MOBILE INTERNET SERVICE: ASSESSMENT OF QUALITY AND SATISFACTION FROM THE CUSTOMER'S PERSPECTIVE

by

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With the development of mobile technologies, the use of mobile internet service has spread rapidly. The mobile internet can be considered from different perspective. Specifically, this dissertation studied mobile internet service from the customers' perspective. To conduct this research in the specific context of service operations management (SOM), literature on service, quality, risk, satisfaction, and continuance intention as SOM research domains was reviewed. Moreover, six attributes of mobile internet service were identified; ubiquity, localization, personalization, reachability, convenience, and instant connectivity.

To examine research hypotheses, 400 questionnaires were distributed to Korean students attending universities

in the Republic of Korea due to the highest national percentage of mobile internet service usage in the world. 367 questionnaires out of 400 were returned and the respond rate reached approximately 92 percent. Of 367 questionnaires, 316 data were usable.

Based on the results of this study, among attributes of mobile internet service, three attributes -- ubiquity, reachability, and instant connectivity – were found to have significant effects on mobile internet service quality. As many previous studies have found, mobile internet service quality influenced customer satisfaction, which in turn affected continuance intention. Moreover mobile internet service quality also had a direct effect on continuance intention. Mobile internet risk did not affect mobile internet service quality, and also did not affect mobile internet service satisfaction and continuance intention, respectively.

One of the main contributions of this study is that the roles of mobile internet service quality and mobile internet service satisfaction are important factors in customers' continuance intention with regards to mobile internet service. Service operations managers should consider mobile internet as a service rather than a

technology. Moreover, they must understand mobile internet service quality and satisfaction from the customers' perspective.

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Daewon Jeon. I will forever owe my family. Their self-sacrificing love and support helped me finish this dissertation and pursue my PhD. degree. I love my family and am thankful for their forever love.

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CHAPTER 1: INTRODUCTION

1.1 THE PROBLEM

The portion of economies accounted for by the service sector has grown rapidly. Today's economies, especially in the developed and fast developing countries, have shifted from manufacturing to service industries (Lee et al., 2007). However, there have been few empirical studies in service operations research despite the growing importance of services (Machuca et al., 2007). For many years, service operations management (SOM) has received scant attention from operations academics. One of the main reasons is that some researchers in operations management lack an understanding of services (Heineke and Davis, 2007).

In general, it is known that operations division is regarded as the "back office" which supports people in the front office in order to make sure everything works smoothly (Efinancialcareer.com, 2000). Thus, the operations division has little chance to provide service to end users directly. Operations personnel indirectly obtain information about customers and their perceptions through people in the front office. Given these circumstances,

operations people may not know exactly what customers want, how customers evaluate services, what makes a customer satisfied, and what key factors affect customers' perception of service quality. To be competitive in the cross-functional business world, the operations division has to expand its boundaries through converging various concepts in other functional disciplines.

Mobile technology-mediated services have frequently been identified as the new service frontier (Kleijnen et al., 2004; Newell and Newell-Lemon, 2001). Mobile wireless technologies through mobile phones and personal data assistants (PDAs) are useful tools to provide value-added services to customers (Nysveen et al., 2005). Due to the huge advantage of mobile services, both traditional retails and online service providers have added mobile service enhancements to their multichannel operations.

Recently, mobile internet market has been growing dramatically. For example, the mobile market's growth in the United States has been enormous and is expected to reach $2.1 billion by 2011 (Macilveen, 2008). Although many statistics indicate that the mobile internet market is huge, few studies on mobile internet service have been conducted. The SOM research perspective has yet to deal with

technology-mediated services relating to electronic or even mobile technologies. This study examines mobile internet service from the SOM research perspective in order to address this gap.

1.2 RESEACH PURPOSE AND RESEARCH QUESTIONS

The purpose of this study is to indentify factors influencing mobile internet service quality and investigate the relationships among mobile internet service quality, mobile internet service risk, mobile internet service satisfaction, and continuance intentions from the customer's perspective. In despite of the widespread usage of mobile internet service, recent market indexes indicate poor bottom line results. According to ATKearney's (2005) mobile report, only a small minority of customers in the United States (five percent) and Europe (six percent) showed intention to use their mobile phones for mobile service transactions. The primary reason of this result may be companies' failure to understand mobile services from the customer's perspective (Shankar et al., 2003; Van der Heijden, 2006).

Thus, understanding customers' perceptions of mobile

internet service is useful, so mobile service providers can allocate their resources to improve mobile services (Keijnen et al., 2007). To examine the drivers and barriers of mobile internet service in the SOM research context, this study focuses on the following research questions: 1) Can mobile internet service be one of important SOM research topics? 2) Which factors affect mobile internet service quality? 3) How does mobile internet service quality relate to mobile internet service risk, mobile internet service satisfaction, and continuance intention?

1.3 RESEARCH METHODOLOGY

Several research methods are employed for the empirical portion of this dissertation. First, previous studies relating to mobile internet service are reviewed to develop a research model that consists of 10 research variables: 1) ubiquity, 2)localization, 3)personalization, 4)reachability, 5)convenience, 6)instant connectivity 7) service quality, 8) service risk, 9) service satisfaction, and 10) continuance intention.

Second, a survey is employed to test the research model. Before collecting data for this study, survey

questions were generated based on the literature review. Utilizing the initial survey questions, qualitative interviews were conducted with 20 people using mobile internet service to identify additional factors which were not developed through the literature review. To refine the survey questions and test face validity, a pilot test was conducted with 50 subjects covering 31 questions in ten constructs. Based on ten constructs, 12 hypotheses were developed to test research questions. Data were randomly collected from a university in the Republic of Korea.

Finally, two statistical tools, SPSS 15.0 and Mplus 3.0, were used to test the research model and 12 hypotheses. SPSS 15.0 is employed for the reliability test with values of Cronbach's α. Mplus 3.0 is applied for the validity tests, confirmatory factor analysis, path analysis through structural equation modeling (SEM) and goodness of fit tests of the model. Based on these research methods, 12 hypotheses were tested.

1.4 ORGANIZATION OF DISSERTATION

This dissertation consists of five chapters. The first chapter has discussed the problem, purpose of the research,

and research model.

The second chapter reviews previous research on mobile internet service. Studies on the concepts of service are presented first to help establish mobile internet as a service. This is followed by research on the status of service operations in the context of the operations domain. Finally, studies specifically related to mobile internet service are reviewed.

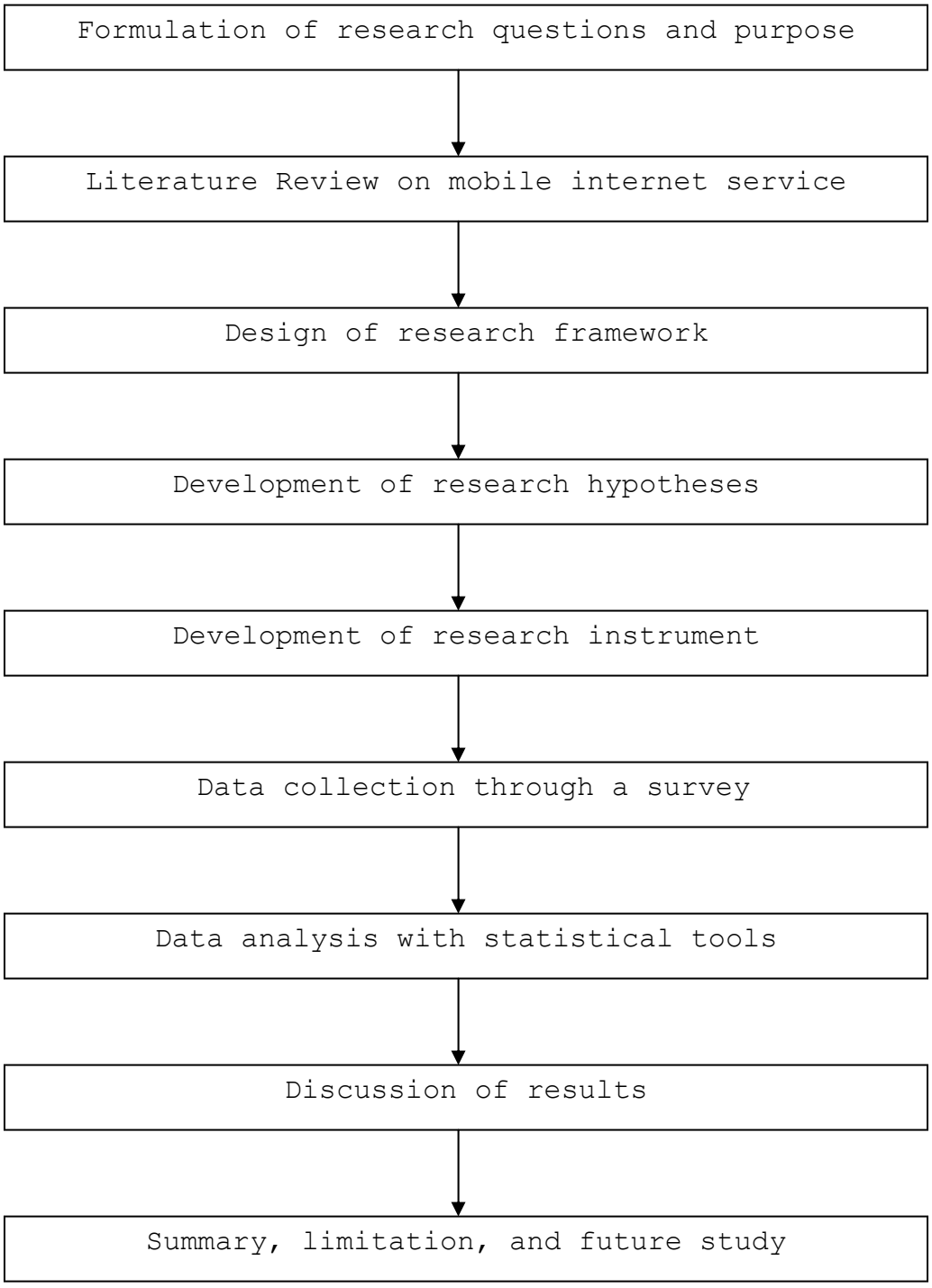
The third chapter develops a research model based on the literature review. 10 constructs and 12 hypotheses are generated in this chapter. Moreover, the data collection procedures and respondent demographics are discussed.

The fourth chapter presents the results of the reliability and validity tests, which measure the consistency and accuracy of the research measurement design. This chapter also provides the results of the tested on 12 hypotheses and the goodness of fit for the model.

The fifth chapter summarizes the research and results of the study. The final chapter also presents the theoretical and practical contributions of this study, and indicates research limitations, followed by possible directions for future research.

An overview of this research is shown in Figure 1.1

Figure 1.1 Overview of Dissertation Process



CHAPTER 2: LITERATURE REVIEW

This chapter reviews the literature on mobile internet service. In this study, mobile internet is considered from the service operations management (SOM) perspective. This is done by drawing on concepts such as service quality, customer satisfaction, and behavioral intention from the marketing and management information systems (MIS) domains. The chapter begins by reviewing the nature of services and types of service before presenting mobile internet service from a SOM perspective. Previously, mobile internet service has been viewed as a specific technology or an information system. The presentation of mobile internet service in this way is accomplished through a review of the current status of research on service operations management. Finally, the market for mobile internet service, type of mobile services, and the unique characteristics of mobile internet service are discussed.

2.1 UNDERSTANDING SERVICE

2.1.1 Importance of Service Sector

The word *service* has its roots in the Latin word *servus,* which means slave or servant. In keeping with this origin, most services were humble works before the 20th century. Service jobs included butlers, maids, and gardeners for the wealthy, chambermaid and bellhops in hotels, waiters/waitress in restaurants, and clerks in retail operations (Heineke and Davis, 2007). At the time, service workers were viewed as unprofessional and unknowledgeable. However, the status of services increased rapidly during the 20th century, especially during the second half.

The strong growth of the service sector in the economy has occurred in developed countries (Lee et al., 2007). In terms of GDP, services account for approximately two-third of total GDP in developed countries and at least half of total GDP in emerging economies (Baltacioglu et al., 2007). In the United States, the service sector accounted for more than 80 percent of real GDP growth, but less than 70 percent of the total economy in 2006 (Howells and Barefoot, 2007).

According to OECD (2005), the service sector accounts

for over 70 percent of total employment in OECD economies. Services account for 78.8 percent of U.S. employment. This growth in the service sector has taken place in other countries as well (see Table 2.1). The service sector accounts for over 70 percent of total value-added activities in Australia, Denmark, France, The Netherlands, Sweden, and the United Kingdom. More than 65 percent of total value-added activities in Italy, Japan, and Spain are services (Wölfl, 2005).

