

國立政治大學資訊管理學系

博士學位論文

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行動旅遊服務分類及系統發展研究
Classification and System Development for
Mobile Tourism Services

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摘要

行動服務分類與系統開發是一個理論上與實務上重要的議題，其中以應用在旅遊業的行動旅遊服務備受關注。本研究試圖提出以多觀點的角度來找出、分類、評估與開發具有價值的行動旅遊服務。也就是說，本研究試圖提出有價值的行動旅遊服務與服務分類，透過多觀點的角度來評估研究所提出的行動旅遊服務與服務分類，並提出系統開發架構與方法，透過離型系統建置來驗證系統開發方法的可行性與離型系統的效率。

本研究範圍主要在企業對客戶的行動旅遊服務，主要研究貢獻在於服務分類架構與系統開發架構。本研究試圖透過服務分類架構將企業對客戶的行動旅遊服務彙整出企業對客戶的行動旅遊服務分類，並透過旅客、電信業者與旅遊業等多觀點來評估本研究提出的企業對客戶的行動旅遊服務與服務分類。本研究並根據系統開發架構來建置與評估企業對客戶的行動旅遊服務的離型系統，來驗證本研究提出的行動旅遊服務的可行性。為了驗證本研究提出的服務分類架構的可應用性，本研究試圖將此服務分類架構延伸應用到企業內部的行動旅遊服務，並透過管理階層與員工雙方的觀點整理出企業內部的行動旅遊服務與服務分類。

本研究的研究方法主要為設計科學。透過文獻探討、半結構化的群組訪談與問卷調查來找出、分類與評估企業對客戶的行動旅遊服務與服務分類。透過物件導向系統發展方法與評估問卷來建置並評估企業對客戶的行動旅遊服務的離型系統。做為一個延伸研究，企業內部的行動旅遊服務與服務分類所採用的研究方法包括文獻探討、半結構化的焦點團體討論與半結構化的田野訪談。

在企業對客戶的行動旅遊服務分類研究結果發現：(1) 在企業對客戶的行動旅遊服務分類中，行動搜尋與通知服務、行動推薦服務、行動交易與付款服務為三項旅客認為最有用，且電信業與旅遊業都認為最重要、最可行、最符合成本效益的服務；(2) 相較於旅遊業，電信業對於企業對客戶的行動旅遊服務態度上較積極；(3) 旅遊業與電信業者對於所提出的企業對客戶的行動旅遊服務的評估，在評分排序上是相同的。

本研究亦建置行動推薦服務的離型系統，來說明系統發展架構與設計方法。行動推薦服務會依據旅客現在的位置與時間，以及個人偏好與需求，來進行個人化的地點相關的推薦，包括景點推薦、飯店推薦、餐廳推薦與旅遊行程推薦等。系統滿意度調查顯示該離型系統具有高度系統滿意度。

就企業內部的行動旅遊服務分類的研究結果顯示，不同管理階層對於企業內部的行動旅遊服務有不同的需求，而不同的企業內部的行動旅遊服務在技術上的難易程度也不同。透過企業內部的行動旅遊服務分類架構，很容易瞭解到該企業內部的行動旅遊服務在技術上的複雜度與管理上的需求程度。這樣的服務分類架構對於規劃與開發企業內部的行動旅遊服務，提供一個參考基準與指引。此外，本研究結果指出，行動旅遊品質控管服務對管理階層來說，是很重要、可行與符合成本效益的服務。而行動銷售支援服務對管理階層來說，是一個可行有效但不是很重要的服務。最後，本研究建議後續研究將本研究提出的服務分類架構與系統開發架構應用到其他的行動服務領域，以驗證本研究提出的服務分類架構與系統開發架構的可應用性。

關鍵字：服務分類、系統發展、行動旅遊服務、行動服務。

Abstract

The service classification and system development of mobile services is an important issue both in research and in practice, and research attention is called to the mobile services for the tourism industry. This study tries to identify, classify, evaluate, and develop value-added mobile tourism services with multiple perspectives. That is, user groups with different perspectives are asked to evaluate the proposed value-added mobile tourism services as well as a mobile tourism service classification framework. Moreover, this study also proposes the system development framework and processes, and the prototype system is built and evaluated to validate the feasibility of the proposed system development framework as well as the effectiveness of the prototype system.

The research scope is focused on the B2C mobile tourism services, and the main contribution of this study is the proposed service classification framework and the system development framework. This study tries to identify and classify B2C mobile tourism services based on the proposed service classification framework and processes. Moreover, tourists, 3G operators and the tourism industry are asked to evaluate the proposed B2C mobile tourism services as well as the service classification. Based on the proposed system development framework and processes, this study also builds and evaluates the prototype system to validate the feasibility of the proposed B2C mobile tourism services. To validate the appliance of our service classification framework, an extension research to the B2E mobile tourism services is also conducted. Management perspectives including managers and employees are taken into accounts to summarize the B2E mobile tourism services and the service classification framework.

The research methodology used in this study is the design science research methodology. With literature reviews, semi-structured group interviews, and surveys to identify, classify, and evaluate B2C mobile tourism services as well as the service classification. The prototype system of the B2C mobile tourism services is built through object-oriented system analysis and design, and the survey questionnaire is used for the system evaluation of the prototype system. As an extension study, the B2E mobile tourism service classification research is built with literature reviews, semi-structured focus group discussions and semi-structured field interviews.

The B2C mobile tourism service classification research results are as follows. (1) The mobile search & notification services, the mobile recommendation services, and the mobile transaction & payment services are top three useful B2C mobile tourism services valued by tourists, and these three B2C mobile tourism services are top three most important, feasible and cost-benefit effective services from the 3G operators' and travel agencies' perspectives. (2) The 3G operators hold more positive attitudes towards the B2C mobile tourism services than the tourism industry does. (3) Tourism industry sets the same priority list toward the proposed B2C mobile tourism services as the 3G operators do.

In this study, an application prototype of mobile recommendation services is also implemented to illustrate the development framework and design methods. The mobile recommendation services provide personalized and location-based recommendations regarding sightseeing spots, hotels, restaurants, and packaged tour plans based on tourists' current location and time, as well as personal preferences and needs. Results from the system evaluation indicate high system satisfaction toward the prototype system.

Based on the research results of the B2E mobile tourism service classification, different management levels have different needs for B2E mobile tourism services, and different B2E mobile tourism services have different technology complexities. Through this B2E mobile tourism service classification framework, it is easy to understand the technology complexities of the B2E mobile tourism services and managerial needs for the B2E mobile tourism services. Such service classification framework offers a reference baseline and guidance for planning

and system development of B2E mobile tourism services. Moreover, this research results show that from managers' perspectives, the mobile tour quality control services are important, feasible, and cost-benefit effective while the mobile sales support services are feasible, effective, but not so important services. Finally, future researches are suggested to apply the service classification framework and system development framework to other mobile service domain to validate the appliance of the proposed service classification framework and system development framework.

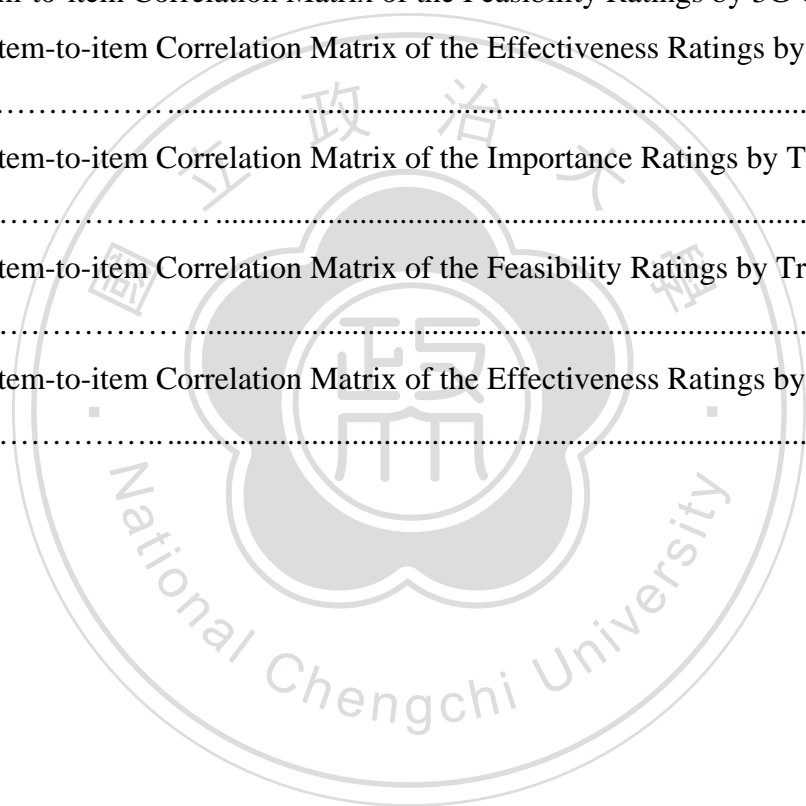
Keywords: service classification, system development, mobile tourism service, and mobile service.



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Chapter 1 Introduction

The discussions on research background of the mobile tourism services are presented in section 1.1. Research objective of this study is presented in section 1.2. Design science research methodology, research frameworks, and research processes are illustrated in section 1.3, followed by a study limitation presented in section 1.4.

1.1 Research Background

With the advances in wireless and mobile technologies, mobile commerce has created huge opportunities for businesses to offer value-added services to consumers, partners, as well as employees (Anckar and D’Incau, 2002; Clarke, 2001; Chen and Cheng, 2010). Among various mobile commerce related issues, one major research issue to be addressed is to identify, classify, evaluate, and design useful mobile services for mobile users as well as mobile organizations, and therefore more research efforts devoted to this area are highly expected (Anckar and D’Incau, 2002; Carlsson, Carlsson, and Walden, 2005; Chiu et al., 2009; Cil, Alpturk, and Yazgan, 2005; Maamar, Yahyaoui, and Mansoor, 2004; Ngai and Gunasekaran, 2007; Scornavacca, Barnes and Huff, 2006; Tarasewich, 2003; Varshney, 2003). That is, the requirement assessment and system development of mobile services and applications to assist on-the-move users in making mobility-related decisions is considered a critical research topic.

As one of the most important type of mobile services, location-based services focus mainly on providing point of interest information to mobile users based on their current positions (Barnes, 2003; Giaglis, Kourouthanassis and Tsamakos, 2002; Sadoun and Al-Bayari, 2007). On the other hand, as major e-commerce and e-business application functions, personalized recommendation services aim at suggesting products and services to meet users’ needs and preferences (Yu, 2005; Zhang, Chen and Zhou, 2005). It has been noted that, without proper system support, the integrated process of searching and filtering products, comparing alternatives, and recommending suitable selections for users can be extremely complicated and hard to be carried out. Furthermore, when taking into account the support of mobile users with a variety of mobile devices in personalized and location-based decision making, the complexities of the problem and associated solution processes are compounded significantly, and the design and implementation issues for constructing the desired personalized mobile recommender systems become even more complex (Kwon and Shin, 2008; Ricci and Nguyen, 2007).

The tourism industry is chosen as an application domain due to the facts that mobile commerce gradually intensifies competition in the tourism domain (Buhalis and Licata, 2002; European Commission, 2003). Moreover, tourism-related companies are relatively more mobile, agile, and knowledge-oriented organizations, and the needs of communication, collaboration, knowledge sharing, and decision support among internal employees and external customers/partners are significant (Cooper, 2006; Liebowitz, 2007; Werthner and Ricci, 2004). Furthermore, the tourism domain is one of those industries that are able to gain

enormous synergy effects from the use of mobile devices and applications (Feyne et al., 2009; Wang and Cheung, 2004). However, even though the travel agencies are prime candidates of mobile e-business, the lack of innovative thinking in mobile service design, and the uncertainty related to technology as well as market aspects hinder the advances in the development and application of mobile tourism services (Grun et al., 2008; Wang and Cheung, 2004).

In the tourism management domain, mobile and wireless technologies have been pointed out as one of the most interesting areas of technological innovation for enhancing Internet applications to tourism (Buhalis and Law, 2008). Identified primary functions of location-based services for travelers include localization of persons and objects, routing between them, as well as search for objects such as hotels, restaurants, shops, or sights and information about travelling conditions. Eventually, tourists are typical consumers who have strong mobility-related needs and have shown significant interests in acquiring location-based services during the trips (Werthner and Ricci, 2004). They like to make their own tour plans during the trips, and moreover, tourists have a high frequency in rescheduling their trips to suit the dynamically changing conditions and needs. As a key application service in tourism, travel and tour planning is a process of searching, selecting, grouping and sequencing destination related products and services including attractions, accommodations, restaurants and activities. With more availability of comprehensive data about travelers and destinations as well as more exchanges of experiences between travelers, the location-based recommendation services based on content and/or collaborative filtering technologies attract more interests in the travel and tourism domain (Kansa and Wilde, 2008). How to provide personalized and location-based recommendation services for facilitating tour planning process inevitably becomes a critical research and practical issue in mobile tourism applications. However, existing mobile services related to personalized tour recommendation services are still very primitive. In the literature, although there are more and more mobile applications to explore position information for guiding the on-the-trip users, there is still a lack of personalization in context to meet the interests, preferences and devices of the individual tourists (Scherp and Boll, 2004). Ideal personalized and location-based tour planning recommendation services should be able to integrate information about tourists' preferences, needs and constraints, location and time information, destination and attraction information, as well as recommendation models and rules in order for recommending personalized tour plans in which sightseeing spots, restaurants, and hotels are bundled to match the context and location aware conditions. Since there are very limited previous research efforts undertaking the integrated issues of personalized and location-based tour plan recommendations, this study tries to fill the gap by providing a system architecture and development method for efficiently and effectively guiding the design and implementation of the demanded location-based recommendation service systems to support personalized tour planning.

1.2 Research Objective

Tourism providers use short message services for distributing tour information and for allowing tourists to check flight arrivals and departures, etc via mobile devices. The tourism industry acknowledges that the launch of value-added mobile tourism services via the 3G

platform is clearly identified as the main factors affecting the competitiveness of the tourism industry, and it is clear that mobile tourism services will eventually be mature and change the way the tourism industry works today (Buhalis and Licata, 2002; European Commission, 2003). However, the tourism industry still doubles the technical complexity and profitable issues for mobile tourism services via 3G platform. That is, there are several difficulties facing the tourism industry. First, many potent value-added mobile tourism services will be possible via the 3G platform; however, it is not clear what these mobile tourism services are. Secondly, the technical difficulty and cost-benefit issues are key business concerns regarding the mobile tourism services. Thirdly, the tourism industry alone cannot launch the mobile tourism services because they need location information from 3G operators.

Existing literatures try to solve the difficulties facing the tourism industry regarding the mobile tourism services by proposing a variety of mobile tourism services (e.g. tour route recommendation services and weather forecast notification services). Even these mobile tourism services are interesting, but there is still lacking an overall mobile tourism service classification framework. Moreover, there are no service evaluation surveys from multiple perspectives to our knowledge. Thirdly, it is important to propose a system development framework and process for the system development of mobile tourism services to meet the concerns of technical complexities facing the tourism industry. This study tries to fulfill the gaps of service identification, service classification, service evaluation, and system development of mobile tourism services.

Since the existing literatures are of limited assistance in unraveling the complexities of identification, classification, evaluation, and development of useful business-to-customer (B2C), the objective of this study is set to identify, specify, classify and develop potential useful B2C mobile tourism services. That is, the B2C study includes service identification, service classification & service evaluation as well as the system development and system evaluation. This study also extends the service identification, service classification, and service evaluation to the business-to-employee (B2E) mobile tourism services. The research scope is shown in Figure 1. In this study, the B2C domain is chosen as the primary research domain for the service classification and system development of mobile tourism services. To validate the generalizability of our service classification framework and processes, this study also extends to the B2E domain to come up with the B2E mobile tourism service classification.

To deal with the service classification and system development of mobile tourism services, multiple perspectives and functional complexities are considered in this study, as shown in Figure 2. In the B2C mobile tourism service study, the multiple perspectives include tourists', 3G operators', and travel agencies' perspectives. Based on the complexity of system design and development of mobile tourism services, functional perspectives are also taken into consideration to categorize the B2C mobile tourism services into mobile information & communication services, location-based services, context-aware services, and transaction-support services. In the B2E mobile tourism service study, managers and employees are representatives of the management & operational perspectives respectively. The functional perspectives include mobile information & communication services, location-based services and context-aware services.

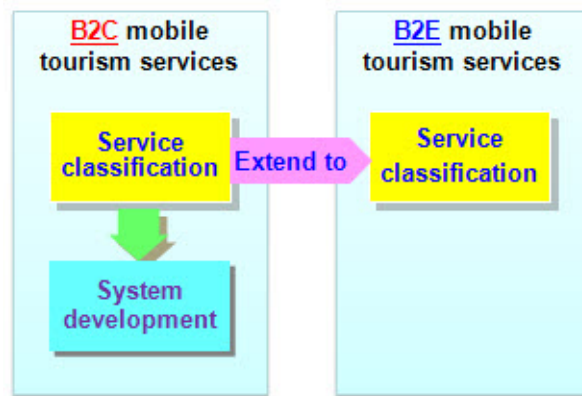


Figure 1. Research Scope

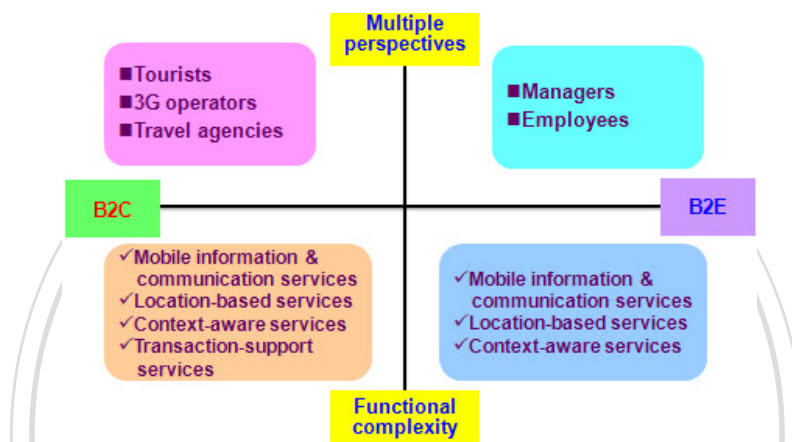


Figure 2. Multiple Perspectives and Functional Complexity

1.3 Research Methodology

Design science is chosen as the research methodology because the nature of this study is a research in information technology to address the design tasks faced by practitioners. It is important that the problem is properly conceptualized and represented, appropriated technologies are constructed, and solutions must be implemented and evaluated using appropriated criteria (March and Smith, 1995). According to the design science proposed by March and Smith (1995), the four research activities are to build, evaluate, theorize, and justify; the research outputs are constructs, model, method, and instantiation. Hevner et al. (2004) propose design science research guidelines including design as an artifact, problem relevance, design evaluation, research contribution, research rigor, design as a search process, and communication of research to help researchers to create new and innovative artifacts. These guidelines help researchers to implement and evaluate information systems within design science paradigm.

Peppers et al. (2007) propose the design science research methodology, as shown in Figure 3. There are six activities in the design science research methodology including problem identification & motivation, objectives of a solution, design & development, demonstration, evaluation, and communication. Based on the design science research

methodology proposed by Peffers et al. (2007), this study tries to identify, classify, evaluate and develop useful B2C mobile tourism services. The prototype system is implemented and evaluated to demonstrate the feasibility and effectiveness of the proposed B2C mobile tourism services. Additional extension to the identification, classification, and evaluation of B2E mobile tourism services are also proposed to illustrate the appliance of the classification research framework and processes.



Figure 3. Design Science Research Methodology

The research framework of B2C mobile tourism service classification and system development are presented in Figure 4. The main research processes in the B2C research framework include B2C mobile tourism service identification, B2C mobile tourism service classification, B2C mobile tourism service evaluation, and system development & system evaluation of B2C mobile tourism services. B2C mobile tourism services are identified from literature reviews and investigation of practical B2C mobile tourism services. Then, both multiple perspectives and functional complexity are taken into accounts to build the B2C mobile tourism service classification. When it comes to the B2C mobile tourism service evaluation, three surveys are distributed in this study, including tourist survey, 3G operator survey and travel agency survey. Tourists are asked to evaluate the usefulness of the proposed B2C mobile tourism services while the importance, feasibility, and cost-benefit effectiveness of the proposed B2C mobile tourism services are evaluated by service providers including 3G operators and travel agencies. Based on the results of B2C mobile tourism service evaluation, a system development framework and processes are proposed and a prototype system of B2C mobile tourism services is designed and implemented. The system evaluation criteria for the B2C mobile tourism service prototype system are user interface & layout, functionality, ease of use, understandability, satisfaction, and intention for future use.

The research framework of multi-dimensional classification and evaluation of B2E mobile tourism services is formulated and presented in Figure 5. The main research processes in the B2E research framework include B2E mobile tourism service identification, B2E mobile tourism service classification, and B2E mobile tourism service evaluation. Mobile services & mobile values for mobile businesses and tourism industry characteristics are considered when identifying the B2E mobile tourism services. Mobile values for mobile businesses include efficiency & effectiveness, time-critical & mobility-related, organizational agility, collaboration, innovation & decision support, and competence enhancement. Tourism

industry characteristics considered is mobile communication, agile response, learning organization, and knowledge-oriented services. When classifying the B2E mobile tourism services, management/operational perspectives and functional perspectives are considered. The management support considered includes strategic planning, management control, knowledge management, and operational control. Based on the functional complexities of the mobile service design and development, the proposed B2E mobile tourism services are categorized into mobile information & communication services, location-based services, and context-aware services. The B2E mobile tourism service is evaluated with criteria including importance, feasibility, and cost-benefit effectiveness. The fitness and soundness of the mapping of the B2E mobile tourism services into the corresponding slot of the B2E mobile tourism service classification framework is evaluated by managers as well as employees.

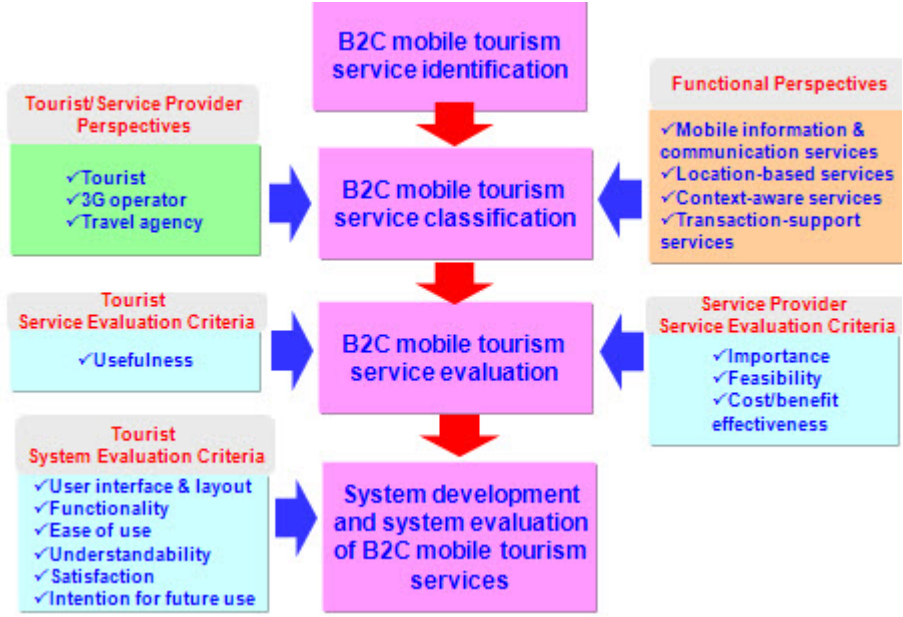


Figure 4. B2C Research Framework

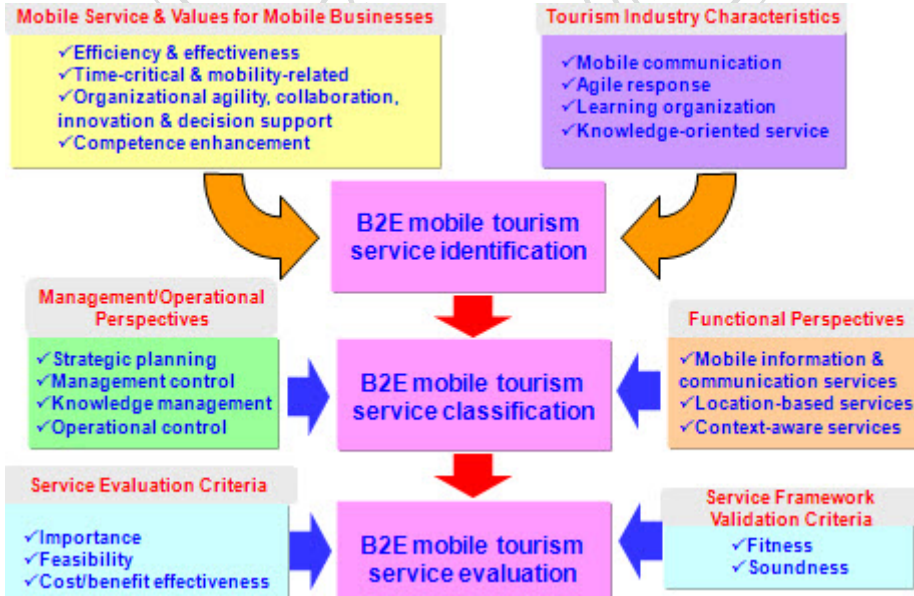


Figure 5. B2E Research Framework

Based on the research frameworks, the detailed research processes and research methods of B2C service classification, B2C system development, and B2E service classification are depicted in Figures 6-8. As shown in Figure 6, literature reviews and investigation of practical B2C mobile tourism services are used to identify value-added B2C mobile tourism services. The B2C mobile tourism service classification is built upon the discussion results of seven semi-structured group interviews with total fifty-six students. Three surveys are used for the B2C mobile tourism service evaluation, including tourist survey, 3G operator survey, and travel agency survey. As shown in Figure 7, object-oriented analysis and design is chosen as the system analysis and design method for building the prototype system of B2C mobile tourism services. Twenty-eight students test the prototype system and fill up the system evaluation survey. As shown in Figure 8, the research method for B2E mobile tourism service identification is literature reviews and a case study of a large travel agency. The research method used to classify the B2E mobile tourism services is two focus group discussions with total thirteen senior students major in tourism management. The research method of the B2E mobile tourism service evaluation is semi-structured field interviews with five local travel agencies.

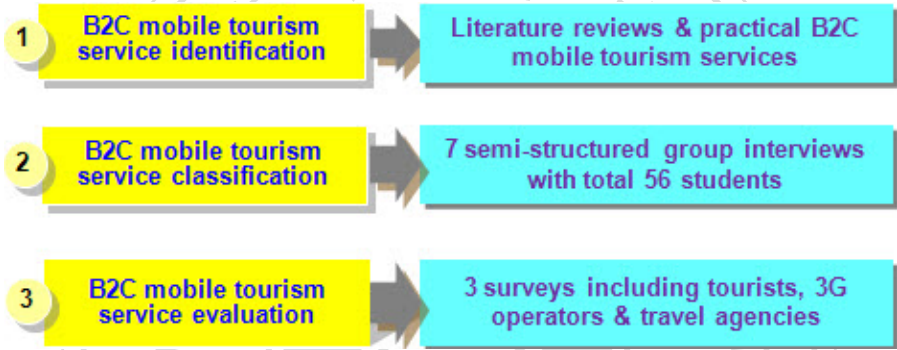


Figure 6. B2C Service Classification Research Process and Research Method

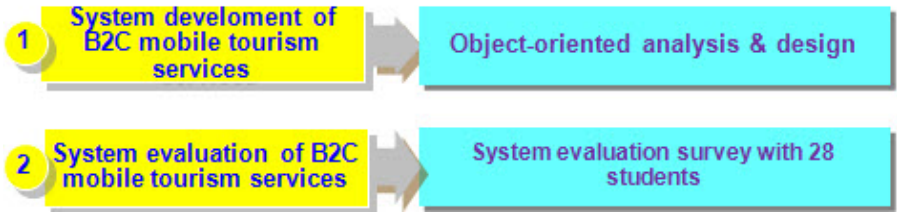


Figure 7. B2C System Development Research Process and Research Method

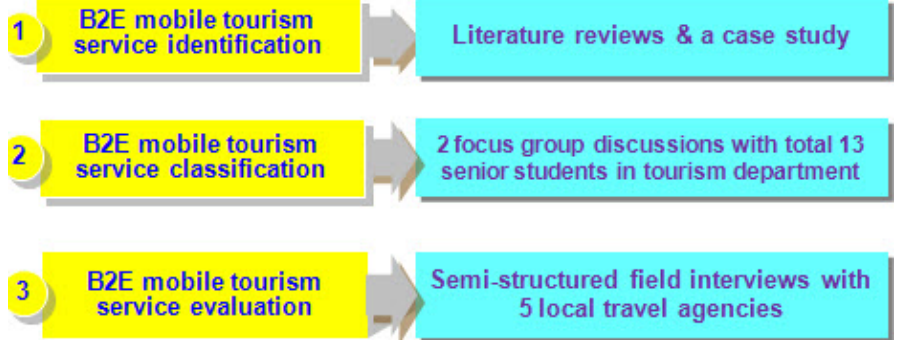
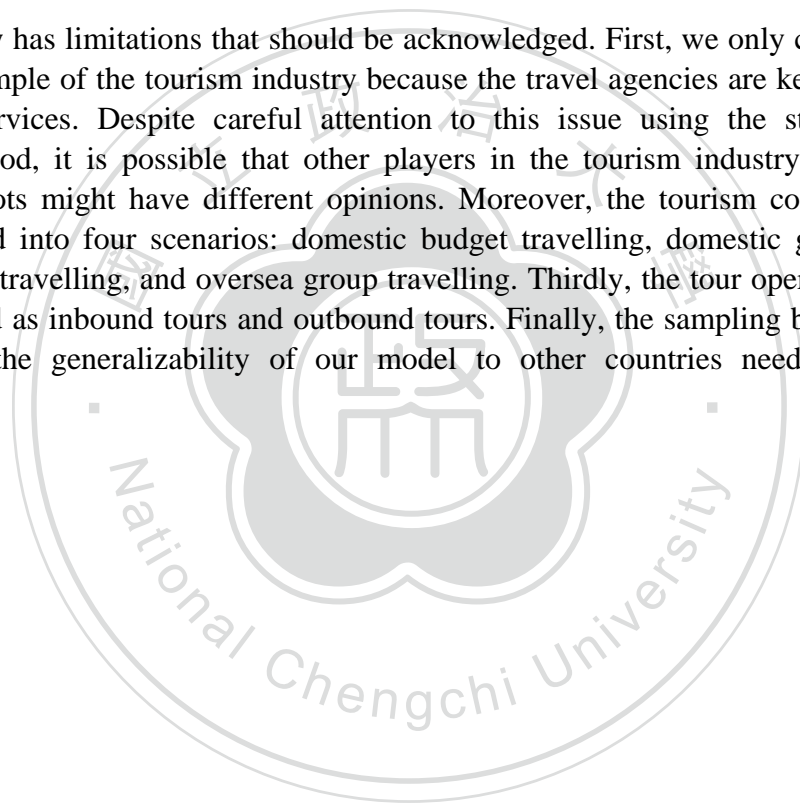


Figure 8. B2E Service Classification Research Process and Research Method

In the subsequent sections, this study is organized as follows. A brief literature review on requirement assessment and system development of B2C mobile tourism services is provided in section 2. Section 3 describes the research method and process for identifying, classifying, and evaluating the potential B2C mobile tourism services. Section 4 presents the research results and discussions of the proposed service classification of the B2C mobile tourism services. The proposed functional framework, processes, models and rules for developing and delivering B2C mobile tourism services as well as the prototype system & system evaluation are presented in section 5. In section 6, an extension research to the service classification of the B2E mobile tourism services are presented. Section 7 contains a concluding remark with future research issues.

1.4 Study Limitation

This study has limitations that should be acknowledged. First, we only choose the travel agencies as sample of the tourism industry because the travel agencies are key candidates for the mobile services. Despite careful attention to this issue using the stratified random sampling method, it is possible that other players in the tourism industry like hotels and sightseeing spots might have different opinions. Moreover, the tourism contexts would be further detailed into four scenarios: domestic budget travelling, domestic group travelling, oversea budge travelling, and oversea group travelling. Thirdly, the tour operations would be further detailed as inbound tours and outbound tours. Finally, the sampling base is limited to Taiwan, and the generalizability of our model to other countries needs to be further investigated.



Chapter 2 Literature Review on B2C Mobile Tourism Service

The discussions on the requirement assessment of B2C mobile tourism services based on literature reviews and practical mobile tourism services are presented in section 2.1. The discussions on the system development of B2C mobile tourism services are illustrated in section 2.2.

