

Multi-Dimensional Classification and Evaluation of B2E Mobile Services for the Tourism Industry

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ABSTRACT

Even mobile commerce is a hot topic; the development of mobile services for intra-organizational use is still rare and slow. As being agile, mobile, experience-based, and knowledge-oriented, the tourism industry casts strong needs for mobile communication, collaboration, and knowledge sharing among employees including tour guides, tour operators, line controllers, and other support teams. In this paper, we present a multi-dimensional B2E mobile service classification and evaluation approach for the tourism industry. For service design and classification concerns, managerial and functional dimensions are taken into account simultaneously. In the management dimension, four management levels are strategic planning, management control, knowledge sharing, and operational control. In the functional dimension, three functional categories of mobile services include wireless communication, location-based support, and context-based support respectively. For service evaluation concerns, three criteria including importance, feasibility, and cost-benefit effectiveness are adopted to evaluate and rank identified mobile services. Based on research findings, suggestions and recommendations are provided to mobile service providers as well as tourism agencies and operators for efficiently and effectively developing and delivering employee-oriented mobile services.

Keywords: Mobile service, tourism industry, B2E, service classification, service evaluation

INTRODUCTION

With the advances in wireless and mobile technologies, mobile commerce has created a huge opportunity for businesses to offer value-added services to consumers, partners, as well as employees (Ankar and D’Incau, 2002; Clarke, 2001; Chen and Cheng, 2010). One major research problem to be addressed is how to identify, classify, and evaluate useful mobile services for mobile businesses and organizations (Scornavacca, Barnes, and Huff, 2006; Varshney, 2003). Although a certain amount of research efforts have contributed to consumer-based technical solutions, the development and adoption of mobile services for intra-organizational management, or business-to-employee (B2E) applications, are still very rare and slow in progress (Chiu, Yueh, Leung and Hung, 2009; Cil, Alpturk, and Yazgan, 2005; Maamar, Yahyaoui, and Mansoor, 2004; Scornavacca et al., 2006; Tarasewich, 2003). The need of a classification framework for mobile service development and evaluation within the management context is significant and strong (Chen and Nath, 2004; Lu, Zhang, and Wang, 2009; Rangone and Renga, 2006). On the other hand, comparing to other industries, tourism-related companies are relatively more mobile, agile, and knowledge-oriented organizations, and the needs of ubiquitous communication, collaboration, knowledge sharing, and decision support among internal employees and external customers/partners are significant (Cooper, 2006; Liebowitz, 2007; Werthner and Ricci, 2004). The tourism industry is one of those domains 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). Therefore, for addressing issues regarding the classification and evaluation of mobile services in the B2E sector, the tourism industry is a perfect application domain to be chosen for conducting exploratory study.

This paper aims at identifying, classifying, and evaluating useful mobile services for employees in the tourism industry based on multi-dimensional perspectives. For accomplishing the research objectives, we first propose a

tourism-related B2E mobile service classification framework with four management levels and three functional design concerns to categorize identified existing and potential intra-organizational mobile services. Classified B2E mobile tourism services are then evaluated in terms of three specified criteria. User groups of the B2E mobile services include chief executives and line managers, tour operation centers, tour leaders and tour guides, local travel agents and destinations, sales people, field workforce, and business travelers. We expect that the B2E mobile service classification and evaluation scheme can serve as a guideline for reviewing and grouping current B2E mobile solutions, and further facilitating the development and delivery of value-added B2E mobile services.

In the subsequent sections, this paper is organized as follows. Section 2 provides literature reviews. Section 3 describes the research methodology and process. Section 4 presents the research results including the B2E mobile service classification framework. In section 5, discussions and business implications are presented followed by a conclusion in section 6.

LITERATURE REVIEWS

In this section, we investigate the needs of value-added services in the tourism industry, values of mobile services elicited from customers' and employees' views, evaluation framework for measuring impacts and performances of mobile services, and relevant research works in the B2E area.

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 services, 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 the 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 rather strong.