Table 2.1 Percentage of Workers in the Service Sector

Country	1960	1970	1980	1990	1995	2000	***2005***	2006	2007
United States	58.1	62.3	67.1	72.0	74.1	76.2	78.6	78.5	78.8
United Kingdom	49.2	53.6	61.2	66.7	71.4	73.9	77.0	77.2	n/a
Netherlands	50.7	56.1	65.1	69.5	73.4	75.2	76.5	77.1	77.3
Canada	54.7	62.6	67.9	72.4	74.8	74.9	76.0	76.6	77.1
Australia	n/a	57.3	64.9	70.5	73.1	73.9	75.8	75.8	75.9
Sweden	44.6	53.9	62.9	67.9	71.5	73.4	75.6	76.4	76.7
France	40.7	48.0	56.3	65.6	70.0	72.9	73.4	74.6	n/a
Japan	41.9	47.4	54.8	59.2	61.4	64.3	68.6	68.8	68.9
Germany	40.2	43.8	52.8	45.0	60.8	64.3	67.4	68.8	n/a
Italy	33.4	40.1	47.7	58.6	62.2	64.9	65.5	65.9	66.1

Source: U.S. Bureau of Labor Statistics (2008)

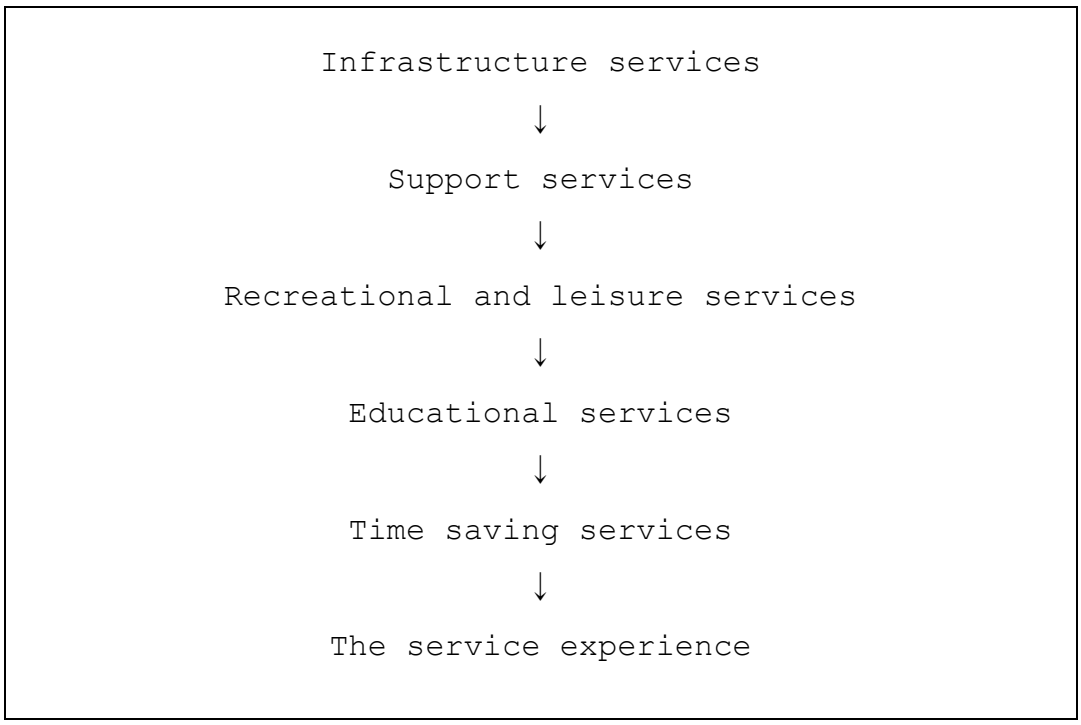
This growth has not been present in all countries, as those adhering to the Marxist-Leninist economic doctrine have emphasized manufacturing and agricultural sectors because services are considered to be non-productive. The deceleration of communist countries' economic growth was directly related to their inability to properly develop the service sector (Macierewicz and Mankiewicz, 1989).

As an economy develops, different types of services evolve in stages (see Figure 2.1). In the first stage, the role of service is minimal and there is little need for purchased services. Infrastructure services in the form of transportation, government services, education and healthcare are developed at this stage. As trade and commerce grows, support services emerge in the form of banking, insurance, retail operations, restaurants, and hotels. With the growth in an economy, salaries and standard of living also increase. During this stage, people begin to spend their discretionary income for recreation and leisure service. For example, hospitality, movies, and sports industries may develop.

As a society becomes more complicated economically, the demand for higher education increases. As higher education becomes emphasized, the number of schools

increases. The United States provides the greatest access to higher education in the world with a total of 4352 post-secondary intuitions with 17.5 million students as of 2005(U.S. Department of Education, 2005).

Figure 2.1 Types of Services in an Economy



Source: Heineke and Davis (2007)

To increase their standards of living and survive in competitive economic environments, people have to work longer hours, which leaves them with less free time. Thus, services that save time, such as home shopping or express

mail, emerged to cope with the time pressures and improve people's lifestyles. For example, a wide variety of online shopping and mobile commerce via mobile devices have developed.

As service businesses develop and customers' expectations increase, customers want a memorable or emotional experience providing value-added service rather than just good service. Moreover, information systems have become an important service with the explosive growth of IT and the Internet towards the end of the 20th century (Heineke and Davis, 2007; Roth and Menor, 2003). Even agricultural and manufacturing companies began to use sophisticated information systems for customer service. IS service features and experiences contribute value to customers (Van Dyke et al., 1997). Recently, organizations have provided IS service to their customers through mobile internet (Keijnen et al., 2007).

2.1.2 The Nature of Service

Grönroos (2007) compared services and goods from several perspectives, as shown in Table 2.2. Fitzsimmons and Fitzsimmons (2007) categorized the distinctive

characteristics of services: 1) intangibility, 2) simultaneity, 3) heterogeneity, and 4) perishability. Intangibility means that a service cannot be touched or shaped physically. Because of this characteristic, a number of logistics activities including transportation cannot be adapted to service supply chains. The physical flow of the service from supplier to the service provider to the end customer is not applicable in a service supply chain.

Table 2.2 Goods versus Services Dichotomy

Goods	**Services**
Tangible (A thing)	Intangible (An activity or process)
Production and distribution separated from consumption	Production, distribution, and consumption simultaneous
Homogenous	Heterogeneous
Mostly nonperishable, can be kept in stock	Perishable, cannot be kept in stock
Core value produced in a factory	Core value produced in buyer-seller interactions
Customers do not (normally) participate in production	Customers participate in production
Transfer of ownership	No transfer of ownership

Source: Grönroos (2007)

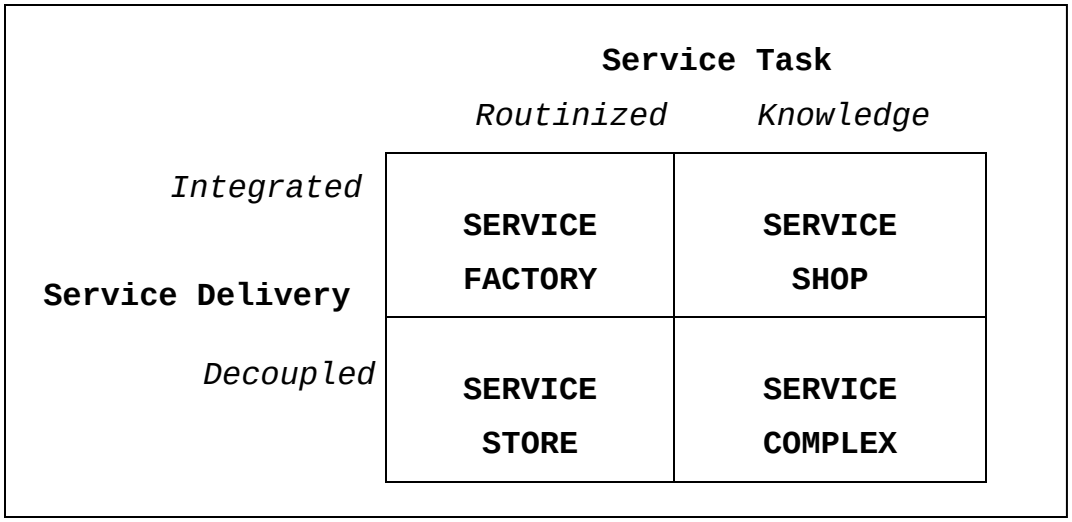
The second characteristic of services is that they are produced and consumed simultaneously. In other words, customers are usually involved in the service production process, and production and consumption happen simultaneously. Production and consumption in a service setting is inseparable. When considering goods, the production and distribution are separated from consumption. The third factor is that services are heterogeneous. This is representative of the idea that service outcomes cannot be easily standardized. The outcomes of services can be evaluated differently by different customers and even differently by the same customer in similar service situations. The last feature of services is perishability. It suggests services cannot be stored or inventoried for future use if they are not consumed on the spot. Due to this characteristic of services, warehouse or distribution activities cannot be applied to service supply chains. Baltacioglu et al. (2007) added "labor intensive" to the nature of services. Services are usually provided by human resources rather than production machines. Thus, the human aspects in service supply chains should be considered an important factor.

2.1.3 Types of Service

David (1999) categorized services into four types in terms of business: service factories, service store, service shop, and service complexes. In David's (1999) framework, there are two task dimensions. One dimension is whether the task is based on routine activities or non-routine, knowledge-based applications. The other dimension is based on how integrated or decoupled the tasks are. We will define each of the service firm types and describe the characteristics, problems, and solutions to the problems faced by each. Figure 2.2 shows the four types of services.

Service factory is a type of service firm performing routine tasks which are very integrated in the delivery of the service. There are minimal variations to the predefined processes and procedures and consumers expect the same level of product and service quality for the same level of expense. Services performed in service factories are specialized, costs can be easily assigned, and the value chain structures can easily be drawn. When one company operates in multiple locations, the expected services, price structure, and the quality of the service should be uniform. Examples include fast food restaurants and car rental services.

Figure 2.2 Four Types of Service



Source: Davis (1999)

Service store deals with tasks which are more varied and less integrated than the service factory. This type of service firms includes airlines, hotels, and insurance firms. The businesses require more customization and customer contact than service factory. Their operations require some level of coordination of different departments or divisions to meet individuals' taste. In service stores, cooperate managers set overall goals and strategies, but local adaptation of services is needed.

The major problem of the service store firms is the somewhat complex coordination and control encountered when delivering services. The responsibility for service is

shared by many people and costs are hard to allocate. Employee morale is low since employees with front line jobs are not typically promoted to the top management positions and technology often has the potential to replace employees. Companies need to strategically position themselves to pursue either cost leadership or quality leadership to be competitive.

Service shops provide highly integrated services tailored to specific customers' needs. They typically are tendered by a small number of local staff as is commonly done with accountants, consultants, and lawyers. Coordination is less of a problem due to the size of the company and a small set of customers. Since the service is rendered with the customer's specific need in mind, the customer has specific expectations of the service outcome which cannot always be met easily. Due to the uniqueness of the service rendered, pricing is often non-routine and difficult.

Service complexes provide a broad range of services which are knowledge-based. The range of services is much broader than service shops. Examples would include large consulting firms, law firms, and hospitals. Service complexes are also different from service shops in the

amount of interaction among employees, the capital investment, and the coordination involved in conducting the business, which is highest among the four types of service firms. Individual employee management of clients is typical and key employees retain valued accounts or fulfill an important role in attracting customer. While broad services are performed by a number of employees, customers can be ignored in the system. Retaining key employees and being attentive to individual customers' needs are important.

2.2 SERVICE OPERATIONS MANAGEMENT RESEARH

Over the last 20 years, operations management has recognized the importance of service research. Miller et al. (1981) presented Service Operations Management (SOM) as one of their four special interest research agenda groups in Decision Sciences. Based on Miller et al.'s (1981) study, Amoako-Gyampah and Meredith (1989) updated the SOM research agenda. Although SOM has been considered to be one of the most important subjects in the academic area and was expected to increased continuously, the general research and teaching focus of OM academics was manufacturing based

(Nie and Kellog, 1999), resulting in a low percentage of SOM research (Roth and Menor, 2003; Slack et al., 2004; Johnston, 2005). In other words, a gap exists between the importance of services in the real world and the number of studies performed in operations management. SOM research has not kept up the real world demands for research in the area.

2.2.1 Quantification of SOM Research

To motivate OM researchers to facilitate SOM directed research, Machuca et al. (2007) investigated the state of SOM research in the most relevant OM journals. In their study, the authors selected 344 articles out of a total of 4609 OM articles published in 10 journals from 1997 to 2002. During this period, the percentage of research on SOM in the OM research was 7.5 percent. Moreover, there appears to be no distinct trends towards an increase in SOM research, as seen in Table 2.3. The percentages of SOM research during 1997-2000, 1999-2000, and 2001-2002 years were 7.4 percent, 8.0 percent, and 6.7 percent respectively. If the time period is extended further into the past, the amount of SOM publications decreased in 1990s. Amoako-Gyampath and

Meredith (1989) investigated SOM research during the period from 1982-1987. The period from 1992-1997 period was examined by Pannirselvam et al. (1999). Table 2.4 shows how the amount of SOM research was changed over the past 20 years.