2.1 Requirement Assessment of B2C Mobile Tourism Service

Among previous research addressing the requirements of mobile tourism services, Proll and Retschitzegger (2000) address this issue by providing real-time tourism information like weather forecasts and snow reports via mobile devices to help tourists in scheduling their tour plans and outdoor activities. According to Cheverst et al. (2000), the mobile tour guide services are useful in providing up-to-date and context-aware tourism information to tourists via handheld devices. Yeo and Huang (2003) report that by gathering and providing accurate, prompt and relevant traffic condition to tourists, the mobile tourism services solve the transportation problems for tourists during the trips. Tsamakos, Giaglis, and Kourouthamassis (2002) indicate a promising application potential to auction and reverse auction of tourism products and services over mobile devices to allow tourists to enjoy personalized services and to empower tourists with active participation in the industry. Research groups of Berger, Lehmann, and Lehner (2003) as well as Hinze and Voisard (2003) point out the potential of location-based information services in the tourism industry. Chiu et al. (2009) propose a multi-agent mobile route advisory system for a multi-modal public transport network. Yu (2005) suggests that tourism related information search and recommendation, transaction and payment, as well as trip tracking and quality control services can be well supported by using mobile devices. Mallat et al. (2006) observe that usefulness and benefits of the mobile ticketing services are perceived differently in different use situations. Axup and Viller (2005), on the other hand, show the user needs for travel gossips on the road from the mobile travel community services. Besides, major functions and benefits of mobile tourism services mentioned in previous studies include allowing tourists to locate friends (Olofsson, Carlsson, and Sjolander, 2006), to access real-time tour information such as road conditions, weather forecasts, events changes, and flight delays for tour control (Berger, Lehmann, and Lehner, 2003; Cheverst et al., 2000; Hinze and Voisard, 2003; Kakalettris et al., 2004; Proll and Retschitzegger, 2000; Yeo and Huang, 2003; Yu, 2005), to hook on the mobile tourism community to ask for the comments of nearby vegetarian restaurants or to share the latest tour news via mobile devices (Aschoff and Novak, 2008; Axup and Viller, 2005; Nielsen, 2004), to use theme-based, multimedia supported, interactive, personalized mobile tour guides to seize indoor and outdoor learning opportunities like museum exhibition guidance or bird watching activities during the trips (Abowd et al., 1997; Alfaro et al., 2004; Cabrera et al., 2005; Chen, Kao, and Sheu, 2003; Cheverst et al., 2000), to get recommendations on restaurants, events, sightseeing spots, hotels, transportation options, direction instructions, souvenirs, and tour plans (Ardissono et al., 2003; Bellotti et al., 2008; Berger, Lehmann, and

Lehner, 2003; Castillo et al., 2008; Cheverst et al., 2000; Chiu et al., 2009; Nielsen, 2004; Pousman et al., 2004; Yu, 2005), and to initiate auctions, book, and pay for last-minute trips, train tickets, car rentals, and hotel reservations (Cheverst et al., 2000; Goto and Kambayashi, 2003; Lukkari, Korhonen, and Ojala, 2004; Mallat et al., 2006; Ondrus and Pigneur, 2006; Ortiz et al., 2001; Tsamakos, Giaglis, and Kourouthanassis, 2002; Yu, 2005).

From literature reviews on B2C mobile tourism services, prior researches acknowledge the significant needs of the B2C mobile tourism services, and they address the requirements of B2C mobile tourism services by proposing specific types of B2C mobile tourism services to solve specific types of B2C mobile tourism issues. However, they do not delve into the dynamics of the whole tour decision-making processes from tourist perspectives and therefore existing literatures are of limited assistance in unraveling the complexities of requirements of the B2C mobile tourism services. This study addresses the above gaps in the B2C mobile tourism service literatures by presenting a simple yet useful B2C mobile tourism service classification framework that can serve as the basis for further exploration of the requirement assessments of the B2C mobile tourism services. Moreover, there is little study on the importance, feasibility, and cost-benefit effectiveness assessment of the B2C mobile tourism services from the business perspectives. Existing B2C mobile tourism services researches lack empirical observations of service providers' responses to the proposed B2C mobile tourism services with real business operation considerations. Past B2C mobile tourism services do not employ tourist surveys as well as business surveys, wherein tourists and service providers are asked to respond to hypothetical scenarios. Even though survey responses are challenged by not being indicative of final choices, survey results are still important references to observe tourists' as well as service providers' assessments of B2C mobile tourism services. In brief, it is significant important to have a multi-facet requirement assessment to identify potential value-added B2C mobile tourism services from both tourists' and service providers' perspectives. Since such observations are missing from existing literatures, this study represents a first step in this direction. In summary, it can be easily seen that previous works on B2C mobile tourism services focus mainly on specific service types or issues, the lacks of comprehensive studies regarding the integrated B2C mobile tourism service classification framework, as well as empirical evidence on assessing B2C mobile tourism service requirements are significant.

In addition to the literature reviews on B2C mobile tourism services, practical mobile tourism services provided by the tourism industry, 3G operators, Taiwan government offices, etc. are also presented. Current travel and tourism related websites such as Travelocity, Expedia, and Priceline launch the mobile tourism services to allow travelers to access travel information via mobile devices. For example, travelers can view their current itineraries, book ground transportation and hotels, and receive up-to-the-minute information about flight status. Moreover, other useful travel tools include access to a currency converter calculator, city guide and destination information, and local weather reports, etc. Priceline also provides highlights of Zagat-rated restaurants and attractions by city. These mobile tourism services meet the information needs, but no personalized recommendation services have been provided in current mobile tourism services offered by e-tourism websites. We also investigate some practical B2C mobile tourism services in Taiwan provided by the government offices (e.g., Central Weather Bureau, Yangmingshan National Park, and Taipei Travel Net), the 3G

operators (Taiwan Mobile, Chunghwa Telecom, and FETnet), the GPS-based navigation service providers (TOBE, PAPAGO, and TomTom), and the tourism industry (Eva Airways and Lion Travel Service). Available B2C mobile tourism services in Taiwan include weather forecast information for major sightseeing spots, static introduction and direction information for a specific sightseeing spot, predicted bus arrival time for a selected bus number, nearby restaurant information based on tourist current location, mobile payment services like mobile wallets, mobile credit cards, and travel insurance payment, tour route recommendations, map-based and audio-enabled direction instructions, flight re-schedule notification services, and hotel reservation confirmation messages, etc. These service providers offer mobile payment services, location-based information and recommendation services, but no personalized recommendation services have been offered by current B2C mobile tourism services providers in Taiwan.

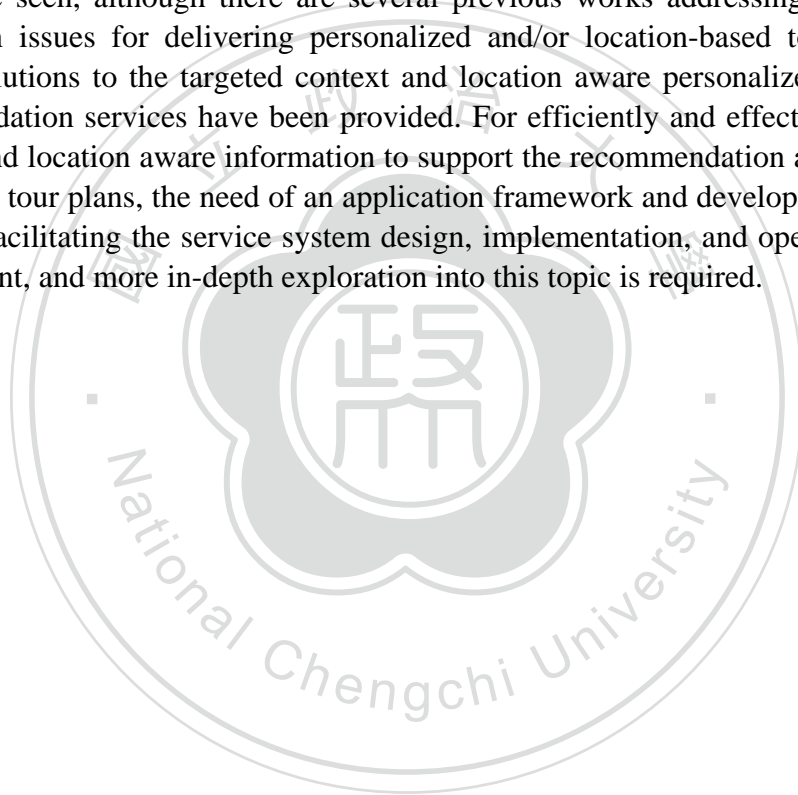
2.2 System Development for B2C Mobile Tourism Service

Among many research works regarding personalized and/or location-based mobile services, Chen, Zhang, and Zhou (2005) propose an architecture design of an m-service portal. In their proposed architecture, there are three major components, namely, list manager, profiler, and agency. List manager maintains a personalized list of preconfigured m-services specified by mobile users. Profiler is responsible for storing personal information and preferences such as information needs and message delivery preference. Agency uses intelligent agent technologies to automatically search in the web service/m-service registers to identify appropriate services that satisfy users' needs. Focusing on web service interoperation, Zhang, Chen, and Zhou (2005) provide a framework for dynamic and personalized composition of web services. Four major components specified in the framework include storages for personal preference settings, web services for inter-business cooperation, business intelligence to satisfy users' needs, and geographic displays for location-based services. Hand et al. (2006) propose a three-tier location-based development architecture that consists of client communication tier, application-tier, and geographic information system (GIS) tier. The client communication tier is a protocol independent tier, where the users' location is established and where communication with the application tier occurs. The application tier performs all results-set mark-up into the appropriate output display for the user's wireless device. The geographic information system tier performs all location-based application query processing.

As for specifically applying to the tourism domain, Kakalettris et al. (2004) address the design and implementation issues for delivering location-based tourism-related content services. Key points that require careful considerations include service features and procedures, content structure, quality-of-service terms, and security. By illustrating an example of generic tourist guide, Scherp and Boll (2004) emphasize on supporting the dynamic generation of personalized multimedia content in respect of the tourist's interests and preferences, current location and environment, and mobile device used. Aiming at effectively coordinating and integrating disparate information and service resources anytime and anywhere, Chiu et al. (2009) propose a ubiquitous tourist assistance system that is built upon multi-agent and semantic web technologies for providing personalized assistance and automation to the tourists with different preferences and often changing requirements during

their trips. Five agent clusters specified in the system architecture include tourist assistant, ontology maintenance and search, requirement/preference management, package planning, and local tour planning. Ricci and Nguyen (2007) present a critique-based mobile recommender system that lets users expressing session-specific preferences in addition to the long-term collected preferences. The objective is to provide on-tour system support to mobile travelers for selecting products or services based on the integration of both types of preferences. Driver and Clarke (2008), on the other hand, point out that most research related to mobile, context-aware activity scheduling to date has focused on tourist guide applications. This type of application provides the user with a static tour on a mobile device, but does not support dynamic and context-based trail management. An application framework comprising trail generation and trail reconfiguration point identification modules is then proposed for managing mobile and context-aware trails.

As can be seen, although there are several previous works addressing the design and implementation issues for delivering personalized and/or location-based tourism services, only partial solutions to the targeted context and location aware personalized tour planning and recommendation services have been provided. For efficiently and effectively integrating personalized and location aware information to support the recommendation and rescheduling of personalized tour plans, the need of an application framework and development method for directing and facilitating the service system design, implementation, and operation processes is still significant, and more in-depth exploration into this topic is required.



Chapter 3 Research Method for B2C Mobile Tourism Service Classification

There are three research stages for generating B2C mobile tourism service classification, including B2C mobile tourism service identification, B2C mobile tourism service classification, and B2C mobile tourism service evaluation. Different research methods are used for different research stages, including literature reviews & investigation on practical B2C mobile tourism services, seven semi-structured group interviews with fifty-six students and three surveys. In the first step, B2C mobile tourism services are identified and a B2C mobile tourism service classification framework is constructed from previous research and existing B2C mobile tourism services. In the second step, semi-structured group interviews are conducted to modify and validate the proposed B2C mobile tourism service classification framework as well as associated B2C mobile tourism services, and to discuss the wordings of each item in the survey questionnaire. In the third step, three surveys are conducted to investigate different stakeholders' opinions toward the proposed B2C mobile tourism services. Target samples include tourists, 3G operators, and travel agencies. One on-line survey is to uncover the usefulness of the proposed B2C mobile tourism services from the tourists' perspectives. Another on-line survey and one mail survey are used to uncover the importance, feasibility and cost/benefit effectiveness of the B2C mobile tourism services from respectively the 3G operators' and the travel agencies' perspectives. Survey reliability and validity are assessed, and statistical analysis includes descriptive statistics, factor analysis, and difference analysis.

In the following sub-sections, the research method for B2C mobile tourism service identification is introduced in section 3.1. Research method for B2C mobile tourism service classification is presented in section 3.2, and followed by research method for B2C mobile tourism service evaluation presented in section 3.3.

3.1 Research Method for B2C Mobile Tourism Service Identification

During stage 1, the aim was to develop an initial mobile tourism service list and service classification framework of B2C mobile tourism services by taking results from literature reviews and existing mobile tourism services. To ensure developing a comprehensive list of B2C mobile tourism services, a broad range of previous studies were reviewed. Existing B2C mobile tourism services provided by 3G operators and travel industry (e.g. travel agency and airline) were also investigated. In this study, the B2C mobile tourism services were mobile services to help tourists to deal with tour-related information and decision during pre-trip, on-site, and post-trip periods. These included B2C mobile tourism services such as safety-related notification via mobile devices and mobile tour plan recommendation services. Based on the literature review and investigation of practical B2C mobile tourism services, an initial list of B2C mobile tourism services and an initial B2C mobile tourism service classification framework were developed in this stage.

Examples of the B2C mobile tourism services are as follows. Tourists have friend locator needs via mobile devices. Mobile tourism services provide real-time information about road conditions, weather forecasts, events changes, and flight delays, etc. Budget travelling tourists can hook to mobile tourism community to ask for the comments of nearby vegetarian restaurants or share the latest tour news via mobile devices. Tourists can also use theme-based, multimedia supported, interactive, personalized mobile tour guides to seize indoor and outdoor learning opportunities like museum exhibition guidance or bird watching activities during the trips. Mobile tourism services also offer recommendations on restaurants, events, sightseeing spots, hotels, transportation options, direction instructions, souvenirs, and tour plans, etc. Mobile tourism services allow tourists to initiate auctions, book, and pay for last-minute trips, train tickets, car rentals, and hotel reservations. Finally, mobile wallet services and mobile credit card services are added to the initial list of the B2C mobile tourism services based on the investigation of practical B2C mobile tourism services.

Based on the literature reviews and investigations of practical B2C mobile tourism services, the initial list of B2C mobile tourism services contains twenty mobile services, including safety-related information services, road condition & weather report services, event schedule change notification services, tour information inquiry services, tour information sharing services, people tracking services, interactive mobile guide services, theme-based mobile guide services, hotel recommendation services, sightseeing recommendation services, restaurant recommendation services, tour plan recommendation services, tour route recommendation services, souvenir store recommendation services, mobile auction services, mobile reverse auction services, mobile booking services, mobile wallet services, mobile credit card services, and mobile ticketing services.

3.2 Research Method B2C Mobile Tourism Service Classification

During stage 2, the aim was to classify the initial list of B2C mobile tourism services into the B2C mobile tourism service classification framework through semi-structured group interviews. The participants of the semi-structured group interviews were asked to validate the proposed B2C mobile tourism services, to discover and identify more potentially useful B2C mobile tourism services, to discuss the wordings of each item in the questionnaire, and to classify the B2C mobile tourism services. The sample population of the semi-structured group interviews was people who had domestic and/or oversea travelling experiences and better with full-time working experiences. Research intention was announced in three classes including one daily class, one night class, and one weekend class. Students of the night class and weekend classes had full-time jobs during weekdays. Interested groups with four to six people were encouraged to schedule the group interviews. Invitation emails stating our research purpose of the B2C mobile tourism service study along with the semi-structured group interview procedures and questions as attachments were sent to the participants before the semi-structured group interviews. Tape recording of the semi-structured group interviews for research purpose only was clearly stated in advance in the invitation emails. The participants were ensured that there was no individual information shown in our final report. Only summary of the discussions were reported. This study also ensured that the confidential tape-recordings would not be released.

We conducted seven semi-structured group interviews with total fifty-six interviewees. Each lasted about one and half hours with two to ten people each time. The respondents were encouraged to speak freely about the topic. The interviews were carried out after classes at student cafeteria or classrooms where each respondent could see each other and felt free to talk. During the semi-structured group interviews, the purpose of this study along with the concept of B2C mobile tourism services as well as the concept of B2C mobile tourism service classification framework was introduced to the participants. Then, the proposed B2C mobile tourism services were presented and discussed. The participants were encouraged to provide comments about the initial B2C mobile tourism services, to propose interesting B2C mobile tourism services, to eliminate unwanted B2C mobile tourism services, to integrate similar items, to validate the descriptions of each B2C mobile tourism service, and to group the proposed B2C mobile tourism services into B2C mobile tourism service classification framework. The discussions were taped and summaries were confirmed by the respondents.

Based on the discussions of the semi-structured group interviews, we made several modifications to the initial list of B2C mobile tourism services. First, people tracking services were deleted because most tourists were concerned with the privacy issues. Secondly, mobile wallet services and mobile credit card services were integrated as mobile payment services because these two B2C mobile tourism services sounded similar from tourist perspectives. The tourists were insensitive to the underlying technique differences between mobile wallet services and mobile credit card services. Thirdly, the participants added three B2C mobile tourism services including major pre-trip information notification services, the reminder services, and the pre-recorded mobile guide services. Participants stated that short messages were useful for pre-trip notification and reminding. For example, destination typhoon news were sent to the tourists whose tour plans might be affected. Not all tourists had email addresses, and it would be effective to get short message notification for affected tours. Some participants mentioned that it was useful service to send short messages to remind tourists of the flight booking codes the day before departure or to send weather forecasts along with the hotel reservation numbers before check-in day. Some participants suggested add the pre-recorded mobile guide services to the list because they were simple and useful services. Finally, the revised list contained twenty-one B2C mobile tourism services, shown in Table 1, and the wordings were validated by all participants.

During the semi-structured group interviews, the initial B2C mobile tourism service classification framework was also discussed. The revised list of B2C mobile tourism services were grouped into six B2C mobile tourism services and the group interviewees helped to finalize the revised B2C mobile tourism service classification framework. To support the integrated requirements of B2C mobile tourism services, the proposed B2C mobile tourism service classification framework consists of six B2C mobile tourism services including the mobile search & notification services, the mobile community services, the mobile guide services, the mobile recommendation services, mobile auction services, and the mobile transaction & payment services. Figure 9 presents our B2C mobile tourism service classification framework and detailed descriptions of each B2C mobile tourism service are as follows.

Table 1. Revised List of B2C Mobile Tourism Services

No	Mobile Tourism Service	References/Comments from Group Interviews
1	Safety-related information services	Proll and Retschitzegger, 2000
2	Road condition & weather report services	Berger, Lehmann, and Lehner, 2003; Hinze and Voisard, 2003; Kakalettris et al., 2004 ; Proll and Retschitzegger, 200; Yeo and Huang, 2003; Yu, 2005
3	Event schedule change notification services	Berger, Lehmann, and Lehner, 2003; Cheverst et al., 2000; Hinze and Voisard, 2003; Kakalettris et al., 2004; Yeo and Huang, 2003; Yu, 2005
4	Major pre-trip information services (Added)	Destination typhoon news are sent to the tourists whose tour plans may be affected.
5	Reminder services (Added)	Flight booking information is sent to the tourists the day before departure.
6	Tour information inquiry services	Aschoff and Novak, 2008; Axup and Viller, 2005; Nielsen, 2004
7	Tour information sharing services	Aschoff and Novak, 2008; Axup and Viller, 2005; Nielsen, 2004
8	Pre-recorded mobile guide services (Added)	Simple and useful services
9	Interactive mobile guide services	Abowd et al., 1997; Alfaro et al., 2004; Cabrera et al., 2005; Chen, Kao, and Sheu, 2003; Cheverst et al., 2000
10	Theme-based video and audio services	Alfaro et al., 2004; Cabrera et al., 2005; Chen, Kao, and Sheu, 2003
11	Hotel recommendation services	Berger, Lehmann, and Lehner, 2003; Cheverst et al., 2000; Nielsen, 2004; Yu, 2005
12	Sightseeing recommendation services	Ardissono et al., 2003; Berger, Lehmann, and Lehner, 2003; Cheverst et al., 2000; Nielsen, 2004; Yu, 2005
13	Restaurant recommendation services	Berger, Lehmann, and Lehner, 2003; Cheverst et al., 2000; Nielsen, 2004; Yu, 2005
14	Tour plan recommendation services	Bellotti et al., 2008; Berger, Lehmann, and Lehner, 2003; Castillo et al., 2008; Cheverst et al., 2000; Nielsen, 2004; Pousman et al., 2004; Yu, 2005
15	Tour route recommendation services	Chiu et al., 2009
16	Souvenir store recommendation services	Nielsen, 2004
17	Mobile auction services	Ortiz et al., 2001; Tsamakos, Giaglis, and Kourouthanassis, 2002
18	Mobile reverse auction services	Ortiz et al., 2001; Tsamakos, Giaglis, and Kourouthanassis, 2002
19	Mobile booking services	Cheverst et al., 2000; Yu, 2005
20	Mobile payment services	Lukkari, Korhonen, and Ojala, 2004; Ondrus and Pigneur, 2006; Yu, 2005
21	Mobile ticketing services	Goto and Kambayashi, 2003; Mallat et al., 2006

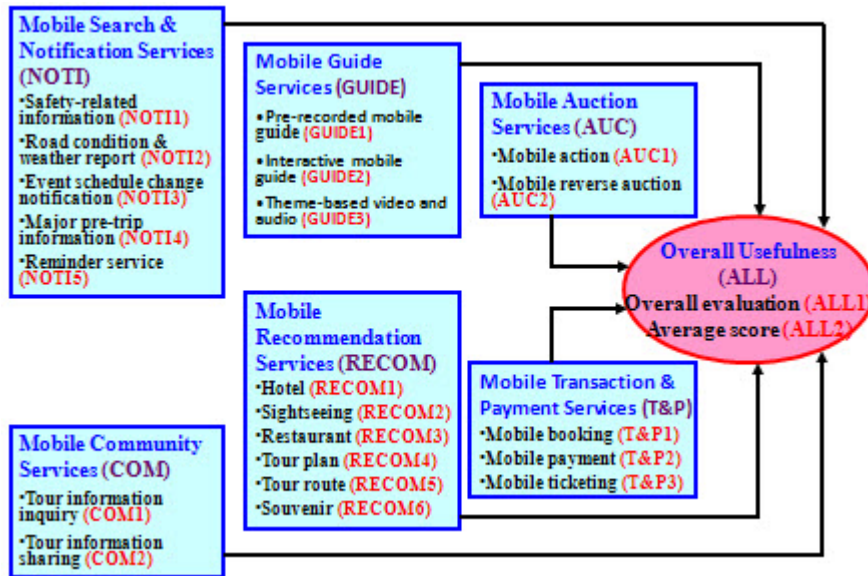


Figure 9. B2C Mobile Tourism Service Classification Framework

■ Mobile Search & Notification Services (NOTI)

Services in this group allow tourists to create and maintain their personal notification preferences, including the notification types, duration, and frequency, etc. Tourists may search for festival information by themselves via mobile devices. Tourists may also specify their personalized preferences and opt in the mobile notification services. Based on tourists' requests and preferences, this group of B2C mobile tourism services provides auto-pushed & tourist-preferred travel information such as traffic condition, weather forecast, snow slide warning, earthquake warning, typhoon warning, festival event schedule change notification, flight schedule change notification, pre-trip tour warning notification, and flight booking number reminder message, etc via mobile devices. The push mechanism enables the service providers to send relevant information to the tourists without having to wait for information requests. Safety-related information services (NOTI1), road condition & weather report services (NOTI2), event schedule change notification services (NOTI3), major pre-trip information services (NOTI4), and reminder services (NOTI5) are typical examples.

■ Mobile Community Services (COM)

This group of B2C mobile tourism services allows tourists to have real-time tour information exchange from the tourism community based on the tourist current location. For example, tourists may inquiry general travel advices like nearby accommodation suggestions or post today's houses sharing information in a tourism community via mobile devices. The mobile tourism community provides higher quality information than Web-based tourism community because the location information is used to index travel related information and therefore provide more relevant information. Thus, the tour information inquiry services (COM1) and the tour information sharing services (COM2) are major services of the mobile community services.

■ Mobile Guide Services (GUIDE)

This group of B2C mobile tourism services allows tourists to enjoy interactive and theme-based mobile tour guide services by choosing what they want to visit with their own interests and paces. Research has proven that tourists are interested in using the mobile guide services for their knowledge enhancement. For example, tourists benefit from the mobile guide services in bird watching activities. As for indoor activities, different tourists are interested in different themes in a museum environment. Some tourists are interested in painting while some others are interested in jades and rare documents. A theme-based mobile guide services make the museum guidance more personalized as different tourists may choose different topics with different routes and enjoy their own guidance tours. The mobile guide services include pre-recorded mobile guide services (GUIDE1), interactive mobile guide services (GUIDE2), and theme-based video and audio mobile guide services (GUIDE3).

■ Mobile Recommendation Services (RECOM)

Using the mobile recommendation services in this group, tourists may first specify what kind of tour recommendations they want by clicking the corresponding functions. They input their preferences by choosing the desired radio buttons or check boxes through an input screen within mobile devices, and then activate the recommendation processes by clicking the submit button. The results are personalized tour recommendations based on tourist profiles and preferences. Tourists often encounter problems with where to go and what to do in the limited time; the mobile recommendation services response to these needs by recommending hotels (RECOM1), sightseeing (RECOM2), restaurants (RECOM3), tour plans (RECOM4), tour routes (RECOM5), souvenir stores (RECOM6), etc.

■ Mobile Auction Services (AUC)

This group of mobile tourism services provides the tourists with last-minute offers for hotel reservations via mobile devices. For example, a group of tourists are notified about nearby festival activities tomorrow and decide to stay overnight. With the mobile auction services (AUC1), tourists may search the last-minute hotel offers and see if there is any vacancy. If the tourists have dogs and they are interested in houses with a large yard, they may launch the mobile reverse auction services (AUC2) to see if there is any nearby available home-stays with large yards within their budgets.

■ Mobile Transaction & Payment Services (T&P)

The mobile transaction & payment services allow tourists to actually book and pay for the selected tour products or services such as hotel reservation, lunch payment, train ticket purchases, etc via mobile devices. The mobile transaction & payment services include booking/reservation services (T&P1), payment services (T&P2), and ticketing services (T&P3), and they are supporting services for tourism activities.

3.3 Research Method for B2C Mobile Tourism Service Evaluation

During stage 3, the aim was to evaluate the revised list of B2C mobile tourism services as well as the proposed B2C mobile tourism service classification framework with multiple perspectives. The sample population was tourists and two key B2C mobile tourism service providers including 3G operators and travel agencies. Three surveys for the B2C mobile tourism service evaluation included an online survey of the tourists, another online survey of the 3G operators, and a mail survey of the travel agencies. The questionnaire was written in Chinese. Prior to the survey was distributed, the wordings of each item in the questionnaire were discussed during the semi-structured group interviews. Moreover, the questionnaire was pre-tested, using a small convenience sample of twenty respondents to detect any logical errors of questions. The survey was lasted for 42 days - from January 11 to February 19, 2007.

Taiwan is an appropriate empirical setting for B2C mobile tourism service evaluation surveys from both telecommunication and tourism perspectives. From the telecommunication perspectives, according to the telecommunication figures in 2011 released by National Communications Commission (National Communications Commission, 2012), there are 29 millions mobile phone subscribers, and among them, 20.9 million are 3G subscribers. Among all mobile subscribers, 71.3% are mobile Internet subscribers. That is, the mobile Internet access is highly used by Taiwan residents, which makes Taiwan an appropriate empirical setting for B2C mobile service evaluation survey. From the tourism perspectives, according to the 2010 survey of travel by Taiwan citizens released by the Tourism Bureau (Tourism Bureau, 2011), 93.9% Taiwan citizens take domestic travels, and 20.1% take outbound travels. The average number of domestic trips per person is 6.08 trips while the average number of outbound trips per person is 0.41 trips. That is, most Taiwan citizens have either domestic or outbound travel experience, and it makes Taiwan an appropriate survey site for tourism survey. Based on these two perspectives, we conclude that Taiwan is an appropriate empirical setting for B2C mobile tourism service evaluation survey.

The first survey was an online survey for Taiwan tourists who had domestic and/or oversea travelling experiences, better with mobile Internet experiences. We chose the convenience sampling method, and the website address of the online B2C mobile tourism service survey was emailed to one class of the part-time college students who had at least one-year full-time working experience, the full-time graduate students of the Department of Management Information Systems, the members of the Information Management Association in Taiwan, and the authors' personal networks. The respondents were encouraged to forward the online survey to other qualified respondents. There were total 325 effective responses from the tourists.

The second survey was another online B2C mobile tourism service survey for the 3G operators. We targeted three major 3G mobile companies, and they were Chunghwa Telecom Co., Taiwan Mobile Co., and Far Eastone Telecommunication Co. We chose the convenience sampling method, and the online survey website address was forwarded to the contact windows of the three companies, and they promised to forward this online survey to their

coworkers whose jobs were related to the planning, management, and operations of mobile services. There were total 86 effective responses from the mobile industry.

The third survey was a mail survey to the travel agencies in Taiwan. The mailing list of the travel agencies was downloaded from the official website of the Tourism Bureau, Ministry of Transportation and Communications in Taiwan. There were three different travel agency licenses: general, type-A, and type-B. We chose the stratified random sampling method, and 300 travel agencies were randomly selected from 2708 travel agencies. There were 132 return surveys from the travel agencies, and a 44% response rate was obtained from the survey of the travel agencies. Among the 132 returns, 40 questionnaires were with too many missing data; so, remaining 92 questionnaires were usable, representing an effective response rate of 31%, which was satisfactory. Moreover, as shown in Table 2, among the 92 usable questionnaires from the travel agencies, 11 (11.96%) responses had general travel licenses, 76 (82.61%) responses were with type-A travel license, and 5 (5.43%) were with type-B travel licenses. The ratios of effective returns with different travel license types were close to the ratios of the mail surveys and the ratios of the industry profiles. So, the effective returns were representative of the tourism industry.

Table 2. Return Profiles of the Travel Agencies of B2C Survey

Travel License Type	Sample Base		Mail Survey		Effective Return	
	N	%	N	%	N	%
General	275	10.16	30	10.00	11	11.96
Type-A	2281	84.23	252	84.00	76	82.61
Type-B	152	5.61	18	6.00	5	5.43
Total	2708	100.00	300	100.00	92	100.00

Table 3 showed the outline of survey questions of the B2C mobile tourism service evaluation by tourists. The survey questions are extracted from literature reviews, summarized in Table 1. In part one, there were six B2C mobile tourism services from our proposed B2C mobile tourism service classification framework with twenty-one questions. We had five questions for mobile search & notification services, two for mobile community services, three for mobile guide services, six for mobile recommendation services, two for mobile auction services, and three for mobile transaction & payment services. In part two, we wanted the tourists to evaluate the overall usefulness of the proposed B2C mobile tourism services. In part three, we had five user background information questions. The background data of the respondents were limited to travel experiences, 3G mobile Internet experiences, gender, age range, and educational level for minimum background analysis. So, there were total twenty-seven questions in the B2C mobile tourism service evaluation survey, including twenty-one in part one, one in part two, and five in part three. For the user background information, we avoided sensitive personal data like ID number or income. Anonymity was ensured for surveys, as the questionnaires were not traceable to the respondents. We wanted the tourists to evaluate the usefulness of the proposed B2C mobile tourism services. The 5-point Likert scale was used, ranging from “1=not useful at all” to “5=very useful”. The tourist survey (Chinese version) was presented in Appendix 1.

Table 3. Survey Questions of the B2C Mobile Tourism Service Evaluation by Tourists

Part I: Evaluation of B2C mobile tourism service			
No	Mobile services	Questions	Usefulness
1	Mobile search & notification services	(Q1) Safety-related information services	
		(Q2) Road condition & weather report services	
		(Q3) Event schedule change notification services	
		(Q4) Major pre-trip information services	
		(Q5) Reminder services	
2	Mobile community services	(Q6) Tour information inquiry services	
		(Q7) Tour information sharing services	
3	Mobile guide services	(Q8) Pre-recorded mobile guide services	
		(Q9) Interactive mobile guide services	
		(Q10) Theme-based video and audio services	
4	Mobile recommendation services	(Q11) Hotel recommendation services	
		(Q12) Sightseeing recommendation services	
		(Q13) Restaurant recommendation services	
		(Q14) Tour plan recommendation services	
		(Q15) Tour route recommendation services	
		(Q16) Souvenir store recommendation services	
5	Mobile auction services	(Q17) Mobile auction services	
		(Q18) Mobile reverse auction services	
6	Mobile transaction & payment services	(Q19) Mobile booking/reservation services	
		(Q20) Mobile payment services	
		(Q21) Mobile ticketing services	
Part II: Overall evaluation of the B2C mobile tourism services			
The overall usefulness rating of the proposed B2C mobile tourism services			
Part III: User background			
1	What are your travelling experiences (multiple choices)? Domestic budget travelling, domestic group travelling, overseas budget travelling and/or group travelling experiences		
2	Did you ever access Internet via WAP, GPRS, 3G or PHS? Yes or no		
3	Gender: Female or male		
4	Age: Below 20, 20-29, 30-39, 40-49, 50-59 or above 60		
5	Educational level: High school, junior college, college or university, master or PhD		

Table 4 showed the survey questions of the B2C mobile tourism service evaluation presented to the business sides, including the 3G operators and the travel agencies. The survey questions for service providers were the same as the survey questions for tourists, based on literature reviews shown in Table 1. While the tourists evaluated the usefulness of the proposed B2C mobile tourism services, we wanted the business sides to evaluate the importance, feasibility, and cost-benefit effectiveness of the proposed B2C mobile tourism services. The 5-point Likert scale was used, ranging from “1=not important at all/not feasible at all/not cost-benefit effective at all” to “5=very important/very feasible/very cost-benefit effective”. We took (Q1) safety-related information services for example. When it came to the importance dimension, a respondent strongly agreed that the safety-related information services were very important services, and he/she chose 5 to rate the importance of the safety-related information services. However, when it came to the feasibility dimension, he/she strongly disagreed that the safety-related information services were very feasible, and

he/she chose 1 to rate the feasibility of the safety-related information services. He/she held neutral attitude toward the cost-benefit effectiveness of the safety-related information services, and he/she chose 3 to rate the cost-benefit effectiveness of the safety-related information services. The Chinese version of the survey questions for 3G operators and travel agencies was presented in Appendix 2-3.

