a service for sending a welcome message to mobile phone users as they enter the country which contains the local emergency number and the local tourist information centre contact details and commented:

… I have seen this in UAE and in my country Oman. When you are at the border of the country and entering Oman, you get a message welcoming you to Oman and giving you directions to the nearest tourist information centre. Then you can call if you would like to. I have seen this but never tried it …

(U4)

While user three highlighted that the water and electricity providers used SMS for contacting customers, e.g. using SMS to inform their customers about the next bill and he stated:

… In my country, the water and electricity company follows this service. If you send the meter number to a special number, they will text you back how much amount you have to pay. Even for the banks if you send them a message, they will send you back information regarding your account balance etc …

(U3)

7.6 Summary

It can be seen from the previous findings that most users obtained the required information on Cardiff from friends. However, the Internet is considered a vital method to get the information for others. The majority of users were familiar with
using mobile applications and many of them highlighted how they benefited from their use. Conversely, users found difficulties in using a mobile phone to find the required information despite having Internet facilities on their mobile phones. Some of them recognised that it is uncomfortable to use the Internet via a mobile phone and said that it was a complicated process.

The interactions of the majority (86.7%, N=15) of the interviewees with the TMICS paper prototype were positive and this leads users to easily complete the required tasks. Also, the majority of users (93.3%, N=15) found the system very simple to use and uncomplicated. In addition, two users mentioned that the system will be ideal for elderly people as it is very simple to use and that there was no need for an Internet connection.

The cost issue is an important issue that encourage users to use the new service. For example if the proposed service was free of charge or was offered at low cost it would be highly acceptable also, the interviewees highlighted the clarity of the cost which should be obvious to the users before using the service. It was suggested that cost should be made clear in the poster and SMS.
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8.1 Introduction

This chapter provides an integrated explanation about the revised model and the TMICS in order to discuss the findings which are revealed in this research. The chapter discusses issues related to the usability testing of TMICS. It starts by providing an overview of the revised model for mobile information for tourism destinations. The chapter then focuses on consumers’ perception of the integration of mobile applications in tourism. The practical experience of TMICS and overcoming the challenges with regard to TMICS and the revised model are also discussed in this chapter.

8.2 Overview of the Revised Model for Mobile Information for Tourism Destinations

Chapter Four presented the revised model for the mobile information for tourism destinations. The development for this model was divided into three stages (see Figure 8.1). Each stage is discussed in detail below:

Stage 1: The first stage was an analysis of the literature and is presented in Chapter Two. The chapter concludes with the conceptual model for mobile information provision for tourism destinations which was presented in Section 2.5. This stage was considered the basis of the actual model.
Stage 2: The second stage of the development involved editing feedback received from the audience at the IBIMA which highlighted cost as the main issue that should be considered when providing the mobile service to the potential users. To do this, the audience recommended reducing the mobile technology stakeholder’s involvement on the conceptual model to be in the basic level that enables a tourism destination to deliver the required information.

Stage 3: The third stage concerned the implementation of mobile information applications (e.g. management or technical aspects) for tourism destinations that implemented mobile technology to enhance its marketing efforts. This stage combined two case studies that highlighted a number of issues. It was beneficial to consider these issues when developing the revised model. The
case of Cardiff Bus/Traveline presented a coherent example for the mobile technology platform. The issues that emerged from this helped to understand the process flow of information between stakeholders who participated in the platform, as well as identifying the role of each of the entities. Also, the cross-case analysis pointed out issues that could be barriers and drivers in order to improve the mobile destination platform performance. The cross-case analysis led to the development of a model for mobile information for tourism destinations (see Figure 4.10).

8.2.1 Testing the Validity of the Mobile Information Revised Model

To increase the validity of the revised model it is important to identify if this model would be applicable to destination stakeholders, particularly the end-users (tourists). Based on the literature and the case study outcomes it has been noted that a SMS application with a coding system would be an appropriate means to enhance tourism destination marketing and assist SMEs to overcome the barriers that face them in order to adopt the new technology activities, such as e-commerce and m-commerce activities. One of the reasons behind choosing the SMS application and coding system was that it would be cost effective and easy to use (see Section 4.5.2).

After investigating the coding systems used in different areas (e.g. airport codes – bus stop codes) and the classification of tourism services based on implementation reviewed in the document analysis, a study for a number of online tourism booking companies was investigated. In addition to ensure these
classifications met the purpose of this research an analysis of mobile tourism guides was undertaken in order to highlight a classification of tourism services that could be utilised in the proposed coding system. Based on this exploration a specific coding system was developed (see Chapter Five).

The aim of developing TMICS was to create an easy-to-use SMS-based information service and to cover a large volume of tourism information, such as hotels and restaurants. In order to achieve a suitable mobile tourism information coding system that would assist in the success of the mobile tourism platform, it was essential to examine the usability of the initial TMICS. Therefore, a modified paper prototype method was used to test this coding system. Snyder (2001) and Houde and Hill (2010) mentioned that the paper prototype technique considered a powerful instrument to develop products and services, particularly in the early stages to meet users’ needs. In this research the usability process started with designing and creating the proposed paper prototype then implementing the TMICS paper prototype, involving the end-users with realistic tasks that enabled them to interact with the new coding mobile information coding system (see Chapter Six). Following the usability test, a series of semi-structured interviews were conducted with users (n=15) to identify any further essential modifications that might have been needed to improve TMICS.
8.3 Consumers’ Perceptions of the Integration of Mobile Applications in Tourism

This section explores participants’ awareness regarding the use of mobile applications for tourism purposes. It first identifies users’ preferences for different types of tourism service that they may like to utilise during their visit to a tourist destination or in their everyday life. Secondly, it identifies the distribution channel that was used to obtain the relevant information. It was apparent that mobile phones were used for different purposes to find information or make a query about certain services such as bills, or confirm an appointment. There was no significant evidence available in this study to measure the frequency of mobile phone user’ interaction with mobile applications to find tourism information. However, this does not prevent the interviewees from being able to use the potential tourism mobile information applications.

8.3.1 Identification of Users Preferences Regarding Tourism Services

Preferences amongst users were varied, they preferred to visit historical and recreational places as well as shopping centres. However, the majority of users (93.3%, N=15) classified restaurants as one of the main places that came in their top priorities. For example, one of the interviewees (U10) mentioned “Right, so I usually go to pubs, clubs and restaurants”. This agreed with the investigation which was undertaken and discussed in Chapter Five. This highlighted food and beverage services as one of the main tourist places of
interest to visit. Interestingly, none of the interviewees referred to the accommodation facilities such as hotels, which may be due to the fact that the participants live in Cardiff, so they do not need to be look at these facilities.