Table 2.3 Proportion of SOM/OM

	1997-1998		1999-2000		2001-2002		1997-2002 (Total)	
	SOM/OM	%	SOM/OM	%	SOM/OM	%	SOM/OM	%
Total	110/1477	7.4	130/1625	8.0	104/1507	6.9	344/4609	7.4

Source: Machuca et al. (2007)

Table 2.4 Evolution of SOM Research (1982-2002)

	1982-1987 Amoako-Gyampath & Meredith (1989)		1992-1997 Pannirselvam et al., (1999)		1997-2002 Machuca et al. (2007)	
	SOM/OM	%	SOM/OM	%	SOM/OM	%
Total	23/362	6.35	53/1958	2.71	344/4609	7.4

Source: Machuca et al. (2007)

2.2.2 Main Topics of SOM Research

Machuca et al. (2007) classified SOM topics into four

research groups. In this classification, some of the articles were assigned to more than one research group. Due to this, the total number of articles in Table 2.5 is 471. Of the four SOM topics, the highest percentage of SOM articles (44.8 percent) falls into the fourth group, "planning, scheduling and control of service operations" The next most researched topic (24.4 percent) belong to the third group, "service operations design." As an individual research topic, topic 3.2 "selection and design of the service delivery system" is the most researched area in the ranking of articles with 9.3 percent. Meanwhile, topic 4.8 "planning, scheduling and control in supply chains" is the second most researched topic at 9.1 percent.

In terms of the pipeline research, Machuca et al. (2007) emphasized topic 2.5 "information technology and new technology in services" and topic 4.7 "measuring and control of service quality" as research domains which have grown rapidly. Topic 2.5, "information technology and new technology in services," has recently seen a huge jump in the SOM research rankings with the development of advanced information technologies such as mobile, RFID, and ubiquitous technologies.

Table 2.5 Research Topics in SOM

No.	Topic (1997-2002)	Articles	(%)
1.	**Introduction and key issues of management in services**	**6**	**1.3**
2.	**Service operations strategies and objectives**	**139**	**29.5**
2.1	Service management	12	2.5
2.2	General aspects of strategy and objectives of operations in services	17	3.6
2.3	Strategic quality issues in services	38	8.1
2.4	Service productivity	42	8.9
2.5	Information technology and new technology in services	18	3.8
2.6	Expansion, internationalization and globalization of services	3	0.6
2.7	Supply chain strategies and objectives	9	1.9
3.	**Service operations design**	**115**	**24.4**
3.1	Service selection and design	17	3.6
3.2	Selection and design of the service delivery system	44	9.3
3.3	Capacity design/long-term capacity and demand decisions	25	5.3
3.4	Service facility location	8	1.7
3.5	Service facility design and layout	6	1.3
3.6	Service operations design in supply chains	15	3.2
4.	**Planning, scheduling and control of service operations**	**211**	**44.8**
4.1	Planning, scheduling and control service operations	24	5.1
4.2	Capacity planning, scheduling and control	42	8.9
4.3	Short-term scheduling and control	39	8.3
4.4	Inventory management and control	42	8.9
4.5	Service project management	1	0.2
4.6	Design, measurement and compensation of service work	1	0.2
4.7	Measuring and control of service quality	19	4.0
4.8	Planning, scheduling and control in supply chains	43	9.1
	Total	**471**	**100**

Source: Machuca et al., (2007)

2.2.3 Methods of SOM Research

Table 2.6 and Table 2.7 address what methods are used in SOM research. Because there are some articles which used multiple methods, the total number of articles is 443. According to Table 2.6, the method of modeling and simulations was primarily used (67 percent), which is almost twice that of empirical methods (31.2 percent). However, there is a tendency toward empirical methods throughout the three 2-year periods. Their use has increased while the use of models and simulations methods decreased.

Table 2.6 Distribution of SOM Research Methods

Research method	1997-1998		1999-2000		2001-2002		1997-2002 (Total)	
	Articles	%	Articles	%	Articles	%	Articles	%
Theoretical/ conceptual	6	4.6	7	4.0	7	5.0	20	4.5
Literature review	1	0.8	8	4.6	7	5.0	16	3.6
Models/ Simulations	89	68.5	106	60.9	74	53.2	269	60.7
Empirical studies	34	26.2	53	30.5	51	36.7	138	31.2
Total	130	100	174	100	139	100	443	100

Source: Machuca et al., (2007)

Table 2.7 Empirical Research of SOM

Empirical research	1997-1998		1999-2000		2001-2002		1997-2002 (Total)	
	Articles	%	Articles	%	Articles	%	Articles	%
1. Survey	6	16.7	20	37.0	16	29.1	42	29.0
2. Direct Observation methods	20	55.6	12	22.2	24	43.6	56	38.6
2.1 Case studies	18	50.0	2	22.2	18	32.7	48	33.1
2.2 Field research	1	2.8	0	0.0	2	3.6	3	2.1
2.3 Field experiments	0	0.0	0	0.0	1	1.8	1	0.7
2.4 Action research	1	2.8	0	0.0	3	5.5	4	2.8
3. Panel study	2	5.6	0	0.0	1	1.8	3	2.1
4. Laboratory experiments	1	2.8	1	1.9	0	0.0	2	1.4
5. Other	7	19.4	21	38.9	14	25.5	42	29.0
5.1 Database	0	0.0	2	3.7	1	1.8	3	2.1
5.2 Historical data	7	19.4	19	35.2	13	23.6	39	26.9
Total	36	100	54	100	55	100	145	100

Source: Machuca et al., (2007)

Over the last 20 years, empirical research has been conducted in five categories: survey, directed observation, panel study, laboratory experiments, and other. The majority of empirical research utilizes "direct observation methods" (38.6 percent) and mostly case studies (33.1 percent). The next most used method is "surveys" (29.0

percent) and "historical data" accounts for 26.9 percent. Amoako-Gyampath and Meredith (1989), Pannirselvam et al. (1999), and Machuca et al. (2007) also found that the use of surveys increased significantly over the last 20 years.

2.2.4 Sectors of SOM Research

This section deals with which sectors of services have been most studied in SOM research. Table 2.8 shows the number and percentages of articles for 15 specific sectors. If an article cannot be identified as a particular sector, it is classified as "generic". Three sectors such as "*Transportation*" (20.1 percent), "commercial distribution" (18.0 percent) and "health" (10.2 percent) constitute almost 50 percent of the total articles. The sectors of "tourism, leisure, culture and sport" and "telecommunication" are the next largest, with percentages of 5.8 and 4.7 respectively.

According to Machuca et al.'s (2007) analysis, the sectors telecommunication, health, and financial institutions have a greater link with strategic issues. Meanwhile, the sectors of transportation, commercial distribution, and B2B service companies have a greater connection with tactical and operational issues.

Table 2.8 Sectors in SOM Research

Sector of activity	Articles	%
* B2B service companies	14	4.1
* Commercial distribution	62	18.0
* Education	3	0.9
* Financial institutions and insurance companies	16	4.7
* General energy supply	9	2.6
* Health	35	10.2
* Maintenance and repair	9	2.6
* Personal services	0	0.0
* Postal and courier services	3	0.9
* Professional services	6	1.7
* Public services and non-profit making companies	11	3.2
* Telecommunications	16	4.7
* Tourism, Leisure, culture and sport	20	5.8
* Transportation	69	20.1
* Generic (no specific sector)	71	20.6
Total	**344**	**100**

Source: Machuca et al. (2007)

2.2.5 Expanding Service Operations Boundaries

As stated above, the boundaries of SOM research need to be expanded in many ways to reduce the gap between the importance of the service sector in the real world and the amount of research in the SOM. First, the functional boundary of SOM research can be extended to cross-functional areas. Karmarkar (1996) depicted service management as a transfunctional research area. In other

words, service management should be studied from the perspective of multiple business disciplines. Service can be studied through the integration of various functional areas such as marketing, human resources, information systems, and operations (Johnston, 1999). Due to the importance of service research, marketing has identified service as a distinct subfield of marketing study (Iacobucci, 1998). The organizational behavior/management area also has distinct service-based research (e.g., Bowen and Hallowell, 2002; Schneider, 1994). However, truly integrative research with an operations perspective is a rarity. Therefore, an approach incorporating various fields' research on service operations is necessary for the development of SOM research.

2.2.6 Implementing Information Technology Service

Information technology (IT) as a service is a critical factor for SOM study (Roth and Menor, 2003). In the SOM context, IT service has been studied in terms of service design, service delivery, and service performance (Lovelock, 1995; Quinn, 1996). For example, research in e-services has dealt with the online experience (Novak et al., 2000),

service quality (Zeithaml et al., 2000), and customer choices (Iqbal et al., 2003). Recently, a greated attention has been paid to customized or personalized service offerings relating to IT. However, few studies have been conducted on customized or personalized advanced IT services, such as mobile internet service. In the interest of addressing this gap in the literature, this study focuses on mobile internet service as an IT service.

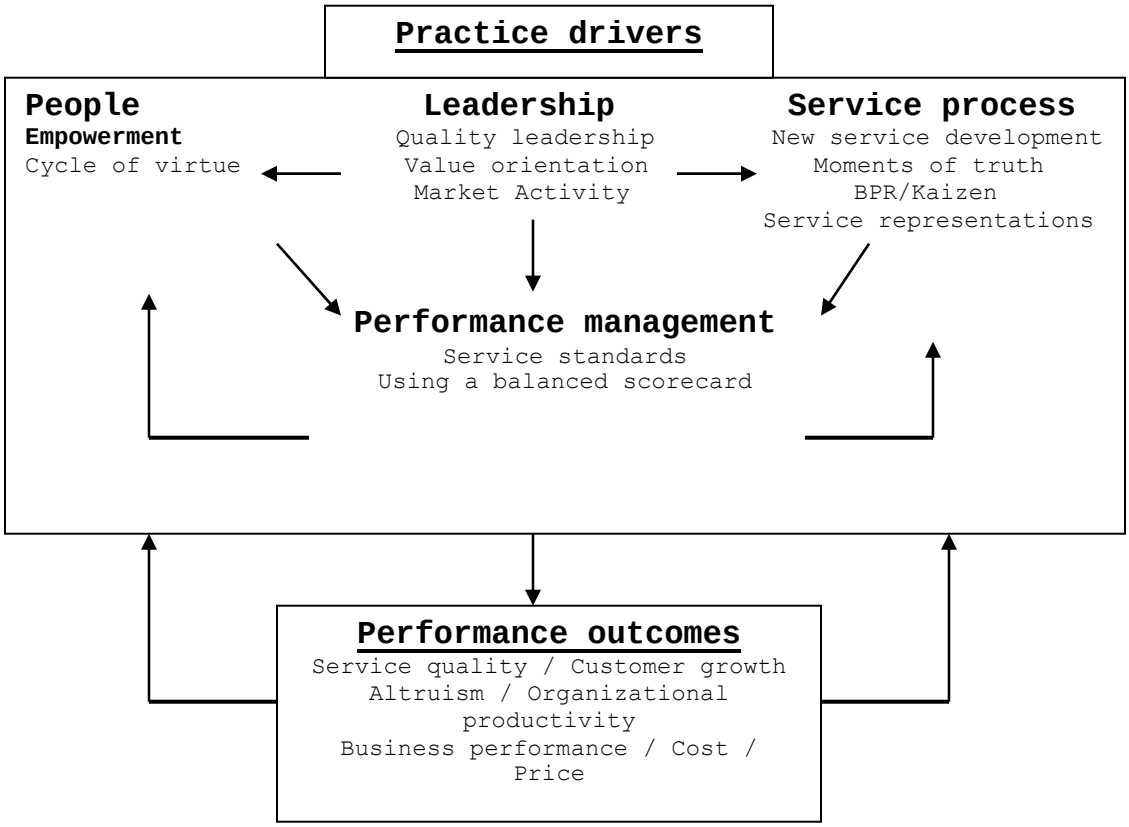
2.2.7 Service Quality and Customer Satisfaction in SOM

Traditionally, studies on service quality in operations management have been conducted from the organization's rather than from the customer's perspective. Operations management has focused on goods-oriented quality to improve an organization's productivity or efficiency, intending to lower cost. In contrast to researchers in production operations management, researchers in SOM study service quality measurement and control, topics which were four percent of total research in SOM topics from 1997 to 2002 (Machuca et al., 2007).

Roth and Menor (2003) categorized service quality as one of an organization's performance outcomes (see Figure

2.3).