Table 4. Survey Questions of the B2C Mobile Tourism Service Evaluation by Service Providers

Part I: Evaluation of B2C mobile tourism service					
No	Mobile services	Questions	Importance	Feasibility	Cost-benefit Effectiveness
1	Mobile search & notification services	(Q1) Safety-related information services			
		(Q2) Road condition & weather report services			
		(Q3) Event schedule change notification services			
		(Q4) Major pre-trip information services			
		(Q5) Reminder services			
2	Mobile community services	(Q6) Tour information inquiry services			
		(Q7) Tour information sharing services			
3	Mobile guide services	(Q8) Pre-recorded mobile guide services			
		(Q9) Interactive mobile guide services			
		(Q10) Theme-based video and audio services			
4	Mobile recommendation services	(Q11) Hotel recommendation services			
		(Q12) Sightseeing recommendation services			
		(Q13) Restaurant recommendation services			
		(Q14) Tour plan recommendation services			
		(Q15) Tour route recommendation services			
		(Q16) Souvenir store recommendation services			
5	Mobile auction services	(Q17) Mobile auction services			
		(Q18) Mobile reverse auction services			
6	Mobile transaction & payment services	(Q19) Mobile booking/reservation services			
		(Q20) Mobile payment services			
		(Q21) Mobile ticketing services			
Part II: Overall evaluation of the B2C mobile tourism services					
The overall importance, feasibility, and cost-benefit effectiveness ratings of the proposed B2C mobile tourism services					
Part III: User background					
1	What are your travelling experiences (multiple choices)? Domestic budget travelling, domestic group travelling, oversea budget travelling and/or group travelling experiences				
2	Did you ever access Internet via WAP, GPRS, 3G or PHS? Yes or no				
3	Gender: Female or male				
4	Age: Below 20, 20-29, 30-39, 40-49, 50-59 or above 60				
5	Educational level: High school, junior college, college or university, master or PhD				

There was no lie detector in our surveys because the employees in the mobile and tourism industries were professional workers. There was no prize for filling the questionnaire, and it avoided the unusable replies. For online survey, there was no default answer, and the

respondents needed to complete the whole on-line questionnaire before they clicked the submit button. So, there was no missing data problem for online surveys, but there was possibility for double clicks for online surveys. The website was design to have a thank notice to avoid accident double clicks. Also, IP and completion time were recorded in the online survey for further double checking for double-click problems. We did not filter the same IP address because the IP pooling was used for most companies and Internet service providers. As for mail survey, each questionnaire's mean value was filled as a substitute of missing data if there were no more than three missing values. Questionnaire with too many missing data were deemed unusable.

Reliability is tested in terms of internal reliability, construct reliability and variance extracted. Internal reliability is measured using Cronbach's alpha. 0.60 is satisfactory for exploratory studies, and 0.70 is the generally agreed upon lower limit for Cronbach's alpha (Hair et al., 2010). Construct reliability and variance extracted are calculated from standardized loading and measurement error for each indicator. A commonly used threshold value for acceptable construct reliability is 0.70, and guidelines suggest that the variance extracted value should exceed 0.50 for a construct (Hair et al., 2010).

Validity is assessed in terms of content and constructs validity. Survey questions extracted from literature reviews and refined by group interviews ensure the content validity of the instruments. Construct validity is established by measuring the convergent and discriminant validity of the survey items. When survey items with the same corresponding constructs are significant correlated in the item-to-item correlation matrixes, it indicates the measures satisfy convergent validity. In terms of discriminant validity, when none of the off-diagonal correlations among constructs are higher than the values of the corresponding internal reliability of the construct, it indicates strong discriminant validity. Factor analysis is also performed to validate the construct validity. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (MSA) is used to determine the appropriateness of applying factor analysis. Values above 0.80 for the factor matrix indicate that the use of factor analysis is appropriate (Hair et al., 2010).

Chapter 4 Research Result for B2C Mobile Tourism Service Classification

During the B2C mobile tourism service evaluation stage, three surveys including the tourist survey, 3G operator survey, and travel agency survey were conducted to investigate different stakeholders' opinions toward the proposed B2C mobile tourism services. Survey reliability and validity were assessed, and the results of the descriptive statistics and difference analysis were presented in this chapter. In the following sub-sections, the demographics for B2C mobile tourism service evaluation survey are illustrated in section 4.1. Reliability and validity for B2C mobile tourism service evaluation surveys are presented in section 4.2. The evaluation survey result of the B2C mobile tourism service by tourists is presented in section 4.3. The evaluation result of the B2C mobile tourism service by service providers is described in section 4.4, followed by the discussions on the research results of the B2C mobile tourism service classification in section 4.5.

4.1 Demographics for B2C Mobile Tourism Service Evaluation Survey

As shown in Table 5, there were 325 effective responses from the tourists, 92 effective responses from the travel agency, and 86 effective responses from 3G operators in the B2C mobile tourism service evaluation surveys. So, there were total 503 effective responses, including 325 from the consumer side and 178 from the industry side. The ratio of the respondents from the consumer side to those from the industry side was about 2:1, while the ratio of respondents from the travel agencies to the respondents from the 3G operators was almost 1:1.

Among the 325 respondents from the tourists, 165 (50.8%) respondents were female and 160 (49.2%) respondents were male. The ratio of female to male was about 1:1, about the same sex ratio in Taiwan. About 80% of them were 20-39 because our sampling frame was mainly the full-time and part-time college students. There were only two people below 20 and fourteen people above 50, which were relatively less than other age ranges. More than 80% respondents had college/university degrees or above. 123 (37.8%) respondents had mobile Internet access experiences. All of our respondents had domestic and/or overseas travelling experiences.

Among the 92 respondents from the travel agencies, 60 (65.2%) respondents were female and 32 (34.8%) respondents were male. 35 (38%) respondents were 20-29, 29 (31.5%) respondents were 30-39, and 28 (30.4%) respondents were above 40. More than 60% respondents had college/university degrees or above. 27 (29.3%) had mobile Internet access experiences. All of our respondents had domestic and/or overseas travelling experiences.

Among the 86 respondents from the mobile companies, 22 (25.6%) respondents were female and 64 (74.4%) respondents were male. 10 (11.6%) respondents were 20-29, 53 (61.6%) respondents were 30-39, and 23 (26.8%) respondents were above 40. More than 80%

respondents had college/university degrees or above. More than 70% had mobile Internet access experiences. All of our respondents had domestic and/or oversea travelling experiences.

Table 5. Respondent Profiles for B2C Mobile Tourism Service Surveys

Characteristics		Tourist (n=325)		Travel Agency (n=92)		3G Operator (n=86)		Total (n=503)	
		N	%	N	%	N	%	N	%
Gender	Female	165	50.8	60	65.2	22	25.6	247	49.1
	Male	160	49.2	32	34.8	64	74.4	256	50.9
Age (years)	<=19	2	0.6	0	0.0	0	0.0	2	0.4
	20-29	140	43.1	35	38.0	10	11.6	185	36.8
	30-39	133	40.9	29	31.5	53	61.6	215	42.7
	40-49	36	11.1	23	25.0	14	16.3	73	14.5
	50-59	10	3.1	4	4.3	9	10.5	23	4.6
	>=60	4	1.2	1	1.1	0	0.0	5	1.0
Educational level	High school	6	1.8	11	12.0	1	1.2	18	3.6
	Junior college	37	11.4	22	23.9	10	11.6	69	13.7
	College or university	173	53.2	46	50.0	47	54.7	266	52.9
	Master	91	28.0	12	13.0	26	30.2	129	25.6
	PhD	18	5.5	1	1.1	2	2.3	21	4.2
Mobile Internet access experience	Yes	123	37.8	27	29.3	62	72.1	212	42.1
	No	202	62.2	65	70.7	24	27.9	291	57.9
Domestic budget travelling experience	Yes	276	84.9	74	80.4	77	89.5	427	84.9
	No	49	15.1	18	19.6	9	10.5	76	15.1
Domestic group travelling experience	Yes	132	40.6	57	62.0	34	39.5	223	44.3
	No	193	59.4	35	38.0	52	60.5	280	55.7
Oversea budget travelling experience	Yes	160	49.2	49	53.3	34	39.5	243	48.3
	No	165	50.8	43	46.7	52	60.5	260	51.7
Oversea group travelling experience	Yes	215	66.2	70	76.1	70	81.4	355	70.6
	No	110	33.8	22	23.9	16	18.6	148	29.4

4.2 Reliability and Validity for B2C Mobile Tourism Service Evaluation Survey

The reliability and correlation matrix of constructs for tourist survey, 3G operator survey, and travel agency survey were shown in Tables 6-8 respectively. As shown in Table 6, for the tourist survey, the Cronbach's alpha ranged from 0.77 to 0.94, higher than 0.70, which indicated that the tourist survey passed the internal reliability assessment. The construct reliability of the tourist survey ranged from 0.78 to 0.96, higher than 0.70, which indicated that the tourist survey passed this construct reliability assessment. The variance extracted in the tourist survey ranged from 0.54 to 0.85, higher than 0.50, which meant that the tourist survey passed this construct reliability assessment. As shown in Table 7, the Cronbach's alpha ranged from 0.73 to 0.95 for the importance dimension, 0.77 to 0.93 for the feasibility dimension, and 0.76 to 0.95 for the effectiveness dimension for the 3G operator survey, which

indicated high internal consistency. As for the travel agency survey, the Cronbach's alpha ranged from 0.77 to 0.94 for both importance and feasibility dimensions as shown in Table 8. As for the effectiveness dimension for the travel agency survey, except for the RECOM construct with the Cronbach's alpha of 0.66 which was a little lower than 0.70, all other constructs were with high reliability values ranging from 0.71 to 0.92. Overall, the results from the three surveys indicated acceptable reliability.

Validity was assessed in terms of content and construct validity. In our research, content validity was satisfactory because all question items were extracted from the literature reviews, and the survey questions were refined through semi-structured group interviews. These development procedures ensured the content validity of the instruments. Construct validity was established by measuring the convergent and discriminant validity of the survey items. Most of the items with the same corresponding constructs were significantly correlated as shown in the item-to-item correlation matrixes in Appendix 7-13, and it indicated that our measures satisfied convergent validity. In terms of discriminant validity for the tourist survey, as shown in Table 6, none of the off-diagonal correlations were higher than the diagonal values, which indicated strong discriminant validity for the tourist survey. As shown in Table 7, all elements passed the discriminant validity for the 3G operator survey except for the correlation between ALL construct and RECOM construct with a value of 0.76 which was a little lower than the Cronbach's alpha for ALL construct with a value of 0.75 in the importance dimension for 3G operator survey. For the travel agency survey, none of the correlations between constructs was sufficiently high to jeopardize discriminant validity for both importance and feasibility dimensions as shown in Table 8. As for the effectiveness dimension, only one element failed the discriminant validity for travel agency survey. That was, the correlation between ALL construct and RECOM construct with a value of 0.68 which was high than the Cronbach's alpha of RECOM construct with a value of 0.66. Overall, the results from the three surveys confirmed the discriminant validity.

A factor analysis using SPSS was conducted on the tourist data. The value of MSA found in this study was 0.883, which verified that the use of factor analysis was appropriate in this study. Bartlett's Test of Sphericity (chi-square) value was 4614.974, which was significant at $p=0.000$. This test showed that a significant correlation existed among at least some of the variables. The rotated factor matrix, resulting from a Varimax rotated principal axis factor extraction of the independent variables with six factors extracted, which indicated that six factors merged and reported their factor loadings in Table 9 and Table 10. The six extracted factors were named RECOM (factor 1), NOTI (factor 2), GUIDE (factor 3), T&P (factor 4), AUC (factor 5), and COM (factor 6). These six extracted factors accounted for 75.368% of the total variation in the original variables. RECOM had an eigenvalue of 8.279 and alone explained a variance of 39.424%. NOTI had an eigenvalue of 2.360; GUIDE had an eigenvalue of 1.668; T&P had an eigenvalue of 1.366; AUC had an eigenvalue of 1.216; COM had an eigenvalue of 0.938. These results showed that except for COM (0.938), all extracted factors were useful because they all had eigenvalues greater than one. The factor loadings ranged from 0.465 to 0.842 for NOTI, 0.747 to 0.821 for COM, 0.699 to 0.873 for GUIDE, 0.773 to 0.893 for RECOM, 0.898 to 0.902 for AUC, and 0.552 to 0.896 for T&P. Except for NOTI5 (0.465), all factor loadings were larger than 0.5, representing an acceptable significant level of internal validity. Since all factor loadings were of an acceptable significant

level, all question items were retained for further analysis. The mean value and standard deviation for NOTI were 4.44 and 0.509 respectively; the mean value and standard deviation for COM were 3.45 and 0.973 respectively; the mean value and standard deviation for GUIDE were 3.48 and 0.963 respectively; the mean value and standard deviation for RECOM were 4.16 and 0.706 respectively; the mean value and standard deviation for AUC were 3.38 and 1.065 respectively; the mean value and standard deviation for T&P were 3.78 and 0.914.

Table 6. Reliability and Correlation Matrix of Constructs for Tourist Survey

Construct	Cronbach's Alpha	Construct Reliability	Variance Extracted	Inter-Construct Correlations					
				NOTI	COM	GUIDE	RECOM	AUC	T&P
NOTI	0.77	0.88	0.59	(0.77)					
COM	0.83	0.82	0.69	0.39**	(0.83)				
GUIDE	0.87	0.85	0.66	0.37**	0.51**	(0.87)			
RECOM	0.94	0.96	0.81	0.54**	0.51**	0.46**	(0.94)		
AUC	0.93	0.92	0.85	0.24**	0.39**	0.42**	0.34**	(0.93)	
T&P	0.80	0.78	0.54	0.34**	0.44**	0.40**	0.33**	0.40**	(0.80)

Table 7. Reliability and Correlation Matrix of Constructs for 3G Operator Survey

Dimension	Construct	Cronbach's Alpha	Inter-Construct Correlations					
			NOTI	COM	GUIDE	RECOM	AUC	T&P
Importance	NOTI	0.73	(0.73)					
	COM	0.83	0.46**	(0.83)				
	GUIDE	0.87	0.45**	0.65**	(0.87)			
	RECOM	0.90	0.43**	0.61**	0.49**	(0.90)		
	AUC	0.95	0.29**	0.59**	0.54**	0.40**	(0.95)	
	T&P	0.82	0.39**	0.31**	0.49**	0.34**	0.31**	(0.82)
Feasibility	NOTI	0.77	(0.77)					
	COM	0.83	0.50**	(0.83)				
	GUIDE	0.90	0.53**	0.58**	(0.90)			
	RECOM	0.92	0.55**	0.54**	0.57**	(0.92)		
	AUC	0.93	0.41**	0.44**	0.60**	0.47**	(0.93)	
	T&P	0.79	0.43**	0.49**	0.65**	0.49**	0.43**	(0.79)
Effectiveness	NOTI	0.76	(0.76)					
	COM	0.85	0.42**	(0.85)				
	GUIDE	0.89	0.39**	0.63**	(0.89)			
	RECOM	0.93	0.61**	0.61**	0.60**	(0.93)		
	AUC	0.95	0.35**	0.45**	0.51**	0.51**	(0.95)	
	T&P	0.78	0.25**	0.38**	0.45**	0.40**	0.37**	(0.78)

Note: The numbers on the diagonal are the internal reliability. Off-diagonal elements are correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

**Correlation is significant at the 0.01 level (2-tailed).

Table 8. Reliability and Correlation Matrix of Constructs for Travel Agency Survey

Dimension	Construct	Cronbach's Alpha	Inter-Construct Correlations						
			NOTI	COM	GUIDE	RECOM	AUC	T&P	
Importance	NOTI	0.81	(0.81)						
	COM	0.90	0.36**	(0.90)					
	GUIDE	0.87	0.37**	0.50**	(0.87)				
	RECOM	0.94	0.55**	0.54**	0.41**	(0.94)			
	AUC	0.93	0.37**	0.38**	0.52**	0.52**	(0.93)		
	T&P	0.80	0.39**	0.46**	0.46**	0.49**	0.67**	(0.80)	
Feasibility	NOTI	0.77	(0.77)						
	COM	0.86	0.39**	(0.86)					
	GUIDE	0.90	0.36**	0.48**	(0.90)				
	RECOM	0.94	0.48**	0.61**	0.44**	(0.94)			
	AUC	0.92	0.34**	0.39**	0.51**	0.43**	(0.92)		
	T&P	0.81	0.31**	0.44**	0.50**	0.46**	0.54**	(0.81)	
Effectiveness	NOTI	0.81	(0.81)						
	COM	0.87	0.43**	(0.87)					
	GUIDE	0.86	0.41**	0.51**	(0.86)				
	RECOM	0.66	0.48**	0.58**	0.47**	(0.66)			
	AUC	0.92	0.31**	0.40**	0.48**	0.39**	(0.92)		
	T&P	0.84	0.30**	0.36**	0.44**	0.37**	0.49**	(0.84)	

*Note: The numbers on the diagonal are the internal reliability. Off-diagonal elements are correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements. **Correlation is significant at the 0.01 level (2-tailed).*

Table 9. Cross-Factor Loadings

	NOTI	COM	GUIDE	RECOM	AUC	T&P
NOTI1	0.842	0.093	0.061	0.138	-0.054	0.098
NOTI2	0.768	0.018	0.032	0.304	0.057	0.125
NOTI3	0.593	0.098	0.042	0.380	-0.005	0.090
NOTI4	0.666	0.176	0.156	0.083	0.099	-0.073
NOTI5	0.465	-0.133	0.207	0.218	0.215	0.247
COM1	0.197	0.747	0.214	0.314	0.205	0.167
COM2	0.119	0.821	0.226	0.245	0.125	0.200
GUIDE1	0.135	0.137	0.870	0.168	0.144	0.073
GUIDE2	0.145	0.095	0.873	0.167	0.135	0.175
GUIDE3	0.074	0.223	0.699	0.311	0.164	0.168
RECOM1	0.248	0.023	0.114	0.804	0.140	0.067
RECOM2	0.225	0.070	0.118	0.884	0.073	0.055
RECOM3	0.170	0.089	0.133	0.893	0.106	0.100
RECOM4	0.170	0.141	0.169	0.838	0.141	0.088
RECOM5	0.183	0.218	0.143	0.773	0.093	0.129
RECOM6	0.122	0.194	0.175	0.782	0.050	0.102
AUC1	0.046	0.110	0.145	0.191	0.902	0.110
AUC2	0.048	0.151	0.200	0.146	0.898	0.162
T&P1	0.048	0.061	0.118	0.144	0.057	0.896
T&P2	0.068	0.192	0.122	0.128	0.105	0.880
T&P3	0.262	0.122	0.187	0.056	0.381	0.552

Table 10. Factor Analysis Results

No	Construct	M	SD	Eigen-value	Variance Explained %	Indicator	Mean	Standard Deviation	Factor Loading
2	NOTI	4.44	0.509	2.360	11.239	NOTI1	4.56	0.643	0.842
						NOTI2	4.50	0.674	0.768
						NOTI3	4.30	0.754	0.593
						NOTI4	4.39	0.769	0.666
						NOTI5	4.44	0.667	0.465
6	COM	3.45	0.976	0.938	4.469	COM1	3.58	1.020	0.747
						COM2	3.33	1.088	0.821
3	GUIDE	3.48	0.963	1.668	7.942	GUIDE1	3.42	1.143	0.870
						GUIDE2	3.57	1.042	0.873
						GUIDE3	3.46	1.058	0.699
1	RECOM	4.16	0.706	8.279	39.424	RECOM1	4.29	0.744	0.804
						RECOM2	4.22	0.755	0.884
						RECOM3	4.18	0.778	0.893
						RECOM4	4.13	0.811	0.838
						RECOM5	4.16	0.827	0.773
						RECOM6	4.00	0.887	0.782
5	AUC	3.38	1.065	1.216	5.791	AUC1	3.42	1.110	0.902
						AUC2	3.34	1.090	0.898
4	T&P	3.78	0.914	1.366	6.505	T&P1	3.82	1.051	0.896
						T&P2	3.66	1.121	0.880
						T&P3	3.85	1.065	0.552

Note: No: factor number; M: mean; SD: standard deviation; Varimax rotated principal axis factor extraction by SPSS software; MSA=0.883 and Barillett's Test of Sphericity (chi-sqaure)=4614.974, significant=0.000; These six extracted factors accounted for 75.368% of the total variation in the original variables.

4.3 B2C Mobile Tourism Service Evaluation by Tourists

In this subsection, survey results of B2C mobile tourism service evaluation by tourists were discussed. The mean values of the usefulness ratings of the B2C mobile tourism services ranged from 3.38 to 4.44, as shown in Table 11. The usefulness ranking orders of the B2C mobile tourism services were mobile search & notification services, mobile recommendation services, mobile transaction & payment services, mobile guide services, mobile community services, and mobile auction services in this order. From system development perspectives, the B2C mobile tourism services were further categorized based on the functional complexity of the B2C mobile tourism services. The mobile search & notification services were categorized as mobile information & communication services. The community services were categorized as location-based services. The mobile guide services and mobile recommendation services were categorized as context-aware services. The mobile auction services and mobile transaction & payment services were categorized as transaction-support services. The functional complexity order (from simple to complex) was the mobile information & communication services, the location-based services, the context-aware services, while the transaction-support services were supporting services to support mobile commerce transactions. To sum up, the mobile search & notification services were the most useful B2C mobile tourism services from tourists' perspectives and it was also simple B2C mobile tourism services from system development perspectives. The mobile recommendation services were the second useful B2C mobile tourism services and it was complex B2C mobile tourism services. The transaction & payment services were the third useful B2C mobile tourism services and it was the supporting services to support transactions of mobile commerce. Within the top three useful B2C mobile tourism services, the mobile search & notification services were simple mobile tourism services and there was no technical bottlenecks to build the mobile search & notification services. As for the transaction-support services, there were already some practical implementation, and the technology complexity was not an issue for this type of mobile tourism services. However, the mobile recommendation services were useful yet complex B2C mobile tourism services. There were not many supports for personalization and location with current solutions of the mobile recommendation services, and it meant that many research efforts were deserved to investigate the feasibility and effectiveness of the system design and implementation of personalized and location-based mobile recommendation services. This gave us a strong reason to choose the mobile recommendation services as the research scope for system development of B2C mobile tourism services.

Table 11. B2C Mobile Tourism Service Evaluation by Tourists

	Functional Complexity	Mobile Services	Mean	Standard Deviation	Ranking
Simple	Mobile information & communication services	NOTI	4.44	0.509	1
Compound	Location-based services	COM	3.45	0.976	5
Complex	Context-aware services	GUIDE	3.48	0.963	4
		RECOM	4.16	0.706	2
Supporting	Transaction-support services	AUC	3.38	1.065	6
		T&P	3.78	0.914	3

4.4 B2C Mobile Tourism Service Evaluation by Service Providers

In this subsection, B2C mobile tourism service evaluation by service providers was discussed. Table 12 showed the mean value, standard deviation, and ranking of the importance, feasibility, and cost/benefit effectiveness ratings of the B2C mobile tourism services by 3G operators and travel agencies. For the 3G operators, the mean values of the importance ratings of the B2C mobile tourism services ranged from 3.17 to 4.46. The mean values of the feasibility ratings of the B2C mobile tourism services ranged from 3.58 to 4.41. The mean values of the cost/benefit effectiveness ratings of the B2C mobile tourism services ranged from 2.91 to 4.08. It meant that the proposed B2C mobile tourism services were important, feasible and cost/benefit effective for the 3G operators. As for the travel agencies, the mean values of the importance ratings of the B2C mobile tourism services ranged from 2.48 to 4.12. The mean values of the feasibility ratings of the B2C mobile tourism services ranged from 2.52 to 3.94. The mean values of the cost/benefit effectiveness ratings of the B2C mobile tourism services ranged from 2.22 to 3.44. So, the proposed B2C mobile tourism services were only nice-to-have services for the travel agencies, and the travel agencies were more conservative about investing in the B2C mobile tourism services. There were significant differences in the mean values of the importance, feasibility and cost/benefit effectiveness ratings of the B2C mobile tourism services between 3G operators and travel agencies. While the 3G operators were more aggressive than the travel agencies, both business sides agreed that the top three important, feasible, and cost/benefit effective B2C mobile tourism services were mobile search & notification services, mobile recommendation services, and mobile transaction & payment services in this order.

Table 12. B2C Mobile Tourism Service Evaluation by Service Providers

Dimension	Construct	3G Operator			Travel Agency			F-value	D
		M	SD	R	M	SD	R		
Importance	NOTI	4.46	0.549	1	4.12	0.862	1	9.614	***
	COM	3.17	1.053	5	2.53	1.142	4	15.112	***
	GUIDE	3.17	1.040	5	2.49	1.093	5	18.305	***
	RECOM	3.97	0.765	2	3.32	1.102	2	20.758	***
	AUC	3.23	1.124	4	2.48	1.296	6	17.099	***
	T&P	3.65	1.001	3	3.04	1.144	3	14.495	***
Feasibility	NOTI	4.41	0.597	1	3.94	0.839	1	18.699	***
	COM	3.58	1.108	5	2.62	1.187	5	31.113	***
	GUIDE	3.58	1.107	5	2.74	1.132	4	24.913	***
	RECOM	4.06	0.769	2	3.33	1.073	2	27.183	***
	AUC	3.67	1.103	4	2.52	1.236	6	42.891	***
	T&P	3.85	0.960	3	2.96	1.142	3	31.361	***
Effectiveness	NOTI	4.08	0.722	1	3.44	1.040	1	22.616	***
	COM	2.91	1.141	6	2.22	1.080	6	17.454	***
	GUIDE	2.93	1.113	5	2.39	1.073	4	10.971	***
	RECOM	3.75	0.920	2	3.19	1.565	2	8.309	***
	AUC	3.21	1.250	4	2.28	1.232	5	25.090	***
	T&P	3.67	0.993	3	2.82	1.177	3	27.258	***

Note: M: mean; SD: standard deviation; R: ranking; D: difference; *** $p < 0.001$.

Table 13 showed the mean value, standard deviation, and ranking of the importance, feasibility, and cost/benefit effectiveness ratings of the B2C mobile tourism services by travel agencies with different travel license types. For the travel agencies with general licenses, the mean values of the importance ratings of the B2C mobile tourism services ranged from 2.68 to 4.56. For the travel agencies with type-A licenses, the mean values of the importance ratings of the B2C mobile tourism services ranged from 2.45 to 4.09. For the travel agencies with type-B licenses, the mean values of the importance ratings of the B2C mobile tourism services ranged from 1.80 to 3.56. There were two interesting findings. First, bigger travel agencies gave higher scores to the importance ratings of the B2C mobile tourism services than the smaller travel agencies. Secondly, travel agencies with different license types agreed that the top three important B2C mobile tourism services were mobile search & notification services, mobile recommendation services, and mobile transaction & payment services in this order.

Table 13. B2C Mobile Tourism Service Evaluation by Travel Agency Types

Dimension	Construct	General			Type-A			Type-B			D
		M	SD	R	M	SD	R	M	SD	R	
Importance	NOTI	4.56	0.650	1	4.09	0.849	1	3.56	1.187	1	NS
	COM	3.27	0.817	4	2.47	1.144	5	1.80	1.095	5	***
	GUIDE	2.88	0.898	5	2.45	1.141	6	2.20	0.447	4	NS
	RECOM	3.99	0.762	2	3.28	1.106	2	2.43	0.983	2	***
	AUC	2.68	1.270	6	2.49	1.325	4	1.80	0.758	5	NS
	T&P	3.36	1.069	3	3.04	1.143	3	2.33	1.225	3	NS
Feasibility	NOTI	4.64	0.512	1	3.84	0.837	1	3.88	0.832	1	***
	COM	3.36	1.343	5	2.53	1.138	5	2.30	1.204	5	NS
	GUIDE	3.45	1.327	4	2.65	1.104	4	2.47	0.506	4	NS
	RECOM	4.12	0.840	2	3.26	1.057	2	2.57	0.976	3	***
	AUC	2.91	1.068	6	2.51	1.274	6	1.90	0.742	6	NS
	T&P	3.58	1.106	3	2.87	1.142	3	3.07	0.983	2	NS
Effectiveness	NOTI	4.18	0.583	1	3.37	1.043	1	2.92	1.188	1	***
	COM	2.82	1.146	5	2.18	1.054	6	1.50	0.866	6	NS
	GUIDE	3.06	0.941	4	2.34	1.081	4	1.73	0.494	5	***
	RECOM	3.92	1.063	2	3.15	1.621	2	2.10	0.778	3	NS
	AUC	2.64	1.416	6	2.24	1.232	5	2.00	0.791	4	NS
	T&P	3.21	1.214	3	2.77	1.184	3	2.67	1.027	2	NS

Note: M: mean; SD: standard deviation; R: ranking; D: difference; NS: non-significant; *** $p < 0.001$.

When it came to the feasibility ratings of the B2C mobile tourism services by travel agencies with different travel license types, the mean values of the feasibility ratings of the B2C mobile tourism services rated by travel agencies with general license types ranged from 2.91 to 4.64. For the travel agencies with type-A licenses, the mean values of the feasibility ratings of the B2C mobile tourism services ranged from 2.51 to 3.84. For the travel agencies with type-B licenses, the mean values of the feasibility ratings of the B2C mobile tourism services ranged from 1.90 to 3.88. Overall speaking, travel agencies with general licenses held more positive attitudes toward the feasibility assessment of the proposed B2C mobile tourism services than the travel agencies with type-A or type-B licenses. Another finding was that travel agencies with different license types agreed that the top three feasible B2C mobile

tourism services were mobile search & notification services, mobile recommendation services, and mobile transaction & payment services.

Now we talked about the cost/benefit effectiveness ratings of the B2C mobile tourism services by travel agencies with different travel license types. For travel agencies with general license types, the mean values of the cost/benefit effectiveness ratings of the B2C mobile tourism services ranged from 2.64 to 4.18. For the travel agencies with type-A licenses, the mean values of the cost/benefit effectiveness ratings of the B2C mobile tourism services ranged from 2.18 to 3.37. For the travel agencies with type-B licenses, the mean values of the cost/benefit effectiveness ratings of the B2C mobile tourism services ranged from 1.50 to 2.92. Interesting findings were as follows. First, bigger travel agencies gave higher scores to the cost/benefit effectiveness ratings of the B2C mobile tourism services than the smaller travel agencies. Secondly, travel agencies with different license types agreed that the top three cost/benefit effective B2C mobile tourism services were mobile search & notification services, mobile recommendation services, and mobile transaction & payment services.

Table 14 showed the B2C mobile tourism service evaluation from multiple perspectives including the mean value and ranking of usefulness rating of the B2C mobile tourism services by tourists along with the mean value and ranking of the importance, feasibility, and cost/benefit effectiveness ratings of the B2C mobile tourism services by 3G operators and travel agencies. Both 3G operators and the travel agencies agreed that the top three important, feasible and cost-benefit effective B2C mobile tourism services are the mobile recommendation services, the mobile search & notification services, and the mobile transaction & payment services while these three B2C mobile tourism services were the top three useful mobile tourism services from the tourists' perspectives. It meant that the tourists, 3G operators and travel agencies had consensus on the top three B2C mobile tourism services.

Table 14. B2C Mobile Tourism Service Evaluation by Multiple Perspectives

Construct	Tourist		3G Operator						Travel Agency					
	U		I		F		E		I		F		E	
	M	R	M	R	M	R	M	R	M	R	M	R	M	R
NOTI	4.44	1	4.46	1	4.41	1	4.08	1	4.12	1	3.94	1	3.44	1
COM	3.45	5	3.17	5	3.58	5	2.91	6	2.53	4	2.62	5	2.22	6
GUIDE	3.48	4	3.17	5	3.58	5	2.93	5	2.49	5	2.74	4	2.39	4
RECOM	4.16	2	3.97	2	4.06	2	3.75	2	3.32	2	3.33	2	3.19	2
AUC	3.38	6	3.23	4	3.67	4	3.21	4	2.48	6	2.52	6	2.28	5
T&P	3.78	3	3.65	3	3.85	3	3.67	3	3.04	3	2.96	3	2.82	3

Note: U: usefulness; I: importance; F: feasibility; E: cost-benefit effectiveness; M: mean; R: ranking.

4.5 Discussion on B2C Mobile Tourism Service Classification Result

Our research results indicate that the mobile community services are not attractive to the tourists compared to other proposed B2C mobile tourism services. One explanation is that the survey was distributed in 2007 while the Facebook community (Chinese version) was launched in 2008 and the check in function on the Facebook community via mobile devices

was launched in 2012. In 2007, the check in and photo sharing functions were not common enough for tourists to recognize the usefulness of mobile community services. It is understandable that why the survey results indicate a weak usefulness rating of the mobile community services compared to other proposed B2C mobile tourism services. With the wide acceptance of the check in function on the Facebook community via mobile devices, it is reasonable to expect that tourists will have a more positive attitude towards the mobile community services, and thus the usefulness rating of the mobile community services will have a more positive result.

While the usefulness assessment addresses which B2C mobile tourism service is attractive to tourists, the importance, feasibility, and cost-benefit effectiveness assessments address which B2C mobile tourism service is attractive to the businesses. Our results indicate that the top three useful B2C mobile tourism services are the mobile search & notification services, the mobile recommendation services, and the mobile transaction & payment services from tourists' perspectives, and these three B2C mobile tourism services are also the top three important, feasible and cost-benefit effective B2C mobile tourism services from service providers' perspectives. It is good that both tourists and service providers have agreements on the top three B2C mobile tourism service list. It can be concluded that instead of providing individual B2C mobile tourism services, the mobile service package of B2C mobile tourism services consisting of the mobile search & notification services, the mobile recommendation services, and the mobile transaction & payment services will be accepted by tourists because the top three most useful B2C mobile tourism services are combined in the mobile service package.