8.3.2 The Collection of Relevant Information through Various Distribution Channels

In terms of collecting information, it was found that ten users (U3, U4, U6, U7, U9, U10, U11, U12, U14 and U15) depended on traditional sources to collect relevant information, such as word of mouth. In addition, the findings identified that electronic distribution channels (e.g. local authority websites) were the main source of information as well as the traditional one. As one of interviewees (U3) commented:

   … I found the information through the Internet, through tourist websites giving you all the attraction sites here in the UK and some of it though my friends …

This finding supported Bouras et al., (2009) and Schwartz et al., (2009) who indicated that the Internet has become a household device and its uses are becoming increasingly extensive, especially after the recent development of broadband services, which has facilitated easy and low-cost access to the Internet.
8.3.3 Users’ Pre-existing Knowledge of Using Mobile Tourism Applications

The findings revealed that eight users (U1, U2, U3, U6, U7, U11, U13 and U15) are aware of using different types of mobile application through their mobile phones for different purposes, such as weather forecasting and to find addresses by using GPS. As one of the interviews (U11) said “I use the weather service very frequently on my mobile device”. Also, the findings highlighted that SMS was one of the mobile applications that is widely accepted by users and they utilised it for many aspects e.g. balance enquiry or confirming an appointment. This result was supported by Bodic (2003) who identified that the usage of SMS increased and more applications based on SMS were being developed, such as consumer applications (e.g. person-to-person messaging, information services) and operator applications.

On the other hand, Rasinger et al. (2007) mentioned that there has been a huge development occurring in mobile technologies, particularly in tourism mobile information applications. However, there is no significant evidence found in this research for using specific mobile applications to obtain tourism information, such as tourist attractions. The interviewees identified a number of barriers that prevented them for using mobile applications in an appropriate manner. They were limited in using mobile phones functionality only for calling or texting. As one of interviewees commented:

... I’m familiar using a mobile phone, when I generally use mobiles it’s just for calling or texting. I use a business smart phone and a Blackberry, so I get my emails and my calendars, but those are the only functions I tend to use. I don’t do much surfing on the
internet using my mobile, occasionally I’m stuck I would, But that’s it ...

(U1)

In practice, some users (e.g. U4 and U5) argued they were familiar with different mobile applications but were restricted when using the Internet, such as comfort when reading the small screen and Internet browsing was a complicated process that required a high level of technical skill. Additionally, two users (U10 and U12) preferred to plan their journeys via the Internet from a PC at home instead of using the mobile. As one user said:

... Well I have a mobile phone, but I don’t have a smart phone, I only have a dumb phone, so if I want to access information I will probably look on the web at home the previous evening and make a plan rather than trying to do something as I’m going out ...

(U10)

Interestingly, the findings highlighted that some users (e.g. U1) preferred using SMS, they preferred not to talk through mobile phones to access the required information. As one of the interviewees commented:

... Yeah I think it’s going to be quite beneficial, obviously for example it’s going to be good to have a text service rather than talking to someone for example if my understanding of written English is better then perhaps I am able to talk about, I may feel more confident using a text-based system than I would having to phone someone up. So I think the idea of using an anonymous text-based service its probably quite appealing ...

(U1)
8.4 Practical Experience of TMICS

Faulkner (2000) identified that creating a scenario was a good method for gathering information on how users would use a system to deal with their task. This research identified the user’s interactions during the TMICS usability test to find if it was effective and if it led to the required tasks being carried out appropriately. In addition, it was noted that there were no problems that prevented the end-users from completing the process in order to achieve these tasks, this helped in enhancing users’ knowledge about what are the features and functions offered by the proposed system. The best explanation of user-satisfaction can be found in the following quote:

... So I think I will go for the Chinese one. So I have to send a message with DA, the service, and for the location, I think the only place I'm interested to visit is the city centre. I have to see what it says. So for the city centre Chinese restaurants, I received 4 different restaurants, so I think I need to go for Noodle House, which sounds interesting for me. I need more details, I think, so I'm going to send another message, as it says here 'For more information regarding any displayed service, re-text 42682 by M plus'. Now I have experience using the system, so I'm going to send the message M4. Good, so the address is there, St David's House, CF10 1ER, good ...

(U7)

Practically, after conducting the usability test, the majority of users (93.3%, N=15) mentioned that they were fully satisfied and indicated a number of advantages for TMICS. For example, the system was very simple with no need for technical skill. As one of the interviewees stated:

... It's very simple, very easy. I think nobody can have an excuse not to use it. Even non-technical people they can easily find it and use it. It doesn't need anyone who is quite specific in IT to use it. It's very simple ...

(U12)
Additionally, based on the simplicity of TMICS and ease-of-use, this system will be suitable for elderly people compared to other electronic and mobile applications such as car park SMS services or Google maps as one of the interviewees commented:

... older women might not find anything complicated, as me as a middle-aged woman, if it was too complicated I wouldn't use it, but this is so simple that it just gives brief information back which is better than being bombarded with irrelevant information like you can sometimes be if you use the Internet, so that seems good ...

(U2)

Users can access TMICS at any time and anywhere, without the need for constant Internet connection. This result agreed with the literature that highlighted ubiquity and addressability as key characteristics for mobile commerce. One user argued that this system could be useful for people who have previous experience in using different types of mobile application as he said:

... Actually, it would be easy to use. It's easy to use, it's not difficult, and this is number one. Especially for the people who daily use the text messages, so it's very easy to use, but again it would be very easy to use for the people who are using the mobile applications and it will be more and more easier if I'm going to use it more than once ...

(U7)

8.4.1 Assessing the Usefulness of TMICS Content

The content of the TMICS database was an important element in the proposed system because it affects the end users' decision to select services that meet their needs. Wang et al. (2010) referred to the importance of information in tourism mobile services because the nature of tourism is different from tangible
products—therefore tourists continually search for information to support their decisions. The findings of this study highlighted that TMICS database provided participants with useful and helpful information that partly met their needs. However, it had a few limitations, such as price range and contact details for service providers. This study developed the TMICS database according to information that was available on the official tourist guide from Cardiff Tourist Information Centre. The problem was that this guide did not always contain enough relevant information (see Picture Six in Section 6.3.4.1).

Nevertheless, participants came up with some promising suggestions that could enhance the database of TMICS and provide end-users with better quality information. For example, they recommended adding opening times for museums and the price-range for each hotel. As one of the interviews stated:

... I think it's useful, it will be more helpful with a little more information. I think the main thing is that the information coming back is limited, so maybe it would be helpful to have more information. I know these are SMS messages, so you can't put a lot of information, but it could, for example, show you the price range for each hotel, or the time when the museum is open. A little bit of extra information on what is already there ...

(U10)

On the other hand, if more details were added to the reply message it might affect the quantity of SMS required and the information would be sent in two or three SMS and may cause confusion for the end-user. One of the interviewees (U15) suggested that to overcome this problem, contact detail could be added for the service providers, such as the phone number, and this would enable the users to obtain further information. In addition, the findings pointed out the
advantage of providing a link to the service providers e-mail address or website with their contact details in the replied message. This is useful particularly as there is an increasing number of mobile phones which have the functionality to enable the user to browse the Internet. As one of the interviewees commented:

... Yes, it's useful and it's helpful, but the only thing is for the hotels I need the websites of the hotels. Sometimes, you know I need to have a view of the hotels, they will have a view of the rooms on the website. The second thing is for the restaurants there are not any phone numbers, there are not any websites, so I think we need more information, we need more details in these messages ...