For research efforts contributed in investigating value-creating features of mobile services, most works focused on consumer-oriented mobile values. Clarke (2001) exploited four value propositions of mobile commerce, namely, ubiquity, localization, personalization, and convenience. Anckar and D'Incau (2002) reported on a national consumer survey the investigation of consumer recognized values. They categorized consumer values into the wireless values and the mobile values. They also subdivided mobile values into time-critical needs and arrangements, spontaneous needs and decisions, entertainment needs, efficiency needs and ambitions, as well as mobility-related needs. Both researches pointed out that location based services were of value exclusively in the mobile settings, and were likely to constitute the core of mobile commerce value proposition. In the process of analyzing the strategy of mobile service providers, Chen and Cheng (2010) identified mobility, convenience, personalization, and security as values of the mobile communication and information services.

Among researchers tried to develop an evaluation framework for analyzing mobile services, Chen and Nath (2004) used the impact/value framework to study the business opportunities made possible by wireless technologies within organizational contexts. In their framework, the impacts included time, mobility, relationship, and location, and the values included efficiency, effectiveness, and innovation. However the contents of mobile services were still unclear. Lyytinen and Yoo (2002) presented a four-level framework including individual, team, organizational, and inter-organizational levels for examining a series of mobile commerce issues. They indicated that mobile services could provide essential information to remote collaborators. They further called 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) presented an evaluation framework for classifying and evaluating mobile tourist guides. Design dimensions of mobile services comprised service delivery, service customization, and service initiation. Using mobile brokerage service as an example, Lu, Zhang, and Wang (2009) proposed a multidimensional framework for measuring mobile service quality. Interaction, outcome, and environment qualities were identified as primary dimensions that further consisted of multiple sub-dimensions.

When specifically focusing on the topic of B2E mobile services, few works could be found in the literature. Rangone and Renga (2006) reported an exploratory study to investigate the B2E mobile internet applications in Italian. Their study focused on sales- and field-force automation applications via wireless devices and infrastructures. The main ideas behind these applications were efficiency and investment paybacks. However, intrinsic mobile values and managerial thinking were left behind in their portfolio of B2E mobile applications. Barnes (2004) used mobility, process, and market to position the mobile works in organizations. Three levels of geographic independence enabled by wireless solutions for enterprise workers were transient, mobile and remote. The changes in work processes included automaton, decision support, and transformation. The value proposition included mobile channel access, mobile service value, and mobile service creation. This model provided an intuitive assessment of mobile distributed works in various aspects, and emphasized the needs of mobile employee empowerment such as mobile decision support applications. Leem, Suh, and Kim (2004) suggested a B2B/B2E model classification approach based on Porter's value chain perspective. Their B2B/B2E model was 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 referred to a mobile solution supporting a firm's general decision making and information sharing. This classification approach offered a good explanation for the manufacturing industry based on functional and operational views. Nevertheless, several key components were still missing, for instance, knowledge management and learning that were vital to the creation of organizational values and employee competence were omitted in the classification. Furthermore, this approach did not separate strategic and managerial levels from the operational level to address and specify B2E mobile service needs in different organization levels.

In summary, time-critical and mobility-related arrangements are valuable to employees and mobile services with values of organizational agility and collaboration, innovation and learning, social interaction and knowledge sharing, personalization and decision support, efficiency and effectiveness, etc are attractive to businesses. 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. Four management levels considered include strategic planning, management control, knowledge management, and operational control (Laudon and Laudon, 2004). On the other hand, three functional service design concerns include wireless communication, location-based support, and context-based support (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).

RESEARCH METHODOLOGY AND PROCESS

Research methods used in this paper include literature reviews, a case study, focus group discussions, and field interviews. To examine which mobile services are valuable to the travel agencies, three analysis stages are carried out. In the first stage, mobile services are identified from previous researches and a case study of a large travel agency. An initial classification framework is also proposed. In the second stage, focus group discussions are brought into the mobile service classification research agenda to uncover which mobile service fits into which slot of the framework.

The soundness and fitness of the proposed mobile service classification are also validated by the focus group participants. In the last stage, semi-structured field interviews are conducted to evaluate the importance, feasibility, and cost/benefit effectiveness of the classified value-added B2E mobile services for the tourism industry. Details of the research processes are as follows.