Figure 2.3 Roth-Chase-Voss Model of Practices and Performance



Source: Roth and Menor (2003)

To understand service quality in terms of performance outcomes, researchers in SOM need to develop an insight

into customer-oriented quality which focuses not on lowering costs, but on increasing customer satisfaction as it relates to service effectiveness. However, few studies on customer satisfaction connected with service quality have been conducted in SOM. Based on Karmarkar's (1996) argument, SOM researchers need expand service operations boundaries via cross-functional studies. Thus, this study adopts the overall concepts of service quality and customer satisfaction from marketing literature.

A large number of researchers have studied service quality and satisfaction to understand customer evaluation of services. Quality and satisfaction have sometimes been considered the same construct due to their semantic similarity (Tian-Cole and Cromption, 2003). Some researchers found a high intercorrelation between service quality and satisfaction (Cronin et al., 2000; Spreng and Mackoy, 1996) and determined that the conceptualizations of the two construct overlap (LeBlanc, 1992), resulting in rising confusion with regard to the causal relationship between the two constructs. Teas (1993) explained that the confusion could result from the lack of consensus in the definition and operationalization of the two constructs.

Some researchers (Anderson and Sullivan, 1993; Raval

and Grönroos, 1996; Delone and McLean, 2003; De Ruyter et al., 1997; Tam, 2004) argued that quality is an antecedent of satisfaction, while others (Parasuraman et al., 1988; Bolton and Drew, 1991; Patterson and Johnson, 1993) contended that quality is a consequent of satisfaction (see Table 2.9).

Emerging definitions make the difference between the two constructs clear. Service quality has been viewed from two different perspectives, the global and the transactional (Teas, 1993; Oliver, 1993; Parasuraman et al., 1994). From the global perspective, satisfactory service experiences cause customers to develop their attitudes toward service quality over the long run. In other words, the accumulation of specific evaluations (satisfaction with transactions) affects global evaluations (service quality). From the transactional perspective, transaction-specific quality influences the overall satisfaction.

Table 2.9 Causal Relationships between Service Quality and Satisfaction

Causal relationships	References
Service Quality → Satisfaction	Anderson et al., 1994; Bigné et al., 1997; Churchill and Suprenant, 1982; Cronin and Taylor, 1992; Cronin et al., 2000; De Ruyler et al., 1997; Ekinci, 2004; Fornell et al., 1996; Leunissen et al., 1996; Oh, 1999; Oliver, 1993; Rust and Oliver, 1994; Shemwell et al., 1998; Swan and Bowers, 1998; Woodside et al., 1989
Service Quality ↔ Satisfaction	Berné et al., 1996; Driver, 2002; Iacobucci et al., 1995; McAlexander et al., 1994; Oliver, 1994; Teas, 1993
Satisfaction → Service Quality	Bitner, 1990; Bitner and Hubert, 1994; Bolton and Drew, 1991; Carman, 1990; Grönroos, 1994; Parasuraman et al., 1988, 1994; Patterson and Johnson, 1993; Schommer and Wierderholt, 1994

Source: González et al.(2007)

Many researchers (Berné et al., 1996; Driver, 2002; Iacobucci et al., 1995; McAlexander et al., 1994; Oliver, 1994; Teas, 1993) argue for an alternative conceptualization, that of service quality as both an antecedent and a consequence of satisfaction (see Table

2.9). For example, Iacobucci et al. (1994) suggested that service quality and satisfaction are antecedents of each construct, meaning that the relationship between the two constructs is reciprocal and it is impossible to prove which the antecedent is.

Many researchers (Berné et al., 1996; Driver, 2002; Iacobucci et al., 1995; McAlexander et al., 1994; Oliver, 1994; Teas, 1993) argue an alternative conceptualization that service quality is both an antecedent and a consequence of satisfaction (see Table 2.9). For example, Iacobucci et al. (1994) examined that service quality and satisfaction are antecedents of each construct. It means that the relationship between the two constructs is reciprocal and it is impossible to prove which the antecedent of the other is.

However, service quality and satisfaction are highly correlated to behavior intentions, regardless of the causal relationship between the two constructs. Many researchers have studied the direct relationship between service quality and behavior intention variables or the indirect relationship between service quality and behavior intention via satisfaction (see Table 2.10). Based on this stream of research, the relationships among service quality,

satisfaction, and behavior intention are investigated in this study.

Table 2.10 Studies on Service Quality, Satisfaction and Behavior Intention

Study	Variables studied
Direct relationship:	
Cronin and Taylor (1992)	Repurchase
Boulding et al. (1993)	Repurchase and recommendation
Baker and Crompton (2000)	Intention to purchase, loyalty, and probability of paying more
Alexandris et al. (2002)	Word-of-mouth communication and intention to purchase
Indirect relationship:	
Woodside et al. (1998)	Intention to purchase
Gremler and Brown (1997)	Loyalty
Shemwell et al. (1998)	Complaining behavior and loyalty
Oh (1999)	Repurchase intention and Word-of-mouth communication
Caruana et al. (2000)	Loyalty
Bou-Llusar et al. (2001)	Intention to purchase
Jeong et al. (2003)	Repurchase intention and word-of-mouth communication

Source: González et al. (2007)

2.3 MOBILE INTERNET SERVICE

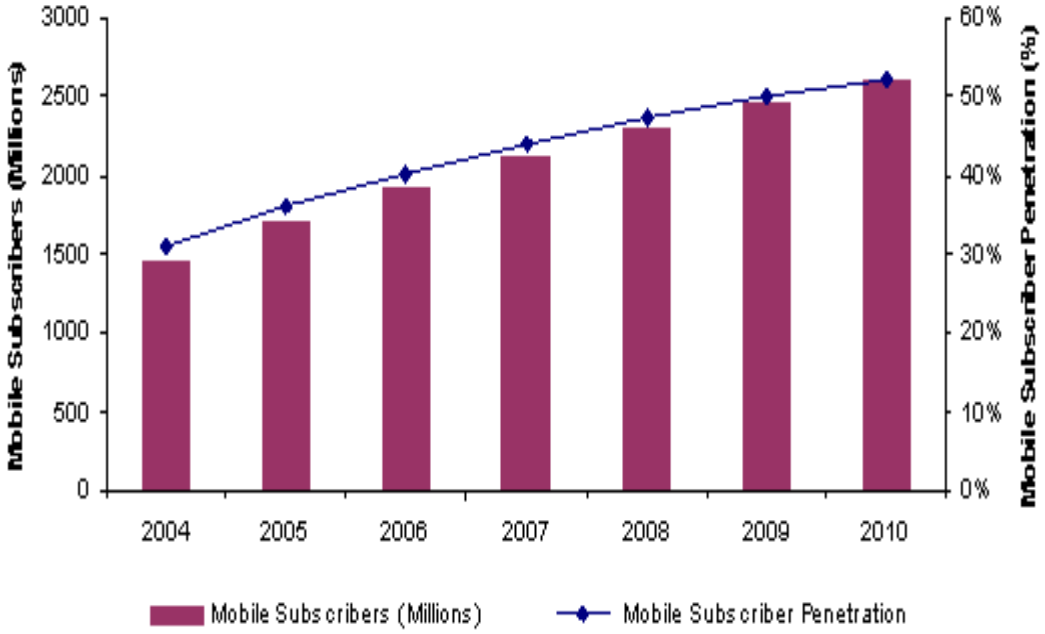
2.3.1 Mobile Internet Service Market

Mobile internet services can be defined as internet services accessed via handheld devices such as cell phones, Personal Digital Assistants (PDAs) and other portable gadgets (Francis, 1997). Mobile internet services can be used while in motion and to transfer information over a distance without the use of wires. Japan was the first country in the world to launch mobile Internet services when NTT DoCoMo started i-mode service on 22 February 2000 (Minges, 2001).

There are over 3.5 billion cell phone subscriptions worldwide (Gartner, 2007). The total value of mobile data services exceeds the value of paid services on the internet, $ 31 billion in 2006. Between 2005 and 2010, the total mobile subscriber base in North America, Europe and Asia Pacific, is expected to grow at a compound annual growth rate (CAGR) of 8.8 percent from 1.7 billion to 2.6 billion subscribers (see Figure 2.4). Annual subscriber growth in North America and Europe will decline gradually as markets become saturated, but the Asia Pacific region will see accelerated growth (Pioneer Consulting, 2008). The annual revenues generated by mobile search services are expected

to reach $4.8 billion by 2013 (Juniper Research, 2008).

Figure 2.4 Forecast Combined Mobile Subscriber Population in North America, Europe, and Asia Pacific (2004-2010)



Source: Pioneer Consulting (2008)

Based on Gartner (2007), the Asia-Pacific region boasts 1.4 billion cell phone subscriptions, more than any other region in the world, and the adoption rate there is 388 every minute. The adoption rates in Europe and North America are 95 and 46 every minute, respectively. According to the International Telecommunication Union (ITU, 2005),

the Republic of Korea has the highest percentage of users with 57.4 of the population using 3 generation mobile service, as seen in Table 2.11. According to Ericsson (2005), the penetration of 3G mobile in the Republic of Korea is expected to reach 65 percent by 2009.

Table 2.11 TOP 10 3 Generation Mobile Markets Worldwide (percent of the population using 3G services)

Country	Korea	Israel	Canada	Japan	USA	Italy	UK	China
%	57.4%	27.8%	23.3%	20.1%	16.7%	4.9%	4.8%	0.7%

Source: International Telecommunication Union (ITU, 2005)

Table 2.12 Market Share and Number of Mobile Phone Subscribers in the Republic of Korea

Mobile Service Provider	Market Share	Mobile Phone Subscribers
SKT	50.5%	21,714,246
KTF	31.6%	13,597,830
LGT	17.9%	7,685,486
Total	100%	42,997,562

Source: Korea IT International Cooperation Agency (KIICA, 2007)

Mobile phone subscribers were 42,997,562 out of a population of 48,606,787 in the Republic of Korea in 2007. This number is expected to rise approximately 45 million by 2010, assuming the population would reach 48,874,534 in 2010 (KSIS, 2008). The annual revenue from mobile service reached about $22.5 billion. Table 2.12 shows the market share and the number of mobile phone subscribers of three mobile phone providers in the republic of Korea (KIICA, 2007).

2.3.2 Types of Mobile Internet Service

Mobile internet services can be categorized into several types in terms of the research context. This study adopts Sørensen et al.'s (2002) functional diversity of mobile services as shown in Figure 2.5. The framework is based on Mathiassen and Sørensen's (2002) general task-based theory of mobile services which combines Mintzberg's (1992), Gutek's (1995), and Sørensen and Kakihara's (2002) studies. Mintzberg (1992) characterized organizational effectiveness in terms of task complexity and uncertainty, Gutek (1995) categorized services into encounter service and relationship service, and Sørensen and Kakihara (2002)

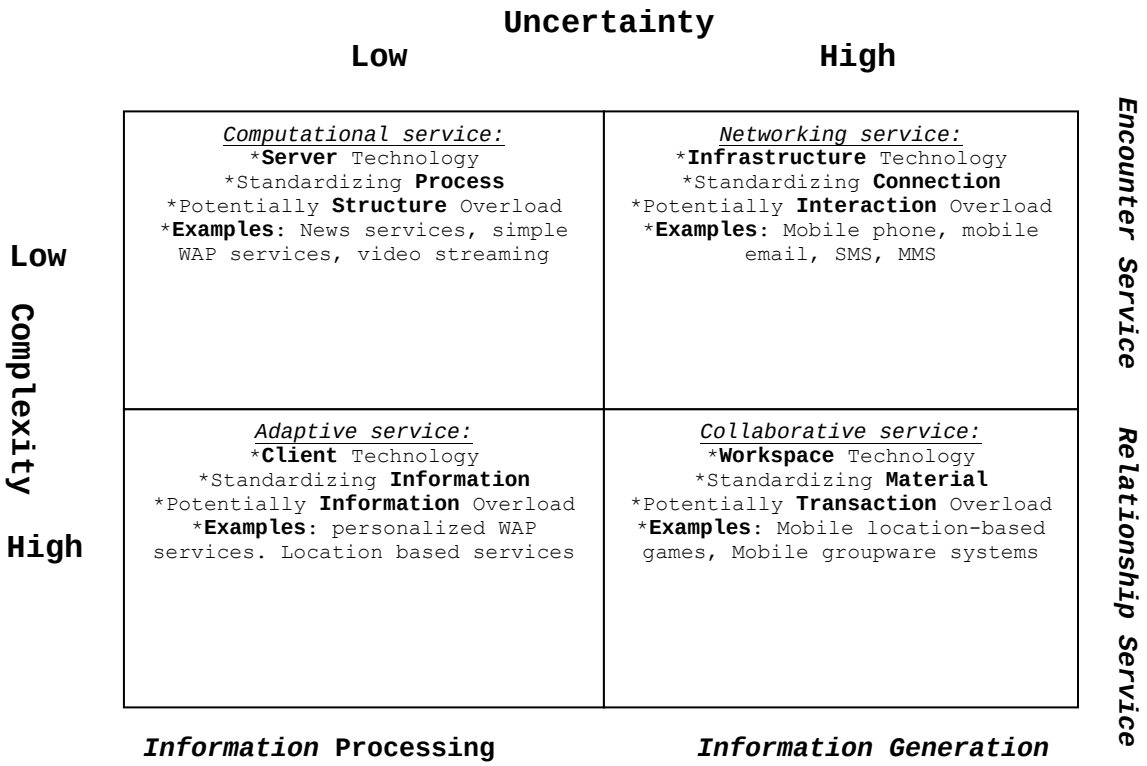
suggested technological diversity. Based on these studies, the framework analytically characterizes the four types of mobile services: computational, adaptive, networking, and collaborative.