(U7)

Moreover, the findings identified that the content of TMICS could be extended and used as a successful tool to promote different types of accommodation, such as SMEs which represent a large number of tourism destination stakeholders. This result supports Jones and Haven-Tang (2005) who mentioned that tourism destinations contain a hierarchy of entities and SMEs are one of the most important entities in this hierarchy. In addition, it would be beneficial to enhance the information provided regarding SMEs by identifying users’ location. As one of the interviewees said:

... I think basic information, that's fine, but as I said, you're not selling me those places to go to. I need more information about why I would want to go to those hotels, what differentiates them and then I felt I needed more idea of how far away it was from where I am. That would be some of the base information I would expect to have there ...

(U8)

8.4.1.1 Clarity and updating information

The findings highlighted that the information provided to the participants via the TMICS paper prototypes was necessary. However, they identified a number of
ideas that could improve the content of the reply SMS. Firstly, modifying the note at the end of the message by excluding information that would be repeated and affect the time spent on sending a reply message. In addition, one of the users recommended to differentiate this note from other reply SMSs by changing the font, so it would reduce potential confusion.

This study supported Gupta (2006) arguing that updating information may be the most critical factor that influenced the end-users’ decision to complete their booking via electronic channels, such as DMSs. The findings of this study highlighted this issue and recognised that updating information was one of the main factors that would enhance the relation between the proposed system and the end-users though providing them with accurate information.

### 8.4.2 The Visual Clarity of the Poster Elements

As has been discussed in Chapter Six the poster was an essential part of the TMICS paper prototype. It was used as a guide to inform end-users how they should interact with the new system. The results showed that the majority of users (80%, N=15) indicated that the poster was clear and understandable. In addition, the poster outline was considered well designed and attractive. However, in order to provide an appropriate appearance, the findings suggested a few modifications that needed to be undertaken in each part that forms the poster. This research took the users’ feedback into consideration and modified the TMICS paper prototypes after undertaking the usability test (see Figure 8.2).
1. Poster heading

There were a number of visual barriers that prevented participants from fully understanding the heading of the poster (see Figure 6.3). Theses visual barriers included.

**Service title**

According to the results, some of the participants were familiar with the words in the title however others were confused. They thought that the five digit SMS number was in fact a code which might be contained within the content of an SMS message. To improve the title, users recommended modifying the title to
reflect the purpose of the new system, for example, “tourism information to your mobile”.

**Text number and logo**

The findings highlighted that the text number (26842) was easy to use during the sending of SMS templates. As one of the interviewees said “*any 5 digit number is fine. It's nicer to have easier to remember numbers, but that's not hard to remember*”. In addition, three users (U4, U7 and U9) to modify this number by changing the first digit (4) to be (2) to represent a circle position in users’ mobile phone keypad where this recommendation agreed with the format of Traveline SMS service number (see Section 4.4.3.1).

For the logo heading, users were interested in using ‘I’ to reflect that the system was delivering local information via the mobile phone, nevertheless it is not convenient to use the world map because the system serves the local area [city of Cardiff]. This leads to change the world map to a symbol that represents this local area.

**2. Poster map**

The findings identified the map as one of the most important parts of the poster, because it was useful to inform users with the directions of services location. Although the participants found the map very useful, the similarity of zones’ colours caused a visual barrier. To overcome this problem they suggested
choosing different colours to represent each zone without affecting the clarity of the map.

3. Poster example

The result identified that the poster example was not clear because of the following reasons: missing instructions on how to use the service, the position of the example is not at the correct eye-level to be noticed, missing telephone number in the displayed example and the fact that the system is not case sensitive (i.e. users can enter the code in capital or lower case letters). In addition the colour code is not matched with the colour of the same service in the displayed tables. The participants argued that the example should be moved to the top of the poster to be more visible.

4. Poster Table

In the table heading, the word ‘Type’ was confusing to the users so it was suggested to use the word ‘text’ instead of ‘type’ so they understand the SMS needed to be ‘sent’. Further the service colours were too dark that caused a visual barrier to users and they recommended using lighter colours instead. Otherwise the tables were satisfactory to the users and understandable and they agreed with using icons that match each service. This result supported the research in Section 6.3.5 for selecting universal recognisable icons to reflect the meaning of each service (see Section 6.3.5).
8.4.3 Classification of the Services

The majority of users (86.7%, N=15) noted that the classification of the services was clear, understandable and easy to use. This result supported the structure of the Initial tourism mobile service which has been discussed in Chapter Five (see Section 5.6.1).

Most of the users argued that the classification of services was direct and covered the users’ needs, but the restaurants category needed more additional types of sub-category, such as family restaurants. This result is supported by Sobaih et al. (2008a) who classified family restaurants as one of main type of restaurants.

It was suggested by U5 to add bed and breakfast operators to the hotel main category as it would be more attractive to a large number of people, particularly young people. One of the interviewees (U12) argued that this type of accommodation was suitable for the majority of people because it is cheaper than the classified hotels. A few users suggested splitting night-life into more sub-categories (i.e. divide pubs and night clubs according to age). On the other hand, one of the users (U15) argued that being more specific will produce a longer list of services which will be harder to display on the poster.

As mentioned in Chapter Four, Cardiff was popular in hosting the Rugby World Cup. There are many sports and outdoor activities and facilities available in Cardiff. For this reason ‘sport and outdoor activities’ was added to the things-to-
do category. Although one user (U1) suggested to split the shopping list to different shopping types such as food shopping and clothes shopping, another participant (U9) disagreed with this point of view and argued that it would be difficult to split shopping into different types, as the main shopping centre includes everything tourists would expected in one place.

8.4.4 Appropriate Coding

The findings highlighted that most of the participants found the coding system easy to use and understandable and they were comfortable with the idea of using a single key press to avoid any mistakes and save users’ time. This result supported the principles that were considered during the design of TMICS codes which was discussed in Section 5.5.2. However, some users found that the coding system was hard to memorise as it did not represent the initial letter of the services title, e.g. (H) for hotel. This suggestion disagreed with the study of IATA codes which identified limitations in creating a code using initial letters of a word. In the case of IATA codes, some airports start with the same initial letters and this proved to be a limitation of this coding system (Ross, 2010).

Conversely, a few users suggested combining letters and numbers together in the code format, however some others disagreed with this suggestion as the code would be too complicated. It may beneficial to use the first letter of the code to be consistent for each group service. As one the interviewees stated:

… I like them, the only thing I would say is, I’m not fussed on the fact that the letters change within groups, so for example in information we get J, J, J, J, J which is great but in some categories like things to do, the first letters change, and it might be
better if accommodation was all A, restaurants were all E or D, things to do were all G, nightlife and clubs could perhaps be all B or something like that so that the first letter in the 2 letter code is the same within each category, so there is some consistency and would probably help the user remember the codes better, it would just make it a little more fluent so that when they saw a code I would go that’s for accommodation because it begins with an A …

(U1)

8.4.5 Issues Affecting the Development of TMICS

The cost of the service

Rasinger et al. (2007) identified cost and interface as the main barriers for the acceptance for mobile information services. The research described in this thesis supported this and highlighted that the majority (73%, N=15) of users addressed the cost of the service as an important factor that would affect on the number of users. Some users (e.g. U2 and U7) said they would utilise this new system if it was free of charge or cheaper than other mobile applications, otherwise they would use alternative information sources. The SMS service for Traveline was funded by the Welsh Assembly Government and in the same way, TMICS or any other potential mobile service could attempt to gain similar funding.