Stage 1: B2E mobile tourism service identification process

During stage 1, the aim is to develop an initial list and classification framework of B2E mobile 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 mobile 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 mobile services were relatively generic and consistent with previous research results. An initial list of B2E mobile services based on the desired mobile values were selected and reworded for the tourism environment. These included mobile services such as mobile tour quality control and mobile learning. Based on the literature review and case study, an initial multi-dimensional B2E mobile service classification framework was also developed in this stage with the concepts of management levels and functional design being taken into account.

Stage 2: B2E mobile tourism service classification process

During stage 2, the aim is to classify the summarized B2E mobile services using the proposed framework through focus group discussions. Focus group sessions were formed by selecting senior students major in tourism management on-site at two universities with fame for cultivating comprehensive tourism professionals in 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. Thirteen people participated in two formed focus group sessions that had been allocated four and nine students respectively, and each focus group session lasted about two and half hours.

During the focus group discussions, the purpose of this 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. We also probed for additional details to gain some consensus on what dimensions should be included in a classification framework of B2E mobile services. The managerial and functional concerns were elucidated and discussed, and the initial B2E mobile service classification framework was presented and modified. Then, based on the modified mobile service classification framework with four management levels and three functional design concerns, identified B2E mobile services were classified into suitable management-function slots. The report of the integrated classification results was further confirmed by all participants of the focus groups.

Stage 3: B2E mobile tourism service evaluation process

During the final stage, a review process by the domain experts from the tourism industry was conducted to verify completeness, clearness, and appropriateness of the B2E mobile service classification framework. Then 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 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 3.5, the corresponding mobile service was deemed insignificant importance and thus removed from the service classification. Secondly, the fitness of the B2E mobile 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 being lower than 3, respondents were asked to provide comments about how to make the service classification more reasonable and to further redirect the classification. The final classification result was obtained based on the level of agreement among the domain experts.

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. Second, the company had good reputation for high service quality. Third, location convenience of the company headquarters was also considered for face-to-face field interviews. With phone contacts to 20 companies, five travel agencies were chosen to schedule the field interviews. People interviewed 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 to two hours.

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.

RESEARCH RESULTS

In the first stage, based on the literature reviews and a case study of a large travel agency, we generated a pool of 16 B2E mobile services for the tourism industry. The summary list of B2E mobile services is shown in Table 1. The initial mobile service classification framework developed is composed of management and functional dimensions. In the management dimension, four management levels are strategic planning, management control, knowledge management, and operational control. In the functional dimension, three service design concerns include wireless communication, location-based support, and context-based support respectively. The identified mobile services were then classified based on the service classification framework in the second stage. After evaluating the importance, feasibility, and cost-benefit effectiveness of the mobile services in the final stage, the result of mobile service classification was refined to include 12 B2E mobile services. Table 2 shows the average scores of the importance, feasibility, and cost/benefit effectiveness for the B2E mobile services from the managers' and employees' perspectives. The average scores of the importance, feasibility, and cost/benefit effectiveness for all B2E mobile services by tourism related managers are 4.2, 4.4, and 3.9 respectively. For employees, the average scores for all B2E mobile services are 3.8, 3.7, and 3.2 respectively. Table 3 presents the summary of B2E mobile service classification and evaluation. Each mobile service is put into the corresponding slot within the service classification framework.

Table 1: Summary of B2E tourism related mobile services

Mobile Service	Definition
Mobile communication services	To talk on the phone, to get SMS alerts, to send instant messages, and to get emails
Mobile information services	To facilitate real-time access of information, feedbacks, and latest status reports
Mobile community services	To share real-time travel news, experiences, and information resources via mobile devices
Mobile sales force support services	To support sales people by checking tourism product availability via mobile devices for fast response to customers
Location-based collaboration services	To help tour leaders/tour guides in coordinating tour activities and resources based on the current locations
Location-based information services	To get the latest location-related tour information like nearby traffic conditions and points of interest
Location-based decision support services	To provide suggestions about travel routes or accommodations based on current location-related information like traffic jams, festival event schedule changes, or distances to destinations.
Mobile learning services (Combined)	To assist location-related, theme-based, community-based learning by providing service platform and discussion forums for engaging employees in lessons and knowledge sharing.