Computational Mobile Services involve situations with a low degree of complexity and uncertainty. In this context, mobile services are based on the standardized process that accesses a centralized server and treat all requests equally. Basically, computational mobile services provide the process to ensure efficiency, speed, and uniformity of services and to restrict tasks with a high degree of complexity. A simple wireless application protocol (WAP) or i-mode site is the most typical example of a computational service. In addition, simple on-line games or video/audio streaming are characterized as computational services.

Adaptive Mobile Services are used in situations with a low degree of uncertainty but high degree of complexity. The services standardize information and are based on a combination of customer and server technology. Due to the high degree of task complexity, adaptive mobile services have an ongoing and constantly updated relationship between the client and the server in order to filter contents and service behavior. Adaptive and personalized WAP services

and location-based services are examples of adaptive mobile services.

Figure 2.5 Four Types of Mobile Service



Source: Sørensen et al. (2002)

Networking Mobile Services are characterized by situations where there is a low degree of complexity and a high degree of uncertainty. Due to the low degree of

complexity, the services generate new information through encounters. An emergent interaction through simple connections is required due to the high degree of uncertainty. To standardize the connection, networking mobile services are based on infrastructure technology. Some examples of this service are the mobile phone itself, mobile e-mail, Short Message Service (SMS), Multimedia Message Service (MMS), and instant messaging.

Collaborative Mobile Services are applied to tasks with a high level of complexity and uncertainty. To deal with these situations, collaborative mobile services provide emergent process mediating relationships and standardize material implemented through workspace technology. Mobile logistics and supply chain systems, mobile groupware systems, and mobile commerce are examples of collaborative mobile services. In these contexts, dispersed users in the workspace or "playspace" of mobile games interact with each other via individual mobile and wireless devices and share changed or updated information and transactions at the same time.

In terms of users' perceptions of telecommunications (presented in Table 2.13), music, picture downloads, video gaming, adult entertainment, gambling, and video/TV

services are the largest categories of mobile internet services (Yoon, 2006).

Table 2.13 Types of Mobile Internet Services

Service category	Examples
Information	SMS(Short Message Service), MMS (Multimedia Messaging Service), M-broadcasting, e-mail, stock quotes, traffic, weather forecasts, news, PIM
Communication	Chatting, VOD, video telecommunication,
Entertainment	VOD, AOD, online Game, fortunetelling, sports scores, content download
M-transaction	Mobile payment, stock transaction, ticketing, lottery purchase, bank account inquiries, m-shopping
Localization	Location tracking, digital logistics, taxi tracking

Source: Yoon (2006)

2.3.3 Unique Features of Mobile Internet Service

There are some specific attributes of mobile technology, such as ubiquity, reachability etc. that provide mobile internet services with an advantage over

wired internet services (Turban and King, 2002). For mobile technology, the primary characteristics are mobility and reachability (Kavassalis et al., 2003). Mobility means that users can use mobile internet services while in motion. Reachability implies that users can be reached anytime, anywhere and they can restrict it to particular persons, context, or time. Several researchers have characterized the attributes of mobile technology in the manner shown in Table 2.14.

Table 2.14 Summary of M-commerce Characteristics

Studies	Major characteristics
Müller-Veerse(2001)	Ubiquity, Security, Convenience, Localization, Instant connectivity, Personalization
Turban and King (2002)	Ubiquity, Convenience, Instant connectivity, Personalization, Localization
Stoica (2003)	Ubiquity, Convenience, Accessibility, Personalization, Localization
Stanoevska-Skabeva (2003)	Ubiquity, Immediacy, Identification, Localization
Zeng et al. (2003)	Currentness, Convenience, Accessibility, Personalization, Localization

Source: Ding et al. (2004)

2.4 SUMMARY OF LITERATURE REVIEW

In order to examine customers' evaluations of service quality, satisfaction, and continuance intention with regards to mobile internet services, this chapter presented literature on services and examined mobile internet services from a service perspective. Moreover, the status of SOM research over the last 20 years was reviewed to determine if mobile internet service could be studied in the context of SOM.

The SOM literature review presented justification for studying mobile internet service from the SOM research perspective by combining concepts from marketing and management information systems. The two important concepts adopted from the marketing and management information systems were service quality and customer satisfaction. The causal relationship between the two constructs was examined.

Finally, the literature related to mobile service was presented with a focus on the types and unique features of mobile internet service. The research design and framework developed in Chapter 3 were based on the underlying themes of mobile internet services presented here.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

This chapter presents the research design and methodology. It consists of three sections: 1) research variables, 2) research hypotheses, and 3) research methodology. The first section addresses ten variables while building the research model. The second section presents research hypotheses based on these variables. The third section presents the research methodology including measurement, data collection, and statistical analysis.

3.1 RESEARCH VARIABLES

3.1.1 Attributes of Mobile Internet Service

Attributes of information system (IS) have been the core factors in the literature on IS service quality and customer satisfaction (Delone and McLean, 1992; Sellitto et al., 2007; Wixom and Todd, 2005). Wixom and Todd (2005) specified key antecedents to IS service quality. According to their study, reliability, flexibility, integration, accessibility, and timeliness are the main dimensions for system quality. Completeness, accuracy, format, and

currency are important dimensions for information quality.

Wixom and Todd (2005) argue that these attributes change or are contingent on a specific IS setting and context. Thus, this study adopts the six factors suggested by Müller-Veerse (2001) as mobile internet services' attributes. These factors are ubiquity, localization, personalization, reachability, convenience, and instant connectivity.

Specifically, 'ubiquity' refers to the ability to obtain information and perform transaction from virtually anywhere and at anytime. 'Localization' refers to the ability to identity the user's location (Clarke, 2002). 'Personalization' refers to the ability to store and obtain personalized or customized information. 'Reachability' represents the degree to which users can obtain mobile services anytime and anywhere and how it can be restricted to people and context. ***'Convenience'*** represents mobile services that are always at hand with no cumbersome processes to use in the mobile environments. ***'Instant connectivity'*** represents the ability of the mobile technology user to connect easily and instantly (Benou and Bitos, 2008).

3.1.2 Mobile Internet Service Quality

Quality can be discussed from multiple perspectives (Nelson et al., 2005). Quality in the mobile technology context should be viewed as information and system quality due to the characteristics of mobile internet service (Chae et al., 2005; Lee and Benbasat, 2003). In general, the definition of information quality has been developed from two dominant viewpoints: an intrinsic view and a contextual view.

The intrinsic view measures differences between the information values designed and the information values actually represented in the real word (Lee et al., 2002; Orr, 1998) and the degree to which information data values are accurate, current, and consistent (Levitin and Redman, 1998). The contextual view assesses the degree to which information is useful in completing a particular task (Fisher and Kingma, 2001; Lee, 2003; Pipino et al., 2002; Strong et al., 1997; Tayi and Ballou, 1998; Wang, 1998; Wang and Strong, 1996).

System quality is an assessment of the information processing system itself and focuses on the outcome of the interaction between users and systems (Cheung and Lee, 2005). In other words, system quality is based on user

perceptions of interaction with the system over time. There is also a relationship between system quality and service quality. Bailey and Pearson (1983) identified that system quality dimensions are related to IS services and user satisfaction. Thus, a mobile internet system associated with a high level of IT service may be considered to be of high service quality.

3.1.3 Mobile Internet Service Risk

Much of previous research on perceived risk has been studied in the context of tangible goods because identifying the risk of goods is well established. Studies on service risk may be less prevalent due to the difficulties in evaluating intangible service risk (Crosby et al., 1990; Keh and Sun, 2008; Laroche et al., 2005; Murray and Schlacter, 1990). In regard to services, risks cannot be measured objectively, but will be subjectively perceived by customers.

In previous academic research, perceived risk has been divided into pre-adoption risk and post-adoption risk. Post-adoption risk is the probability distribution of uncertain outcomes after adoption and pre-adoption risk is

the probability distribution of uncertain outcomes prior to adoption (Grewal et al., 2007). In this study, mobile internet service risk is conceptualized as post-adoption risk perceived by customers who are using mobile internet services. During usage of mobile internet service, customers perceive particular risks such as loss of information or wasting money. This situation is made even more complicated because it may not be possible to identify where the responsibility for a failure or loss lies when important personal information is lost or the failure of transaction, (Bahli and Benslimane, 2004).

Newell and Newell-Lemon (2001) argue that customers' risk perceptions affect the diffusion of mobile transaction services. Customers are very sensitive with regard to services in relation to money and information security (Hourahine and Howard, 2004; Kleijnen et al., 2007). Thus, mobile internet service risk can be defined as the customers' post-adoption perceptions about the probability distribution of uncertain outcomes (i.e., loss of money or information) (Grewal, 2007; Stone and Gronhaug, 1993).

3.1.4 Mobile Internet Service Satisfaction

Satisfaction is the positive affection experienced by customers (Rusbult et al., 1998). It is influenced by the degree to which customer' most important needs are fulfilled. According to theory of disconfirmation of expectations (Oliver, 1980), satisfaction is determined when customers compare their perception of the actual service' or product' performance to expectations. This study defines mobile internet service satisfaction as customers' overall evaluation toward mobile internet service. Customer satisfaction is an important variable in mobile internet service from both a theoretical and practical perspective (Lee et al., 2007).

3.1.5 Continuance Intention

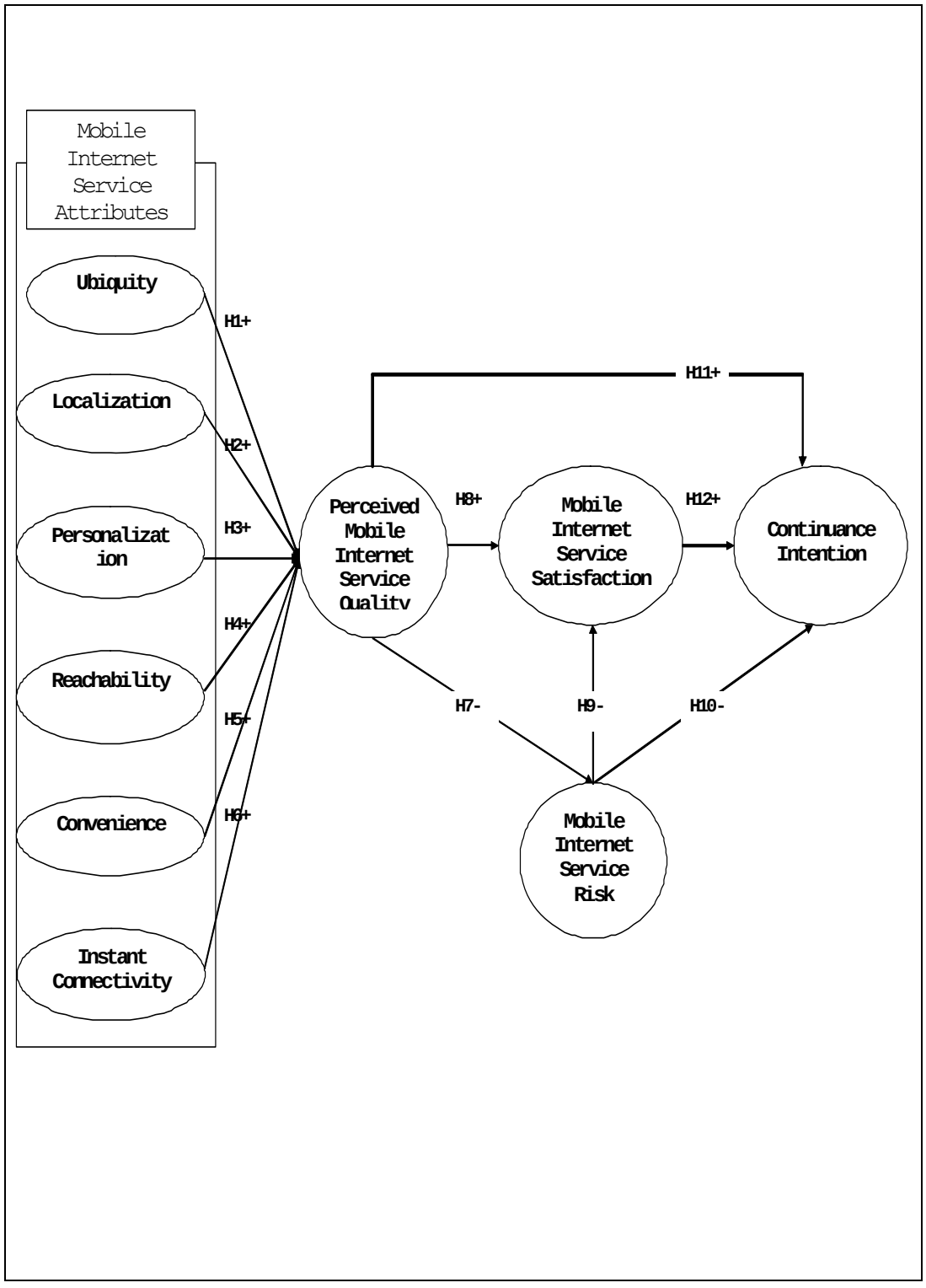
One of outcomes in the research model is continuance intention. According to Ajzen (1991, p.1981), intentions "are assumed to capture the motivational factors that influence a behavior; they are indications how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior." Continuance intention has been used as a key dependent

variable in post-adoption behavior (Bhattacherjee, 2001; Lin et al., 2005). Continuance intention is also a crucial variable for mobile internet service providers in seeking to retain customers or gain new ones (Lin and Wang, 2006). Lee et al. (2007) defined continuance intention as a user's intention to continue using mobile internet service. Thus, continuance intention in this study is defined as the customer's intention to continue using the mobile internet service.