As a result, it is vital to inform users in advance [via the poster] how much they have to pay to use TMICS and how many SMSs they will have to send in order to obtain the required information. One of the participants (U15) suggested solving the cost problem by applying subscription fees from destination stakeholders who advertise services on the new system.
Displaying TMICS in public

The findings pointed out the importance of promoting the new system in different places, such as bus stops, railway stations, restaurants and hotels, because it includes a large volume of information about different services. As a result, this was different from the promotion of the Cardiff Bus electronic and mobile services which focused on displaying information at its bus stops (see Chapter Four).

One of the limitations raised during the usability test was that users cannot use the system without the poster. Some users provided interesting recommendations to overcome this problem by distributing the poster as a leaflet or brochure.

None of the participants were aware of, or had accessed, any similar mobile tourism information systems before. Although one of the users referred to an existing system involving a service sending a welcome message on arrival in a country containing the emergency number and direction to the nearest tourist information centre.

8.5 TMICS and the Revised Model

This section focuses on the challenges of designing a TMICS and how the model was revised to its current design. After reflecting the outcomes of the usability test of TMICS the revised model became a practical model that would enable tourism destinations to enhance their marketing efforts. Figure 8.3
Chapters Eight: TMICS SMS Practical Platform

presents the steps that form the TMICS SMS platform. The usability test of TMICS as a revised model identified two key areas that needed attention. Namely the cost of implementation as well as technical and managerial barriers.

Figure 8.3: Overview of designing the TMICS SMS practical platform

8.5.1 Cost Issue

As stated in the literature, the cost of using mobile information applications was high, particularly when this application is connected to the Internet, e.g. WAP mobile applications. Also, the findings obtained from the two case studies and

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TMICS usability test supported this and identified cost as one of the major obstacles that affect developing mobile information applications for destination stakeholders. As a result, many tourist destination stakeholders were aware of developing further mobile applications and if that happened the cost of this service was a major concern (see Section 4.5.3.1.3).

The revised model, integrated with the new coding system components, provided potential solutions to resolve the cost issue that would be beneficial for tourism destination stakeholders in order to develop more mobile applications. These solutions are summarised below.

**Public funding**

Government funding would reduce the cost of prospective mobile information applications and the literature and Traveline case study support this. This result was supported by Rastrollo and Alarcon (2000) who pointed out that tourism destinations could not take full advantage of ICT without the financial support of the public sector in order to create e-commerce and develop greater capabilities.

**Stakeholder’s subscription fees**

As stated earlier, tourism destinations comprise a large volume of stakeholders particularly, SMEs, who are the majority of stakeholders. If reasonable subscription fees were applied for advertising on the new system, it would cover the service cost (see Section 8.4.6).
**SMS M-technology platform and operational cost**

A mobile technology platform based on a SMS platform would reduce the operational costs for the new service. In addition, the findings identified that the cost of using and operating SMS was lower than any other mobile applications, such as WAP mobile applications (see Section 4.5.2.2). Due to the simplicity of the design of TMICS there are no further manufacturing costs incurred by the phone companies as TMICS works on all current phones that have SMS functionality.

**8.5.2 Technical and Design Issues**

A range of barriers have been mentioned by participants regarding the development of electronic or mobile information services that were investigated in the two case studies. For example, a search option and the accuracy of entering data was one limitation that prevented users obtaining the required information, especially for tourists who were not familiar with bus service numbers or city names in Wales (see Section 4.4.2.1). This research overcame these problems by providing codes to use instead of using city names. In addition, the classification of services was clear and that enabled ease-of-use of the service.

Moreover, the findings identified limitations for implementing the Traveline SMS service, such as, the users have to be physically standing at the bus stop itself to know the bus stop code. The implementation of TMICS provides a significant solution for this issue by transferring and minimising the poster guide of TMICS
to be a leaflet or brochure format which enabled end-users to keep the key codes anytime, and anywhere. In addition, the information provided by the Traveline mobile application was limited and covered bus stops, however the information provided by the proposed system covered a wide range of services and covered the majority of end-users needs.

Regarding the screen size, there was an ongoing debate between experts in terms of screen size being of sufficient size to use for mobile applications, particularly WAP applications. Often SMS is limited due to screen size and information should be compact enough to send in one easy SMS. However, the researcher believes that this problem is temporary and will be solved in time via the continuing developments in mobile technology. Technically, the TMICS provides end-users with a selection of basic information that balances users' needs and the screen size. Additionally, some mobile manufacturing companies optimise the mobile screen size to provide users with more information specifically when they use WAP mobile applications.

This study identified several limitations for the WAP mobile applications, such as using postcodes as a search option to assist in finding the bus stop, as the postcode for some areas can be extremely large especially in rural areas. Also, due to the incompatibility of mobile devices with GPS functionality it is difficult to identify the users' location. The TMICS poster provides participants with a map for the city of Cardiff to guide them to find services even if their mobile phones do not have GPS functionality.
8.5.2.1 Database issue

The investigation involved in the Traveline case study highlighted some issues about developing its database.

**Central database**

Traveline found restrictions in developing its database or adding more information for its current database, this was due to a multi-database system for each region. Also the lack of coordination between Traveline and local authorities was one of main restrictions that prevented the company developing its database to include future mobile applications (see Section 4.5.31.1). Conversely, the SMS platform in this research resolves this problem by centralising its database which includes comprehensive information of tourism destination key stakeholders who participate in this service. This finding was supported by Gupta (2006) who mentioned that the centralising of the database for the VisitWales website was one of the factors that helped in providing information for the whole of Wales.

**Database updates**

The usability test of TMICS identified updating the database as one of the criteria that has to be implemented. There was ongoing debate about updating information, for example the study of VisitWales identified that the system failed in updating stakeholder’s information despite the system allowing the SMEs to update their information instantly without any restriction. The TMICS usability test recommended adding more contact details to the information provided such
as, e-mail address or website for the service providers. The end-users will benefit from this addition by obtaining accurate and direct information. Also, end-users could utilise the service provider’s website to undertake a virtual tour via their mobile phones (see Section 7.3).

**Database content**

The findings identified that the level of usage of mobile information applications increased, particularly in the trip phase and depended on the amount of the information provided to the end users. The usability test confirmed this and as a result many users asked for more details. As mentioned the content of TMICS was based on the Cardiff tourist official guide which was a limitation. However, the classification of the services in TMICS was one of the factors that enhanced the end-users’ experience and met most of their expectations (see Section 8.8.4).

**8.5.3 Managerial Issues**

**8.5.3.1 Leadership level**

As stated in the literature and Chapter Four, the implementation of electronic and mobile applications in tourism destination would not be successful without leadership that is accountable for developing these applications. However, the main issue that emerged from Chapter Four was the planning management in the leadership level because there were two main reasons affecting the planning policy of the leadership level, which were to do with the cost and large number of stakeholders, particularly SMEs. As a result, the leadership level
alienated into regional leadership level to meet participants’ needs (see Section 4.5.3.1.2).