Further, the research results report that while 3G operators and travel agencies have the same ranking orders of the proposed B2C mobile tourism services in the importance, feasibility and cost-benefit effectiveness dimensions; however, travel agencies are more conservative toward the B2C mobile tourism services than the 3G operators are on the importance, feasibility and cost/benefit effectiveness ratings of the proposed B2C mobile tourism services. This implies that the travel agencies are concerned with the technology complexity issues and they doubt if they can really profit from B2C mobile tourism services. The implication is that 3G operators need to overcome the technology complexity concerns and come up with a cost sharing and profit sharing business model to work with the travel agencies to share costs as well as profits to make the tourism industry feel more interested in the B2C mobile tourism services. The results also suggest that business alliance is a must-to-do because 3G operators have the infrastructure while the travel agencies are vital tourism content providers and either side alone cannot provide sophisticated B2C mobile tourism services.

Chapter 5 System Development for B2C Mobile Tourism Service

In this chapter, this study describes the system development of personalized and location-based tour planning recommendation services to demonstrate how mobile recommendation services support tourists' decisions on the move. The information, decision and functional requirements of personalized location-based tour planning recommendation services are presented in section 5.1. Based on the requirement analysis, a functional framework and recommendation process to support personalized and location-based tour planning recommendation services are provided in section 5.2. The database design, model base, and knowledge base design for the mobile tour planning recommendation services are presented in section 5.3. Section 5.4 contains the descriptions of the system development and system evaluation of the prototype system of personalized and location-based tour planning recommendation services.

5.1 Requirement Analysis of B2C Mobile Tourism Service

The information and decision requirements for supporting personalized and location-based tour planning services include (1) user profiles containing personalized preferences, needs, constraints and self-specified evaluation criteria, (2) mobile tourists' time and location information, (3) tourism related destination, attraction, and accommodation information, (4) decision associated model, knowledge, and process information. Major location-based tourism information that tourists requested includes destination-oriented information about what to see, where to eat, and where to stay overnight, etc. Specified information for sightseeing spots include tourism types and features (such as culture-archeological site, sport-ski park), sightseeing theme, opening hours, ticket price, location and map, transportation and directions, briefings and suggested visiting time, etc. Detailed accommodation information specified include hotel name, hotel class (star rating), brief introduction, hotel location (city/region/address) and map, transportation and directions, distances to point-of-interests (e.g. train stations, historical sites, city center, etc.), check-in/checkout times, available rooms, facilities, price per room per night, room availability, photos, booking services, website and contact information, and customer rating score, etc. Detailed dining and restaurant information includes restaurant name, food type, location, map, transportation, opening hours, customer rating score, menu and recommended food lists, etc.

In addition to information requirements, functional requirements specified include user profile management, tourism information management, location-aware personalized recommendation of attractions (e.g. sightseeing spots, museums, restaurants, hotels) and tour plans, tour plan management, as well as map-based positioning and visualization. A few more functions required in the back end system include model base and knowledge base management, as well as ontology and case base management provided that they are used as matching techniques. The design scopes include functional architecture design, process design, user interface design, presentation design, database design, model base design, knowledge

base design, as well as the ontology and case base design, etc. In the following subsections, descriptions will focus on the functional framework and recommendation process, as well as database, model base, and rule base design considerations.

5.2 System Framework and Process for B2C Mobile Tourism Service

Based on the results of requirement specifications, a functional framework for supporting the personalized location-based tour planning recommendation is presented in Figure 10. The core services of the personalized location-based tour planning recommendation offered to the tourists include single-typed attraction/point-of-interest recommendation and packaged tour plan recommendation. A recommended tour plan bundles and schedules a series of selected sightseeing spots, restaurants and hotel with specified sequence and suggested time-to-stay. For an example, a tourist may like to make a half day tour in a city starting from his current position and time, and based on his preference, needs, time and device constraints, as well as criteria for site selections. He would also like to be able to reconfigure his tour plan by the time he leaves a sightseeing spot or restaurant, and use his current time and location for recommending the next visit or subsequent visits with suggested visiting time.

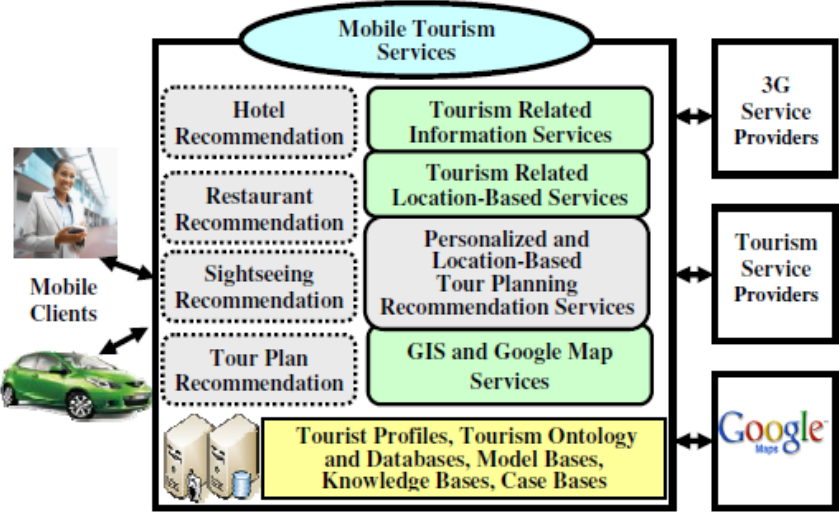


Figure 10. Functional Framework for Mobile Tour Planning Recommendation

The personalized and location-based tour planning recommendation services are comprised of four recommendation services including hotel recommendation services, restaurant recommendation services, sightseeing recommendation services, and tour plan recommendation services. These four recommendation services are responsible to get tourist preference inputs, to activate the corresponding back-end recommendation models and to present the recommendation results. There are four corresponding back-end recommendation models in the prototype system including hotel recommendation model, restaurant recommendation model, sightseeing recommendation model, and tour plan recommendation model. These recommendation models process queries posted by the tourists to the database tier. They interact with the databases to select and filter the query results. The results are then

ranked using a similarity metric that measures the distance between a selected item and the tourist preference setting and output to the mobile devices. There are three back-end supportive services: the tourism related information services linking with tour services providers, the tourism related location-based services linking with the 3G service providers, and GIS and Google map services linking with Google map server. These supportive services allow tourists to access tourism information, tourist location information and location aware tourism site information, as well as geographical information and maps associated with tourists and tourism attractions. The core tour planning recommendation services also use these supportive services to generate content descriptions for recommended attractions or the tour plan, and display the result in the tourist’s mobile device. The tourist profiles, tourism ontology and databases, model bases, knowledge bases, and case bases, etc. are built and deployed to support the personalized and location-based tour planning recommendation services.

Based on the proposed functional framework, personalized location-based recommendation services can be generated to support tourists in making decisions that answer questions including what and where to eat for lunch or dinner? Are there any nearby interesting sightseeing spots? Are they still open and do we have enough time to visit? Where to stay for tonight? A recommended tour plan summarizes the desired decision outcomes and organized them into a sequential process with suggested time to stay. Figure 11 depicts an example flow chart of the personalized location-based tour planning recommendation process. Once the tourist activates the location-based tour planning recommendation services, the tourist’s current location is identified and current time is recorded, personal preferences and criteria are retrieved or specified online. For instance, in the example scenario, the time periods specified for lunch time and dinner time are 11:00 am-14:00 pm and 18:00-21:00 pm respectively, the maximal number of visiting spots is set to be 7, and the time for ending daily activities is set to be 21:00 pm. The search ranges can also be set to, for example, 3 km for restaurants and 5 km for sightseeing spots.

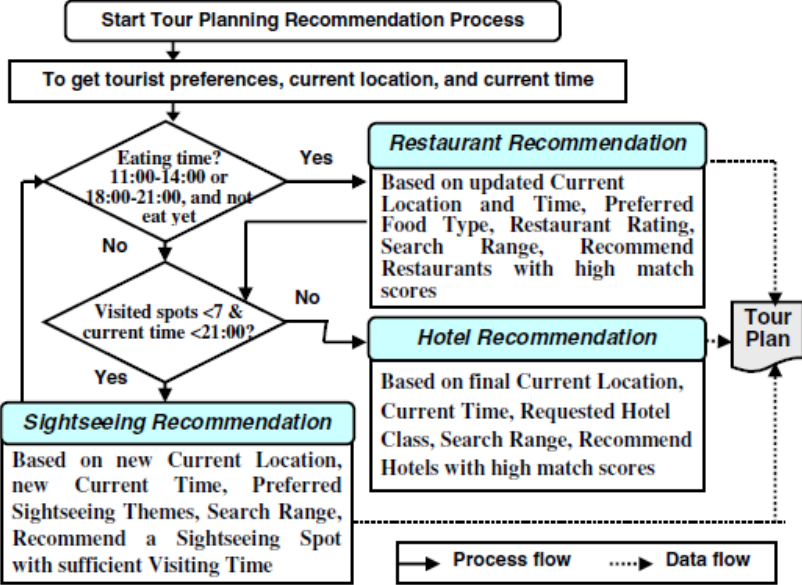


Figure 11. Personalized Location-based Tour Planning Recommendation Process

During the recommendation process, if the updated current time is around the lunch time or the dinner time periods, and the tourist has not eat yet, then the restaurant recommendation service is launched to locate a preferred restaurant within certain search range. If the current time is not in the eating time zones and is no later than 21:00 pm, the number of visited sightseeing spots is less than 7, and there are still nearby open unvisited sightseeing spots with sufficient visiting time, then the recommendation process continues to activate the sightseeing recommendation services. If the current time reaches the time limit 21:00 pm or the number of visited sightseeing spots reaches 7, then the hotel recommendation service is activated. Finally, the complete tour plan consists of sequentially arranged places generated from restaurants, sightseeing spots, and hotel recommendations is sent to and presented in the tourist’s mobile device.

5.3 Database Design for B2C Mobile Tourism Service

For designing and developing system database, the Object-Oriented (OO) database design approach is adopted to create the conceptual data model, and then the OO model is translated into an entity-relationship (ER) model which is further transformed into the internal relational model for physical database implementation. Figure 12 presents the OO data model in which identified objects include Tourist, Tourism Information, Tour Plan, and Recommendation Process. The Tourist object composes of Needs and Preferences (N&P), Search Range and Criteria, as well as Current Location and Time objects, and the Needs and Preferences object is further classified into Sightseeing N&P, Restaurant N&P, and Hotel N&P objects. The Tourism Information object aggregates three sub-class objects including Sightseeing Spots Information, Restaurant Information, and Hotel Information objects. The Recommendation Process object has several component objects including Process Input, Recommendation Model, Recommendation Rule, and Process Output. The Tour Plan object consists of Sightseeing Spot Selection, Restaurant Selection, and Hotel Selection objects as the components.

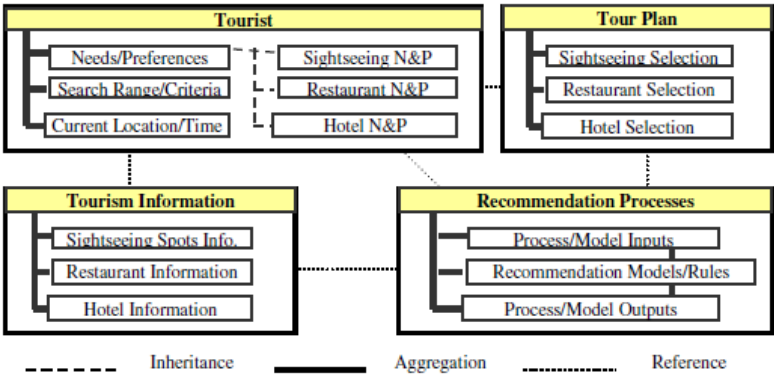


Figure 12. Object-Oriented Data Model

Figure 13 depicts the class diagram of our prototype system. There are seven classes in our system including the tour plan class, the hotel class, the restaurant class, the sightseeing spot class, the tourist preference class, the tourist location class and the Google map class.

The attributes of the tour plan class include tour plan ID (tourPlanID), tourist's mobile phone number (mobilePhoneNumber), tour date (tourDate), sequence of what to do (sequenceOfWhatToDo), recommended activity (recommendedActivity), place ID (placeID), recommended interval (recommendedStartTime and recommendedEndTime), and distance from previous place (distance). The recommended activity field remarks different activities like lunch, dinner, sightseeing, or hotel. With the place ID, our system further links to the corresponding detailed information about the recommended dining, sightseeing or hotel by restaurant ID, sightseeing ID or hotel ID. The tour plan class uses methods to execute the tour plan recommendation (executeTourPlanRecommendation), to get the current time (getCurrentTime), to get the tourist's current location (getTouristLocation), to request more detailed hotel information (getHotelInformation), to access more information about the suggested restaurant (getRestaurantInformation), to retrieve the recommended sightseeing information (getSightseeingInformation), to calculate the distance between two sequence spots (calculateDistance), and to get map display of specific site (getMap). The attributes of the hotel class include hotel ID (hotelID), name (hotelName), class (hotelClass), phone number (hotelPhoneNumber), address (hotelAddress), direction (hotelDirection), check in time (hotelCheckinTime), check out time (hotelCheckoutTime), briefing (hotelBriefing), and the location of the hotel (hotelLongitude and hotelLatitude). Four methods used by the hotel class are to execute the hotel recommendation (executeHotelRecommendation), to calculate the distance between the current location and the hotel (calculateDistance), to calculate the matching score of the selected hotel (calculateMatchScore), and to get map display of the selected hotel (getMap). The attributes of the restaurant class include restaurant ID (restaurantID), name (restaurantName), food type served (foodType), rating (restaurantRating), phone number (restaurantPhoneNumber), address (restaurantAddress), direction (restaurantDirection), open hours (restaurantOpenHours), briefing (restaurantBriefing), and the location of the restaurant (restaurantLongitude and restaurantLatitude). There are four methods used by the restaurant class. These methods help the restaurant class to execute the restaurant recommendation (executeRestaurantRecommendation), to calculate the distance between the current location and the recommended restaurant (calculateDistance), to calculate the matching score of the selected restaurant (calculateMatchScore), and to activate the map display for the chosen restaurant (getMap). The attributes of the sightseeing spot class include sightseeing ID (sightseeingID), name (sightseeingName), themes (sightseeingThemes), phone number (sightseeingPhoneNumber), address (sightseeingAddress), direction (sightseeingDirection), opening information (sightseeingOpenDays, sightseeingOpenFromHour, and sightseeingOpenToHour), briefing (sightseeingBriefing), suggested visiting time (recommendedVisitingTime), ticket price (ticketPrice), and the location of the sightseeing spot (sightseeingLongitude and sightseeingLatitude). Three methods are used by the sightseeing spot class including a sightseeing recommendation method (executeSightseeingRecommendation), a distance calculation method (calculateDistance), and a map display method (getMap). The attributes of the tourist preference class include tourist's mobile phone number (mobilePhoneNUmber), requested hotel class (requestedHotelClass), search range (searchRange), weight between requested hotel class and hotel search range (weightBetweenRequestedHotelClassAndSearchRange), preferred food type (preferredFoodType), requested restaurant rating (requestedRestaurantRating), weight between requested restaurant rating and restaurant search

range (weightBetweenRequestedRestaurantRatingAndSearchRange), and preferred sightseeing themes (preferredSightseeingThemes). The tourist preference class uses the getTouristPreference method to retrieve the preference specification for a selected tourist. The attributes of the tourist location class is the tourist current location (touristLongitude and touristLatitude). The getTouristLocation method reports the tourist's current location for the tourist location class. The attributes of the Google map class contains the place's location (placeLongitude and placeLatitude). The diplayMap method is used to activate the Google map display for a specific place.

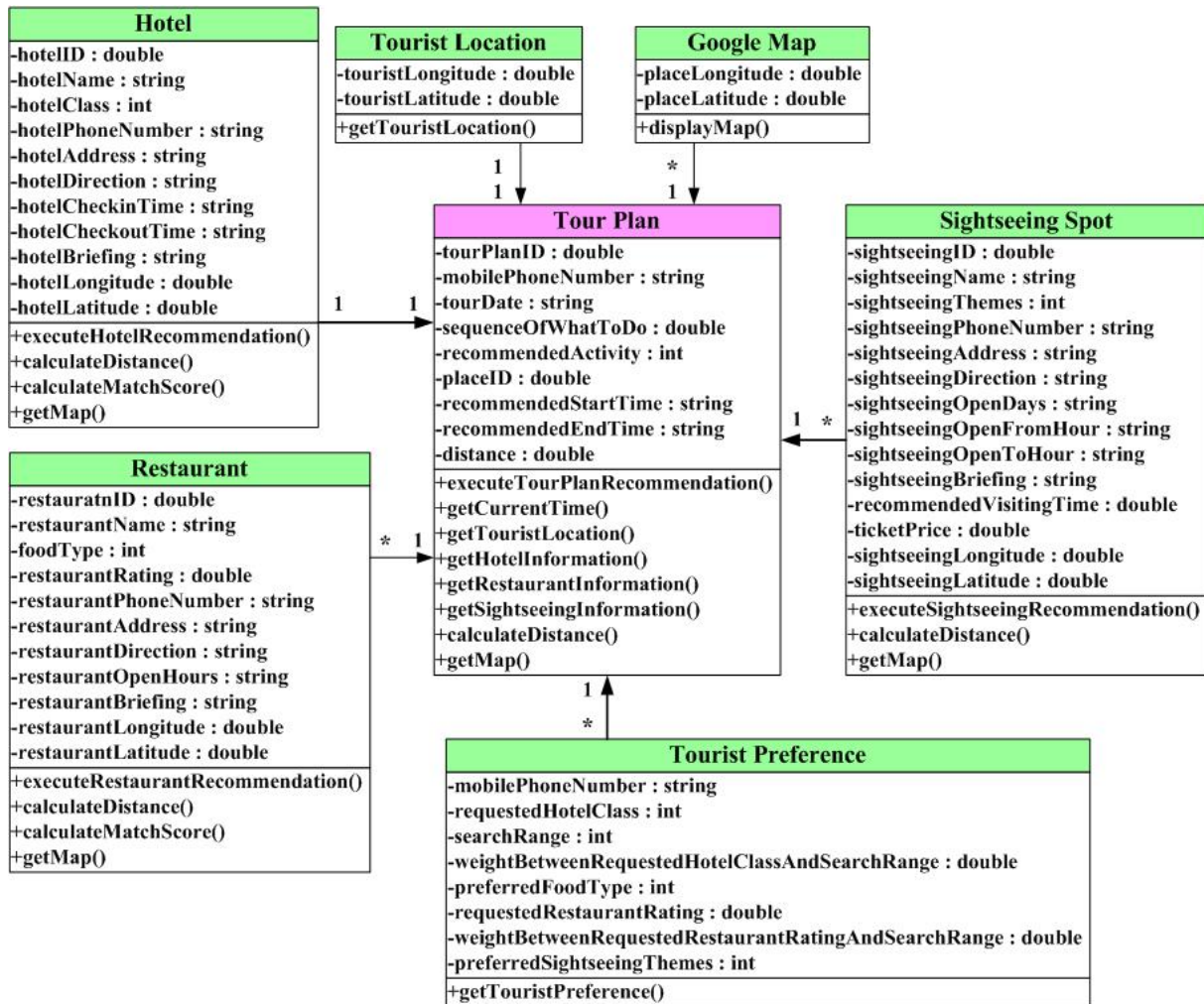


Figure 13. Class Diagram

Table 15 describes the relational database of our prototype system. Tables in our system include the tour plan table, hotel table, hotel class description table, restaurant table, food type description table, sightseeing table, sightseeing theme table, sightseeing theme description table, tourist preference table and tourist location table. A star (*) mark represents the primary key of the table while the underline indicates the foreign key. The primary key in the tour plan table is tourPlanID while the hotelID is the primary key for the hotel table. The hotelclassID is the primary key for the hotel class description table, and the restaurantID is the primary key for the restaurant table. The foodTypeID is the primary key for the food type description table, and the sightseeingID is the primary key for the sightseeing table. The sightseeingThemeID is

the primary key for the sightseeing theme description. The combination of the sightseeingThemeID and sightseeingID is the primary key for the sightseeing theme table because a sightseeing spot may have multiple sightseeing themes while many sightseeing spot may have the same sightseeing theme. The mobile phone number is the primary key for the tourist preference table and for the tourist location table. As for foreign keys, the mobilePhoneNumber in the tour plan table is referred to the mobilePhoneNumber in the tourist location table and to the mobilePhoneNumber in the tourist preference table. Based on different recommended activities, the place ID in the tour plan table is linked to the hotel ID in the hotel table, the restaurant ID in the restaurant table, or the sightseeing ID in the sightseeing table. The hotelClassID in the hotel table is referred to the hotelClassID in the hotel class description table. The foodTypeID in the restaurant table is related to the foodTypeID in the food type description table. The sightseeingThemeID in the sightseeing theme table is referred to the sightseeingThemeID in the sightseeing theme description table.

Table 15. Relational Schema

Table	Field
Tour plan	*tourPlanID, <u>mobilePhoneNumber</u> , tourDate, sequenceOfWhatToDo, <u>recommendedActivity</u> , placeID, recommendedStartTime, recommendedEndTime, distance
Hotel	*hotelID, hotelChineseName, hotelEnglishName, <u>hotelClassID</u> , hotelPhoneNumber, hotelChineseAddress, hotelEnglishAddress, hotelChineseDirection, hotelEnglishDirection, hotelCheckinTime, hotelCheckoutTime, hotelChineseBriefing, hotelEnglishBriefing, hotelLongitude, hotelLatitude
Hotel class description	*hotelClassID, hotelClassChineseDescription, hotelClassEnglishDescription
Restaurant	*restaurantID, restaurantChineseName, restaurantEnglishName, <u>foodTypeID</u> , restaurantRating, restaurantPhoneNumber, restaurantChineseAddress, restaurantEnglishAddress, restaurantChineseDirection, restaurantEnglishDirection, restaurantOpenHours, restaurantChineseBriefing, restaurantEnglishBriefing, restaurantLongitude, restaurantLatitude
Food type description	*foodTypeID, foodTypeChineseName, foodTypeEnglishName
Sightseeing	*sightseeingID, sightseeingChineseName, sightseeingEnglishName, sightseeingPhoneNumber, sightseeingChineseAddress, sightseeingEnglishAddress, sightseeingChineseDirection, sightseeingEnglishDirection, sightseeingOpenDays, sightseeingOpenFromHour, sightseeingOpenToHour, sightseeingChineseBriefing, sightseeingEnglishBriefing, recommendedVisitingTime, ticketPrice, sightseeingLongitude, sightseeingLatitude
Sightseeing theme description	*sightseeingThemeID, sightseeingThemeChineseName, sightseeingThemeEnglishName
Sightseeing theme	* <u>sightseeingThemeID</u> 、* <u>sightseeingID</u>
Tourist preference	*mobilePhoneNumber, requestedHotelClass, searchRange, weightBetweenRequestedHotelClassAndSearchRange, preferredFoodType, requestedRestaurantRating, weightBetweenRequestedRestaurantRatingAndSearchRange, preferredSightseeingThemes
Tourist location	*mobilePhoneNumber, touristLongitude, touristLatitude

Note: star (*) means the primary key, and the underline indicates the foreign key.

For model base and knowledge base design, the process modeling, decision modeling, and rule base approaches are used. Focusing on the example presented in the previous sub-section, Figures 14-17 respectively illustrate the recommendation process model as well as associated decision model and rules for the hotel, sightseeing spot and restaurant recommendations. The inputs to the personalized location-based tour plan recommendation process include tourist current location, the current time, search range (e.g. 3 km to the current location), constraints and criteria (e.g. 11:00 am - 14:00 pm and 18:00 - 21:00 pm as the lunch and dinner time periods respectively, 7 as the maximal number of visiting spots), sightseeing spots needs and preferences, restaurant needs and preferences, and hotel needs and preferences. For more specifically specifying needs and preferences, we take the hotel recommendation as an example for explanation. As a specific instance, data elements and values such as “hotel distance to the current location ≤ 3 km”, “room type = single”, and “availability = yes” can be used as the matching criteria in the data retrieval step, and then, the data elements and values such as hotel distance to the current location, hotel class (3 star and above), price per room per night (less than US\$150), facilities (Internet access), and customer rating score can be chosen as the hotel evaluation criteria in the ranking and selection step. Hotels with the highest total evaluation scores are ranked and presented to the tourist for selection.

```

Record current location and current time
Set restaurant search range, preferred lunch and dinner food type, restaurant rating
Set sightseeing search range, preferred sightseeing theme, opening hours
Set hotel search range, preferred hotel class, room type, room rate, facility, customer
rating
Set temp_time=current time
Set temp_location=current location
While loop
If temp_time is between 11:00 am and 14:00 pm and lunch status=no
or temp_time is between 18:00 pm and 21:00 pm and dinner status=no
then Activate Restaurant Recommendation Service Model (temp_location,
restaurant search range, preferred food type, restaurant rating)
temp_time = temp_time + suggested_eating_time
temp_location = location_of_recommended_place
If temp_time<21:00 pm and the number_visited_site< 7
Then Activate Sightseeing Recommendation Service Model (temp_location,
sightseeing search range, preferred sightseeing theme, opening hours)
temp_time = temp_time + suggested_visitng_time
temp_location = location_of_recommended_place
End loop
Activate Hotel Recommendation Service Model (temp_location, hotel search range,
preferred hotel class, room type, room rate, facility, customer rating)
Output tour plan (selected sightseeing spots, restaurants and hotel with sequence numbers)

```

Figure 14. Tour Plan Recommendation Process Model

Record current location Set hotel search range, room type, room availability Set preferred hotel class, room rate, facility, customer rating Retrieve hotel distance to the current location, hotel class, room rate, facility, customer rating
<p>If Hotel distance to the current location = 0, then $T1 = 100$ Else $T1 = 100 - 10*(\text{Hotel distance to the current location})$</p> <p>If Hotel class a is \geq Preferred hotel class $a1$, then $T2 = 100$ Else $T2 = 100 - 20*(a1 - a)$</p> <p>If Room rate b is \leq Specified room rate $b1$, then $T3 = 100$ Else $T3 = 100 - (b - b1)$</p> <p>If Facility set F contains Specified facility set $F1$, then $T4 = 100$ Else $T4 = 100 - 100*\text{Count}(F1-F)/\text{Count}(F1)$</p> <p>If Customer rating c is \geq Specified customer rating $c1$, then $T5 = 100$ Else $T5 = 100 - 20*(c1-c)$</p>
<p>SET $HT = \text{Sum}(T1*W1, \dots, T5*W5)$ Subject to $\text{Sum}(W1, \dots, W5) = 1$ Where HT = total score of hotel evaluation T_i and W_i are value and weight of the ith hotel evaluation criteria, $i = 1, \dots, 5$</p>

Figure 15. Hotel Evaluation Model and Rules

Record current location, current time, recommended and visited sightseeing spots Set sightseeing search range, preferred sightseeing theme Retrieve sightseeing distance to the current location, sightseeing theme, suggested visiting time
<p>If Sightseeing distance to the current location = 0, then $T1 = 100$ Else $T1 = 100 - 10*(\text{Sightseeing distance to the current location})$</p> <p>If Sightseeing theme set S contains Specified sightseeing theme set $S1$, then $T2 = 100$ Else $T2 = 100 - 100*\text{Count}(S1-S)/\text{Count}(S1)$</p>
<p>SET $ST = \text{Sum}(T1*W1, T2*W2)$ Subject to $\text{Sum}(W1, W2) = 1$ Where ST = total score of sightseeing evaluation T_i and W_i are value and weight of the ith sightseeing evaluation criteria, $i = 1, 2$</p>

Figure 16. Sightseeing Evaluation Model and Rules

Record current location Set restaurant search range, preferred food type, customer rating Retrieve restaurant distance to the current location, food type, customer rating
<p>If Restaurant distance to the current location = 0, then $T1 = 100$ Else $T1 = 100 - 10*(\text{Restaurant distance to the current location})$</p> <p>If Customer rating c is \geq Specified customer rating $c1$, then $T3 = 100$ Else $T2 = 100 - 20*(c1-c)$</p>
<p>SET $RT = \text{Sum}(T1*W1, T2*W2)$ Subject to $\text{Sum}(W1, W2) = 1$ Where RT = total score of restaurant evaluation T_i and W_i are value and weight of the ith restaurant evaluation criteria, $i = 1, 2$</p>

Figure 17. Restaurant Evaluation Model and Rules

The resulting output elements of a recommended tour plan include tour plan ID, sequence number of attractions/activities, types of attractions/activities (sightseeing, restaurant, hotel), attraction/activity ID, attraction/activity name, information of selected sightseeing spots (e.g. name, location, address, distance to the updated current location, sightseeing theme, suggested visiting time, etc.), information of selected restaurants (e.g. name, location, address, distance to the updated current location, food type, suggested eating time, customer rating score, etc.), information of the selected hotel (e.g. name, location, address, distance to the updated current location, hotel class, room type, room rate, check-in/check-out times, facilities, distance to point-of-interest, customer rating score, etc.), as well as a map showing all selected attractions with their sequence numbers. Through using the attraction/activity ID, detailed information about the recommended sightseeing spots, restaurants, or hotel can be accessed and reviewed.

5.4 System Implementation for B2C Mobile Tourism Service

A prototype system that enables the delivery of the personalized location-based tour planning recommendation services is developed. In the system environment, system and application software in the back-end server side include Windows XP, Microsoft IIS Web Server 5.1, Microsoft SQL Server 2008, Microsoft Visual Studio 2010, and Google Map API 3.0. The CHT Windows Mobile 5.0 Smart Phone Emulator is used as the client-side emulator. Besides, one HTC 3G PDA phone and one Apple iPhone 4S are used for system evaluation.

Figure 18 presents the prototype system environment that allows tourists to use PDAs or smart phones for accessing the web-based applications and activating desired personalized location-based recommendation services. Sightseeing spots, restaurants, and hotels can be selected, or a packaged personalized tour plan can be generated based on tourists' location-aware needs, preferences, constraints, and criteria.

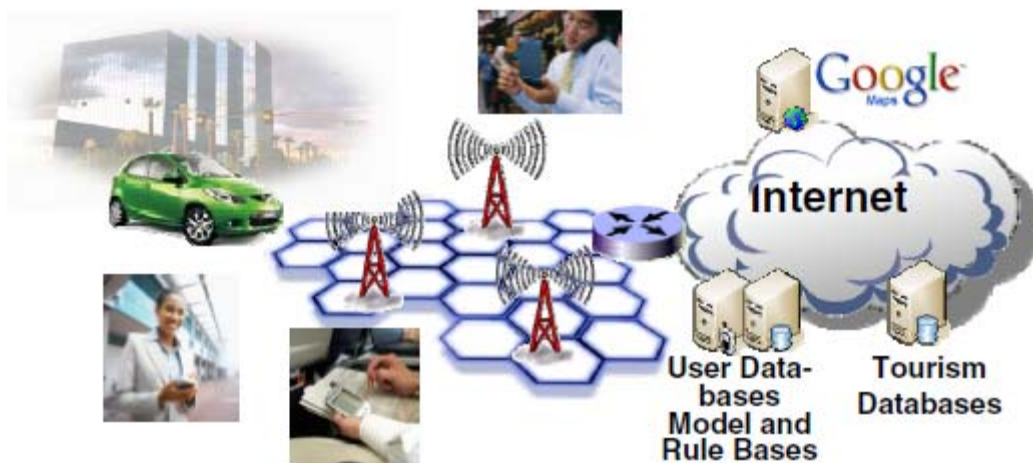


Figure 18. B2C Prototype System Environment

In Figures 19-23, a few screenshots of the personalized location-based recommendation services are illustrated. As shown in Figure 19(A), the first screenshot shows the list of B2C mobile tourism services including restaurant, hotel, sightseeing spot, and tour plan recommendation services, as well as user profile management services. In Figure 19(B) and Figure 19(C), these two screenshots display user interactions for setting criteria for hotel recommendation services including maximum occupancy, search range, minimum hotel class, maximum room price, minimum customer rating, desired facility, and weights for each criterion. The fourth screenshot, as shown in Figure 19(D), is recommended hotel list with photos, names, hotel class, room rate, and distance from current location. Clicking on the photo or the name of the selected hotel will present the detailed information of the selected hotel, as show in Figures 19(E)-19(G). Detailed hotel information includes available room, pricing, available facility, hotel class, hotel phone number, hotel address, nearby MRT station, direction to the hotel, check-in time, check-out time, hotel briefings, nearby point-of-interests, and distance between the selected hotel and the corresponding point-of-interest. In Figure 19(H), the final screenshot is a Google Map display of the recommended hotel.



Figure 19. Output Screenshots of Hotel Recommendation Services

Figure 20 displays output screens of the sightseeing recommendation services. In Figure 20(A) is the selection criteria input screen which allows users to interact with the sightseeing recommendation services to specify their own sightseeing preferences including the maximum search range, sightseeing theme type, and weight between the search range and the sightseeing theme type. Figure 20(B) displays the recommended sightseeing spot based on the selection criteria. The system will automatically check the open days and open hours to filter closed sightseeing spots based on current day and time. Within the recommended sightseeing spot list is the photo and name of the sightseeing spot, the open hours, distance from current location, and the matching score. The detailed information will be retrieved when users click on the name or the photo of the recommended sightseeing spot, then they will see the name, sightseeing theme type, open hour, ticket price, address, nearby MRT, direction, briefing, and suggested visiting time of a selected sightseeing spot, as shown in Figures 20(C) and 20(D).