3.2 HYPOTHESES DEVELOPMENT

Figure 3.1 presents the research model of this study. The hypotheses are developed based on the literature review and research framework.

Figure 3.1 Research Model



3.2.1 Hypotheses regarding Attributes of Mobile Internet Service and Mobile Internet Service Quality

Wixom and Todd (2005) showed empirically that IS attributes influence IS quality. Following their work, this study develops a set of hypotheses regarding mobile internet service attributes and mobile internet service quality. In other words, the greater the value of mobile internet service attributes, the more likely the mobile internet service will be perceived as high quality.There are six mobile internet service attributes: ubiquity, localization, personalization, reachability, convenience, and instant connectivity. According to six attributes of mobile internet service, six hypotheses are proposed as follows.

H1: Ubiquity of mobile internet service will have a positive effect on service quality.

H2: Localization of mobile internet service will have a positive effect on service quality.

H3: Personalization of mobile internet service will have a

positive effect on service quality.

H4: Reachability of mobile internet service will have a positive effect on service quality.

H5: Convenience of mobile internet service will have a positive effect on service quality.

H6: Instant connectivity of mobile internet service will have a positive effect on service quality.

3.2.2 Hypothesis regarding Mobile Internet Service Quality and Mobile Internet Service Risk

Risks such as the loss of information and money are inherent in using mobile internet service. Risks perceived by customers can be defined as "the extent to which one believes uncertainty exists about whether desirable outcomes will occur" (Nicolaou and McKnight, 2006). Many studies found that high quality service reduces customers' perceptions of risks (Chen and Dubinsky, 2003; Clow et al., 1996; Garretson and Clow, 1999; Grewal et al., 2007; Sweeney et al., 1999).

Nicolaou and McKnight (2006) empirically proved the negative impact present in the relationship between quality and risk. Chen and Dubinsky (2003) examined how service quality negatively influences the perceived risk in an e-commerce environment. Snoj et al. (2004) found that the perceived quality of a mobile phone can have a negative impact on the perceived risks. In the mobile internet service context, as customers' perceptions of mobile internet service quality become more favorable, customers will perceive less mobile internet risk. Based on the previous studies, the seventh hypothesis is proposed:

H7: Mobile internet service quality will have a negative effect on service risk.

3.2.3 Hypothesis regarding Mobile Internet Service Quality and Mobile Internet Service Satisfaction

The relationship between quality and satisfaction has been studied for decades by many researchers due to confusion regarding the causal relationship between the two constructs (Yu et al., 2005). Some researchers (Anderson

and Sullivan, 1993; Raval and Grönroos, 1996; Delone and McLean, 2003; De Ruyter et al., 1997; Tam, 2004) argue that quality is an antecedent of satisfaction, while others (Parasuraman et al., 1988; Bolton and Drew, 1991; Patterson and Johnson, 1993) contend that quality is a consequence of satisfaction.

According to Teas (1993), the argument among researchers results from the lack of consensus on the definition and operationalizations of the two constructs. In addition, they have been viewed from different perspectives, the transactional perspective and the global perspective. In the transactional perspective, the overall quality is influenced by the customer's cumulative transaction-specific satisfaction. In this study, mobile internet service quality is considered from the transactional perspective.

In addition to this viewpoint, Wixom and Todd (2005) argued that quality as "object-based beliefs" influences satisfaction as "object-based attitudes." Delone and McLean (2003) also found that IS quality is a key attribute associated with user satisfaction. Based on this, it is hypothesized that if mobile internet service quality is high, mobile internet service satisfaction perceived by

customers will increase. Based on this discussion, the following hypothesis is presented:

H8: Mobile internet service quality will have a positive effect on service satisfaction.

3.2.4 Hypothesis regarding Mobile Internet Service Risk and Mobile Internet Service Satisfaction

The relationship between perceived risk and customer satisfaction has been examined in several studies. Ho et al. (1997) found that perceived risk is negatively related to customer satisfaction in the over-the-counter (OTC) drug context. Rust et al. (1999) suggested that uncertainty with regard to risk affects post-purchase evaluations. Sweeney et al. (1999) argued that the performance risk, financial risk, and time risk factors are most associated with post-purchase evaluation. Johnson et al. (2006) showed an empirical evidence that perceived risk has a negative effect on three satisfaction ratings: overall satisfaction, attribute satisfaction, and relative satisfaction.

Simcock et al. (2006) found that four factors of

perceived risk are related to satisfaction in customer decision making. In the e-commerce context, insufficient security increases the customer's perception of risk, resulting in a decrease in the level of satisfaction for online shopping (Hsu and Chiu, 2004). Due to this, greater perceived risk of mobile internet service is associated with lower perceptions of mobile internet service satisfaction. Based on the previous studies, the ninth hypothesis is:

H9: Mobile internet service risk will have a negative effect on service satisfaction.

3.2.5 Hypothesis regarding Mobile Internet Service Risk and Mobile Internet Continuance Intention

The relationship between perceived risk and behavior intentions has attracted the attention of researchers in a customer behavior context (Grewal et al., 2007). According to risk theory, perceived risk will negatively influence the willingness to perform risky behaviors (Keil et al., 2000; Sitkin and Pablo, 1992). Some studies (Chen and He,

2003; Grewal et al., 2007; Jarvenpaa et al., 2000; Park et al., 2005; Pavlou, 2003) found that perceived risk has a negative impact on behavior intentions. For example, Chen and He (2003) empirically supported a negative relationship between perceived risk and customers' behavior intentions in an online retail context.

Another study on purchase intention in internet shopping was conducted by Vijayasarathy and Jones (2000). They found that perceived risk was an important factor in online shopping intentions. Based on these studies, customers who perceive low mobile internet service risk are also likely to use mobile internet service continually and engage in positive word of mouth (Voss et al., 1998). Thus, the tenth hypothesis is:

H10: Mobile internet service risk will have a negative effect on continuance intention.

3.2.6 Hypothesis regarding Mobile Internet Service Quality and Continuance Intention

Behavior intentions can be purchase intention, repurchase

intention, usage intention, or continuance intention. Many studies found service quality positively influences behavior intentions (Anderson and Sullivan, 1993; Bitner, 1990; Boulding et al., 1993; Bou-Llusar, 2001; Garretson and Clow, 1999; Grewal et al., 1998; Grewal et al., 2007; Parasuraman et al., 1991; Woodside et al., 1989). For example, purchase intentions are positively affected by the service quality. As customers' perceptions of quality increase, their intention to purchase services from providers increases as well (Kurtz and Clow, 1992-93).

Considering perceived service quality as an attitude (Carman, 1990; Parasuraman et al., 1985; Parasuraman et al., 1988) justifies the relationship between perceived service quality and behavior intentions. However, there is a contradiction in the results of empirical studies. For example, Boulding et al. (1993) suggested that service quality is an antecedent of purchase intentions and there is a direct effect between these two constructs. In contrast, Cronin and Taylor (1992) found that the direct effect between perceived service quality and behavior intentions is not significant, although there is an indirect effect between the two constructs by way of satisfaction. It is assumed that the interaction between

perceived service quality and satisfaction has an effect on behavior intentions (Taylor and Baker, 1994). Based on the previous studies, the eleventh hypothesis is:

H11: Mobile internet service quality will have a positive effect on continuance intention.

3.2.7 Hypothesis regarding Mobile Internet Service Satisfaction and Continuance Intention

Customer satisfaction has received attention in the customer behavior literature due to its potential impact on behavior intentions (Cronin et al., 2000; Martinez and Martinez, 2007; Nguyen and LeBlanc, 1998). Satisfied customers have higher intentions to use or purchase than unsatisfied customers (Bolton and Lemon, 1999; Ram and Jung, 1991; Zeithaml et al., 1996). Numerous studies have empirically proven the relationship between customer satisfaction and behavior intentions (Bloemer et al., 1999; Caruana, 2002; Croin et al., 2000; McDougall and Levesque, 2000; Murray et al., 2002; Oliver, 1999; Szymanski and Henard, 2001; Tam, 2004; Yang and Peterson, 2004; Zeithaml

et al., 1996). These studies share a common thread with Wixom and Todd's attitude-behavior argument (2005). Based on the preceding, the twelfth hypothesis is:

H12: Mobile internet service satisfaction will have a positive effect on continuance intention.

3.3 RESEARCH METHODOLOGY

3.3.1 Measurement Development

A set of variables was derived from previous studies for use in this research. Based on the literature review, qualitative interviews were conducted to identify potential variables. Twenty users of mobile internet service were selected for qualitative interviews. Based on the results from both interviews and the literature review, ten variables were identified including the six aforementioned mobile internet service attributes (ubiquity, localization, personalization, reachability, convenience and instant connectivity), mobile internet service risk, mobile internet service quality, mobile internet service

satisfaction, and continuance intention.

In order to collect data, a survey instrument was developed based on previous studies that had examined these 10 variables in regards to mobile internet service. The six mobile internet service attributes were examined in this research model by drawing on measures in Müller-Veerse's study (2001). The items for mobile internet service risk were adapted from the research of Pavlou and Chellappa (2001), Kleijen et al., (2007), and Wu and Wang (2005). The measure of mobile internet service quality was modified based on various studies (Chae et al., 2002; Cheung and Lee, 2005; DeLone and McLean, 2003; Lee and Benbasat, 2003; Wixom and Todd, 2005). The constructs of satisfaction and continuance intention were adopted from Wixom and Todd (2005) and Lee et al. (2007), respectively.

To finalize the survey questions, a pilot test was conducted. The questionnaire was distributed to 30 undergraduate and 20 graduate students who use mobile internet service and attend Kyonggi University in the Republic of Korea. Based on the results of the pilot test, survey questions were refined and issues were addressed before finalizing the questionnaire. The final survey questionnaire is presented in Table 3.1.

The survey questionnaire was divided into two sections. The first section included demographic information such as gender, age, education, usage of mobile internet service and so on. The second section included items related to the respondent's perception of the ten variables. In the second section, a 7-point Likert-type scale was utilized: 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree, and 7 = strongly agree).