In essence, SMEs represent the majority of tourism destination stakeholders that can help the destination organisations in their marketing strategies, especially with the growth in ICT applications. Destination Management Organisations (DMOs) were unsuccessful in achieving their leadership aim in adopting new technology in partnership with SMEs. This research supported Moustafa et al. (2009) who suggested that DMOs could provide a successful leadership through the development of a destination-level technology platform. However, there were three challenges that faced the platform.

**Destination-level leadership**

The revised model integrated with TMICS highlights that the mobile leadership may work for one destination and may not work for another. Therefore it is more strategic for these destinations to focus on building their mobile technology leadership at a regional or national level by understanding other entities’ needs, particularly SMEs to strengthen their relationships with the end users. To do this, this research identified the possibility of significant expansion and improvements. As SMEs and DMOs join their knowledge and experiences with various lessons they learn from mobile applications in other sectors and industries to expand and exploit the potential of mobile technology. The revised model and TMICS was a clear example of this, which provided a practical or
workable SMS mobile information model based on lessons that were driven from other sectors.

**SME participation**

Another key issue for SME participation is that the destination mobile technology platform will provide the ability to design smarter mobile information applications with adaptable content and functionality dependent on combining the strategies of the DMOs and SME. For example, small hotels, e.g. Bed and Breakfasts, were classified with other hotels under the same classification umbrella.

In addition, TMICS classifications enable SMEs to make co-branding with a company that could potentially be non-travel partner e.g. shopping centres or sports organisations. This may help SMEs to improve their market and collect database information from customers of those co-branded partners in terms of database and sharing that information across the m-technology platform members.

**Third-party technology solutions**

The investigation of Traveline mobile partnership and platform identified the importance of the network providers to use them as transaction channels to receive and deliver the required information to their potential users whatever mobile applications were used, e.g. SMS or WAP mobile applications. Also, the simplicity of TMICS proved tourism destinations could benefit from other
industries to design and modify a number of mobile applications without using a third-party technology solutions, using them only with complex technical issues. As a result, the m-technology platform in the revised model and after TMICS implementation focused on utilising mobile network providers such as Vodafone and Orange to support the information transaction process from and to the end-users. This may have an effect on the cost of the service and overcoming the planning management obstacles.

8.6 Summary

Based on the literature the findings of this research related to the revised model as well as the modified TMICS and the research outcomes were combined and linked to provide a valuable practical model. This would enable tourism destinations to enhance their marketing efforts. Issues, such as cost of implementation and technical and management barriers were highlighted. In addition, the chapter presented stages of developing the revised model and the purpose of testing the validity of this model. Also, it provided the customers’ perception and their opinions with regards to usability of the TMICS paper prototype as practical experience.
Chapter Nine
Conclusions
### Chapter Nine: Conclusions

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Chapter Nine: Conclusions

9.1 Introduction

This chapter concludes this study on evaluating the potential of mobile technology in tourism destination marketing. It begins by reviewing the research objectives and provides an overview of major findings (Section 9.2). The significant contributions of the study in relation to theory, practice and methodology are outlined in Section 9.3. The chapter then goes on to highlight the limitations of the study (Section 9.4) and identifies opportunities for further research (Section 9.5). The chapter concludes with Section 9.6 which describes the researcher’s final thoughts and reflections on the research process.

9.2 Review of Objectives and Major Findings

9.2.1 Objective One

Undertake a critical review of relevant literature on m-commerce and the potential problems relating to m-technology exploitation in tourism destination development and marketing through a consideration of the issues relating to the exploitation of new technologies by small tourism businesses to develop a conceptual model for mobile information provision for the tourism sector.

In Chapter Two, this objective was achieved through a critical review of relevant literature on mobile technology concerning tourism destination marketing. Reviewing the literature has given a better understanding of m-commerce activities with the rapid growth in wireless and mobile communication technologies. It was clear from the literature that ICT has transformed the tourism industry globally. The development of a wide range of new services,
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e.g. Web-based services and GDSs encourage global relations between stakeholders in the tourism industry. As a result, ICT had a major impact on the competitiveness of the tourism industry at organisational and at destination level.

The Internet phenomenon has revolutionised information delivery, particularly for the tourism industry. As a result, many enterprises, particularly the hospitality industry have integrated virtual communities into their online booking system to gain more benefits, such as increased sales, higher advertising and transaction-fee revenue.

However, tourism destinations continue to face a wide range of challenges in the implementation of e-commerce activities and there are many issues that face tourism destination stakeholders where the destination is dominated by SMEs. For example, the lack of infrastructure, service cost, integration and partnership problems. In addition, delivering e-commerce through a fixed-line delivery strategy limits the functionality of the service. Tourism is a fragmented industry and SMEs are notorious for their slow adoption of new technologies-as evidence by their slow uptake of web-technologies and e-commerce.

In order to overcome the implications of slow technology adoption and to ensure destination competitiveness, DMOs have often provided leadership through the development of a destination-level technology platform to facilitate technology exploitation. It was apparent that the implementation of a DMS (e.g. VisitWales)
offers some valuable lessons for the potential development of a destination level m-technology platform which is likely to relate to three key challenges Destination level leadership/coordination; SME participation and third-party technology solutions.

Mobile business activities should see an increase in value due to the development of mobile technologies such as the explosive growth of mobile devices, improved wireless network performance and increased investment for establishing short-range wireless networks. These technological developments enable e-business to expand beyond the limitations of the fixed-line Internet. E-business can improve destination marketing by taking advantage of WiFi services and other mobile applications to the potential customers.

The literature addressed the factors that encourage the use of new wireless access technologies, for example, the start up costs, the licenses, the transfer stations, secure and direct access to the Internet. It also addressed the barriers for mobile networks, for example, high investment cost, operating licenses and complex partnerships. This research clearly showed that public funding was important as m-commerce activities need high investment. The critical review of the issues, concepts and opinions in the literature provided a basis for the development of the research conceptual model on mobile information provision for tourism destinations (see Figure 2.8).
9.2.2 Objective Two

*Develop case studies of m-commerce enabled solutions (e.g. Cardiff Bus, Traveline) to identify key issues relating to m-technology implementation.*

This objective is linked to answering the first research question addressed in this thesis namely: what are the challenges of implementing mobile technology in tourism destinations? (see Section 1.4). To accomplish this objective and answer the aforementioned research questions case studies of mobile technology applications were researched in Cardiff, UK and Innsbruck, Austria. Conceptual model was developed in Chapter Two to analyse the implementation of mobile technologies in tourism destinations with regard to the development of a model for mobile information provision for tourism destinations. A summary of the major findings of this objective are as follows:

- The case studies presented in this chapter highlighted differences in Traveline’s integrated transport information systems and Innsbruck mobile applications. The implementation of Traveline’s electronic and mobile information services faced many technical problems such as the functional limitations of the website and the accuracy of entering data and flexibility of navigation.