Figure 20. Output Screenshots of Sightseeing Recommendation Services

Figure 21 shows the screenshots of the restaurant recommendation services. Figure 21(A) displays the interaction screen for users to activate the restaurant recommendation services. Preference criteria for restaurant recommendation include preferred food type, maximum search range, minimum customer rating, and the weight between search range and customer rating. Figure 21(B) presents the recommended restaurant list with photo, name, food type served, customer rating (in red star), distance between current location and recommended restaurant, and matching score. Figure 21(C) presents the detailed information of the recommended restaurant, including food type served, phone number, address, nearby MRT, open hour, recommended food, briefing, etc. In Figure 21(D) displays the Google Map of selected restaurant.

In Figure 22, from the left hand side to the right, the first two screenshots, shown in Figures 22(A) and 22(B), display user interactions for setting matching items and values, as well as evaluation criteria to activate the tour plan recommendation services. As mentioned, these items include search range, multiple sightseeing themes, lunch food type, dinner food type, restaurant ratings, hotel class and room rate, etc. The third screenshot, shown in Figure

22(C), presents the overview of the recommended tour plan with photos and names, sequence numbers (in red balloon), distances to the previous locations, suggested visiting time frames, and location maps of the recommended sightseeing spots, restaurants, and hotel. Clicking on these items will show enlarged pictures or detailed information of the corresponding places. The right hand screenshot is a Google Map display that visually spots all the recommended places, shown in Figure 22(D).

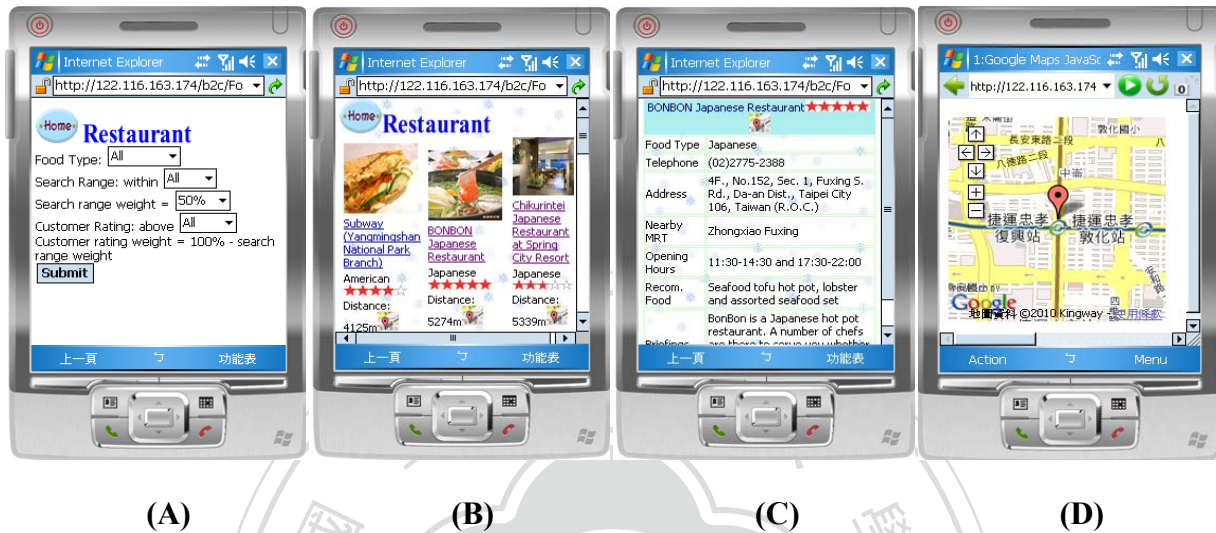


Figure 21. Output Screenshots of Restaurant Recommendation Services

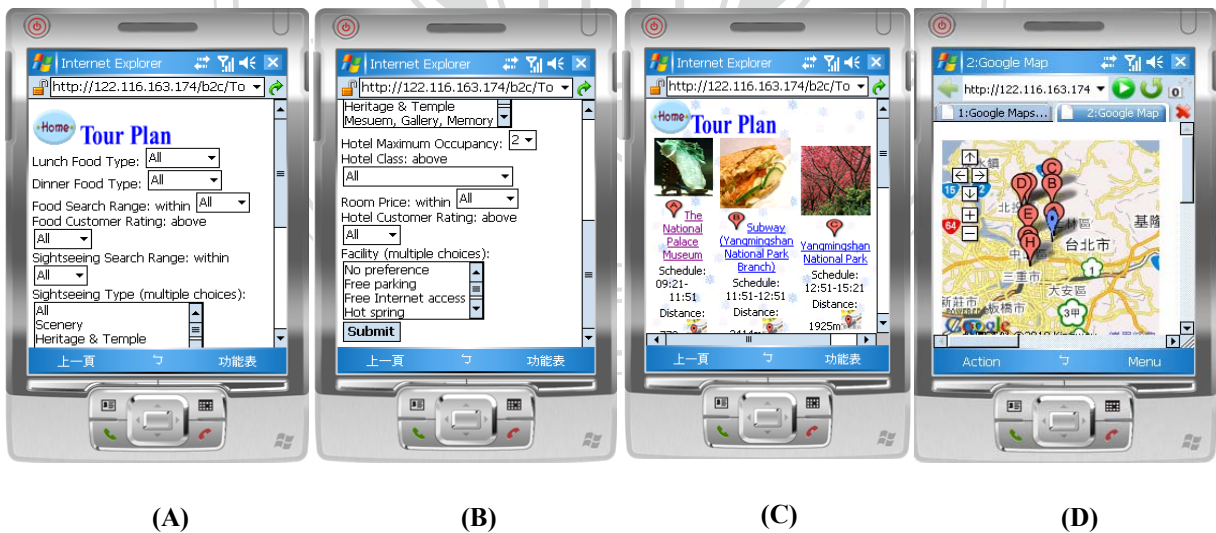


Figure 22. Output Screenshots of Tour Plan Recommendation Services

Figure 23 presents the screenshots of the user profile management services. Figures 23(A) and 23(B) present the personalized preferences about lunch time, dinner time, maximum number of sightseeing spots, tour end time, restaurant criteria weighting, sightseeing criteria weighting, and hotel criteria weighting. Figures 23(C) and 23(D) display the drop down lists

for users to configure their own tour preferences, and these user profiles will be referenced in the tour plan recommendation services to support personalized recommendation.

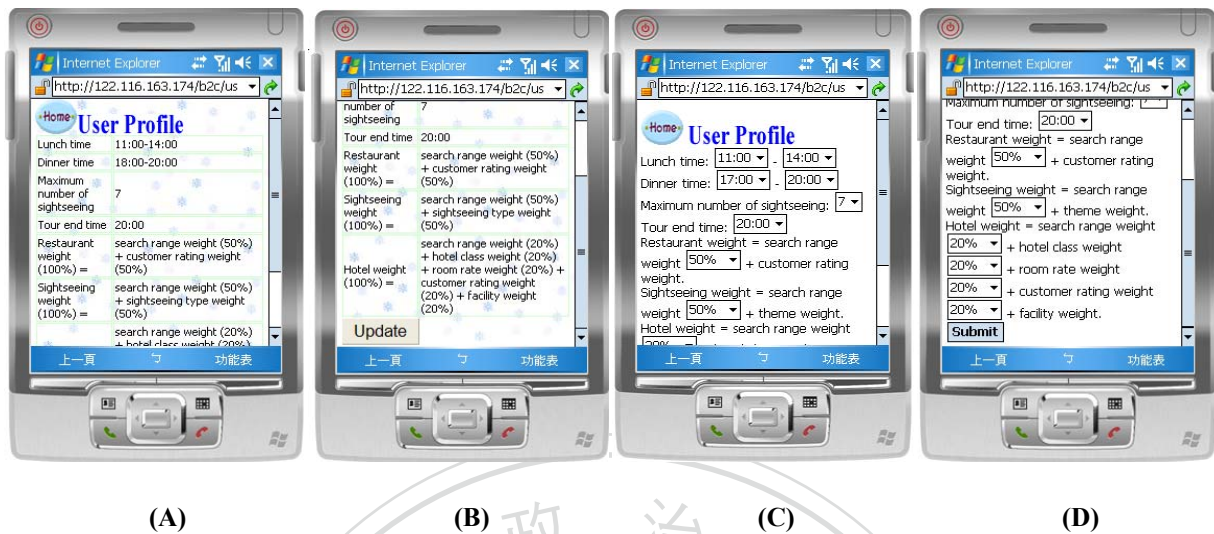


Figure 23. Output Screenshots of User Profile Configuration Services

5.5 System Evaluation for B2C Mobile Tourism Service

The system evaluation is made on a prototype system that is used by tourists for personalized and location-based tour planning recommendation via mobile devices. The mobile device used in the system evaluation for B2C mobile tourism services is a HTC cellular phone with 3G mobile Internet access. Users activate the Web browser and launch the website of the prototype system. They interact with the prototype system through the keyboard and touch screen of the mobile phone. There is no additional software or hardware need for interacting with the prototype system.

The system evaluation of the prototype system is performed through laboratory experiment with actual mobile devices and 3G mobile Internet connections. In the laboratory experiment, the user location is configured to a pre-specified geographical region in Taipei. Actual mobile devices are chosen because actual mobile devices allow users to test the application in a real environment. Compared with emulators in the notebooks, the actual mobile devices reflect the real usage for mobile users. The user location is pre-defined because as a testing mobile service, it is possible for this study to access the location of the mobile phone number via 3G operators for privacy issues. Survey questionnaire is employed as a data collection method in the laboratory experiment. Participation is voluntary and anonymous. Testing candidates are randomly selected in a cafeteria at one university, and the purpose of the study is presented to the candidate to ask if he/she is willing to volunteer for the experiment.

At the beginning of the experiment, a brief orientation is provided to explain the details about this study as well as the procedures of the experiment. During the experiment, the

participant is given a HTC mobile device with 3G mobile Internet access capability. A quick review of the prototype system is introduced to the participants, including a description of main features provided by the prototype system and screen shots of each mobile tourism service. Participants are encouraged to do some hands-on to make sure that they are comfortable with the 3G mobile devices and they know how to access the prototype website via browsers of the 3G mobile devices by themselves. Furthermore, they are encouraged to practice with the prototype system to familiarize themselves with the menus and functionalities of the mobile tourism services. Then, the participants are asked to perform some typical tour planning tasks using the mobile tourism services of the prototype system. Typical tour planning tasks are to find a restaurant, to search for a hotel, to locate some interesting sightseeing spots, and to build a tour plan, etc. Users have to test all functions of the prototype system and to complete the system evaluation questionnaire.

Table 16 shows the outline of the survey questionnaire for the system evaluation of the B2C mobile tourism services. There are total twenty-nine questions in the survey questionnaire for the system evaluation of the B2C mobile tourism services, including twenty-two questions for system evaluation of the B2C mobile tourism services and seven questions for demographic data collection. Six criteria for the system evaluation of the B2C mobile tourism services are user interface & layout, functionality, ease of use, understandability, satisfaction, and intention for future use. We have three questions for user interface & layout criteria, four for functionality criteria, four for ease of use criteria, three for understandability criteria, three for satisfaction criteria, and five for intention for future use criteria. The seven demographic data include mobile phone use experiences, mobile Internet access experiences, travel experiences, gender, age range, educational level and email/phone number. The 5-point Likert scale was used, ranging from “1=strongly disagree” to “5=strongly agree”. The Chinese version of the system evaluation survey questionnaire is shown in Appendix 4.

The system evaluation of the B2C mobile tourism services is based on a sample of twenty-eight recruited students with 50% female. Nearly 80% respondents belong to age under thirty because the main respondents are university students. All of the respondents have mobile phones, and nearly half of them have mobile Internet access experience. 86% respondents have domestic budget travelling experience, and 50% respondents have domestic group travelling experience. As for overseas travelling experience, 39% respondents have overseas budget travelling experience, and 75% respondents have overseas group travelling experience. Based on a 5-point Likert scale (1 as strongly disagree and 5 as strongly agree), the average scores of the six criteria including user interface & layout, functionality, ease of use, understandability, satisfaction, and intention for future use are 3.87, 4.07, 4.10, 4.45, 3.76, and 3.81 respectively with the overall average score being above 3.70. This system evaluation of the B2C mobile tourism services indicates that the average scores of the criteria of understandability, ease of use, and functionality are above 4, which means that this prototype system is easy to understand, easy to use, and useful for travel use. This result indicates that the system analysis, design and development processes are carefully designed and implemented, and thus the prototype system is feasible and useful. Overall, the outcome indicates positively the applicability of the proposed framework and methods of system development for B2C mobile tourism services.

Table 16. System Evaluation of the B2C Mobile Tourism Services

Part I: System Evaluation		
No	Criteria	Questions
1	User interface & layout	(Q1) I like using the interface of the system.
		(Q2) The organization of information presented by the system was clear.
		(Q3) The interface of this system was pleasant to use.
2	Functionality	(Q4) This system has all the functions and capabilities that I expect it to have.
		(Q5) This information retrieved by the system was effective in helping me to complete the task.
		(Q6) This system was suitable for my travel.
		(Q7) I found the whole tour plan recommendation function useful.
3	Ease of use	(Q8) It was simple to use this system.
		(Q9) It was easy to find the information I needed.
		(Q10) The information provided with this system was clear.
		(Q11) Overall, this system was easy to use.
4	Understandability	(Q12) It was easy to learn to use the system.
		(Q13) There was not too much information to read before I can use this system.
		(Q14) The information provided by this system was easy to understand.
5	Satisfaction	(Q15) I felt comfortable using this system.
		(Q16) I enjoyed constructing my travel plans through this system.
		(Q17) Overall, I am satisfied with this system.
6	Intention for future use	(Q18) I was able to make a tour plan quickly using this system.
		(Q19) As far as I know, there are no such mobile services.
		(Q20) I believe I could become productive quickly using this system.
		(Q21) This system was able to convince me that the recommendations are of value.
		(Q22) From my current experience with using this system, I think I would use such system.
Part II: Demographic data		
1	Do you use mobile phone? yes or no	
2	Did you ever access Internet via WAP, GPRT, 3G or PHS? yes or no	
3	What are your travelling experiences (multiple choices)? domestic budge travelling, domestic group travelling, oversea budget travelling and/or oversea group travelling	
4	Gender: male or female	
5	Age: Below 20, 20-29, 30-39, 40-49, 50-59 or above 60	
6	Educational level: High school, junior college, college or university, master or PhD	
7	Email or phone number (only for academic research)	

Chapter 6 Extension to B2E Mobile Tourism Service Classification

For B2E mobile tourism services, the need of a classification framework for mobile service development and evaluation within the management context is significant and strong (Chen and Nath, 2004; Rangone and Renga, 2006). To deal with the emerging mobile tourism service issues in the B2E sector, this study aims at identifying, classifying, and evaluating useful mobile services for employees in the tourism industry based on a multi-dimensional perspective approach. For accomplishing the B2E research objectives, we first propose a tourism-related B2E mobile service classification framework with four management levels and three functional concerns to categorize identified existing and potential intra-organizational mobile tourism services. Classified B2E mobile tourism services are then evaluated in terms of three specified criteria, namely, importance, feasibility, and cost-benefit effectiveness. The proposed B2E mobile tourism service classification framework is also evaluated in terms of fitness and soundness of the mapping of the proposed B2E mobile tourism services and the corresponding slot within the proposed B2E mobile tourism service classification framework. We expect that the B2E mobile tourism service classification framework and evaluation scheme can serve as a guideline for reviewing and categorizing current B2E mobile solutions, and further facilitating the development and delivery of value-added B2E mobile services.

In the subsequent sections, this study is organized as follows. Section 6.1 provides literature reviews on B2E mobile tourism service classification. Section 6.2 describes the research method for B2E mobile tourism service classification. Section 6.3 presents the research results of the B2E mobile tourism service classification. In section 6.4, discussions on B2E research results are presented.

6.1 Literature Review on B2E Mobile Tourism Service Classification

In the tourism market, travel agencies are facing fierce competition for years. It is important for tourism companies to offer value-added products and services with better qualities, as well as to increase the human resources capabilities for survival and sustaining the businesses (Garces, et. al, 2004; Tsai, Huang, and Lin, 2005; Wu, 2006). Companies recognize that the key to satisfy tourist demands is to emphasize the overall quality of service, including pre-trip sales, on-site operations, and post-trip feedbacks. Moreover, tourism companies belong to a labor- and knowledge-intensive industry, and one of the key issues to motivate employees is to build attractive incentive plans and learning programs. Typical employee groups in the travel agencies are sales people, tour leaders, tour guides, tour operation centers, line managers, and executives, etc. Although employees are empowered by electronic commerce applications, most application functions are not applicable when employees are on the move, and the service outcome mainly relies on individual experiences and reactions. Since it is clear that most of the employees are on the move most of the time,

the needs for mobile communication, agile responses, learning organizations, and knowledge-oriented services are strong.

Among researchers tried to develop an evaluation framework for analyzing mobile services, Chen and Nath (2004) use the impact/value framework to study the business opportunities made possible by wireless technologies within organizational contexts. In their framework, the impacts include time, mobility, relationship, and location, and the values include efficiency, effectiveness, and innovation. However, the contents of mobile services are still unclear. Lyytinen and Yoo (2002) present a four-level framework including individual, team, organizational, and inter-organizational levels for examining a series of mobile commerce issues. They indicate that mobile services provide essential information to remote collaborators. They further call for research efforts on new aspects of information availability (overload) and their impacts on learning and performance within organizations, as well as on new impact measures of organizational learning and agility empowered by mobile services in addition to traditional performance measures like efficiency and effectiveness of decision making. Grun et al (2008) present an evaluation framework for classifying and evaluating mobile tourist guides. Design dimensions of mobile services comprise service delivery, service customization, and service initiation. Using mobile brokerage service as an example, Lu, Zhang, and Wang (2009) propose a multidimensional framework for measuring mobile service quality. Interaction, outcome, and environment qualities are identified as primary dimensions that further consisted of multiple sub-dimensions.

When specifically focusing on the topic of B2E mobile services, few works are found in the literature. Rangone and Renga (2006) report an exploratory study to investigate the B2E mobile Internet applications in Italian. Their study focuses on sales- and field-force automation applications via wireless devices and infrastructures. The main ideas behind these applications are efficiency and investment paybacks. However, intrinsic mobile values and managerial thinking are left behind in their portfolio of B2E mobile internet applications. Barnes (2004) uses mobility, process, and market to position the mobile works in organizations. Three levels of geographic independence enabled by wireless solutions for enterprise workers are transient, mobile and remote. The changes in work processes include automaton, decision support, and transformation. The value proposition includes mobile channel access, mobile service value, and mobile service creation. This model provides an intuitive assessment of mobile distributed works in various aspects, and emphasizes the needs of mobile employee empowerment such as mobile decision support applications. Leem, Suh, and Kim (2004) suggest a B2B/B2E model classification approach based on Porter's value chain perspective. Their B2B/B2E model is further subdivided into six representative models including firm infrastructure, procurement & inbound logistics, operations, outbound logistics, marketing & sales, and after service & system support. The firm infrastructure refers to a mobile solution supporting a firm's general decision making and information sharing. This classification approach offers a good explanation for the manufacturing industry based on functional and operational views. Nevertheless, several key components are still missing; for instance, knowledge management and learning that are vital to the creation of organizational values and employee competence are omitted in the classification. Furthermore, this approach does not separate the strategic and managerial levels from the operational level to address and specify B2E mobile service needs in different organization levels.

To capture the characteristics of emerging mobile services for B2E applications, this

paper aims at identifying, classifying, and evaluating useful mobile services for employees in the tourism industry. For the classification purpose, multi-dimensional perspectives are adopted to take into account managerial and functional features simultaneously. Both management and operational perspectives are taken into consideration. Four management levels considered include strategic planning, management control, knowledge management, and operational control (Laudon and Laudon, 2004). On the other hand, three functional concerns include mobile information & communication services, location-based services, and context-aware services (Barnes, 2004; Cil et al., 2005; Giaglis, Kourouthanassis, and Tsamakos, 2002; Grun et al, 2008; Liebowitz, 2007; Rangone and Renga, 2006; Tarasewich, 2003; Vetter, 2001). Major functions of mobile services such as communication and collaboration, location-based information retrieval and decision support, as well as context aware information search, decision support, learning and knowledge management that deal with location, time, personal and social features, are jointly taken into considerations. For the evaluation purpose, three criteria including importance, feasibility, and cost-benefit effectiveness are adopted to evaluate and rank identified/classified mobile tourism services (Yu, 2005).

6.2 Research Method for B2E Mobile Tourism Service Classification

Research methods used in the B2E mobile tourism service classification included literature reviews & a case study, two focus group discussions with total thirteen senior students major in tourism, and five semi-structured field interviews with local travel agencies. To examine which B2E mobile tourism services were valuable to the travel agencies, three analysis stages were carried out. In the first stage, the B2E mobile tourism services were identified from previous researches and a case study of a large travel agency. An initial list of B2E mobile tourism services as well as the initial B2E mobile tourism service classification framework was proposed. In the second stage, semi-structured focus group discussions were brought into the B2E mobile tourism service classification research agenda to uncover which B2E mobile tourism service fitted into which slot of the B2E mobile tourism service classification framework. Senior students major in tourism were asked to use their tourism knowledge and internship experience to act as full-time travel agency employees to discuss and formulate the B2E mobile tourism service classification framework. In the last stage, semi-structured field interviews were conducted to evaluate the importance, feasibility, and cost/benefit effectiveness of the proposed B2E mobile tourism services as well as the soundness and fitness of the proposed B2E mobile tourism service classification. Details of the research processes for the B2E mobile tourism service classification were as follows.

■ Stage 1: B2E mobile tourism service identification process

During stage 1, the aim was to develop an initial list and classification framework of B2E mobile tourism services by taking results from literature reviews and by examining the tourism industry characteristics via a case study of a large travel agency. With the desired mobile values in mind, we summarized the B2E mobile tourism services from previous literatures and built the scenario descriptions. To ensure developing a comprehensive list of

mobile services, a broad range of previous studies were reviewed. We compiled and rephrased the descriptions to simplify them and to ensure that these B2E mobile tourism services were relatively generic and consistent with previous research results. An initial list of B2E mobile tourism services based on the desired mobile values were selected and reworded for the tourism environment. These included B2E mobile tourism services such as mobile tour quality control and mobile learning. Based on the literature review and case study, an initial multi-dimensional B2E mobile tourism service classification framework was also developed in this stage with the concepts of management levels and functional design perspectives being taken into account.

■ Stage 2: B2E mobile tourism service classification process

During stage 2, the aim was to classify the summarized B2E mobile tourism services using the proposed B2E mobile tourism service classification framework through focus group discussions. Focus group sessions were formed by selecting senior students major in tourism management or travel management at two universities with fame for cultivating comprehensive tourism professionals in Taiwan. One school founded the oldest Department of Tourism Management in 1968 and the oldest Graduate Department of Tourism Management in 1989 in Taiwan while the other school was the first Institute of Technology for higher education in northern Taiwan. Students in either school were required to have tourism internships lasting for one summer term to one semester. Both departments encouraged their students to obtain tourism-related licenses like tour guide licenses before graduation. Thus, senior students at these two departments were appropriate candidates of focus group participants.

Phone contacts with the department offices were followed by formal invitation emails. Invitation emails stating our B2E mobile tourism service research purpose and the criteria for focus group participants along with the focus group procedures and questions as attachments were sent to the official department email addresses. Tape recording of the focus group discussions for research purpose only was clearly stated in advance in the invitation emails. The participants were ensured that there was no individual information shown in our final report. Only summary of the discussions were reported. This study also ensured that the confidential tape-recordings would not be released. Both department heads agreed to announce this focus group activity, to help facilitate the focus group participant screening and to offer the discussion room for free.

The criteria for focus group participants were as follows. All of our participants were required to be senior students. All of our participants were required to have e-commerce and mobile phone usage experience. All participants were required to complete the internship, and the internship duration ranged for one summer vacation to six months. These experiences helped participants to understand the research issues and participate in the in-depth discussions.

At first, twenty volunteers agreed to schedule in three focus group sessions, but seven people were not able to attend the focus groups. The drop rate was 35%. Since it was a voluntary research activity, and there was no monetary reward for attending the focus groups, it was reasonable to have some no-shows. Because the focus groups were designed to be

relatively homogenous, the no-shows had little effects on the research sampling. Finally, thirteen volunteers were recruited to participate in two focus group sessions, and each focus group represented one department from one school. Two focus groups were formed with four and nine respectively, and each focus group lasted about two and half hours.

The focus group participants read a description of the B2E mobile tourism service study sent to the department offices prior to participating in the focus group sessions. The focus groups were conducted on site to provide a familiar and relaxed atmosphere. All focus group discussions were recorded with participants' agreement. The same moderator directed both focus group discussions. The moderator attempted to facilitate a lively discussion among focus group participants. A moderately structured focus group session was planned and conducted. All questions were carefully and clearly worded for participants to understand our research and to elicit participants' responses in a nondirective manner.

During the focus group discussions, the purpose of this B2E mobile tourism service study along with the concept of B2E mobile tourism services was introduced to the attendees. Then, the participants were asked to talk about their internship experiences, and to discuss related works as employees in travel agencies. The moderator also probed for additional details to gain some consensus on what dimensions should be included in a B2E mobile tourism service classification framework. The managerial and functional concerns were elucidated and discussed, and the initial B2E mobile tourism service classification framework was presented and modified. Then, based on the modified B2E mobile tourism service classification framework with four management levels and three functional design concerns, identified B2E mobile tourism services were classified into suitable management-function slots. The report of the integrated B2E mobile tourism service classification results was further confirmed by all participants of the focus groups.

Reliability was ensured because the participants were representative and competent to answer the research questions. During the focus group sessions, broad and deep discussions were carried out until no more new information emerged. The findings were stable within and consistent between focus groups. Identifying and recruiting participants also had great impacts on the validity and reliability of the focus group research. The criteria for selecting the focus group participant candidates ensured that the participants were competent to answer the research questions. Even the number of participants invited was carefully designed under the research's control, but the number of people actually appeared was beyond it. The focus groups were designed to be homogeneous to be more focused on developing the B2E mobile tourism service classification framework, so the absence of certain participants did not lead to serious shortcomings in this B2E mobile tourism service research results. However, it did have some effects on the size of focus groups. While the optimal size of focus group was recommended to be six to ten people, the focus groups in this study consisted of four and nine each. The rather small group was the result of some no-shows of participants. However, the smaller focus group gave each participant more time to discuss and thus was better for reliable results. The recording of focus group discussions ensured all verbal communication was not missed. Finally, the confirmation from participants on the B2E mobile tourism service classification results ensured the accuracy and completeness.

Focus group discussions had a high level of face validity and content validity because it allowed analyses of thoughts, attitudes and opinions by face-to-face group interaction. Internal validity was ensured because the research questions were carefully designed to be key points based on a comprehensive literature reviews and a case study. Each B2E mobile tourism service had a precise definition with a detailed scenario description to make sure that the proposed B2E mobile tourism services were consistently and clearly understood by the focus group participants. Moreover, the concept of what a B2E mobile tourism service classification wanted to accomplish was carefully detailed and clarified. Finally, adequate time slot was located to research issue discussion. Relevant, valuable and converged conclusions drawn from the discussions ensured the internal validity of our study.

Construct validity existed when the research instruments accurately reflected the concepts being studied as that the study actually tested what it purported to test. This research ensured the construct validity because the research instruments including the moderator and the discussion guide were carefully assessed. First, both focus groups were conducted by the same moderator following the discussion guide. The chosen moderator was a part-time lecturer and had experience leading discussions and interpreting verbal, emotional and physical responses. The moderator was responsible to cover each of the research question, to ask for clarification or further discussion and, eventually, to offer a brief summary during the focus group discussions. The moderator needed to be a good facilitator, but not to be dominant as to bias or inhibit discussions. The moderator needed to pay special attention to overly enthusiastic or aggressive participants as well as bored or inattentive participants. Moreover, the discussion guide was carefully developed in written format and iteratively refined. The sequence and time allocation of research questions were carefully designed. The email address collections and agreements of the audio-taping during the focus group warm-ups were clearly stated in the discussion guide. The moderator was also required to announce the rules for the focus group discussions to avoid unequal participations at the beginning of the focus group sessions. Thus, the discussion guide and the moderator were qualified as the research instruments to ensure construct validity of our study.

The recruitment of full-time employees from the travel agencies was harder than expected for 2.5-hour focus group discussions, so the senior students major in tourism were chosen as focus group participants. Even though the research results were from discussions among students, the research findings and conclusions were applicable to the tourism industry for the following reasons. First, the research results were evaluated by five top managers from major travel agencies in Taiwan during the following review stage. Secondly, these senior students major in tourism management would be full-time employees within one year after graduation. The completion of tourism internship ensured that they were familiar with industry environment. Finally, the sampling was representative, and the recruitment process was carefully designed and scheduled.

■ Stage 3: B2E mobile tourism service evaluation process

During the final stage, a review process by five domain experts from the tourism industry was conducted to verify the importance, feasibility, and cost-benefit effectiveness of the proposed B2E mobile tourism services as well as the completeness, clearness, and appropriateness of the B2E mobile tourism service classification framework. Two evaluation

steps were carried out. First, the domain experts were requested to evaluate the importance, feasibility, and cost-benefit effectiveness of the identified B2E mobile tourism services. The 5-point Likert scale was used, ranging from “5=strongly agree” to “1=strongly disagree”. If the average score on the importance rating was lower than 3, the corresponding B2E mobile tourism service was deemed insignificant importance and thus removed from the B2E mobile tourism service classification. Secondly, the fitness of the B2E mobile tourism service classification was also evaluated using a 5-point Likert scale, ranging from “5=strongly agree” to “1=strongly disagree”. For services with average scores lower than 3, respondents were asked to provide comments about how to make the B2E mobile tourism service classification more reasonable and to further redirect the B2E mobile tourism service classification. The final B2E mobile tourism service classification result was obtained based on the level of agreement among the domain experts. Appendix 5-6 respectively shows the details of the evaluation questionnaire of B2E mobile tourism services and B2E mobile tourism service classification framework in Chinese.

The field interview candidates were chosen based on the following criteria. First, the company had a Taiwanese general travel agency license, better with branch companies or branch offices. The large-scale tourist enterprise were more sensitive to emerging challenges like mobile commerce, and they usually had more fund and qualified personnel compared to medium and small-scale ones. Second, the company had good reputation for high service quality. Records of related awards and honors from our government were used as filters of good credits. Third, location convenience of the company headquarters was also considered for face-to-face field interviews.

The initial contact list of 80 travel agencies with general licenses was downloaded from the official website of the Tourism Bureau, Ministry of Transportation and Communications in Taiwan. All of the 80 travel agencies were located in Taipei. To limit our scope, 13 branch companies were excluded. So, the revised contact list had 67 candidates. Data from previous case studies and company official websites were collected and studied before the field interviews. The company websites was checked for two main purposes. First, the company backgrounds like company history and awards were recorded and studied. Secondly, the complexity of the official websites gave hints to the IT preferences of the companies.

We tried to start with big companies, so we called 20 companies with huge initial capital amount for initial contact. If the companies were willing to consider the field interviews, the invitation letter, the interview questions, and the survey questions were emailed or faxed to the companies. Even though most managers appreciated the promising future of mobile commerce, however, some felt not ready to talk about B2E mobile tourism services. Finally, we interviewed with 5 travel agencies.

According to the travel agencies' dates of entering business, the first company was established in 1961. It has twenty-five local branch offices and six oversea branch offices in China, Japan and U.S.A. It is a traditional travel agency being famous for full product lines of both inbound and outbound tours. The second company was opened in 1977. It has eighteen local branch offices and twenty-seven service sites in Taiwan, China, Australia, and U.S.A. Its e-tourism website is known for tour package variety and 3C (content, community and commerce) services. The third company was established in 1980 with three local branch

offices. It is famous for high-quality tours, especially the customized tour packages for incentive tours. It has no freelance tour leaders, and their tour leaders are also tour guides. Its main product line is the outbound tours to Japan. The fourth company was established by a newspaper mother company in 1999. It has one branch office now and focuses only on direct sales. The last company was opened in 2000. It has seven local branch offices. It is a leader in e-tourism market offering personalized tour packages for users with high income, high educational levels and high web surfing experiences. It even sells travel necessities like baggage, international phone cards, cameras, and local food on its website.

The respondents included a vice president, senior and middle level managers, and employees with tour leader/tour guide backgrounds. Each field interview lasted about one and half hours to two hours. First, we explained the research purpose to them. Then, they were asked to provide comments about the proposed B2E mobile tourism services. Thirdly, they were asked to score the importance, feasibility, and cost-benefit effectiveness the proposed B2E mobile tourism services during the field interviews. After the B2E mobile tourism service evaluation, interviewees were asked to eliminate duplicate or similar items and to integrate them if possible. Finally, they were asked to evaluate the appropriateness of the mapping of individual B2E mobile tourism service with the B2E mobile tourism service classification framework.

6.3 Research Result for B2E Mobile Tourism Service Classification

In the first stage, based on the literature reviews and a case study of a large travel agency, we generated a pool of sixteen B2E mobile tourism services for the tourism industry. In the second stage, with the help of focus group participants of thirteen senior students from two tourism departments, we classified the B2E mobile tourism services into the B2E mobile tourism service classification framework. In the last stage, we asked five domain experts to evaluate the importance, feasibility, and cost-benefit effectiveness of each B2E mobile tourism service. The final B2E mobile tourism service classification was refined to have twelve B2E mobile tourism services. The following sections described the research results in detail.