Table 3.1 Survey Questionnaire of Variables

Factor	Questions
Ubiquity	**Detail Items** UBI1: Mobile internet service provides me information anytime. UBI2: Mobile internet service provides me information anywhere. UBI3: Mobile internet service provides me real time information.
	References (Turban and King, 2002; Stoica, 2003; Müller-Veerse, 2001; Stanoevska-Slabeva, 2003; Zeng et al., 2003)
Localization	**Detail Items** LOC1: Mobile internet service provides me information about my location. LOC2: Mobile internet service provides me location information about other persons I set. LOC3: Overall, mobile internet service is useful for identifying user's location.
	References (Turban and King, 2002; Stoica, 2003; Müller-Veerse, 2001; Stanoevska-Slabeva, 2003; Zeng et al., 2003)

Personalization	**Detail Items** PER1: Mobile internet service stores my personal information automatically. PER2: Mobile internet service provides me personalized information. PER3: I can personalize mobile internet service based on my preferences.
	References (Turban and King, 2002; Stoica, 2003; Müller-Veerse, 2001; Zeng et al., 2003)
Reachability	**Detail Items** REC1: The connection of mobile internet service is available anytime. PEC2: The connection of mobile internet service is available anywhere. PEC3: The connection of mobile internet service is not disconnected in use.
	References (Müller-Veerse, 2001)
Convenience	**Detail Items** CON1: I can access mobile internet systems easily. CON2: I can use mobile internet service while in motion. CON3: There are few procedures to access mobile internet service.
	References (Turban and King, 2002; Stoica, 2003; Müller-Veerse, 2001; Stanoevska-Slabeva, 2003; Zeng et al., 2003)
Instant Connectivity	**Detail Items** ISC1: The connectivity of mobile internet service is excellent. ISC2: The speed of download of mobile internet service is fast. ISC3: I can access mobile internet systems instantly.
	References (Turban and King, 2002; Stoica, 2003; Müller-Veerse, 2001; Stanoevska-Slabeva, 2003; Zeng et al., 2003)
Mobile Internet Service Quality	**Detail Items** MIQ1: The information quality of the mobile internet service is excellent. MIQ2: Overall, the mobile internet service provides me with high-quality information. MIQ3: In general, I would give the information from the mobile internet service high marks. MIQ4: In terms of system quality of the mobile internet service, I would rate it highly. MIQ5: Overall, the mobile internet service provides me with high-quality system. MIQ6: In general, I would give the system from the mobile internet service high marks.
	References (Bailey and Pearson, 1983, Delone and McLean, 1992, Susarla et al., 2003, Grigoroudis and Siskos, 2004)

Mobile Internet Service Risk	**Detail Items** MSR1: I am worried about my private information while using mobile internet service. MSR2: I am worried about my transaction while using mobile internet service.
	References (Pavlou and Chellappa, 2001; Wu and Wang, 2005)
Mobile Internet Service Satisfaction	**Detail Items** SAT1: Overall, I am very satisfied with the mobile internet service. SAT2: In general, the mobile internet service is very satisfying.
	References (Lee et al., 2007; Rusbullt et al., 1998, Wixom and Todd, 2005)
Continuance Intention	**Detail Items** COI1: I intend to continue using the mobile internet service in the future. COI2: I would not stop using the mobile internet service. COI3: I plan to keep using the mobile internet service frequently.
	References (Bhattacherjee, 2001; Lin et al., 2005; Lin and Wang, 2006, Lee et al., 2007)

3.3.2 Data Collection and Sample Description

The unit of analysis for this study is individual users of a mobile internet service. Universities in the Republic of Korea were chosen for the sample. Universities in the Republic of Korea were chosen because the Republic of Korea has the highest national percentage of mobile internet service usage in the world (57.4% of the population) (ITU, 2005) and the majority of wireless internet users in the Republic of Korea are in their 20s

(NIDA, 2008).

Five universities in the Republic of Korea were randomly contacted by e-mail. In order to recruit participants from universities in the Republic of Korea, approval from each university was required as per Institutional Review Board (IRB) policy. Kyonggie University granted permission for the investigator to collect data in its university.

Once the informed consent form was approved by IRB, a total of 400 questionnaires were randomly distributed to individuals attending Kyonggie University in the Republic of Korea from June 5th, 2008 to June 19th, 2008. The respondents included undergraduate students, graduate students, and the faculty.

367 out of the 400 questionnaires were returned and 316 questionnaires were usable. Summary statistics for the respondents are shown in Table 3.2. The majority of respondents were female (66 percent), while 34 percent were male. The largest percent of respondents were in their 20s (94 percent), while the 30s, 40s, and 50s were 11, 5, and 3 percent, respectively. In terms of the level of education, college students were the largest respondents (89 percent). High school degree, college degree, graduate students, and

graduate degree were 1.9 percent, 1.2 percent, 5.7 percent, and 2.2 percent, respectively.

Table 3.2 Description of Samples

Demographic information	Category	Frequency (N=316)	Percentage (%)
Gender	Male	106	34.0
	Female	210	66.0
Age	20s	297	94.0
	30s	11	3.5
	40s	5	1.6
	50s and over	3	0.9
Education	College students	288	90.9
	College degree	3	1.2
	Graduate students	18	5.7
	Graduate degree	7	2.2
Occupation	Students	291	92.1
	White-collars	8	2.5
	Self-employed	8	2.5
	Professionals	1	1.7
	Sales	1	0.3
	Educators	5	0.3
	Others	2	0.6
Usage duration of mobile internet service	Less than 1 year	65	20.4
	More than 1	29	9.4
	More than 2	39	12.2
	More than 3	43	13.6
	More than 4	29	9.4
	More than 5	111	35.0
Usage time per access (minutes)	Less than 5	194	61.4
	More than 5- less than 10	82	25.9
	More than 10- less than 20	27	8.5
	More than 20- less than 40	7	2.2
	More than 40- less than 60	2	0.7
	More than 60	4	1.3
Usage expenses ($)per month	Less than 5	173	54.7
	More than 5- less than 10	69	21.8
	More than 10- less than 15	33	10.4
	More than 15- less than 20	16	5.2
	More than 20	25	7.9
Reasons for using mobile internet service	Ubiquity	107	33.9
	Subjective norm	18	5.7
	For business	15	4.7
	Curiosity about new service	52	16.5
	Promotion/gift	63	19.9
	Others	61	19.3
Types of mobile internet service usage	Entertainments	264	83.5
	Information search	39	12.3
	Transaction	13	4.2

Regarding occupation, the largest percentage of respondents were college students (92.1 percent), followed by white-collar workers (2.5 percent), self-employed (2.5 percent), sales (0.3 percent), education (0.3 percent), professionals (1.7 percent), and others (0.6 percent).A majority of respondents access mobile internet service less than 10 minutes per use (87.3 percent). Those using it 10-20 minutes were the next largest group (8.5 percent), followed by users for 20-40 minutes (2.2 percent), 40-60 minutes (0.7 percent), and more than 60 minutes (1.3 percent).

With regard to usage expenses, 54.7 percent spent less than $5, 21.8 percent spent $5-10, 10.4 percent spent $10-15, 5.2 percent spent $15-20, and 7.9 percent spent more than $20. The main reasons for using mobile internet service were 'availability of mobile internet service anytime and anywhere (ubiquity)' (33.9 percent), 'influences of family or friends' (subjective norm)' (5.7), curiosity about mobile internet service (16.5 percent), promotion/gift (19.9 percent), and others (19.9 percent). Relatively few respondents used mobile internet service for business applications (4.7 percent) as moist in the sample were college students.

In terms of the types of mobile internet services used by respondents, entertainment services were used by the majority of respondents (83.5 percent), followed by information search (12.3 percent), and mobile transactions (4.2 percent). Table 3.3 shows the frequencies for specific types of mobile internet service. In the entertainment category, MMS/e-mail made up the largest percentage (28.1 percent) of responses.

Table 3.3 Frequency of Mobile Internet Service

Category	Type of mobile internet service	Frequency (Multiple answer questions)	Percentage (%)
Entertainment	MMS/e-mail	202	28.1
	Decorating phone	131	18.2
	Downloading music/movie	76	10.6
	Mobile game	69	9.6
	Downloading ringtones/character	27	3.8
	Chatting/blogs	19	2.6
	Sports	8	1.1
Information Search	News/weather	59	8.2
	Find friends/Traffic information	28	3.9
	Information searching	25	3.5
	Stock trading information	8	1.1
Transaction	Movie/sports ticket purchase	31	4.3
	Mobile banking	26	3.6
	Mobile shopping	6	0.8
	Stock purchase	3	0.4

The next most popular uses were decorating phone (18.2 percent) and downloading music/movie (10.6 percent). The remaining services were mobile games (9.6 percent), downloading ringtones/character pictures (3.8 percent), watching sports (2.6 percent), and chatting/blogs (1.1 percent). In the information search category, searching for news/weather, finding friends/traffic information, and searching for general information made up 8.2 percent, 3.9 percent, and 3.5 percent, respectively. Stock trading information search had the smallest response (1.1 percent).

3.3.3 Statistical Tools

Various statistical methods were used to analyze data. First, SPSS 15.0 was used to obtain Cronbach's α to check the reliability of each variable. The purpose of the reliability test is to identify potential problems with research design in the early stage and to see if the various items measure the intended construct. Second, confirmatory factor analysis was used to check for validity. Finally, structural equation modeling (SEM) using Mplus 3.0 was employed to estimate the causal relationships among the variables and test the hypotheses presented.

SEM is a statistical tool for developing multiple regression functions in a more complex way. There are many advantages of SEM when compared to multiple regression. Some of these advantages include: 1) use of confirmatory factor analysis can reduce measurement error, 2) tests of models with multiple dependent variables can be performed, 3) models with mediating variables can be tested rather than being restricted to an additive model, and 4) model error terms can be measured. Moreover, SEM compares alternative models to evaluate relative model fit where regression is highly susceptible to error in interpretation due to misspecification (Garson, 2008). SEM incorporates factor analysis and path analysis. However, SEM focuses on confirmatory rather than exploratory analysis. Thus, SEM is more appropriate for theory testing rather than for theory development (Wikipedia, 2008).

3.4 SUMMARY OF RESEARCH DESIGN AND METHODOLOGY

This chapter developed a research model comprised of ten variables derived from a review of the literature. These ten variables included six mobile internet service attributes (ubiquity, localization, personalization,

reachability, convenience, and instant connectivity), mobile internet service quality, mobile internet service risk, mobile internet service satisfaction, and continuance intention. Based on these variables, twelve hypotheses were presented.

To test the twelve hypotheses, a survey instrument was developed and a pilot test was conducted to improve the survey questions. After refining the survey questions, 400 questionnaires were randomly distributed at Kyonggi University in the Republic of Korea. 316 useable responses were obtained and analyzed for this study. Demographic information regarding the sample is presented. Finally, statistical tools such as SPSS 15.0 (for reliability and validity tests) and Mplus 3.0 (for confirmatory factory analysis and path analysis) were introduced.

CHAPTER 4: RESULT AND DISCUSSION

4.1 ANALYSIS OF RELIABILITY AND VALIDITY

This study used a survey method to gather data for analysis. Due to this, two types of errors related to survey measurement need to be examined. One is random error and the other is systemic error. Random errors are statistical fluctuations in the measured data due to the accuracy limitations of the measurement instrument. Systemic errors are reproducible inaccuracies due to any problems that occur consistently in the same direction (Rosnow and Rosenthal, 2008). In general, reliability and validity analyses are used to evaluate these two errors.

Reliability is the consistency of a set of measurements. Reliability is the degree to which a variable or concept is measured consistently. Validity is the degree to which the intended variables are actually measured. Reliability and validity were examined by utilizing Cronbach's α and factor analysis. Table 4.1 shows the results of the reliability analysis.

Table 4.1 Results of Reliability

Factor Name	# of Questions	Item	Cronbach's α
Ubiquity	3	UBI 1 UBI 2 UBI 3	0.930
Localization	3	LOC 1 LOC 2 LOC 3	0.867
Personalization	3	PER 1 PER 2 PER 3	0.661
Reachability	3	REA 1 REA 2 REA 3	0.869
Convenience	3	CON 1 CON 2 CON 3	0.892
Instant Connectivity	3	ISC 1 ISC 2 ISC 3	0.854
Mobile Internet Service Risk	2	RIS 1 RIS 2	0.925
Mobile Internet Service Quality	6	MSQ 1 MSQ 2 MSQ 3 MSQ 4 MSQ 5 MSQ 6	0.887
Mobile Internet Service Satisfaction	2	SAT 1 SAT 2	0.895
Continuance Intention	3	CNI 1 CNI 2 CNI 3	0.934

The value of Cronbach's α for each construct varies from .934 to .661. The desired lower limit for Cronbach's α is .7 (Nunnally and Berbstein, 1994), but a value of .6 has been noted as another accepted value (Robinson et al., 1991). Thus, the internal consistency of the measurement scales is verified. In other words, the various questions for each construct measured the same construct.

Validity refers to the degree to which measurements are actually measuring the variables they are purported to measure (Gravetter and Wallnau, 2007). There are several types of internal validity such as face validity, criterion validity, content validity, and construct validity. Construct validity is an essential characteristic of validity and it links theory and psychometric practices (Kerlinger and Lee, 2000; Paulmdeutsch.com 2008; Rosnow and Rosenthal, 2008).

To measure construct validity, factor analysis was employed. In general, there are two types of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA is used to explore data to determine the number of, or the nature of, factors that explain the covariance between variables. If there is no sufficient evidence to form hypotheses based on the

number of factors underlying the data, EFA is employed. In brief, EFA is a theory-generating method (Stevens, 2002).