- Amongst the most significant technical limitations is accessibility of data. Passengers can only plan their journey on the company website in advance of travelling, however mobile information services can be used before and during journeys.
• In terms of management issues, it was apparent from the Innsbruck case study that the high cost of using WAP applications is considered one of the main barriers to users and DMOs. In addition, issues such as local authorities cooperation and funding of services were barriers in developing Traveline’s electronic and mobile service.

• The research discovered that the Cardiff Bus Company and Traveline was an example of a mobile technical platform which could be used for tourism destination marketing. It could provide tourists with a wide range of information about, for example, restaurants, hotels and tourist attractions via their mobile phones, any time, and in any place. From tourism destinations’ perspective, a benefit is the ability to distribute information effectively.

9.2.3 Objective Three

*Develop a model for mobile information provision for tourism destinations.*

The case of Cardiff Bus and Traveline presents a coherent example for the mobile technology platform. The issues that emerged from this case study helped in the understanding of the process flow of information between stakeholders who participated in the platform, as well as identifying the role of each of the entities. Also, the cross-case analysis identified possible issues, barriers and drivers in order to improve the mobile platform performance. The cross-case analysis has led to the development of a model for mobile information for tourism destinations (see Figure 4.10).
Cross-case analysis facilitated the process of developing a revised model for the provision of mobile tourism destination information. It evaluated and discussed all the steps of the model from the perspective of associated stakeholders, including tourism-destination organisations and mobile technology experts. The developed model builds upon the findings obtained throughout the field work, the conceptual model for mobile information provision for tourism destination (see Figure 2.8). The initial conceptual model was presented at the IBIMA (2009) conference (Moustafa et al., 2009). The audience feedback was concerned with the cost and the debate was about enhancing destination marketing via mobile platform, service cost and final price for end-users. The model was developed based on these issues and the findings obtained from the case studies. There were three classes of entity responsible for handling sending and receiving the information.

**Tourism destination stakeholders**

**SMEs** the model starts with the SMEs’ database. The content of the client database includes a large volume of information about hotels and restaurants. According to the Traveline case study, the process of establishing a central database starts from a number of transport operators. These companies provide Traveline with a wide range of information such as bus timetables, Traveline organised and classified this information and feeds the main database.
DMO the next stage in developing the central database platform was done by a DMO. More information was added, about tourist attractions to the client’s data, which were then classified and organised which in turn feeds the platform data store. Furthermore, DMOs as one of the government organisations play a key role for developing various instruments that influence SMEs’ practices in order to achieve their marketing strategies (Page, 2003).

Destination Mobile Platform the destination mobile technology platform was and still is the main core of the model. It is responsible for managing the data flow between the end-users and the central platform data store. Also, it is responsible for coordination between the key stakeholders who are involved in this model.

The platform’s mobile stakeholders in the revised model are only used as mobile transaction tools to deliver the required information to end-users’ mobile applications. The other two mobile technology stakeholders mentioned in the conceptual model were deleted in the revised model. The reason for this was to enhance the destination mobile platform leadership performance and reduce the operational cost of the platform which affects the final price for the service provided to the end-users. Also, from a technological perspective, it is not necessary to have integration with the mobile phone manufacturers and mobile software application developers, if appropriate and flexible mobile applications are applied and have the capability to work with the basic mobile phones.
The two case studies have informed the above amendments to the model. From investigating the Innsbruck mobile application, it was noted that ECCA was responsible for operating and developing services with no integration with the mobile manufactures or mobile software developers. In addition, the Traveline SMS application was successful in coping with any type of mobile phone despite the identified limitations.

Tourist the last and possibly the most important class of entity in the model was the tourist who receives the required information at the end of an information transaction (see Figure 4.10).

9.2.4 Objective Four

*Develop a destination coding system to underpin m-commerce enabled destination information provision.*

This objective is connected with the second research question addressed in this study namely: What are the potential solutions to improve mobile information applications in tourism-destination marketing? To achieve this objective and answer this research question, a destination mobile information coding system evolved for destination stakeholders (particularly SMEs) to enhance mobile information practices in tourism destination. To develop this coding system a number of stages were undertaken.

Establishing the system

A study of online tourism booking companies was undertaken. The study was informed by the literature review, the investigation of different applications of
coding systems (e.g. IATA airport codes–Cardiff bus stops codes–UK cars number plates) and the classification of tourism services based on implementation reviewed in the document analysis. To ensure that these classifications were fit for the purpose of this research an analysis of mobile tourism guide was investigated in order to highlight a classification of tourism services that could be utilised in the proposed coding system. From this analysis, a specific tourism mobile information coding system (TMICS) was developed.

**Prototyping**

After the design of TMICS it was essential for the current study to test this system. The usability analysis began with the design and implementation of a modified paper-prototyping method that helped assess the usability of the new system from the users’ point of view. A paper prototype was piloted with five users to identify any further essential modifications that might be needed to improve TMICS (for more details about the modified paper prototype method see Chapter Six).

**Usability test and the modified system**

The usability process started with designing and creating the proposed paper prototype then the implementation of the TMICS paper prototype, involving the end-users with realistic tasks that enabled them to interact with the new coding mobile information coding system. Following the usability test a series of semi-structured interviews were conducted with users about accessing a mobile
coding information system that worked with the revised model and SMS-based service. The key issues addressed by users were presented in Chapter Seven and discussed in Chapter Eight.

Both the revised model and the modified TMICS suggested possible solutions for tourism-destination stakeholders (SMEs) which, if adopted, would enhance the mobile-technology practices which in turn would be likely to have a positive impact on tourism-destination marketing. These solutions are summarised below.

**Cost**

One of the major obstacles was the issue of cost, which was discussed in Chapters Four and Eight. The revised model integrated with the new coding system components provided potential solutions to resolve the cost issue. That would be beneficial for tourism destination stakeholders in order to develop more mobile applications. These solutions are summarised below.

**Public funding**

The government funding may reduce the cost of the prospective mobile information applications and the literature and Traveline case study support this. Tourism destinations could not take full advantage of ICT without the financial support of the public sector in order to create e-commerce and develop greater capabilities (Rastrollo and Alarcon, 2000).
Stakeholders’ subscription fees

The majority of stakeholders in tourism destination are SMEs, therefore costs for implementing a system could be spread to keep costs down (see Section 8.4.6).

SMS M-technology platform and operational cost

Due to the simplicity of the design of TMICS there are no further manufacturing costs to the phone companies as TMICS works on all current phones that have SMS availability. In order to send and receive SMS to customers the mobile technology stakeholders would act as a transactional channel and as a result the operational cost will be reduced. In addition, the cost of using and operating SMS was lower than any other mobile applications such as WAP mobile applications (see Section 4.5.2.2).

Technical and design issues

From the two case studies the defined barriers were investigated in terms of data entry and search limitations. This research overcame these problems and provides codes to use instead of using city names and in addition, the classification of services was clear and that enabled users to easily use the service. The implementation of TMICS provides a significant solution to this issue by transferring and minimising the manual guide of the TMICS (poster) in the form of a leaflet or brochure format. In addition, the information provided by Traveline mobile applications was limited and only covered bus stops, however
the information provided by the proposed system covered a wide range of services despite limitations.