Mobile knowledge management services	To enable the latest knowledge capture, store, or deliver real-time knowledge to improve the knowledge management practices
Mobile tour quality control services	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
Mobile executive decision support services	To support video conference via mobile devices and to supply the executives with decision-related summary and real-time information
Personalized tour information services	To get the latest tourism related news and information based on personal preferences
Real-time job dispatch services (Removed)	To track and locate the nearest tour services or facilities for job dispatching
Mobile tour planning & group decision support services (Removed)	To enable wireless discussions and decision supports along the group tour planning process

Table 2: Statistics report of the B2E mobile 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.

Also shown in Table 3, the rankings of the importance, feasibility and cost/benefit effectiveness of all B2E mobile tourism services given by managers and employees are presented in brackets. For example, the mobile learning services were ranked as the fourth important, the third feasible, and the seventh cost/benefit effective mobile services by managers; and were ranked as the fifth important, the second feasible, and the first cost/benefit effective mobile services by employees. So we put 4/3/7 and 5/2/1 in brackets right behind the mobile learning services in the corresponding slot. Within the classification framework, the mobile executive decision support services help the executives to analyze semi-structured or unstructured problems and make better decisions in the strategic planning level. The mobile services for management control include location-based decision support services and mobile tour quality control services. User groups of the management control level include executives, middle-level managers, and tour operation centers. Typical B2E mobile services for knowledge management are 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 are examples of knowledge workers and sources. The B2E mobile tourism services for operational control are 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 are typical users in the operational control. The scope of B2E mobile service classification framework covers the needs of all employees from strategic to operational levels in the tourism industry.

Table 3: Summary of the B2E mobile service classification and evaluation

Management Perspectives	Wireless Communication	Location-based Support	Context-based Support	Groups Served
Strategic planning			● Mobile executive decision support services (10/12/11, 10/11/9)	Executive
Management control		● Location-based decision support services (4/6/9, 2/4/4)	● Mobile tour quality control services (2/1/1, 8/9/9)	Executive, middle-level manager, & tour operation center
Knowledge management		● Location-based information services (10/9/11, 5/3/9)	● 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	● 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)	● Location-based collaboration services (10/9/7, 10/12/7)	● 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)

Reliability is 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. Moreover, the confirmation from participants on the classification results ensured the accuracy and completeness.

Validity is also ensured because the research questions used during focus group discussions were carefully designed to be key points based on 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 service classification wanted to accomplish was carefully detailed and clarified. Finally, adequate time slots were allocated to research issue discussions. Relevant, valuable and converged conclusions drawn from the discussions, as well as carefully assessed research instruments including the moderator and the discussion guide all help ensuring the validity of this study.

DISCUSSIONS AND BUSINESS IMPLICATIONS

Based on research results from the identification, classification and evaluation stages, discussions, business implications, and suggestions to the mobile service providers for the tourism industry are presented in this section. The average scores of importance, feasibility, and cost-benefit effectiveness of the B2E mobile 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 mobile services to support the daily works for different management levels. Furthermore, this result supports that sales people are one of the primary users of mobile services. It can be concluded that in the tourism industry, managers, tour operation centers, tour guides, tour leaders, and sales people are all potential users of the mobile services.

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 mobile services. The user-perceived technology complexity and limited functionality of existing mobile services hinder the technical feasibility ratings of the desired important mobile services. This indicates that the potentials of mobile 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 12 mobile services, both managers and employees think the least effective B2E mobile 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 mobile services.

For managers, the top three cost/benefit effective B2E mobile 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 services fail to fulfill the management needs. It is critical to provide value-added mobile 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 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.

Our research indicates that different managerial levels have different mobile service needs. Based on the research results, the tourism industry is eager to have mobile services with essential business values of service quality and organizational competence. 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 service classification framework and evaluation results offer a guidance and baseline reference for planning the B2E mobile service development in the tourism industry. The mobile service providers are suggested to use the proposed B2E mobile service classification framework to elicit and rank their own B2E mobile service requirements in all managerial levels to gain better performances and values of the B2E mobile services.

CONCLUSION

In this paper, we 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. Future studies will focus on building prototype systems in some travel agencies to validate the usability and usefulness of the proposed B2E 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.

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