■ Stage 1: B2E mobile tourism service identification result

Summarized from literature reviews, the mobile values in our research included time-critical and mobility-related needs, organizational agility, innovation, collaboration, efficiency, effectiveness, decision support, and competence enhancement. The mobile services with values of efficiency and effectiveness were mobile communication services, mobile information services, mobile sale force support services, and mobile community services. Mobile services allowed communication, information access, transaction, and entertainment (Camponovo and Pigneur, 2002). Because this paper focused on B2E domain, mobile entertainment services were excluded. First of all, the mobile communication services were most used to get in touch with customers and coworkers. For example, a sales person would call the customer to inform about the hotel reservation confirmation. Secondly, the mobile information services facilitated the real-time feedbacks, like emergency handling

status reports, daily tour status reports, and real-time customer complain process reports etc. For example, the road blocking event along with the new tour routes were reported to the operation centers via mobile devices. Thirdly, mobile transaction services were merged into mobile sale force support services (Rangone and Renga, 2006). Fourthly, mobile community services were included because they were interesting marketing instruments as well as information sharing channels (Prykop and Heitmann, 2006; Yu, 2005). For example, tour leaders interested in major event news like big earthquake near the sightseeing spots would access the latest news in the event community via mobile devices. Finally, even mobile advertising services were also interesting marketing tools; however, previous research indicated that consumers generally had negative attitudes toward mobile advertising services unless they had specifically consented to it (Tsang, Ho, and Liang, 2004), so the mobile advertising services were excluded in our research.

Real-time job dispatch services, location-based collaboration services, location-based information services, and location-based decision support services offered mobile values such as time-critical, mobility-related, decision-making, and collaboration values. First, the successful implementation of real-time taxi dispatching services showed the possibility of real-time tracking and positioning of taxis to achieve greater productivity and customer satisfaction (Liao, 2003). To apply this operation model to the tourism industry, when a group tour had a bus problem and they needed another bus to continue the tour, the nearest available bus was located and assigned to handle the remaining tour plan. Secondly, location-based collaboration services provided essential information to remote collaborators. For example, a group tour had a car accident and the tour leader and tour guide need to take care of injured tourists in the hospitals while arranging nearby hotels for the uninjured group tourists at the same time. Location-based collaboration services helped the tour leader and tour guide to coordinate with multiple hotels at the same time. Thirdly, location-based information services offered nearby information like weather forecasts, event notification, and road conditions, etc (Hinze and Voisard, 2003). Fourthly, based on the location-based information, the location-based decision support services further offered decision-making suggestions (Basole and Chao, 2004). For example, the real-time road condition along with suggested routes would send to the bus drivers based on the current locations of the tours.

The mobile services with values of organizational agility, collaboration, innovation, and decision-making included the mobile executive decision support services, the mobile tour planning & group decision support services, and the mobile tour quality control services. First, the mobile executive decision support services met the decision-making needs for executives on the move (Shim, 2002). For example, the executives would have video conference meeting and access decision-related information via mobile phones during the business trips. Secondly, the mobile tour planning & group decision support services enabled wireless discussions and decision supports along the tour planning process (Roth and Unger, 2001). For example, the tour planners who were on business trips would share cost estimation sheet with partners to discuss the tour route alternatives via mobile devices. Thirdly, the mobile tour quality control services provide real-time backend supports to ongoing tours (Yu, 2005). For example, if there was a big typhoon in Taiwan for several days and there were big flight delays and flight re-schedules, the operation centers needed to find out the affected ongoing tours and to send

the latest feasible tour plan including the flight schedule, hotels, and restaurants to the tour leaders and tour guides of affected tours to ensure the tour service quality.

Mobile services enhancing employee competence included the location-based learning services, the mobile scenario-based learning services, the mobile community-based learning services, the mobile knowledge management services, and the personalized tour information services (Clarke, 2001; Derballa and Pousttchi, 2004; Roschelle, Sharples, and Chan, 2005; Shen, 2003; Wei and Chen, 2006; Zurita and Nussbaum, 2004). Because the learners were on the move, the mobile technologies would enable anytime-anywhere learning (Roschelle, Sharples, and Chan, 2005; Wei and Chen, 2006; Zurita and Nussbaum, 2004). For example, the location-based learning services provided the tour guides with opportunities to review the latest museum exhibit information and to have the rehearsal practices in advance at the night before the visit. The mobile community-based learning services enabled learners to access the discussion forum or experts in the community via mobile devices. The mobile scenario-based learning services captured the customer complaint database and facilitated the self-paced learning process; from these scenarios, the tour leaders and tour guides learned how to react to events like sick customers, bad food, old buses, and overbooking hotels, etc. Moreover, the tourism knowledge was intensive, fast-changing, and distributed; thus, mobile devices would be attractive tools to capture knowledge (Derballa and Pousttchi, 2004; Shen, 2003). For example, the tour leaders would photo the first snow in Japan this year and update the sightseeing database. Finally, the personalized tour information services pushed the short messages of the latest Japan tour news to the subscribed employees based on individual's preferences (Clarke, 2001). The summary list of B2E mobile tourism services was shown in Table 17.

Table 17. Summary of B2E Mobile Tourism Services

Mobile Service	Definition & Example (Ex)	Reference
Mobile communication services	To talk on the phone, to get SMS alerts, to send instant messages, and to get office to emails (Ex) A sales person may use his/her mobile phone to call the operation center for the latest group tour availability of a specific group tour.	Camponovo and Pigneur, 2002
Mobile information services	To facilitate real-time feedbacks or latest status reports (Ex) A tour leader may file the customer complaints about old buses, bad food, or sick customers with photos along with summaries of customer care processes via mobile devices. (Ex) Real time events like car accidents, road blocking, bus breakdowns, and bad weathers are reported to the operation centers along with the handling process.	Camponovo and Pigneur, 2002

Mobile community services	<p>To share real-time travel news and resources via mobile devices (Ex) The latest typhoon warnings or earthquake news is very important to all employees in the tourism industry. Employees may hook on this group of services to update or be updated about the latest tour-related news via mobile devices.</p> <p>(Ex) A tour guide may share the latest music festival events, activities, and stories in a particular music festival community via mobile devices.</p> <p>(Ex) During the cheery season, a cheery flower discussion forum is initiated, and tour guides and tour leaders may share the latest photos of cherry flowers and the knowledge of cherry flower spices via mobile devices.</p>	Prykop and Heitmann, 2006; Yu, 2005
Mobile sales force support services	<p>To support sales people by checking tourism product availability via mobile devices to provide fast response to customers</p> <p>(Ex) A sales person is presenting an incentive tour for a VIP customer, and the customer proposes several modifications such as more flight seats and some seat upgrades. The sales person may query the flight availability via mobile devices, and he/she may reply to the VIP customer on site.</p>	Rangone and Renga, 2006
Location-based collaboration services	<p>To help the tour leaders/tour guides to confirm or coordinate the tour resources based on the current tour locations</p> <p>(Ex) When a group tour has a car accident, the tour leader and tour guide need to take care of injured tourists in the hospitals while arranging nearby hotels for the uninjured group tourists at the same time. This group of services helps the tour leader and tour guide to coordinate with multiple hotels at the same time via mobile devices.</p>	Chen and Nath, 2004
Location-based information services	<p>To get the latest location-related tour information like nearby traffic conditions</p> <p>(Ex) Tour leaders and tour guides are notified about the nearby road conditions, weather forecasts, and festival event schedule changes, etc. Tour bus drivers may take another traffic route if there is a traffic jam nearby. Tour leaders may make suggestions about free time activity to the group tour tourists based on the weather reports and the latest activity notification.</p>	Hinze and Voisard, 2003
Location-based decision support services	<p>To provide suggestions based on current location-related information like traffic jams, rain forecasts, and festival event schedule changes</p> <p>(Ex) Nearby traffic jam along with alternative route suggestions are sent to the bus drivers, tour leaders, and tour guides via mobile devices.</p> <p>(Ex) The latest nearby activities along with the suggested sightseeing schedules are sent to the bus drivers, tour leaders, and tour guides via mobile devices.</p> <p>(Ex) When there is a big traffic jam and it is impossible to make the scheduled restaurant, this group of services will recommend nearby restaurants to the tour guides and tour leaders.</p> <p>(Ex) When a customer loses his/her passport, the locations of the nearest police office and passport application office along with passport application guidelines are sent to the tour leader to help the customer to solve the passport issue.</p>	Basole and Chao, 2004

Mobile learning services (Combined)	<p>To assist location-related, theme-based, community-based learning by providing opportunity for discussion and encouraging employees to engage in knowledge sharing and acquiring</p> <p>(Ex) Tour guides can confirm the latest exhibit information and have the museum guidance rehearsals the night before the visit via mobile devices.</p> <p>(Ex) Tour guides can query more information about related art works of a famous painting artist the night before the visit via mobile devices.</p> <p>(Ex) Tour knowledge of seasonal activities like bird-watching of the Kenting National Park in Taiwan is sent to the tour guides when they are at Kenting area in Taiwan during bird-watching seasons.</p> <p>(Ex) Tour leaders learn how to response to customer complaints like bad food with the theme-oriented training tools or community discussions via mobile devices.</p>	Roschelle, Sharples, and Chan, 2005; Wei and Chen, 2006; Zurita and Nussbaum, 2004
Mobile knowledge management services	<p>To enable the latest knowledge capture, store, or deliver real-time knowledge to improve the knowledge management practices</p> <p>(Ex) Tour guide may photo the first snow in Japan and upload to the knowledge portal to input new sightseeing knowledge via mobile devices.</p> <p>(Ex) When the tour leader notices the open/close time of a certain sightseeing spot is changed because of the season changes, and he/she may update the latest open/close time of that sightseeing spot to the knowledge portal via mobile devices.</p>	Derballa and Pousttchi, 2004; Shen, 2003
Mobile tour quality control services	<p>To provide backend support from operation centers to first-line employees like tour guides and tour leaders to control the tour quality by reacting to major events</p> <p>(Ex) When most customers are complaining about the bad hotels and requesting hotel upgrades. The tour leaders may photo the bad facilities of the hotels and ask approval for hotel changes from backend offices. The backend offices may contact other hotels and send a feasible hotel upgrade list to the tour leaders via mobile devices.</p> <p>(Ex) If there is a typhoon in Taiwan for several days and there are big flight delays and flight re-schedules, the operation center needs to find out the affected ongoing tours and sends new tour plans including the flight schedules, hotels, and restaurants to the tour leaders and tour guides of the affected ongoing tours via mobile devices.</p> <p>(Ex) When the tour operation center gets road block announcements from a national park website, and it is impossible to visit some sightseeing spots during the closed time frame, the operation center would send a new tour plan to the tour leaders and tour guides via mobile devices.</p>	Yu, 2005
Mobile executive decision support services	<p>To support video conference via mobile devices and to supply the executives with decision-related information</p> <p>(Ex) When an executive needs to make some decisions during his/her business trip, he/she may access the latest summary report of the key performance indicators with this group of services and have video conference via mobile devices.</p>	Shim et al., 2002

Personalized tour information services	To get the latest tour news based on personal preferences (Ex) Tour messages of newly opened sightseeing spots and the latest art exhibitions for a specific region are sent to employees who strongly meet the tour features. Employees can still catch the latest subscribed tour information when they are not at office.	Clarke, 2001
Real-time job dispatch services (Removed)	To track and locate the nearest tour services or facilities (Ex) When a group tour have a bus problem and they need another bus to continue the tour, the nearest available bus is located and assigned to handle the remaining tour plan.	Liao, 2003
Mobile tour planning & group decision support services (Removed)	To enable wireless discussions and decision supports along the tour planning process (Ex) The tour planners who are on business trips can share cost estimation sheet with partners to discuss the tour route alternatives via mobile devices.	Roth and Unger, 2001

■ Stage 2: B2E mobile tourism service classification result

During the focus group discussion, the dimensions of a B2E mobile tourism service classification were discussed and formulated. Supports for business operations from both management perspectives and functional perspectives were proposed and discussed. The proposed B2E mobile tourism services were grouped into management-oriented mobile services and operation-support mobile services. The mobile executive decision support services, the mobile tour quality control services, and the location-based decision support services were grouped into management-oriented B2E mobile tourism services. The mobile learning services, mobile knowledge management services, location-based information services, location-based collaboration services, personalized tourism information services, mobile communication services, mobile information services, mobile community services, and mobile sale force support services were regarded as operational level B2E mobile tourism services. From the management perspectives, the management levels were further divided into strategic planning, management control, knowledge management, and operational control.

Moreover, from the functional perspectives, the proposed B2E mobile tourism services were grouped into mobile information & communication services, location-based services, and context-aware services based on functional perspectives. The mobile information & communication services include mobile communication services, mobile information services, mobile community services, and mobile sale force support services. The location-based decision support services, and location-based information services, and location-based collaboration services were grouped into location-based services. The mobile executive decision support services, mobile tour quality control services, mobile learning services, mobile knowledge management services, and personalized tourism information services were regarded as context-aware services. Then, combined these two perspectives, the proposed B2E mobile tourism services were put into different slots based on the management and functional dimensions. The target user groups for the proposed B2E mobile tourism services were also discussed and illustrated. The participants also evaluated the importance, feasibility, and effectiveness of the proposed B2E mobile tourism services as they were employees in

travel agencies. The scores and rankings then were used to compare with those scored by managers to see the difference between managers and employees.

■ Stage 3: B2E mobile tourism service evaluation result

Based on the discussions from the field interviews, we made three modifications. First, the real-time job dispatch services were removed because the field routes were fixed, and the situation was not complicated enough to apply the real-time job dispatch services. Secondly, the mobile tour planning & group decision support services were removed because its average score on the importance rating was lower than 3. Thirdly, interviewees suggested combine the three related mobile learning services into one mobile learning service. The revised list contained twelve B2E mobile tourism services in the final B2E mobile tourism service classification. Table 18 illustrated the statistics report of the B2E mobile tourism service evaluation. Based on 5-point rating, the average scores of the importance, feasibility, and cost/benefit effectiveness for all B2E mobile tourism services by managers were 4.2, 4.4, and 3.9 respectively. For employees, the average scores for all B2E mobile tourism services were 3.8, 3.7, and 3.2 respectively.

Table 18. Statistics Report of B2E Mobile Tourism Service Evaluation

Mobile service	Importance						Feasibility						Cost/Benefit Effectiveness					
	Manager			Employee			Manager			Employee			Manager			Employee		
	M	S	R	M	S	R	M	S	R	M	S	R	M	S	R	M	S	R
Mobile communication services	5.0	0.0	1	4.6	0.8	1	5.0	0.0	1	4.7	0.8	1	4.3	1.2	1	3.5	1.1	2
Mobile information services	4.5	0.9	3	4.0	1.0	3	4.3	1.2	6	3.9	1.1	4	4.2	1.4	5	3.5	1.2	2
Mobile community services	4.3	0.6	4	3.3	1.6	12	4.7	0.6	3	3.3	1.3	9	4.2	0.8	5	2.9	1.4	9
Mobile sale force support services	4.0	1.0	7	4.0	1.0	3	4.7	0.6	3	3.7	0.9	7	4.3	1.2	1	3.0	0.6	7
Location-based collaboration services	3.7	1.5	10	3.6	1.2	10	4.0	1.0	9	2.8	0.7	12	4.0	1.0	7	3.0	1.0	7
Location-based information services	3.7	0.6	10	3.9	1.4	5	4.0	1.0	9	4.1	1.2	3	2.7	0.6	11	2.9	1.0	9
Location-based decision support services	4.3	0.6	4	4.1	1.3	2	4.3	0.6	6	3.9	1.2	4	3.7	1.2	9	3.4	1.0	4
Personalized tourism information services	4.0	1.0	7	3.7	1.3	8	4.0	1.0	9	3.8	1.2	6	3.7	1.2	9	3.2	1.2	5
Mobile learning services	4.3	0.6	4	3.9	1.1	5	4.7	0.6	3	4.5	0.7	2	4.0	1.0	7	4.0	1.0	1
Mobile knowledge management services	4.0	1.0	7	3.8	1.1	7	4.3	0.6	6	3.6	1.0	8	4.3	0.6	1	3.1	1.1	6
Mobile tour quality control services	4.7	0.6	2	3.7	1.5	8	5.0	0.0	1	3.3	1.4	9	4.3	1.2	1	2.9	0.9	9
Mobile executive decision support services	3.7	1.5	10	3.6	1.2	10	3.3	2.1	12	3.2	1.3	11	2.7	1.5	11	2.9	0.8	9

Note: M stands for mean; S is standard deviation; R means ranking.

Table 19 presented the summary of B2E mobile tourism service classification and evaluation. There were two dimensions in this service classification framework, including the management dimension and functional dimension. In the management dimension, two management levels were management level and operational level. The management levels then further divided into strategic planning and management control while the operational level was detailed as knowledge management and operational control. In the functional dimension, three mobile service types included mobile information & communication services, location-based services, and context-aware services respectively. Each B2E mobile tourism service was put into the corresponding slot within the B2E mobile tourism service classification framework. We also presented the rankings of the importance, feasibility and cost/benefit effectiveness of each B2E mobile tourism service by managers and employees in brackets. For example, the mobile learning services were ranked as the fourth important mobile service, the third feasible mobile service, and the seventh cost/benefit effective mobile service by managers; it was ranked as the fifth important mobile service, the second feasible mobile service, and the first cost/benefit effective mobile service by employees; so we put 4/3/7 and 5/2/1 in this order in brackets after the mobile learning services.

Table 19. Summary of B2E Mobile Tourism Service Classification and Evaluation

		Mobile Information & Communication Services	Location-based Services	Context-aware Services	Groups Served
Management level	Strategic planning			<ul style="list-style-type: none"> ● Mobile executive decision support services (10/12/11, 10/11/9) 	Executive
	Management control		<ul style="list-style-type: none"> ● Location-based decision support services (4/6/9, 2/4/4) 	<ul style="list-style-type: none"> ● Mobile tour quality control services (2/1/1, 8/9/9) 	Executive, middle-level manager, & tour operation center
Operational level	Knowledge management		<ul style="list-style-type: none"> ● Location-based information services (10/9/11, 5/3/9) 	<ul style="list-style-type: none"> ● Mobile learning services (4/3/7, 5/2/1) ● Mobile knowledge management services (7/6/1, 7/8/6) 	Executive, middle-level manager, tour operation center Tour leader, tour guide, tour bus driver, & local travel agent
	Operational control	<ul style="list-style-type: none"> ● Mobile communication services (1/1/1, 1/1/2) ● Mobile information services (3/6/5, 3/4/2) ● Mobile community services (4/3/5, 12/9/9) ● Mobile sale force support services (7/3/1, 3/7/7) 	<ul style="list-style-type: none"> ● Location-based collaboration services (10/9/7, 10/12/7) 	<ul style="list-style-type: none"> ● Personalized tourism information services (7/9/9, 8/6/5) 	Executive, middle-level manager, tour operation center Tour leader, tour guide, tour bus driver, local travel agent Business traveler, sale force, & field workforce

Note: Mobile service name (Importance ranking by managers/Feasibility ranking by managers/Effectiveness ranking by managers, Importance ranking by employees/Feasibility ranking by employees/Effectiveness ranking by employees)

Within the B2E mobile tourism service classification framework, the mobile executive decision support services helped the executives to analyze semi-structured or unstructured

questions, build models, and simulate cases to make better decisions in the strategic planning level. The B2E mobile tourism services for management control included location-based decision support services and mobile tour quality control services. User groups of the management control level were executives, middle-level managers, and tour operation centers. Typical B2E mobile tourism services for knowledge management were location-based information services, mobile learning services, and mobile knowledge management services. In addition to the user groups of strategic planning and management control, tour leaders, tour guides, tour bus drivers, and local travel agents were examples of knowledge workers and sources. The B2E mobile tourism services for operational control were mobile communication services, mobile information services, mobile community services, mobile sale force support services, location-based collaboration services, and personalized tourism information services. Business travelers, sales people, and field workforce as well as the user groups previously mentioned were typical user groups in the operational control. The scope of B2E mobile tourism service classification framework covered the needs of all employees from strategic to operational levels in the tourism industry.

6.4 Discussion on B2E Mobile Tourism Service Classification Result

Based on B2E mobile tourism service research results from the identification, classification and evaluation stages, discussions and suggestions are presented in this section. The average scores of importance, feasibility, and cost-benefit effectiveness of the B2E mobile tourism services are further compared and analyzed from both the managers and employees perspectives to achieve the goals.

The top three important B2E mobile tourism services selected by managers are (1) mobile communication services, (2) mobile tour quality control services, and (3) mobile information services. The top three important B2E mobile tourism services selected by employees are (1) mobile communication services, (2) location-based decision support services, (3/tie) mobile information services, and mobile sale force support services. This result supports the strong communication and information needs from both managers and employees. Moreover, the tour operation centers and managers have strong needs to keep track of all ongoing tours, and mobile services help controlling the overall service qualities. Thirdly, from the employee perspectives, employees such as sales people, tour guides, and tour leaders are interested in mobile sale force support and location-based decision support services. This indicates that there is a strong need of B2E mobile tourism services to support the daily works for different management levels. Furthermore, this result supports that in addition to the sales people, the primary users of B2E mobile tourism services include managers, tour operation centers, tour guides, tour leaders, and sales people in travel industry.

The top three feasible B2E mobile services selected by managers are (1/tie) mobile communication services, and mobile tour quality control services, (3/tie) mobile community services, mobile sale force support services, and mobile learning services. For employees, the top three feasible B2E mobile tourism services are (1) mobile communication services, (2) mobile learning services, and (3) location-based information services. Both managers and employees think the mobile learning services are feasible add-ons to existing e-learning

systems. Managers also think it is feasible to have mobile access to the existing community services. Even the employees think the location-based decision support services are important, but it is considered feasible to start from simpler location-based information services. So, demo projects of location-based decision support services may help the industry to fully realize the feasibility and benefits of developing and delivering this type of B2E mobile tourism services. The user-perceived technology complexity and limited functionality of existing B2E mobile tourism services hinder the technical feasibility ratings of the desired important B2E mobile tourism services. This indicates that the potentials of B2E mobile tourism services are not fully recognized by both managers and employees. Besides, both managers and employees think it is feasible to link to the existing e-commerce systems or to have simple notification capability. One interesting result is that the feasibility of the mobile tour quality control services is highly appreciated by managers. They consider that it is feasible to access real-time information like flight delays during the tour, and the tour operation centers can immediately provide rearrangement to the ongoing tour schedule to assure the tour quality.

Among the twelve B2E mobile tourism services, both managers and employees think the least effective B2E mobile tourism services are the location-based information services and mobile executive support services. The location-based information services, although candidates of a feasible pilot project, are not cost-benefit effective compared to location-based decision support services. This explains why information-based mobile services are interesting trials but the continuing usage desires are not strong enough. It is the decision support values that triggers the real demands. As for the mobile executive support services, the unstructured strategic-oriented decision types are bottlenecks for system design and that is why managers cast doubt about effectiveness of this type of B2E mobile tourism services.

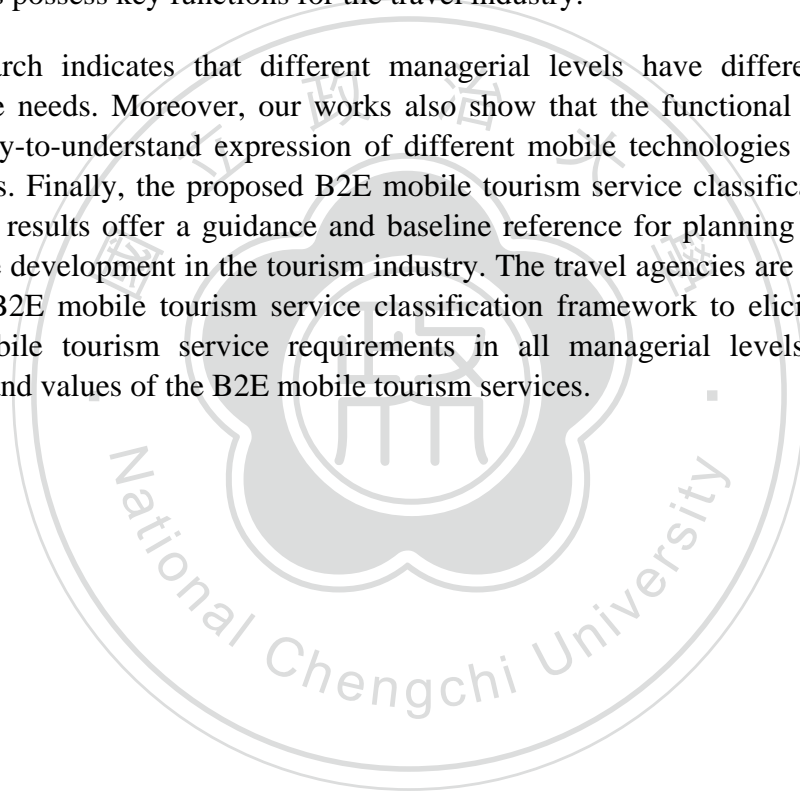
For managers, the top three cost/benefit effective B2E mobile tourism services include (1/tie) mobile communication services, mobile sale force support services, mobile knowledge management services, and mobile tour quality control services. For employees, the top three cost/benefit effective B2E mobile tourism services include (1) mobile learning services, (2/tie) mobile communication services, and mobile information services. It shows that managers appreciate values of service quality enhancement and organizational competence while the information, communication, and learning values touch the employees' hearts. It also indicates that most current B2E mobile tourism services fail to fulfill the management needs. It is critical to provide value-added B2E mobile tourism services to meet the organizational needs. While the mobile learning services are feasible and effective from the employees' perspectives, the mobile sale force support services are feasible and effective from managers' perspectives. This explains why the current B2E mobile tourism services focus on sales supports and why demos of the mobile learning services are emerging. One important finding is that the mobile tour quality control services are important, feasible, and cost-benefit effective from the managers' perspectives.

One interesting finding is that the employees give higher scores for the importance, feasibility, and cost-benefit effectiveness ratings of the location-based information services than the managers do. One explanation is that the difference is due to age difference and working experience. While senior students are young and don't have many working experiences, the managers of the travel agencies are mature and have lots of working

experiences. The Location-based information services are attractive enough to young people. For managers of the travel agencies, based on their working experiences, the location-based decision support services are more attractive than the location-based information services.

Our results provide solid empirical evidence that the mobile tour quality control services are important, feasible and cost-benefit effective from managers' perspectives. In a mobile context, it is quite possible to provide front-end employees on the move with real-time back-end office supports during the trips to ensure the tour quality of group tours. Moreover, the real-time collections of problems provide more evidence and clues for service quality enhancement during post-trip periods. Thus, the mobile tour quality control services provide killer functionality for the tour industry. For mobile service providers, this study scale the product lines of mobile services from mobile sale force support services to mobile tour quality control services while the former mobile services highlight efficiency and paybacks the latter mobile services possess key functions for the travel industry.

Our research indicates that different managerial levels have different B2E mobile tourism service needs. Moreover, our works also show that the functional design concerns provide an easy-to-understand expression of different mobile technologies behind different mobile services. Finally, the proposed B2E mobile tourism service classification framework and evaluation results offer a guidance and baseline reference for planning the B2E mobile tourism service development in the tourism industry. The travel agencies are suggested to use the proposed B2E mobile tourism service classification framework to elicit and rank their own B2E mobile tourism service requirements in all managerial levels to gain better performances and values of the B2E mobile tourism services.



Chapter 7 Conclusion

In the subsequent sections, this study is organized as follows. Section 7.1 presents the discussions on B2C and B2E mobile tourism services research results and describes the managerial implications based on our research results. In section 7.2, limitations in our study are discussed and future research directions are suggested as well.

7.1 Discussions and Managerial Implications

The research contribution of our study is the service classification and system development of mobile tourism services with multiple perspectives, as shown in Figure 24. Based on the design science research methodology, this study proposes and validates the service classification framework and system development of B2C mobile tourism services with multiple perspectives. Moreover, the extension study of B2E mobile tourism service classification shows the generalizability of the research framework and processes of B2C mobile tourism service classification. Tourists, 3G operators and travel agencies are considered in the B2C mobile tourism service study while the multiple perspectives considered in the B2E mobile tourism service study are managers and employees. Previous researches contribute to the research domain with one perspective while our study contributes to the research area with the multiple perspectives for the service classification of the mobile tourism services. The system analysis and development of prototype system of B2C mobile tourism services shows the feasibility and effectiveness of the proposed B2C mobile tourism services as well as the proposed development framework and processes.

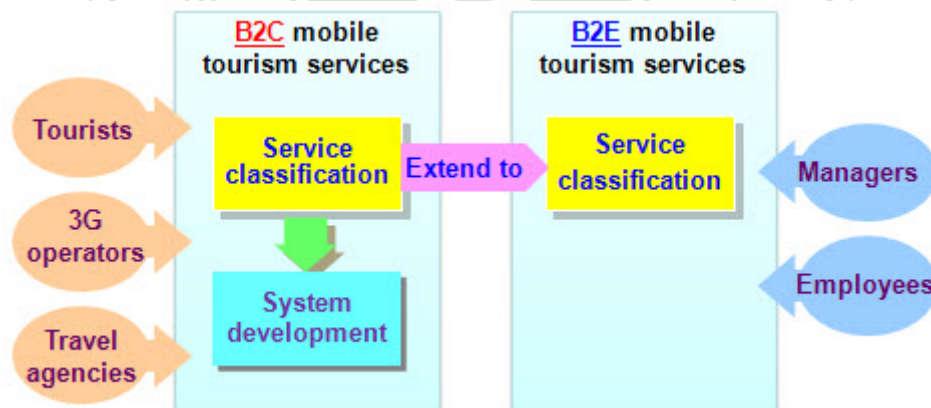


Figure 24. Research Contribution

This study constitutes the first systematic integrated requirement assessment of B2C mobile tourism services, an area that has not been comprehensively examined by previous studies of mobile commerce and e-tourism. This study proposes an integrated B2C mobile service classification framework including the mobile search & notification services, the mobile community services, the mobile guide services, the mobile recommendation services, the mobile auction services, and the mobile transaction & payment services. This study

provides multiple perspectives on the integrated requirement assessments of B2C mobile tourism services. The integrated requirement assessments of B2C mobile tourism services may provide a promising point for research to apply to other interesting application domains as well. Our proposed B2C mobile service classification framework offers a starting point in assisting the organizations to prioritizing their efforts in the B2C mobile tourism services. This research has demonstrated the integrated requirement assessment of mobile tourism services from both tourists' and service operators' perspectives. This research also investigates how the user requirements are translated to working system, and reports on the system design and development of mobile tourism services. The system evaluation result indicates the appropriateness and usefulness of the prototype system.

We also propose a B2E mobile service classification and evaluation framework for the tourism industry that reflects the accumulation of existing research efforts and highlights some interesting research results. The two-dimensional classification framework is comprehensive since it covers the mobile service requirements of four management levels with three functional design concerns. The staged approach and multi-dimensional perspectives provide a systematically way to identify and rank the B2E mobile service requirements for mobile-oriented organizations like the tourism industry. Moreover, the evaluation of importance, feasibility, and cost/benefit effectiveness of each B2E mobile services are useful as guidelines for planning and implementing the mobile service development project by tourism service providers.

7.2 Limitations and Future Research Directions

The tourist sample in the B2C study provides both strengths and weaknesses. For example, nearly 83% of the participants are between 20-39 years old, commonly described as a key target market for technology-enabled products and services. While our sample is appropriate given our research focus on mobile services, as the market for mobile services evolves, future research should include a more diverse sample in terms of demographic characteristics (i.e., age range and educational level).

With regard to evaluations of the usefulness of the mobile tourism services, only one-third of our B2C tourist sample has experience with mobile Internet access while the penetration rate of mobile Internet access in Taiwan is about 71.3% (National Communications Commission, 2012). While our results illustrate the usefulness of the mobile tourism services, further research with more experienced mobile Internet user populations should lend additional insights. Furthermore, we focus here on the usefulness of the mobile tourism services without pricing consideration in our B2C study. A logical extension would be to include pricing considerations as this will likely influence the usefulness evaluation by tourists and the profit sharing among different service providers.

In our B2C study, we focus our attention on the usefulness of the mobile tourism services from tourists' perspectives and the importance, feasibility, and cost-benefit effectiveness of the mobile tourism services from 3G operators' and travel agencies' perspectives. While 3G operators and travel agencies are key service providers of the mobile tourism services, it may be useful to examine more closely other tour-related service

providers' (i.e., hotels, airlines, sightseeing spots, and restaurants), government's (i.e., the tourism bureau and departments of information and tourism in different cities), and non-profit organizations' (i.e., Taiwan visitors association and tourist guide association) attitudes toward the importance, feasibility, and cost-benefit effectiveness of the mobile tourism services. A closer examination of more players' attitudes toward the importance, feasibility, and cost-benefit effectiveness of the mobile tourism services may be a useful avenue for future research.

In our study, the travel agencies are categorized by their travel license types. Even though this categorization is suitable for stratified random sampling method, however, this categorization cannot reflect the tour operations (e.g. inbound tours and outbound tours). Future researches are encouraged to investigate the B2C mobile tourism services with different tour operations. Moreover, future researches focusing on specific type of tourism contexts (e.g. domestic budget travelling) are desired to investigate which B2C mobile tourism services are useful under a specific type of tourism context. That is, future research could also extend the surveys to investigate more service operators or more service scenarios to further understand the business environment. Additional research is needed to further examine the detailed business model design to deliver a triple win solution for tourists, 3G operators as well as travel agencies.