Often SMS is limited with the screen size, however, TMICS provides the end users with a selection of basic information that addressed both the users’ needs and screen size. The TMICS poster provides participants with a map for the city of Cardiff to guide them to find services with a given address even if their mobile phones have not the capability of GPS functionality.

Database issue
The investigation of the Traveline case study highlighted some issues about developing their database.

Central database
Traveline’s limitations were associated with the integration of multi-database systems and the coordination problems between them and the local authorities. (see Section 4.5.3.1). The SMS platform in this research resolves this problem by centralising its database which includes comprehensive information of tourism destination key stakeholders who participate in this service.

Database updates
The usability test of TMICS identified updating as one of the criteria that has to be available on the information provided. The TMICS usability test recommended adding more contact details to the information provided such as, e-mail address or website for the service providers. The end-user will benefit
from this addition by obtaining accurate, direct information and undertaking a virtual tour via their mobile phones.

Database content
The findings identified that the level of usage of mobile information applications increased, particularly in the trip phase and this depended on the amount of the information provided to the end-users. As a result many users asked for more details, as mentioned the content of TMICS based on the Cardiff tourist official guide. However, the classification of the services in TMICS was one of the factors that enhanced the end-users experience and met most of their expectations (see Section 8.8.4).

Managerial issues
Leadership
As stated in the literature and Chapter Four, the implementation of electronic and mobile applications in tourism destinations would not be successful without a leadership level that is accountable for developing and operating these applications. However, the main leadership problems emerging from Chapter Four mainly stemmed from two issues. The first issue is cost and the second issue is the large number of stakeholders, particularly SMEs. As a result, the leadership level is devolved to a regional level to meet the needs of the participants (see Section 4.5.3.1.2).

In essence, SMEs represent the majority of tourism-destination stakeholders that can help the destination organisations in their marketing strategies,
especially with the growth in ICT applications. Destination Management Organisations (DMOs) were unsuccessful in achieving their leadership aim in the adoption of new technology in partnership with SMEs. This research supported Moustafa et al. (2009) who suggested that DMOs could provide successful leadership through the development of a destination-level technology platform. However, there were three challenges that faced the platform.

**Destination level leadership/coordination**

The revised model integrated with TMICS highlighted that the mobile leadership may work for one destination and may not work for another. Therefore it is more strategic for these destinations to focus on building their mobile technology leadership into regional or national level by understanding other entities’ needs. Practically SMEs need to strengthen their relationships with the end-users. To do this, this research identified the possibility of significant expansion and improvements as SMEs and DMOs are joining their knowledge and experience with various lessons they have learnt from the mobile applications in other sectors and industries to expand and exploit the potential of mobile technology. The revised model and TMICS was a clear example of this, which provided a practical SMS platform.

**SME participation**

Another key issue for SME participation in the destination mobile technology platform would provide the ability to design smarter mobile information
applications with adoptable content and functionality dependent on the combination of the DMO’s and SME’s strategies. For example, small hotels e.g. Bed and Breakfast were classified with other hotels under the same classification umbrella.

In addition, TMICS classifications enables SME co-branding with a companies that could potentially be a non-travel partner e.g. shopping centres or sport organisations, which may help SMEs to improve their market and to collect database information from customers.

**Third-party technology solutions**

The investigation of the Traveline mobile partnership and the platform identified the importance of the network providers as transaction channels to receive and deliver the required information to their potential users whatever mobile applications were used. Also, the simplicity of TMICS proved tourism destination could benefit from other industries to design and modify mobile applications without using a third party technology solution. Utilising standard mobile phone technology- would only need assistance when developing a more complex implementation. This may have an affect on the cost of the service and overcome the planning management obstacles by keeping down costs and implementing a non-technical system.
9.3 Contributions of the Thesis

This section presents and discusses the contribution that this research has made to theory (knowledge), practice and methodology. The following paragraphs discusses these issues.

9.3.1 Contribution to Theory

This study contributed to an enhanced understanding of mobile technology issues in the tourism industry, specifically in relation to the implementation of mobile information applications in the UK tourism and travel sector. The study has added to the growing mobile technology literature through its review of previous research, generation of new ideas and interpretation of rich data collected from different associated stakeholders, practically tourists in respect of using mobile device to deliver the required information. It also increased the understanding of potential drivers such as growth of mobile devices and wireless development that would support SMEs to participate in implementing mobile-technology applications. Also, the study identified slow technology adoption by SMEs for many reasons e.g. IT skills, however the study presents a solution to overcome this problem by offering a destination-level m-technology platform which related to three key challenges, destination level leadership; SME participation and third-party technology solutions. The study revealed empirical evidence that supports this platform through achieving a practical SMS platform in addition to providing answers for these challenges. The study grounded the theoretical base for the implementation of mobile technology in
tourism destination using a phenomenological approach which would undoubtedly help any researcher who wants to investigate further in this field.

A major contribution of this study to knowledge was made by presenting a conceptual model for mobile information provision in tourism destination (Figure 2.8). The model was developed from a critical review of literature on ICT and with a main focus on mobile technology in the tourism industry. The conceptual model was revised, based upon the key findings from the interviews with experts in the two case studies and a revised model was developed. The revised model identified three main elements instead of four in the original conceptual model excluding mobile technology stakeholders as a major element. This model utilises SMS and WAP-based mobile applications to distribute a wide range of information, however the cost of the service should be taken into account before applying these two applications.

Contributions were made to usability design and implementation through prototyping a possible implementation of the system. Issues were identified with regards to coding, interaction design and the study further contributes to the growing research in the tourism field.

9.3.2 Contribution to Practice

The study contributes significantly to practice by introducing a revised model (see Figure 4.14) and mobile information coding system (see Chapters Five and Eight) for mobile information provision in the UK. The revised model which
aimed to enhance mobile technology practices with tourism destination (particularly SMEs) was developed based up on the key findings from the interviews with technology experts in the two case studies, which aimed to explore the implementation of mobile technology in other areas as well as in tourism destinations. The model is also sustained by the evidence related in the literature. The revised model facilitates the process of understanding and directing the required information via different entities, and the core of this model was the mobile technology platform. The model ought to serve as an effective instrument to assist SMEs in the implementation of mobile technology in order to enhance their marketing efforts.

Another significant contribution to practice was the development of tourism mobile information coding system TMICS. There are benefits that this system introduces: it transfers the revised model to be a practical (SMS model); it facilities understanding of end-users needs regarding mobile information applications. Due to the generic nature of the coding system, it could be applied across many types of platform.

9.3.3 Contribution to Methodology

The chief contribution of this study to methodology is the adapted paper prototype to evaluate the usability of the proposed coding system. In addition, Snyder (2001); Houde and Hill (2010) mentioned that the paper prototype technique is considered to be a powerful instrument to develop products and services particularly in the early stages to meet users’ needs. In relation to
using this technique in this research, the usability process started with designing and creating the proposed paper prototype. This stage aimed to create a tool that could be utilised to present this coding system to the end-user. TMICS was presented as an SMS based service that provides users with a wide range of tourism information. This research designed a comprehensive paper prototype that evaluated the majority of the proposed system aspects. For example the developed database aimed to evaluate the content and information of TMICS and the service guide (poster) was aimed to evaluate the codes, service classification and users’ interaction. The paper prototype of TMICS identified results regarding the users’ perception towards the integration of mobile application in tourism. Additionally, the implementation of a prototype had a fundamental impact in improving the coding system as well providing solutions to overcome the challenges that were faced in the implementation of the revised model.