We recognize some limitations as regards the system development and system evaluation of the mobile tourism services. Assessing the entire study against the selected methodology requirements, it can be seen that the recommendation functions can be further enhanced by integrating ontology mapping and case-based reasoning mechanisms. We also have to recognize that our preliminary results of the system evaluation of the prototype system are limited. We have tested the prototype system with only students and we have not yet seen the results of operational efficiency and user acceptance of the system using real world cases. Some future work needs to be done to fully realize the potential of the proposed system framework. First, as a technical extension, recommendation functions have to be further developed to include ontology mapping and case-base reasoning mechanism. Second, formal evaluation of the proposed framework will be conducted using a set of real businesses cases and business problems with different levels of complexity.

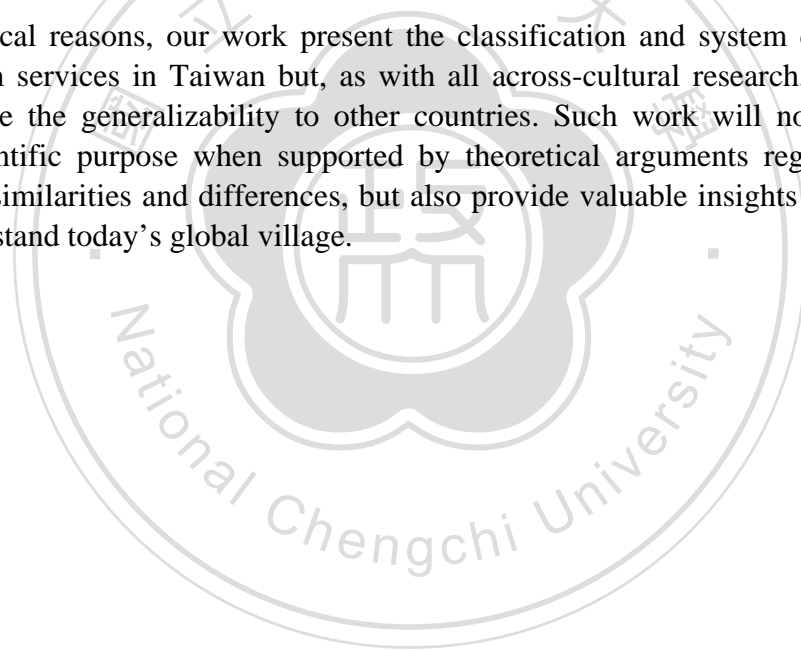
Another limitation as regards the system development and system evaluation of the mobile tourism services stems from the use of "live" cell phone with real mobile Internet access but with predefined geographic location. This choice is a compromise because a prototype system cannot access the mobile phone's current location via the 3G providers. Another constraint that plays a role in our decision is that we only have one 3G mobile phone for system evaluation. The strength is that there is no rating bias because of different mobile handheld devices. Future research can get a more accurate assessment of the mobile tourism services by suing different live wireless, handheld devices with current locations reported from the 3G providers. This is important since this research likely presents a rosier picture of prototype system evaluation because of the use of one mobile device with predefined geographic location whereas tests with the different mobile devices with different locations might reveal that the state-of-the-art is actually worse. Thus, further studies focusing on the system evaluation of mobile tourism services should also try to use different types of devices (e.g., PDAs, smart phones, etc.) and, possibly, various models within each type of device.

Such specific research studies will help further understand specific design practices and their impact on various outcomes.

We have also recognized limitations as regards the classification of B2E mobile tourism services. It has been found more difficult than expected to recruit full-time employees in travel agencies to participate in the B2E mobile tourism service study. With this constraint, senior students major in tourism management with internship experiences are recruited in our B2E mobile tourism service study. In our study, managers of the travel agencies evaluate and validate the classification of the B2E mobile tourism services. Thus, the research results are acceptable and adequate enough to satisfy the research question. More research should be done to develop prototype systems to find out how the employees in the travel agencies evaluate the usefulness of the mobile tourism services.

Future studies will focus on building prototype systems in some travel agencies to validate the usability and usefulness of the proposed B2E mobile tourism service classification framework and identified mobile services, as well as on adapting this approach to classify and evaluate intra- or inter-organizational mobile services in other industry sectors.

For practical reasons, our work present the classification and system development for mobile tourism services in Taiwan but, as with all across-cultural research, future research should examine the generalizability to other countries. Such work will not only serve an important scientific purpose when supported by theoretical arguments regarding expected cross-cultural similarities and differences, but also provide valuable insights for practitioners to better understand today's global village.



References

1. Abowd, G. D., Atkeson, C. G., Hong, J., Long, S., Kooper, R. and Pinkerton, M. (1997). Cyberguide: a mobile context-aware tour guide. *Wireless Networks*, 3(5), 421-433.
2. Alfaro, I., Nardon, M., Pianesi, F., Stock, O. and Zancanaro, M. (2004). Using cinematic techniques on mobile devices for cultural tourism. *Information Technology & Tourism*, 7(2), 19 pages.
3. Anckar, B. and D’Incau, D. (2002). Value creation in mobile commerce: findings from a consumer survey. *Journal of Information Technology Theory and Application*, 4(1), 43-64.
4. Ardissono, L., Goy, A., Petrone, G., Segnan, M. and Torasso, P. (2003). Intrigue: personalized recommendation of tourist attractions for desktop and handheld devices. *Applied Artificial Intelligence*, 17(8-9), 687-714.
5. Aschoff, F. and Novak, J. (2008). The mobile forum: real-time information exchange in mobile SMS communities. *Proceedings of the 26th Annual SIGCHI Conference on Human Factors in Computing Systems*, 3489-3494.
6. Axup, J. and Viller, S. (2005). Augmenting travel gossip: design for mobile communities. *Proceedings of the 19th Conference of the Computer-Human Interaction Special Interest Group (CHISIG) of Australia on Computer-Human Interactions*, 4 pages.
7. Barnes, S. J. (2003). Location-based Services: the state of the art. *E-Service Journal*, 2(3), 59-70.
8. Barnes, S. (2004). Wireless support for mobile distributed work: a taxonomy and examples. *Proceedings of the 37th Hawaii International Conference on System Sciences*, 10 pages.
9. Basole, R. C. and Chao, R. O. (2004). Location-based mobile decision support systems and their effect on user performance. *Proceedings of the 10th Americas Conference on Information Systems*, 2870-2874.
10. Bellotti, V., Begole, B., Chi, E. H., Ducheneaut, N., Fang, J., Isaacs, E., King, T., Newman, M. W., Partridge, K., Price, B., Rasmussen, P., Roberts, M., Schiano, D. J. and Walendowski, A. (2008). Activity-based serendipitous recommendations with the Magitti mobile leisure guide. *Proceedings of the 26th Annual SIGCHI Conference on Human Factors in Computing Systems*, 1157-1166.
11. Berger, S., Lehmann, H., and Lehner, F. (2003). Location based services in the tourist industry. *Information Technology & Tourism*, 5(4), 243-256.
12. Buhalis, D., Law, R. (2008). Progress in Information Technology and Tourism Management: 20 Years on and 10 Years after the Internet—The State of eTourism Research. *Tourism Management*, 29(4), 609–623.
13. Buhalis, D. and Licata, M. C. (2002). The future eTourism intermediaries. *Tourism Management*, 23(3), 207-220.
14. Cabrera, J. S., Frutos, H. M., Stoica, A. G., Avouris, N., Dimitriadis, Y., Fiotakis, G. and Liveri, K. D. (2005). Mystery in the museum: collaborative learning using handheld devices. *Proceedings of the 7th International Conference on Human Computer Interaction with Mobile Devices and Services*, 315-318.

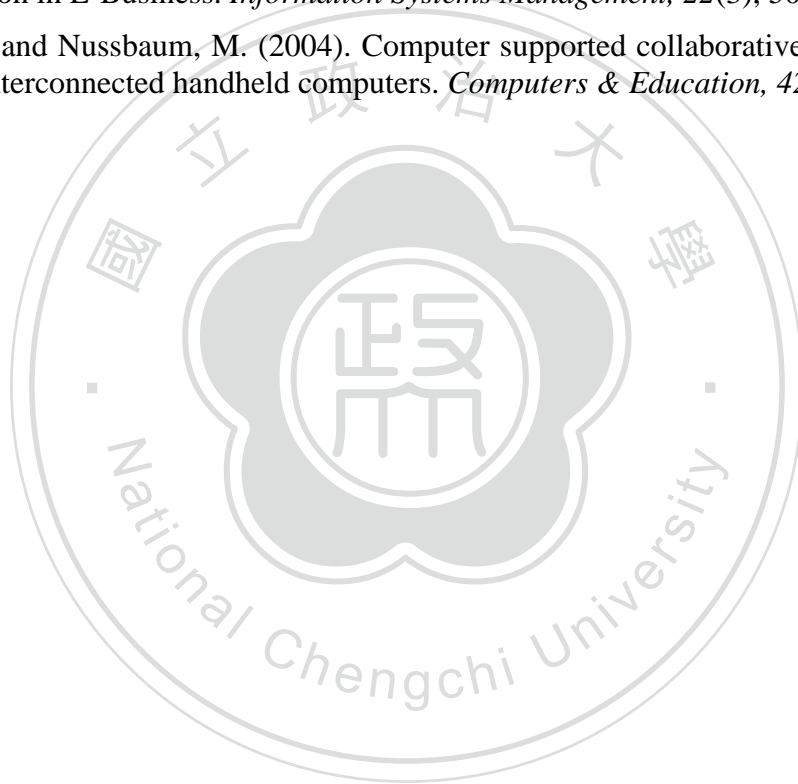
15. Camponovo, G. and Pigneur, Y. (2002). Analyzing the m-business landscape. *Annals of Telecommunications*, 58 (1-2), 59-77.
16. Carlsson, C., Carlsson, J. and Walden, P. (2005). Mobile services for the hospitality industry. *Proceedings of the 13th European Conference on Information Systems*, 12 pages.
17. Castillo, L., Armengol, E., Onaindia, E., Sebastia, L., Gonzalez-Boticario, J., Rodriguez, A., Fernandez, S., Arias, J. D. and Borrajo, D. (2008). SAMAP: an user-oriented adaptive system for planning tourist visits. *Expert Systems with Applications*, 34(2), 1318-1332.
18. Chen, L. and Nath, R. (2004). A framework for mobile business applications. *International Journal of Mobile Communications*, 2 (4), 368-381.
19. Chen, M., Zhang, D. and Zhou, L. (2005). Providing web services to mobile users: the architecture design of an m-service portal. *International Journal of Mobile Communications*, 3 (1), 1-18.
20. Chen, P.-T. and Cheng, J. Z. (2010). Unlocking the promise of mobile value added services by applying new collaborative business models. *Technological Forecasting & Social Change*, 77 (4), 678-693.
21. Chen, Y. S., Kao, T. C. and Sheu, J. P. (2003). A mobile learning system for scaffolding bird watching learning. *Journal of Computer Assisted Learning*, 19(3), 347-359.
22. Cheverst, K., Davies, N., Mitchell, K., Friday, A. and Efstratiou, C. (2000). Developing a context-aware electronic tourist guide: some issues and experiences. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 17-24.
23. Chiu, D. K. W., Yueh, Y. T. F., Leung, H.-F. and Hung, P. C. K. (2009). Towards ubiquitous tourist service coordination and process integration: a collaborative travel agent system architecture with semantic web services. *Information Systems Frontiers*, 11 (3), 241-256.
24. Cil, I., Alpturk, O., and Yazgan, H. R. (2005). A new collaborative system framework based on a multiple perspective approach: IntelliTeam. *Decision Support Systems*, 39 (4), 619-641.
25. Clarke, I. (2001). Emerging value propositions for m-commerce. *Journal of Business Strategies*, 8 (2), 133-148.
26. Cooper, C. (2006). Knowledge management and tourism. *Annals of Tourism Research*, 33 (1), 47-64.
27. Derballa, V. and Pousttchi, K. (2004). Extending knowledge management to mobile workplaces. *Proceedings of the 6th International Conference on Electronic Commerce*, 583-590.
28. Driver, C. and Clarke, S. (2008). An application framework for mobile, context-aware trails. *Pervasive and Mobile Computing*, 4 (5), 719-736.
29. European Commission (2003). *Final report of working group on mobile services for tourism*. Retrieved Sep. 1, 2006, from <http://europa.eu.int/comm/enterprise/services/tourism/tourism-publications/documents/mobileservices.pdf>.

30. Feyne, J. et al. (2009). Automated murmurs : the social mobile tourist application. *Proceedings of the 2009 International Conference on Computational Science and Engineering*, 1021-1026.
31. Garces, S. A., Gorgemans, S., Sanchez, A. M., and Perez, M. P. (2004). Implications of the Internet – an analysis of the Aragonese hospitality industry, 2002. *Tourism Management*, 25 (5), 603-613.
32. Giaglis, G. M., Kourouthanassis, P. and Tsamakos, A. (2002). *Towards a classification framework for mobile location services*. In E.B. Mennecke & T.J. Strader (Eds.), *Mobile Commerce - Technology, Theory, and Applications* (pp. 67-85), Idea Group Publishing.
33. Goto, K. and Kambayashi, Y. (2003). Integration of electronic tickets and personal guide system for public transport using mobile terminals. *Proceedings of the 2003 ACM SIGMOD International Conference on Management of Data*, 642-646.
34. Grun, C. et al. (2008). Assisting tourist on the move – an evaluation of mobile tourist guides. *Proceedings of the 7th International Conference on Mobile Business*, 171-180.
35. Hand, A., Cardiff, J., Magee, P. and Doody, J. (2006). An architecture and development methodology for location-based services. *Electronic Commerce Research and Applications*, 5(3), 201-208.
36. Hair, J. F., Black, W. C., Babin, B. J. and Anderson, R. E. (2010). *Multivariate Data Analysis*, 7th edition, Prentice-Hall.
37. Hevner, A. R., March, S. T., Park, J., and Ram, S. (2004). Design science in information systems research. *MIS Quarterly*, 28 (1), 75-105.
38. Hinze, A. and Voisard, A. (2003). Location- and time-based information delivery in tourism. *Lecture Notes in Computer Science*, 2750, 489-507.
39. Kakaletris, G., Varoutas, D., Katsianis, D., Spicopoulos, T. and Kouvas, G. (2004). Designing and implementing an open infrastructure for location-based, tourism-related content delivery. *Wireless Personal Communications*, 30(2-4), 153-165.
40. Kansa, E. C. and Wilde, E. (2008). Tourism, peer production, and location-based service design. *Proceedings of the 2008 IEEE International Conference on Service Computing*, 629-636.
41. Kown, Q. and Shin, M. K. (2008). LACO: a location-based cooperative query system for securely personalized services. *Expert Systems with Applications*, 34 (4), 2966-2975.
42. Laudon, J. P. and Laudon, K. C. (2004). *Management Information Systems: Managing the Digital Firm*, 8th ed. Prentice Hall.
43. Leem, C. S., Suh, H. S., and Kim, D. S. (2004). A classification of mobile business models and its applications. *Industrial Management and Data Systems*, 104 (1), 78-87.
44. Liao, Z. (2003). Real-time taxi dispatching using global positioning systems. *Communications of the ACM*, 46 (5), 81-83.
45. Liebowitz, J. (2007). Developing knowledge and learning strategies in mobile organizations. *International Journal of Mobile Learning and Organisation*, 1 (1), 5-14.
46. Lu, Y., Zhang, L., and Wang, B. (2009). A multidimensional and hierarchical model of mobile service quality. *Electronic Commerce Research and Applications*, 8 (5), 228-240.

47. Lukkari, J., Korhonen, J. and Ojala, T. (2004). SmartRestaurant – mobile payments in context-aware environment. *Proceedings of the 6th International Conference on Electronic Commerce*, 575-582.
48. Lyytinen, K. and Yoo, Y. (2002). Research commentary: the next wave of nomadic computing. *Information Systems Research*, 13 (4), 377-388.
49. Maamar, Z., Yahyaoui, H. and Mansoor, W. (2004). Design and development of an m-commerce environment: the E-CWE project. *Journal of Organizational Computing and Electronic Commerce*, 14 (4), 285-303.
50. Mallat, N., Rossi, M., Tuunainen, V. K. and Oorni, A. (2006). The impact of use situation and mobility on the acceptance of mobile ticketing services. *Proceedings of the 39th Hawaii International Conference on System Sciences*, 10 pages.
51. March, S. T. and Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems*, 15 (4), 251-266.
52. National Communications Commission (2012). *Telecommunication Figures in 2011*. Retrieved May 20, 2012, from http://www.ncc.gov.tw/english/show_file.aspx?table_name=news&file_sn=732.
53. Ngai, E. W. T. and Gunasekaran, A. (2007). A review for mobile commerce research and applications. *Decision Support Systems*, 43(1), 3-15.
54. Nielsen, L. B. (2004). Post Disney experience paradigm? Some implications for the development of content to mobile tourist services. *Proceedings of the 6th International Conference on Electronic Commerce*, 657-666.
55. Olofsson, S., Carlsson, V. and Sjolander, J. (2006). The friend locator: supporting visitors at large-scale events. *Personal and Ubiquitous Computing*, 10(2-3), 84-89.
56. Ondrus, J. and Pigneur, Y. (2006). Towards a holistic analysis of mobile payments: a multiple perspectives approach. *Electronic Commerce Research and Applications*, 5(3), 246-257.
57. Ortiz, G. F., Branco, A. S. C., Sancho, P. R. and Castillo, J. L. (2001). ESTIA-Efficient electronic services for tourists in action. *Lecture Notes in Computer Science*, 2193, 163-174.
58. Peffers, K., Tuunainen, T., Rothenberger, M. A., and Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of Management Information Systems*, 24(3), 45-77.
59. Pousman, Z., Iachello, G., Fithian, R., Moghazy, J. and Stasko, J. (2004). Design iterations for a location-aware event planner. *Personal and Ubiquitous Computing*, 8(2), 117-125.
60. Proll, B. and Retschitzegger, W. (2000). Discovering next-generation tourism information systems – a tour on TIScover. *Journal of Travel Research*, 39(2), 182-191.
61. Prykop, C. and Heitmann, M. (2006). Designing mobile brand communities: concept and empirical illustration. *Journal of Organizational Computing and Electronic Commerce*, 16 (3-4), 301-323.
62. Rangone, A. and Renga, F. M. (2006). B2E mobile internet: an exploratory study of Italian applications. *Business Process Management Journal*, 12 (3), 330-343.

63. Ricci, F. and Nguyen, Q. N. (2007). Acquiring revising preferences in a critique-based mobile recommender system. *IEEE Intelligent Systems*, 22 (3), 22-29.
64. Roschelle, J., Sharples, M. and Chan, T. W. (2005). Introduction to the special issue on wireless and mobile technologies in education. *Journal of Computer Assisted Learning*, 21 (3), 159-161.
65. Roth, J. and Unger, C. (2001). Using handheld devices in synchronous collaborative scenarios. *Personal and Ubiquitous Computing*, 5 (4), 243-252.
66. Sadoun, B. and Al-Bayari, O. (2007). Location based services using geographical information systems. *Computer Communications*, 30 (16), 3154-3160.
67. Scherp, A. and Boll, S. (2004). Generic support for personalized mobile multimedia tourist applications. *Proceedings of the 2004 ACM International Conference on Multimedia*, 178-179.
68. Scornavacca, E., Barnes, S. J. and Huff, S. L. (2006). Mobile business research published in 2000-2004: emergence, current status, and future opportunities. *Communications of the Association for Information System*, 17, 635-646.
69. Shen, J. (2003). Utilizing mobile devices to capture case stories for knowledge management. *Proceedings of the ACM Conference on Computer Human Interaction*, 688-689.
70. Shim, J. P., Warkentin, M., Courtney, J. F., Power, D. J., Sharda, R. and Carlsson, C. (2002). Past, present, and future of decision support technology. *Decision Support Systems*, 33 (2), 111-126.
71. Tarasewich, P. (2003). Designing mobile commerce applications. *Communications of the ACM*, 46 (12), 57-60.
72. Tourism Bureau (2011). *2010 Survey of Travel by R.O.C. Citizens*. Retrieved May 20, 2012, from http://admin.taiwan.net.tw/upload/statistic_eng/20110816/08ed5146-f7c4-45dd-93c8-09eafb5fc4f5.doc.
73. Tsai, H.-T., Huang, L., and Lin, C.-G. (2005). Emerging e-commerce development model for Taiwanese travel agencies. *Tourism Management*, 26 (5), 787-796.
74. Tsamakos, A., Giaglis, G. M. and Kourouthanassis, P. (2002). Auctioning tourism products over mobile devices. *Proceedings of the 1st International Conference on Mobile Commerce*, 10 pages.
75. Tsang, M. M., Ho, S.-C. and Liang, T.-P. (2004). Consumer attitude toward mobile advertising: an empirical study. *International Journal of Electronic Commerce*, 8 (3), 65-78.
76. Varshney, U. (2003). Wireless I: Mobile and wireless information systems: applications, networks, and research problems. *Communications of the Association for Information System*, 12, 155-166.
77. Vetter, R. (2001). The wireless web. *Communications of the ACM*, 44 (3), 60-61.
78. Wang, S. and Cheung, W. (2004). E-business adoption by travel agencies: prime candidates for mobile e-business. *International Journal of Electronic Commerce*, 8 (3), 43-63.

79. Wei, F.-H. and Chen, G.-D. (2006). Collaborative mentor support in a learning context using a ubiquitous discussion forum to facilitate knowledge sharing for lifelong learning. *British Journal of Educational Technology*, 37 (6), 917-935.
80. Werthner, H. and Ricci, F. (2004). E-commerce and tourism. *Communications of the ACM*, 47 (12), 101-105.
81. Wu, W.-H. (2006). An exploratory study of reintermediation of Taiwan travel industry in the e-commerce environment. *Journal of Information Management*, 13 (1), 243-269.
82. Yeo, J. and Huang, W. (2003). Mobile e-commerce outlook. *International Journal of Information Technology & Decision Making*, 2(2), 313-332.
83. Yu, C. C. (2005). Personalized and community decision support in e-tourism intermediaries. *Lecture Notes in Computer Science*, 3588, 900-909.
84. Zhang, D., Chen, M. and Zhou, L. (2005). Dynamic and Personalized Web Services Composition in E-Business. *Information Systems Management*, 22(3), 50-65.
85. Zurita, G. and Nussbaum, M. (2004). Computer supported collaborative learning using wireless interconnected handheld computers. *Computers & Education*, 42 (3), 289-314.



Appendix 1. B2C Tourist On-line Survey

行動旅遊服務的問卷調查—旅客觀點(無記名的學術問卷)

問卷描述：親愛的女士、先生您好：行動旅遊服務的意思，是希望透過手機上的加值服務，來協助您的旅遊過程，包括行程規劃、旅遊經驗分享等。本問卷想瞭解您身為旅客對此研究的想法，以作為未來研究方向之重要參考。本問卷採無記名方式，所有資料將僅做學術研究用且不對外公開。您寶貴意見對於本研究相當重要，煩請您費神填答。本研究結果預計於3月31日公告於<http://www3.nccu.edu.tw/~g0356504/>，如對本研究有興趣的先進們，歡迎自行上網瀏覽研究報告。感謝您的熱情協助與支持！並祝您平安、快樂！

政大資管博士生張小萍敬上
Email: ping@mis.nccu.edu.tw

填寫期限：2007年01月11日14時00分~2007年02月19日23時59分 為止

在單純考慮功能，不考慮收費的情況下，請您評估下列功能對您是否有幫助。

1. 行動搜尋與通知服務 (必填)

題目	非常有用	有用	普通	不太有用	用不到
安全相關告警服務：會影響到旅遊安全的資訊，例如附近發生地震、山崩、雪崩、颱風	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
路況與氣象報告服務：旅客可以自行在手機上查詢或是以簡訊通知即時路況與氣象資訊	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
活動異動通知服務：簡訊通知特別活動臨時改時間的訊息	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
重大行前通知服務：旅遊業者根據旅客預定前往的地點，以簡訊通知旅客會影響旅遊的重大資訊，如颱風訊息	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
提醒服務：如訂位代號提醒或班機時刻提醒	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2. 行動社群服務 (必填)

題目	非常有用	有用	普通	不太有用	用不到
資訊查詢服務：例如用手機上旅遊的論壇或討論區，問大家對於當地某景點或餐廳的評價	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
資訊分享服務：例如用手機簡訊發送旅遊心得或上傳照片到旅遊的論壇或討論區	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. 行動導覽服務 (必填)

題目	非常有用	有用	普通	不太有用	用不到
定點式導覽服務：例如當旅客在看畫展時，跟著固定的路線，在手機上可以看到每幅畫的介紹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
互動式導覽服務：例如當旅客在看一幅名畫時，感到很有興趣，可以透過手機進一步瞭解大師其他的作品介紹	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
主題式影音或遊戲服務：例如當旅客在路上時，在手機上可以看到主題樂園的影片或遊戲	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. 行動推薦服務 (必填)

題目	非常有用	有用	普通	不太有用	用不到
住宿推薦：例如臨時有住宿需求，手機可以推薦附近住宿的地點	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
景點推薦：例如推薦當地好吃好玩的景點	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
餐廳推薦：例如依照旅客偏好(中式或西式)，推薦附近的熱門餐廳或新餐廳	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
行程推薦：例如根據旅客偏好，推薦當地好吃好玩的景點與參觀順序	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
路線推薦：例如依照附近活動訊息通知，建議最佳的路線	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
特產推薦：例如推薦當地名產、特產、紀念品、特色商店	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. 行動拍賣服務 (必填)

題目	非常有用	有用	普通	不太有用	用不到
最後一秒大拍賣 1：例如飯店可以把當天的空房間拿出來拍賣，飯店設定一個價格下限，讓旅客來競標	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
最後一秒大拍賣 2：例如旅客設定一個價格上限與特定的地區，讓飯店拿當天的空房來競標	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. 行動交易與付款服務 (必填)

題目	非常有用	有用	普通	不太有用	用不到
行動訂位服務：例如用手機軟體來訂位	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
行動付款服務：例如將信用卡與手機結合，旅途中用手機當信用卡來刷卡	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
行動票券服務：例如將門票與手機結合，旅途中用手機當門票進場	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. 我覺得行動旅遊服務很有用 (必填)

非常同意 同意 普通 不太同意 非常不同意

受訪者基本資料

1. 旅遊經驗(可複選) (必填)

國內自助 國內跟團 國外自助 國外跟團

2. 是否用過行動上網？(WAP、GPRS、3G、PHS等手機上網) (必填)

有 沒有

3. 性別 (必填)

女 男

4. 年齡 (必填)

19歲以下 20—29歲 30—39歲 40—49歲 50—59歲 60歲以上

5. 教育程度 (必填)

高中/職 專科大學/技術學院 碩士 博士

送出

清除

Appendix 2. B2C 3G Operator On-line Survey

行動旅遊服務的問卷調查-3G電信業觀點(無記名的學術問卷)

問卷描述：

親愛的女士、先生您好：行動旅遊服務的意思，是希望透過手機上的加值服務，來協助旅客的旅遊過程，包括行程規劃、旅遊經驗分享等。本問卷想瞭解您身為 3G 電信業對此研究的想法，以作為未來研究方向之重要參考。本問卷採無記名方式，所有資料將僅做學術研究用且不對外公開。您寶貴意見對於本研究相當重要，煩請您費神填答。本研究結果預計於 3 月 31 日公告於 <http://www3.nccu.edu.tw/~g0356504/>，如對本研究有興趣的先進們，歡迎自行上網瀏覽研究報告。

感謝您的熱情協助與支持！並祝您平安、快樂！

政大資管博士生張小萍敬上

Email: ping@mis.nccu.edu.tw

填寫期限：2007 年 01 月 11 日 14 時 00 分~2007 年 02 月 19 日 23 時 59 分 為止

針對下列服務，如果以 5 分作為總分，請就重要性、可行性、可投資性(成本效益評估)，分別評分(5 為最高分，1 為最低分)。

1. 行動搜尋與通知服務(必填)

題目	重要性	可行性	可投資性
安全相關告警服務：會影響到旅遊安全的資訊，例如附近發生地震、山崩、雪崩、颱風	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
路況與氣象報告服務：旅客可以自行在手機上查詢或是以簡訊通知即時路況與氣象資訊	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
活動異動通知服務：簡訊通知特別活動臨時改時間的訊息	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
重大行前通知服務：旅遊業者根據旅客預定前往的地點，以簡訊通知旅客會影響旅遊的重大資訊，如颱風訊息	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
提醒服務：如訂位代號提醒或班機時刻提醒	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1

2. 行動社群服務 (必填)

題目	重要性	可行性	可投資性
資訊查詢服務：例如用手機上旅遊的論壇或討論區，問大家對於當地某景點或餐廳的評價	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1
資訊分享服務：例如用手機簡訊發送旅遊心得或上傳照片到旅遊的論壇或討論區	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1

3. 行動導覽服務 (必填)

題目	重要性	可行性	可投資性
定點式導覽服務：例如當旅客在看畫展時，跟著固定的路線，在手機上可以看到每幅畫的介紹	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1
互動式導覽服務：例如當旅客在看一幅名畫時，感到很有興趣，可以透過手機進一步瞭解大師其他的作品介紹	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1
主題式影音或遊戲服務：例如當旅客在路上時，在手機上可以看到主題樂園的影片或遊戲	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1

4. 行動推薦服務 (必填)

題目	重要性	可行性	可投資性
住宿推薦：例如臨時有住宿需求，手機可以推薦附近住宿的地點	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
景點推薦：例如推薦當地好吃好玩的景點	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
餐廳推薦：例如依照旅客偏好(中式或西式)，推薦附近的熱門餐廳或新餐廳	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
行程推薦：例如根據旅客偏好，推薦當地好吃好玩的景點與參觀順序	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
路線調整：例如依照附近活動訊息通知，建議最佳的路線	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
特產推薦：例如推薦當地名產、特產、紀念品、特色商店	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1

5. 行動拍賣服務 (必填)

題目	重要性	可行性	可投資性
最後一秒大拍賣 1：例如飯店可以把當天的空房間拿出來拍賣，飯店設定一個價格下限，讓旅客來競標	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1
最後一秒大拍賣 2：例如旅客設定一個價格上限與特定的地區，讓飯店拿當天的空房來競標	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1	○5 ○4 ○3 ○2 ○1

6. 行動交易與付款服務 (必填)

題目	重要性	可行性	可投資性
行動訂位服務：例如用手機軟體來訂位	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1
行動付款服務：例如將信用卡與手機結合，旅途中用手機當信用卡來刷卡	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1
行動票券服務：例如將門票與手機結合，旅途中用手機當門票進場	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1

7. 整體的評價 (必填)

題目	重要性	可行性	可投資性
我對行動旅遊服務整體的評價為	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1

受訪者基本資料

1. 旅遊經驗(可複選) (必填)

- 國內自助 國內跟團 國外自助 國外跟團

2. 是否用過行動上網？(WAP、GPRS、3G、PHS 等手機上網) (必填)

- 有 沒有

3. 性別 (必填)

- 女 男

4. 年齡 (必填)

- 19歲以下 20—29歲 30—39歲 40—49歲 50—59歲 60歲以上

5. 教育程度 (必填)

- 高中/職 專科學校/技術學院 碩士 博士

送出

清除

Appendix 3. B2C Travel Agency Mail Survey

行動旅遊服務的問卷調查—旅遊業觀點(無記名的學術問卷)

親愛的女士、先生您好：

行動旅遊服務的意思，是希望透過手機上的增值服務，來協助旅客的旅遊過程，包括行程規劃、旅遊經驗分享等。本問卷想瞭解您身為旅遊業者對此研究的想法，以作為未來研究方向之重要參考。本問卷採無記名方式，所有資料將僅做學術研究用且不對外公開。您寶貴意見對於本研究相當重要，煩請您費神填答。本研究結果預計於3月31日公告於<http://www3.nccu.edu.tw/~g0356504/>，如對本研究有興趣的先進們，歡迎上網瀏覽研究報告。感謝您的熱情協助與支持！並祝您平安、快樂！

政大資管博士生張小萍敬上
Email: ping@mis.nccu.edu.tw

針對下列服務，如果以5分作為總分，請就重要性、可行性、可投資性(成本效益評估)，分別評分(5為最高分，1為最低分)。

序號	行動增值服務	行動增值服務說明	重要性	可行性	可投資性
1	行動搜尋與通知服務	安全相關告警服務：會影響到旅遊安全的資訊，例如附近發生地震、山崩、雪崩、颱風			
		路況與氣象報告服務：旅客可以自行在手機上查詢或是以簡訊通知即時路況與氣象資訊			
		活動異動通知服務：簡訊通知特別活動臨時改時間的訊息			
		重大行前通知服務：旅遊業者根據旅客預定前往的地點，以簡訊通知旅客會影響旅遊的重大資訊，如颱風訊息			
		提醒服務：如訂位代號提醒或班機時刻提醒			
2	行動社群服務	資訊查詢服務：例如用手機上旅遊的論壇或討論區，問大家對於當地某景點或餐廳的評價			
		資訊分享服務：例如用手機簡訊發送旅遊心得或上傳照片到旅遊的論壇或討論區			

針對下列服務，如果以5分作為總分，請就重要性、可行性、可投資性(成本效益評估)，分別評分(5為最高分，1為最低分)。

序號	行動加值服務	行動加值服務說明	重要性	可行性	可投資性
3	行動導覽服務	定點式導覽服務：例如當旅客在看畫展時，跟著固定的路線，在手機上可以看到每幅畫的介紹			
		互動式導覽服務：例如當旅客在看一幅名畫時，感到很有興趣，可以透過手機進一步瞭解大師其他的作品介紹			
		主題式影音或遊戲服務：例如當旅客在路上時，在手機上可以看到主題樂園的影片或遊戲			
4	行動推薦服務	住宿推薦：例如臨時有住宿需求，手機可以推薦附近住宿的地點			
		景點推薦：例如推薦當地好吃好玩的景點			
		餐廳推薦：例如依照旅客偏好(中式或西式)，推薦附近的熱門餐廳或新餐廳			
		行程推薦：例如根據旅客偏好，推薦當地好吃好玩的景點與參觀順序			
		路線調整：例如依照附近活動訊息通知，建議最佳的路線			
		特產推薦：例如推薦當地名產、特產、紀念品、特色商店			
5	行動拍賣服務	最後一秒大拍賣 1：例如飯店可以把當天的空房間拿出來拍賣，飯店設定一個價格下限，讓旅客來競標			
		最後一秒大拍賣 2：例如旅客設定一個價格上限與特定的地區，讓飯店拿當天的空房來競標			
6	行動交易與付款服務	行動訂位服務：例如用手機軟體來訂位			
		行動付款服務：例如將信用卡與手機結合，旅途中用手機當信用卡來刷卡			
		行動票券服務：例如將門票與手機結合，旅途中用手機當門票進場			

7. 整體而言，如果以5分作為總分(5為最高分，1為最低分)，您對於本研究所提出的行動旅遊服務的重要性_____分、可行性_____分、可投資性(成本效益)_____分。

受訪者基本資料

1. 旅遊經驗(可複選)：

國內自助 國內跟團 國外自助 國外跟團

2. 是否用過行動上網(WAP、GPRS、3G、PHS等手機上網)：

有 沒有

3. 性別：

女 男

4. 年齡：

19歲以下 20—29歲 30—39歲 40—49歲 50—59歲 60歲以上

5. 教育程度：

高中/職 專科學校/技術學院 碩士 博士

問卷到此結束，非常謝謝您大力的幫助。祝福您有愉快的一天！



Appendix 4. B2C System Evaluation Survey

行動旅遊離型系統之系統滿意度問卷調查表

親愛的女士、先生您好：

本問卷想瞭解您對於本研究所提的行動旅遊離型系統的系統滿意度，以作為未來研究之重要參考。您寶貴意見對於本研究未來發展相當重要，煩請您費神填答。感謝您的協助與支持！並祝您平安、快樂！！

政大資管博士生張小萍敬上

Email : ping@mis.nccu.edu.tw

第一部份 系統評估

本問卷調查是想瞭解您在使用過本離型系統(<http://122.116.163.174/b2c/>)後，您認為本系統的滿意程度如何？請您就每一個項目所陳述的內容選擇一個合適的分數打圈「○」來表示您的滿意程度。

項 目		系統滿意度				
		5 非常 滿意	4 滿 意	3 普 通	2 不 滿 意	1 非 常 不 滿 意
5 分代表最高，1 分代表最低→						
系統介面與版面						
1	我喜歡使用系統操作介面	5	4	3	2	1
2	系統所提供的資訊編排方式很清楚	5	4	3	2	1
3	系統操作介面使用起來很愉快	5	4	3	2	1
系統功能						
4	系統提供的功能，合乎我所預期	5	4	3	2	1
5	系統提供的資訊，方便我做旅遊行程規劃	5	4	3	2	1
6	系統提供的功能，對於旅遊行程規劃有幫助	5	4	3	2	1
7	系統的旅遊行程推薦功能，是有用的	5	4	3	2	1
操作簡易性						
8	系統使用起來很簡單	5	4	3	2	1
9	很容易找到我需要的資訊	5	4	3	2	1
10	畫面資訊安排很清楚	5	4	3	2	1
11	整體而言，系統容易操作	5	4	3	2	1
系統上手程度						
12	很容易學會使用本系統	5	4	3	2	1
13	不需要閱讀大量文件就可以輕鬆操作系統	5	4	3	2	1
14	系統所提供的資訊很容易瞭解	5	4	3	2	1

項 目		系統滿意度				
		5 非常 滿意	4 滿 意	3 普 通	2 不 滿 意	1 非 常 不 滿 意
5分代表最高，1分代表最低→						
滿意程度						
15	我在使用系統上很自在	5	4	3	2	1
16	我喜歡透過系統來安排我的旅程	5	4	3	2	1
17	整體而言，我對系統感到滿意	5	4	3	2	1
整體評價與未來使用意願						
18	系統幫助我快速規劃旅遊行程	5	4	3	2	1
19	據我所知目前並沒有這樣的行動服務	5	4	3	2	1
20	我相信系統可以提高我的生產力	5	4	3	2	1
21	我相信系統推薦是有價值的	5	4	3	2	1
22	我想我應該會使用這樣的系統	5	4	3	2	1

第二部份 受訪者基本資料

1. 旅遊經驗(可複選):
國內自助 國內跟團 國外自助 國外跟團
2. 是否用過行動上網(WAP、GPRS、3G、PHS等手機上網):
有 沒有
3. 性別:
女 男
4. 年齡:
19歲以下 20—29歲 30—39歲 40—49歲 50—59歲 60歲以上
5. 教育程度:
高中/職 專科學校/技術學院 碩士 博士
6. 請問您的 Email 或電話 (只做學術研究使用，複查用):
_____。

第三部份 建議事項

除了以上所提到的項目，您是否認為本系統還有其他值得重視或應該改善的項目。

問卷到此結束，非常謝謝您大力的幫助。祝福您有愉快的一天！

Appendix 5. B2E Mobile Service Survey

旅遊業員工的行動加值服務評估問卷

親愛的女士、先生您好：

所謂行動加值服務是手機上的應用程式，包括多媒體簡訊、手機上網或手機的小程式，現有一般的應用為手機遊戲、行動銀行或手機版的氣象網。本研究想將行動加值服務應用到旅遊業，因為旅遊業是個具高度移動性的知識產業。本研究希望透過提供旅遊業內部員工的行動加值服務，來提升員工對旅客的服務水準，進而提高客戶滿意度。

本問卷想瞭解您對於本研究的想法，以作為未來研究之重要參考。您寶貴意見對於本研究未來發展相當重要，煩請您費神填答。感謝您的協助與支持！並祝您平安、快樂！！

政大資管博士生張小萍敬上
Email: ping@mis.nccu.edu.tw

一、針對下列服務，如果以5分作為總分，請就重要性、可行性、可投資性(成本效益評估)，分別評分(5為最高分，1為最低分)。

編號	行動加值服務	情境說明與適用對象	重要性	可行性	可投資性
1	行動通訊服務	如：用手機聯絡客戶。 其他：_____			
2	行動資訊服務	如：連上公司官方網站或公司內部查詢最新的旅遊行程資料。 其他：_____			
3	行動社群服務	社群服務是讓一群有共同興趣的人可以在網路上交換經驗。 如：導遊可以用手機連上導遊社群或歷史景點社群，分享帶團解說的經驗。 其他：_____			

針對下列服務，如果以5分作為總分，請就重要性、可行性、可投資性(成本效益評估)，分別評分(5為最高分，1為最低分)。

編號	行動加值服務	情境說明與適用對象	重要性	可行性	可投資性
4	行動銷售支援服務	如：業務今天要對好幾組客戶做旅遊產品說明會，透過本服務，業務可以在到客戶的公司之前，從手機上自動取得該客戶的背景資料。另外，如果客戶詢問特定的旅遊產品，業務可以透過本服務即時查詢最新的機位或飯店訂房的情況，當場回報給客戶，還可以即時幫客戶完成下訂的服務。 其他：_____			
5	地點相關的協同服務	如：領隊因為封路要改行程，需要重新安排路線、餐飲與住宿。 其他：_____			
6	個人化旅遊資訊服務	如：員工希望成為日本通，如果有關於日本的新景點或展覽資料，公司會以簡訊的方式提供給員工。 其他：_____			
7	地點相關的資訊服務	如：導遊目前人在南投，可以收到南投的氣象預報與即時路況。 其他：_____			
8	行動學習服務	如：導遊可以透過手機，練習明天景點介紹內容。如明天要到博物館看到某名畫，可以用手機查詢該名畫匠相關作品介紹。 其他：_____			
9	行動知識管理服務	如：導遊在帶團中，將當地雪景照片回傳公司，建立新的景點知識。 如：導遊在帶團中，發現景點的開放時間調整了，與之前在公司看到的資料不符；可以用手機拍下最新的開放時間，並回傳公司，建立新的景點知識。 其他：_____			

針對下列服務，如果以5分作為總分，請就重要性、可行性、可投資性(成本效益評估)，分別評分(5為最高分，1為最低分)。

編號	行動加值服務	情境說明與適用對象	重要性	可行性	可投資性
10	地點相關的決策支援服務	如：司機的手機可以收到即時的路況資訊。為避開堵車路段，手機可以提供幾條好走的路。 其他：_____			
11	行動旅遊品質控管服務	如：本服務會自動蒐集有出團的區域的最新訊息，如氣候變化與班機狀況，如有調整旅遊行程(換交通工具、改住宿地點、改餐飲)的必要，公司可以在重新計算成本後，選擇一個較佳的方案，透過手機把訊息傳給導遊與領隊，以確保旅遊品質。 其他：_____			
12	行動主管決策支援服務	如：主管人在外面時，可以透過手機開視訊會議，即時雙向溝通。 其他：_____			

二、整體而言，如果以5分作為總分，您對於本研究所提出的服務的重要性____分、可行性____分、可投資性(成本效益)____分。

三、受訪者基本資料

1. 請問您的性別是：女 男
2. 請問您的公司是：_____。
3. 請問您的部門是：_____。
4. 請問您的職稱是：_____。
5. 請問您的電話是：_____。
6. 請問您的 Email (回傳研究成果報告電子檔)：
_____。

四、建議事項

問卷到此結束，非常謝謝您大力的幫助。祝福您有愉快的一天！

Appendix 6. B2E Mobile Service Framework Survey

旅遊業員工的行動增值服務架構評估問卷

親愛的女士、先生您好：

所謂行動增值服務是手機上的應用程式，包括多媒體簡訊、手機上網或手機的小程式，現有一般的應用為手機遊戲、行動銀行或手機版的氣象網。本研究想將行動增值服務應用到旅遊業，因為旅遊業是個具高度移動性的知識產業。本問卷想瞭解您對於本研究所提的旅遊業員工的行動增值服務架構的想法，以作為未來研究之重要參考。您寶貴意見對於本研究未來發展相當重要，煩請您費神填答。感謝您的協助與支持！並祝您平安、快樂！！

政大資管博士生張小萍敬上
Email: ping@mis.nccu.edu.tw

表 1：旅遊業企業對員工的行動增值服務分類

管理觀點	無線通訊	地點相關的支援	情境相關的支援	適用群組
策略規劃			● 行動主管決策支援服務	高階主管
管理控制		● 地點相關的決策支援服務	● 行動旅遊品質控管服務	高階主管、中階主管、旅遊營運中心
知識管理		● 地點相關的資訊服務	● 行動學習服務 ● 行動知識管理服务	高階主管、中階主管、旅遊營運中心領隊、導遊、司機、當地的旅行社
作業控制	● 行動通訊服務 ● 行動資訊服務 ● 行動社群服務 ● 行動銷售支援服務	● 地點相關的協同服務	● 個人化旅遊資訊服務	高階主管、中階主管、旅遊營運中心領隊、導遊、司機、當地的旅行社商務旅者、業務、現場工作人員

一、請針對表 1 所提的架構評分(5 為最高分，1 為最低分)。

1. 整體而言，您對於本研究所提出的服務的**重要性**____分、**可行性**____分、**可投資性(成本效益)**____分。

2. 請問您認為本研究所提出的由四個管理觀點(策略規劃、管理控制、知識管理、作業控制)與三個功能性的服務設計考量角度(無線通訊、地點相關的支援、情境相關的支援)所組成的**架構**的合適度____分。如果是 1-2 分，請問該如何調整？_____

3. 請問您認為**策略規劃相關服務**的

甲、完整度____分。如果是 1-2 分，請問需增加哪些服務？

4. 合適度____分。如果是 1-2 分，請問該如何調整？

5. 請問您認為**管理控制相關服務**的

甲、完整度____分。如果是 1-2 分，請問需增加哪些服務？

乙、合適度____分。如果是 1-2 分，請問該如何調整？

6. 請問您認為**知識管理相關服務**的

甲、完整度____分。如果是 1-2 分，請問需增加哪些服務？

乙、合適度____分。如果是 1-2 分，請問該如何調整？

7. 請問您認為**作業控制相關服務**的

甲、完整度____分。如果是 1-2 分，請問需增加哪些服務？

乙、合適度____分。如果是 1-2 分，請問該如何調整？

二、請問表 1 內個別服務位於架構中對應的格子是否合適？(請打 V)

編號	行動加值服務	非常合適	合適	普通	不合適	非常不合適
1	行動通訊服務					
2	行動資訊服務					
3	行動社群服務					
4	行動銷售支援服務					
5	地點相關的協同服務					
6	個人化旅遊資訊服務					
7	地點相關的資訊服務					
8	行動學習服務					
9	行動知識管理服務					
10	地點相關的決策支援服務					
11	行動旅遊品質控管服務					
12	行動主管決策支援服務					

如果有「不合適」或「非常不合適」的項目，請問您建議如何調整？

三、受訪者基本資料

1. 請問您的性別是：女 男
2. 請問您的公司是：_____。
3. 請問您的部門是：_____。
4. 請問您的職稱是：_____。
5. 請問您的電話是：_____。
6. 請問您的 Email (回傳研究成果報告電子檔)：_____。

四、建議事項

問卷到此結束，非常謝謝您大力的幫助。祝福您有愉快的一天！

Appendix 7. Item-to-item Correlation Matrix of the Usefulness Ratings by Tourists

	N1	N2	N3	N4	N5	C1	C2	G1	G2	G3	R1	R2	R3	R4	R5	R6	U1	U2	T1	T2	
N2	0.65**																				
N3	0.47**	0.56**																			
N4	0.52**	0.35**	0.29**																		
N5	0.31**	0.40**	0.29**	0.27**																	
C1	0.27**	0.34**	0.32**	0.24**	0.27**																
C2	0.21**	0.21**	0.27**	0.25**	0.25**	0.72**															
G1	0.19**	0.22**	0.24**	0.26**	0.26**	0.43**	0.38**														
G2	0.23**	0.23**	0.23**	0.26**	0.30**	0.41**	0.37**	0.80**													
G3	0.22**	0.25**	0.22**	0.19**	0.31**	0.45**	0.49**	0.61**	0.65**												
R1	0.32**	0.44**	0.44**	0.26**	0.36**	0.41**	0.32**	0.30**	0.31**	0.38**											
R2	0.32**	0.43**	0.43**	0.33*	0.35**	0.43**	0.35**	0.30**	0.31**	0.40**	0.77**										
R3	0.30**	0.42**	0.43**	0.25**	0.33**	0.46**	0.37**	0.33**	0.33**	0.43**	0.76**	0.87**									
R4	0.29**	0.39**	0.42**	0.29**	0.32**	0.48**	0.41**	0.36**	0.35**	0.45**	0.70**	0.81**	0.84**								
R5	0.30**	0.42**	0.39**	0.26**	0.30**	0.50**	0.44**	0.33**	0.36**	0.41**	0.69**	0.72**	0.74**	0.70**							
R6	0.30**	0.33**	0.42**	0.21**	0.27**	0.43**	0.43**	0.35**	0.34**	0.43**	0.62**	0.72**	0.72**	0.70**	0.67**						
U1	0.09	0.18**	0.16**	0.16**	0.26**	0.36**	0.31**	0.33**	0.33**	0.37**	0.29**	0.26**	0.31**	0.33**	0.29**	0.29**					
U2	0.09	0.17**	0.15**	0.18**	0.26**	0.40**	0.34**	0.37**	0.39**	0.39**	0.28**	0.24**	0.29**	0.33**	0.29**	0.26**	0.87**				
T1	0.19**	0.19**	0.17**	0.10	0.23**	0.26**	0.30**	0.22**	0.30**	0.31**	0.20**	0.21**	0.25**	0.26**	0.26**	0.25**	0.26**	0.27**			
T2	0.20**	0.20**	0.21**	0.11*	0.25**	0.38**	0.38**	0.25**	0.34**	0.32**	0.21**	0.22**	0.27**	0.25**	0.29**	0.26**	0.28**	0.34**	0.79**		
T3	0.22**	0.29**	0.20**	0.20**	0.40**	0.38**	0.35**	0.34**	0.34**	0.31**	0.26**	0.23**	0.23**	0.26**	0.28**	0.19**	0.35**	0.45**	0.44**	0.49**	

Note: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Appendix 8. Item-to-item Correlation Matrix of the Importance Ratings by 3G Operators

	N1	N2	N3	N4	N5	C1	C2	G1	G2	G3	R1	R2	R3	R4	R5	R6	U1	U2	T1	T2	
N2	0.40**																				
N3	0.26*	0.45**																			
N4	0.58**	0.37**	0.19																		
N5	0.45**	0.25*	0.27*	0.46**																	
C1	0.33**	0.38**	0.23*	0.18	0.44**																
C2	0.35**	0.37**	0.26*	0.15	0.35**	0.71**															
G1	0.25*	0.40**	0.32**	0.16	0.17	0.52**	0.64**														
G2	0.30**	0.25*	0.28**	0.26*	0.34**	0.42**	0.51**	0.74**													
G3	0.22**	0.41**	0.27**	0.27*	0.31**	0.54**	0.59**	0.66**	0.70**												
R1	0.18	0.35**	0.39**	0.16	0.27**	0.40**	0.35**	0.33**	0.30**	0.35**											
R2	0.10	0.32**	0.34**	0.07	0.30**	0.41**	0.38**	0.28**	0.33**	0.38**	0.57**										
R3	0.12	0.32**	0.26**	0.04	0.28**	0.39**	0.51**	0.39**	0.41**	0.47**	0.51**	0.76**									
R4	0.16	0.27*	0.34**	0.16	0.31**	0.48**	0.53**	0.46**	0.45**	0.45**	0.57**	0.75**	0.80**								
R5	0.24*	0.22*	0.36**	0.17	0.37**	0.57**	0.49**	0.36**	0.32**	0.40**	0.52**	0.63**	0.63**	0.75**							
R6	0.13	0.31**	0.30**	0.09	0.28**	0.45**	0.53**	0.34**	0.23*	0.32**	0.38**	0.46**	0.61**	0.61**	0.53**						
U1	0.17	0.30**	0.21**	0.20	0.21**	0.46**	0.63**	0.47**	0.41**	0.61**	0.28**	0.37**	0.33**	0.33**	0.36**	0.25*					
U2	0.11	0.27*	0.16	0.15	0.18	0.43**	0.60**	0.42**	0.40**	0.56**	0.25*	0.42**	0.36**	0.35**	0.36**	0.17	0.90**				
T1	0.26*	0.31**	0.23*	0.25*	0.24**	0.22**	0.38**	0.43**	0.45**	0.24*	0.26*	0.24*	0.25*	0.33**	0.27*	0.28**	0.16	0.17			
T2	0.20	0.19	0.24*	0.17	0.20	0.13	0.29**	0.34**	0.39**	0.23*	0.14	0.13	0.20	0.23*	0.18	0.17	0.18	0.24*	0.86**		
T3	0.19	0.20	0.27*	0.24*	0.35**	0.14	0.32**	0.44**	0.45**	0.36**	0.28**	0.23*	0.26*	0.33**	0.35**	0.25*	0.42**	0.40**	0.47**	0.47**	

Note: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Appendix 9 Item-to-item Correlation Matrix of the Feasibility Ratings by 3G Operators

	N1	N2	N3	N4	N5	C1	C2	G1	G2	G3	R1	R2	R3	R4	R5	R6	U1	U2	T1	T2
N2	0.51**																			
N3	0.58**	0.55**																		
N4	0.43**	0.19	0.35**																	
N5	0.45**	0.37**	0.26*	0.44**																
C1	0.29**	0.46**	0.33**	0.32**	0.48**															
C2	0.22**	0.46**	0.29**	0.19	0.35**	0.71**														
G1	0.37**	0.37**	0.35**	0.36**	0.27*	0.41**	0.51**													
G2	0.32**	0.39**	0.39**	0.34**	0.31**	0.40**	0.44**	0.82**												
G3	0.28**	0.43**	0.41**	0.29**	0.41**	0.59**	0.61**	0.70**	0.75**											
R1	0.37**	0.44**	0.37**	0.22*	0.25*	0.41**	0.24*	0.42**	0.49**	0.42**										
R2	0.29**	0.47**	0.39**	0.15	0.33**	0.43**	0.30**	0.27*	0.33**	0.43**	0.68**									
R3	0.33**	0.44**	0.43**	0.08	0.36**	0.41**	0.42**	0.40**	0.45**	0.52**	0.58**	0.73**								
R4	0.38**	0.53**	0.49**	0.26*	0.32**	0.46**	0.48**	0.48**	0.53**	0.55**	0.68**	0.74**	0.79**							
R5	0.26*	0.47**	0.35**	0.19	0.36**	0.53**	0.39**	0.34**	0.43**	0.52**	0.55**	0.73**	0.64**	0.75**						
R6	0.26*	0.47**	0.39**	0.08	0.29**	0.47**	0.49**	0.40**	0.41**	0.48**	0.42**	0.53**	0.58**	0.72**	0.58**					
U1	0.22*	0.28**	0.32**	0.29**	0.38**	0.36**	0.43**	0.42**	0.52**	0.61**	0.41**	0.33**	0.41**	0.43**	0.40**	0.21				
U2	0.22*	0.33**	0.32**	0.27**	0.26*	0.37**	0.40**	0.48**	0.56**	0.60**	0.48**	0.39**	0.40**	0.49**	0.40**	0.23*	0.88**			
T1	0.33**	0.40**	0.29**	0.26*	0.22*	0.43**	0.46**	0.62**	0.58**	0.55**	0.41**	0.43**	0.47**	0.47**	0.42**	0.41**	0.35**	0.37**		
T2	0.25*	0.31**	0.23*	0.27*	0.14	0.47**	0.40**	0.47**	0.49**	0.50**	0.24*	0.33**	0.34**	0.31**	0.39**	0.29**	0.28**	0.34**	0.84**	
T3	0.27*	0.21	0.26*	0.16	0.35**	0.22*	0.28**	0.41**	0.49**	0.42**	0.30**	0.23*	0.34**	0.28*	0.26*	0.24*	0.42**	0.34**	0.38**	0.45**

Note: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Appendix 10. Item-to-item Correlation Matrix of the Effectiveness Ratings by 3G Operators

	N1	N2	N3	N4	N5	C1	C2	G1	G2	G3	R1	R2	R3	R4	R5	R6	U1	U2	T1	T2
N2	0.53**																			
N3	0.51**	0.52**																		
N4	0.31**	0.28**	0.37**																	
N5	0.41**	0.35**	0.30**	0.37**																
C1	0.20	0.33**	0.37**	0.31**	0.26*															
C2	0.17	0.21	0.29**	0.31**	0.28**	0.75**														
G1	0.25*	0.17	0.40**	0.13	0.20	0.51**	0.61**													
G2	0.24*	0.16	0.35**	0.13	0.25*	0.44**	0.49**	0.83**												
G3	0.20	0.27*	0.47**	0.26*	0.33**	0.55**	0.60**	0.71**	0.66**											
R1	0.39**	0.50**	0.55**	0.31**	0.36**	0.53**	0.42**	0.41**	0.35**	0.49**										
R2	0.42**	0.47**	0.52**	0.38**	0.33**	0.51**	0.40**	0.43**	0.38**	0.53**	0.71**									
R3	0.36**	0.40**	0.44**	0.23*	0.38**	0.46**	0.45**	0.47**	0.44**	0.49**	0.64**	0.73**								
R4	0.39**	0.36**	0.49**	0.25*	0.33**	0.53**	0.50**	0.59**	0.52**	0.59**	0.70**	0.79**	0.82**							
R5	0.35**	0.34**	0.47**	0.26*	0.32**	0.59**	0.47**	0.50**	0.43**	0.53**	0.66**	0.74**	0.63**	0.76**						
R6	0.27*	0.36**	0.49**	0.25*	0.35**	0.51**	0.46**	0.42**	0.37**	0.52**	0.53**	0.67**	0.64**	0.69**	0.58**					
U1	0.17	0.25*	0.37**	0.28*	0.26*	0.36**	0.43**	0.43**	0.37**	0.53**	0.44**	0.43**	0.34**	0.44**	0.47**	0.37**				
U2	0.15	0.22*	0.33**	0.26*	0.16	0.41**	0.46**	0.45**	0.40**	0.54**	0.45**	0.46**	0.38**	0.52**	0.50**	0.37**	0.91**			
T1	0.16	0.29**	0.05	0.09	0.20	0.31**	0.28**	0.37**	0.37**	0.29**	0.24*	0.26*	0.35**	0.32**	0.28**	0.32**	0.17	0.23*		
T2	0.14	0.22*	0.10	0.15	0.10	0.40**	0.31**	0.35**	0.39**	0.34**	0.25*	0.20	0.27*	0.33**	0.29**	0.30**	0.24*	0.35**	0.84**	
T3	0.12	0.13	0.15	0.10	0.33**	0.25*	0.22*	0.29**	0.33**	0.32**	0.24*	0.27*	0.32**	0.29**	0.37**	0.31**	0.45**	0.38**	0.38**	0.40**

Note: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Appendix 11. Item-to-item Correlation Matrix of the Importance Ratings by Travel Agencies

	N1	N2	N3	N4	N5	C1	C2	G1	G2	G3	R1	R2	R3	R4	R5	R6	U1	U2	T1	T2
N2	0.60**																			
N3	0.49**	0.68**																		
N4	0.62**	0.30**	0.26*																	
N5	0.55**	0.58**	0.46**	0.26*																
C1	0.24*	0.31**	0.43**	0.28**	0.18															
C2	0.15	0.29**	0.38**	0.15	0.15	0.82**														
G1	0.28**	0.30**	0.27*	0.40**	0.06	0.41**	0.40**													
G2	0.30**	0.27**	0.21*	0.43**	0.17	0.36**	0.40**	0.81**												
G3	0.16	0.34**	0.24*	0.21*	0.10	0.48**	0.53**	0.62**	0.65**											
R1	0.48**	0.55**	0.47**	0.28**	0.42**	0.45**	0.38**	0.28**	0.45**	0.37**										
R2	0.35**	0.53**	0.46**	0.16	0.39**	0.39**	0.36**	0.23*	0.41**	0.30**	0.79**									
R3	0.36**	0.53**	0.46**	0.12	0.43**	0.41**	0.35**	0.21*	0.38**	0.29**	0.83**	0.86**								
R4	0.41**	0.51**	0.42**	0.12	0.28**	0.44**	0.38**	0.26*	0.35**	0.30**	0.79**	0.78**	0.86**							
R5	0.43**	0.50**	0.48**	0.29**	0.35**	0.58**	0.52**	0.41**	0.40**	0.39**	0.69**	0.62**	0.64**	0.75**						
R6	0.21*	0.43**	0.38**	0.01	0.31**	0.55**	0.54**	0.25*	0.25*	0.27*	0.55**	0.68**	0.64**	0.63**	0.68**					
U1	0.27**	0.36**	0.27*	0.24*	0.27**	0.37**	0.32**	0.48**	0.46*	0.48**	0.42**	0.45**	0.41**	0.39**	0.40**	0.44**				
U2	0.26*	0.35**	0.26*	0.25*	0.23*	0.35**	0.34**	0.43**	0.41*	0.40**	0.44**	0.47**	0.47**	0.44**	0.46**	0.47**	0.88**			
T1	0.10	0.35**	0.34*	0.22*	0.10	0.40**	0.37**	0.36**	0.28*	0.23*	0.30**	0.38**	0.37**	0.33**	0.37**	0.47**	0.46**	0.58**		
T2	0.14	0.27**	0.26*	0.27**	0.13	0.34**	0.35**	0.32**	0.35*	0.25*	0.33**	0.33**	0.37**	0.21*	0.25*	0.34**	0.44**	0.55**	0.77**	
T3	0.21*	0.46**	0.31*	0.26**	0.28**	0.36**	0.39**	0.45**	0.46**	0.46**	0.38**	0.46**	0.43**	0.38**	0.37**	0.45**	0.66**	0.61**	0.52**	0.42**

Note: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Appendix 12. Item-to-item Correlation Matrix of the Feasibility Ratings by Travel Agencies

	N1	N2	N3	N4	N5	C1	C2	G1	G2	G3	R1	R2	R3	R4	R5	R6	U1	U2	T1	T2
N2	0.61**																			
N3	0.62**	0.63**																		
N4	0.45**	0.37**	0.22*																	
N5	0.27*	0.29**	0.31**	0.30**																
C1	0.22*	0.26*	0.32**	0.21*	0.23*															
C2	0.35**	0.34**	0.41**	0.12	0.16	0.76**														
G1	0.23*	0.29**	0.17	0.40**	0.15	0.43**	0.29**													
G2	0.26*	0.28**	0.23*	0.31**	0.20	0.41**	0.42**	0.82**												
G3	0.09	0.30**	0.22*	0.26*	0.16	0.46**	0.43**	0.65**	0.76**											
R1	0.44**	0.42**	0.47**	0.33**	0.35**	0.54**	0.39**	0.39**	0.45**	0.34**										
R2	0.23*	0.34**	0.31**	0.16	0.28**	0.43**	0.39**	0.29**	0.39**	0.39**	0.66**									
R3	0.16	0.35**	0.35**	0.18	0.30**	0.52**	0.46**	0.35**	0.40**	0.38**	0.74**	0.81**								
R4	0.33**	0.37**	0.33**	0.20	0.22*	0.51**	0.48**	0.32**	0.45**	0.41**	0.76**	0.78**	0.85**							
R5	0.44**	0.40**	0.38**	0.29**	0.30**	0.63**	0.54**	0.33**	0.36**	0.31**	0.75**	0.66**	0.72**	0.75**						
R6	0.15	0.34**	0.39**	0.10	0.26*	0.55**	0.50**	0.24*	0.22*	0.31**	0.53**	0.66**	0.67**	0.62**	0.66**					
U1	0.22*	0.25*	0.19	0.40**	0.26*	0.35**	0.32**	0.55**	0.51**	0.50**	0.37**	0.33**	0.30**	0.32**	0.39**	0.32**				
U2	0.20	0.24*	0.17	0.28**	0.18	0.38**	0.34**	0.40**	0.36**	0.35**	0.38**	0.35**	0.39**	0.37**	0.45**	0.32**	0.85**			
T1	0.09	0.27**	0.27**	0.14	0.18	0.43**	0.34**	0.37**	0.32**	0.44**	0.25*	0.40**	0.31**	0.31**	0.34**	0.51**	0.43**	0.36**		
T2	0.02	0.27**	0.22*	0.22*	0.19	0.41**	0.33**	0.39**	0.35**	0.48**	0.25*	0.40**	0.39**	0.33**	0.33**	0.42**	0.48**	0.45**	0.84**	
T3	0.01	0.35**	0.17	0.28**	0.15	0.30**	0.32**	0.34**	0.35**	0.45**	0.21*	0.32**	0.35**	0.32**	0.31**	0.34**	0.43**	0.50**	0.43**	0.49**

Note: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

Appendix 13. Item-to-item Correlation Matrix of the Effectiveness Ratings by Travel Agencies

	N1	N2	N3	N4	N5	C1	C2	G1	G2	G3	R1	R2	R3	R4	R5	R6	U1	U2	T1	T2
N2	0.65**																			
N3	0.60**	0.64**																		
N4	0.44**	0.35**	0.42**																	
N5	0.46**	0.42**	0.43**	0.35**																
C1	0.30**	0.31**	0.24*	0.14	0.35**															
C2	0.46**	0.37**	0.37**	0.24*	0.36**	0.77**														
G1	0.35**	0.45**	0.22**	0.30**	0.12	0.43**	0.37**													
G2	0.45**	0.41**	0.26*	0.26*	0.22*	0.44**	0.47**	0.75**												
G3	0.27**	0.37**	0.19	0.21*	0.14	0.43**	0.39**	0.59**	0.67**											
R1	0.57**	0.53**	0.39**	0.28**	0.47**	0.58**	0.52**	0.35**	0.51**	0.46**										
R2	0.35**	0.47**	0.33**	0.13	0.49**	0.47**	0.36**	0.35**	0.50**	0.46**	0.77**									
R3	0.33**	0.47**	0.37**	0.13	0.47**	0.53**	0.41**	0.37**	0.48**	0.44**	0.76**	0.89**								
R4	0.20	0.19	0.20	0.16	0.18	0.35**	0.36**	0.14	0.17	0.30**	0.33**	0.31**	0.34**							
R5	0.48**	0.49**	0.34**	0.26*	0.47**	0.62**	0.58**	0.36**	0.47**	0.41**	0.84**	0.68**	0.70**	0.31**						
R6	0.18	0.40**	0.27*	0.13	0.37**	0.38**	0.35**	0.35**	0.34**	0.43**	0.55**	0.77**	0.67**	0.29**	0.57**					
U1	0.19	0.21*	0.16	0.37**	0.20	0.39**	0.30**	0.47**	0.46**	0.41**	0.30**	0.26*	0.26*	0.26*	0.35**	0.21*				
U2	0.14	0.19	0.18	0.38**	0.20	0.39**	0.38**	0.38**	0.39**	0.34**	0.35**	0.31**	0.34**	0.29**	0.43**	0.27**	0.86**			
T1	0.05	0.26*	0.19	0.14	0.24*	0.30**	0.21*	0.25*	0.24*	0.32**	0.29**	0.39**	0.26*	0.13	0.32**	0.44**	0.33**	0.38**		
T2	0.01	0.21*	0.19	0.18	0.14	0.31**	0.18	0.32**	0.31**	0.34**	0.29**	0.37**	0.30**	0.13	0.26*	0.32**	0.39**	0.40**	0.80**	
T3	0.12	0.34**	0.22*	0.36**	0.26*	0.44**	0.29**	0.45**	0.34**	0.44**	0.33**	0.38**	0.37**	0.17	0.37**	0.37**	0.52**	0.47**	0.55**	0.55**

Note: **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).