9.4 Limitations of the Research

The first and most obvious limitation of this research is that due to temporal constraints (the research has already taken four years and has challenged the timescales allowed by the sponsors of the research), the revised model integrated with the mobile information coding system (workable SMS model) was not trialed with SMEs to check their ability to apply the SMS model and enhance their mobile marketing performance. Limited access to technology and software development was one of the limitations in this study. In
addition the limitation of access to comprehensive database that includes a wide range of information.

9.5 Opportunities for Future Research

This study is quite complex and explored a wide range of issues regarding the potential use of mobile technology not only SMEs but also with other stakeholders, such as public sector (e.g. DMOs), which need more investigation to explore their vision or intention of using mobile applications as a marketing tool. Also, testing the model and the coding system in any other sectors and industry could be useful to improve the coding system.

An initial opportunity for further research would be to trial the SMS model with SMEs in Wales and wider across the UK. Following that the generic nature of the model from the UK context to other contexts, e.g. Egypt, as an established tourism destination. More research is needed on the SMEs’ ability to implement mobile applications and identify the barriers that could prevent them to do this.

9.6 Personal Reflection

I hope that the development of a tourism mobile information model integrated with TMICS and other results of this study would help SMEs and tourism destination stakeholders to enhance their marketing practices. I also hope that this thesis, through its rich data will provide support to those who would like to
conduct further research in relation to mobile information applications in tourism.

The study has greatly contributed to my knowledge and research skills and permitted me to explore issues in a new area that has not received much attention from research. I found the issues regarding this area interesting and challenging, especially those that appeared during the development of the model, the search for the appropriate methodology and the corresponding theoretical research perspectives and techniques. Further to this, I believed that I benefitted by attending conferences and workshops that helped to clarify and discuss ideas. Thus, I believe that I am now able to share this experience and knowledge which I have gained through the development of this study with my colleagues when I return back to my position as a staff member in the Faculty of Tourism and Hotels in El-Minia University in Egypt.


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Kingdom.


Gupta, H. (2006) Is VisitWales A Story of Success or Another Example of the


References


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Appendices
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<th>Appendix One: Sample of Semi-structured Interview Questions</th>
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<td>Appendix Two: TMICS: Questions for the Paper Prototype</td>
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<td>Appendix Three: List of participants in the usability test by Gender and Age</td>
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<td>Appendix Four: TMICS Database</td>
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<td>Appendix Five: Researcher’s Publications</td>
<td>349</td>
</tr>
</tbody>
</table>
Appendix One
Sample of Semi-Structured Interview Questions
Sample of semi-structured interview questions

Q.1: How can the vision for mobile technology enabled destination be turned into reality?

Q.2: what are the key stages, who are the key stakeholders?

Q.3: Destination organizations are also stakeholder?

Q.4: So it will be concentrated on private or public sector?

Q.5: Are there any mobile technology enabled destinations or projects you are aware of which is particularly very good or very bad?

Q.6: What are the challenges (e.g. The financial, technical, knowledge and skills) that may face small business regarding mobile technologies exploitation?

Q.7: What do you think about the knowledge of the consumers’ behaviour does affect things?
Appendix Two

TMICS: Questions for the Paper Prototype
TMICS a paper prototyping questions

The questions are divided into four sections

Section One: Using mobile search information applications
This section aims to explore users’ background (experience) in using mobile search information applications. In addition, identify the barriers in using mobile phone to obtain the required information.

Q.1: Are you interested to visit different places in Cardiff? If yes give me an example.

Q.2: How did you find out about these places?

Q.3: How did you get access to the information on the places you were looking for?

Q.4: Are you familiar with using mobile phone applications to obtain the information you need? For example SMS car park service.

Section Two: TMICS Scenarios
In this section a series of scenarios (tasks) will be given to the interviewee to do. This is to measure the flexibility and efficiency of using the new mobile information service.

Scenario: “You are an international tourist who has arrived in Cardiff for the first time. You have brought with you your mobile handset. Using only your phone and the poster in front of you, try to find information about the following aspects of your stay in the city”.

- A four-star hotel.
- A restaurant for your evening meal (choose your favourite type of food).
- A museum to visit during the day in West Cardiff.
Appendix Two: TMICS: Questions for the Paper Prototype

- A bar to visit at night in North Cardiff.
- A tour guide from travel agency option in Cardiff Bay.

**After finishing these tasks the user will be asked the following questions:**

Q.1: How did you find the new system (Easy to use or too complicated) and why?

Q.2: Were the responses you received efficient and helpful. If not, how would you like to receive the information?

Q.3: Is there any unnecessary and irrelevant information provided?

Q.4: Is the language used at the interface (poster) clear?

Q.5: Are the words used familiar to you?

Q.6: Are the codes used easy to understand?

Q.7: Did the use of codes make the process of sending SMS easier and quicker?

Q.8: Would the coding be better if numbers were used instead of letters?

**Section Three: Poster questions**

This section focuses on presenting TMICS poster to the users in order to identify their opinions in regard to their use of this new service interface. The interviewee will be asked the following questions:

Q.1: What is your first impression of the poster?

Q.2: Is the poster easy to understand?

Q.3: Did you find any visual barriers in the poster? Such as colour, map, heading, writing, zones, tables, icons and poster size.

Q.4: Is the text number easy to remember or use and why?
Section Four: TMICS Database

This section will explore TMICS database problems. The interviewer will ask the following:

Q.1: Is the classification of the services clear, understandable. If not, why?
Q.2: What are the major strengths and weakness of the classifications?
Q.3: Did you find any crossover regarding the classification? If yes where?
Q.4: Would these classifications meet your likely information needs?
Q.5: Do you think there was enough variety in the classifications or would you like to see more information available. If yes, what would you like to see?
Q.6: Are there any additions and deletions you would like to mention?
Q.7: Any other comments?
Q.8: Have you used or are you aware of a similar service elsewhere?
Appendix Three

List of Participants in the Usability Test by Gender and Age

(Chapter Seven)
## List of participants in the usability test by Gender and Age

(Chapter Seven)

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<thead>
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Appendix Four

TMICS Database
## TMICS Database

### Cardiff City Centre Hotels

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<td>5</td>
<td>Hilton Cardiff</td>
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<td>Park Place, Cardiff CF10 3UD</td>
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### Cardiff City Centre (Things to Do)

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### Appendix Four: TMICS Database

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345
# Cardiff Bay (Things to Do)

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### Golf Club

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### Cardiff Bay (Nightlife)

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### Cardiff Bay (Information)

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Appendix Five

Researcher’s Publications
**Peer-reviewed conference article**


**Poster and Abstract**