EFA faces several criticisms. First, EFA may not consider the relationships among variables in a given data set. The common EFA is a linear model which is appropriate only for the specific data set. Many causal relationships are nonlinear. Thus, EFA can cause the results to be misleading in nonlinear relationships. Second, EFA depends on specific mechanics of extraction and rotation procedures, which do not provide any way of indicating when something is wrong with research assumptions (Mulaik, 1987). Third, the interpretation of the results in EFA is frequently complicated, especially when researchers do not have enough research knowledge (Nunnally and Berbstein, 1994). In sum, EFA does not provide general optimal solutions for the factors or unique interpretations of factors. In this case, it is hard to justify the results (Mulaik, 1972).

Unlike EFA, CFA is a theory-testing model. CFA identifies the number of factors and specifics about which variables are correlated with which factors. The decision as to which method to use in an analysis is made depending upon the purpose of the data analysis (Hair et al., 2005; Stevens, 2002). If the hypotheses are based on a strong

theoretical and/or empirical foundation, CFA is a useful method for construct validity test (Kline, 2004). Thus, CFA was applied in this study because the measurement scale was developed based on the theoretical background and measurement items that were examined empirically in the previous studies.

Tables 4.2, 4.3, and 4.4 show the values of covariance of 31 variables in this study. The reason the covariance matrix should be presented in the research is to allows other researchers to re-run the analyses and to use the data in their own analyses. In other words, other researchers can reproduce all of the analysis with Mplus and other statistical programs using just the covariance matrix (Amsreview, 2007). Unlike standardized correlation, unstandardized covariance has no upper or lower limits.

With covariance values, the standardized factor loading Lambda (λ) and t-values ($p<0.05$) were generated. If the value of Lambda (λ) is more than 0.30, an observed variable is significantly loading on an unobserved variable (Carroll and Clark, 2006). If the t-value is greater than 1.965, it is significant at the $p=0.05$ level. If the t-value is greater than 2.576, it is significant at the $p=0.01$ level. In other words, higher t-values represent

lower p-values and more confidence in the results.

Table 4.2 Covariance Matrix 1

	UBB1	UBB2	UBB3	LOC1	LOC2	LOC3	PER1	PER2	PER3	REA1
UBB1	1.930									
UBB2	1.605	1,872								
UBB3	1.582	1.602	2.072							
LOC1	0.426	0.441	0.482	1890						
LOC2	0.346	0.405	0.456	1.595	2.192					
LOC3	0.272	0.308	0.367	2.43	1.371	2.060				
PER1	0.240	0.111	0.259	0.405	0.235	0.346	2.489			
PER2	0.375	0.344	9.451	0.380	0.393	0.404	0.695	1.828		
PER3	0.484	0.487	0.577	0.511	0.547	0.652	0.594	1.109	1.772	
REA1	0.363	0.513	0.515	0.329	0.485	0.347	0.289	0.379	0.452	2.060
REA2	0.249	0.482	0.471	0.335	0.377	0.268	0.157	0.305	0.420	1.727
REA3	0.228	0.362	0.302	0.202	0.251	0.226	0.183	0019	0.229	1.215
CON1	0.337	0.450	0.437	0.363	0.452	0.275	0.258	0.364	0.281	1.080
CON2	0.367	0.424	0.418	0.409	0.442	0.258	0.286	0.350	0.310	1.025
CON3	0.333	0.412	0.382	0.334	0.410	0.353	0.312	0.322	0.326	0.864
ISC1	0.282	0.272	0.286	0.280	0.315	0.238	0.215	0.182	0.245	0.689
ISC2	0.292	0.334	0.380	0.269	0.314	0.182	0.224	0.158	0.259	0.519
ISC3	0.247	0.247	0.262	0.050	0.084	-0.051	0.156	-0.026	0.214	0.437
MSQ1	0.586	0.620	0.587	0.356	0.376	0.309	0.209	0.249	0.438	0.475
MSQ2	0.630	0.591	0.537	0.278	0.311	0.238	0.067	0.198	0.408	0.535
MSQ3	0.619	0.650	0.558	0.237	0.279	0.192	0.116	0.239	0.455	0.706
MSQ4	0.341	0.406	0.367	0.281	0.292	0.155	-0.005	0.161	0.281	0.546
MSQ5	0.549	0.518	0.483	0.190	0.188	0.121	0.015	0.196	0.310	0.577
MSQ6	0.582	0.573	0.507	0.291	0.299	0.213	0.070	0.225	0.356	0.646
SAT1	0.532	0.571	0.582	0.204	0.189	0.217	-0.047	0.044	0.265	0.493
SAT2	0.639	0.628	0.657	0.229	0.238	0.220	0.031	0.209	0.313	0.591
CNI1	0.597	0.576	0.609	0.187	0.261	0.066	0.041	0.297	0.509	0.551
CNI2	0.538	0.529	0.483	0.164	0.190	0.181	0.006	0.156	0.421	0.419
CNI3	0.438	0.454	0.421	0.148	0.294	0.194	0.129	0.026	0.319	0.442
RIS1	-0.013	0.011	0.016	0.176	0.140	0.155	0.328	0.106	0.3133	-0.249
RIS2	0.020	0.013	0.090	0.160	0.107	0.163	0.273	0.147	0.140	-0.184

Table 4.3 Covariance Matrix 2

	REA2	REA3	CON1	CON2	CON3	ISC1	ISC2	ISC3	MSQ1	MSQ2
REA2	2.070									
REA3	1.230	1.967								
CON1	0.999	0.926	2.016							
CON2	0.978	0.915	1.536	1.775						
CON3	0.841	0.683	1.401	1.404	2.147					
ISC1	0.645	0.552	0.781	0.744	0.787	1.607				
ISC2	0.524	0.473	0.543	0.569	0.687	1.132	1.575			
ISC3	0.388	0.451	0.440	0.456	0.518	0.947	1.195	1.763		
MSQ1	0.462	0.391	0.391	0.368	0.446	0.386	0.430	0.452	1.122	
MSQ2	0.470	0.374	0.262	0.296	0.483	0.341	0.390	0.394	0.907	1.451
MSQ3	0.635	0.457	0.443	0.443	0.539	0.512	0.616	0.636	0.906	1.184
MSQ4	0.556	0.442	0.444	0.458	0.560	0.608	0.590	0.532	0.633	0.730
MSQ5	0.530	0.377	0.400	0.377	0.499	0.592	0.574	0.445	0.722	0.938
MSQ6	0.581	0.453	0.415	0.480	0.539	0.641	0.651	0.519	0.722	0.904
SAT1	0.460	0.406	0.481	0.390	0.534	0.556	0.595	0.568	0.671	0.741
SAT2	0.540	0.372	0.463	0.449	0.605	0.569	0.621	0.552	0.671	0.811
CNI1	0.526	0.333	0.315	0.409	0.447	0.483	0.513	0.461	0.526	0.719
CNI2	0.397	0.208	0.163	0.211	0.256	0.422	0.510	0.433	0.468	0.642
CNI3	0.407	0.230	0.163	0.209	0.307	0.579	0.613	0.511	0.491	0.715
RIS1	-0.335	-0.174	-0.054	-0.040	-0.022	0.079	0.181	0.140	-0.093	-0.007
RIS2	-0.300	-0.195	0.020	-0.024	-0.163	0.044	0.123	0.057	-0.137	-0.074

Table 4.4 Covariance Matrix 3

	MSQ3	MSQ4	MSQ5	MSQ6	SAT1	SAT2	CNI1	CNI2	CNI3	RIS1	RIS2
MSQ3	1.742										
MSQ4	1.903	1.110									
MSQ5	1.096	0.975	1.376								
MSQ6	1.211	0.931	1.153	1.475							
SAT1	0.971	0.682	0.789	0.876	1.502						
SAT2	1.059	0.745	0.905	0.930	1.215	1.560					
CNI1	0.894	0.593	0.746	0.806	0.777	0.938	2.144				
CNI2	0.838	0.517	0.617	0.695	0.722	0.814	1.588	1.835			
CNI3	0.906	0.546	0.719	0.814	0.741	0.877	1.498	1.553	2.311		
RIS1	-0.050	0.101	0.020	-0.006	-0.013	-0.094	0.030	0.044	-0.164	2.025	
RIS2	-0.129	0.026	-0.084	-0.057	-0.034	-0.161	-0.014	0.045	-0.168	1.776	2.040

Table 4.5 Model Fit Index of Confirmatory Factor Analysis

Fit indices	χ^2/df	p-values	CFI	NNFI	RMSEA
Recommended value	< 3		>0.90	>0.90	<0.08
Test of model fit	1.8 (719.207/389)	0.0000	0.952	0.900	0.052

Moreover, CFA provides goodness of fit indexes showing the validity of measurement models with the 10 latent constructs. The results are shown in Table 4.5. The values of all goodness of fit indexes were acceptable based on the recommended value.

The results of the CFA in Table 4.6 show good factor loading values, lamda (λ), and t-values. Every factor

loading was higher than 0.30 and every t-value exceeded 1.965. Based on the resulting lamda (λ) and goodness of fit, the measurement instrument used for this study measured the variables consistently and accurately in terms of reliability and validity.

Table 4.6 Results of Confirmatory Factor Analysis

Constructs and Indicator	Estimates	Standardized Error	t-Value	Standardized Coefficient (λ)
UBI1 ← Ubiquity factor	1.000			0.905
UBI2 ← Ubiquity factor	1.013	0.039	25.730	0.931
UBI3 ← Ubiquity factor	1.001	0.044	22.828	0874
LOC1 ← Localization factor	1.000			0.878
LOC2 ← Localization factor	1.091	0.061	17.882	0.890
LOC3 ← Localization factor	0.860	0.059	14.504	0.724
PER1 ← Personalization factor	1.000			0.365
PER2 ← Personalization factor	1.680	0.293	5.741	0.715
PER3 ← Personalization factor	1.988	0.354	5.609	0.860
REA1 ←Reachability factor	1.000			0.921
REA2 ←Reachability factor	0.986	0.044	22.199	0.906
REA3 ←Reachability factor	0.711	0.051	13.925	0.670
CON1 ←Convenience factor	1.000			0.877
CON2 ← Convenience factor	0.989	0.046	21.704	0.925
CON3 ← Convenience factor	0.910	0.054	16.854	0.774
ISC1 ← Instant Connectivity factor	1.000			0.778
ISC2 ← Instant Connectivity factor	1.171	0.073	16.000	0.920
ISC3 ← Instant Connectivity factor	1.028	0.073	14.050	0.763
MSQ1 ← Security factor	1.000			0.716
MSQ2 ← Security factor	1.232	0.091	13.492	0.776
MSQ3 ← Security factor	1.488	0.100	14.890	0.855
MSQ4 ← Security factor	1.136	0.080	14.233	0.818
MSQ5 ← Security factor	1.360	0.089	15.321	0.880
MSQ6 ← Security factor	1.399	0.092	15.216	0.874
RIS1 ← Perceive Risk factor	1.000			1.027
RIS2 ← Perceive Risk factor	0.831	0.107	7.740	0.851
SAT1 ← Satisfaction factor	1.000			0.858
SAT2 ← Satisfaction factor	1.099	0.057	19.315	0.925
CTU1 ← Continuance Intention factor	1.000			0.860
CTU2 ← Continuance Intention factor	0.998	0.048	20.963	0.928
CTU3 ← Continuance Intention factor	0.972	0.055	17.555	0.806

4.2 PATH ANALYSIS

Path analysis is an extension of the regression model and can be used to examine causal relationships between two or more variables. It was developed by Sewall Wright in the 1930s for phylogenetic studies and was adopted by social sciences in the 1960s (Stock and Trebbi, 2003). In path analysis, it is assumed that relations among models are liner, additive and causal, the causal flow is one-way, and the variables are measured on an interval scale. Comparative strengths of direct and indirect relationships among a set of variables can be examined in path analysis.

Path analysis is a subset of Structural Equation Modeling (SEM) which deals with measured and latent variables. Measured variables are variables that can be observed directly and measured. They are also known as observed variables or manifest variables. Latent variables are variables that cannot be observed directly and must be inferred from measured variables. Latent variables are implied by the covariance among two or more measured variables. They are also known as factors, constructs, or unobserved variables. SEM is a combination of multiple regression and factor analysis (Stoelting, 2001).

Based on the research model in Figure 3.1, 12 paths

are hypothesized. Hypotheses one through six were about the relationship among six mobile internet service attributes and mobile internet service quality. The seventh hypothesis concerned the relationship between mobile internet service quality and mobile internet service risk, which will affect mobile internet service satisfaction and continuance intention negatively. The final two hypotheses stated that continuance intention was influenced by mobile internet service quality and mobile internet service satisfaction respectively. Table 4.7 shows the results of the path analysis. The path coefficients provide an indication of the strength of paths. The t-values were used to determine if the hypothesized relationships were significant.

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Table 4.7 Results of Path Analysis

Path relationship	Estimates	Standardized Error	T-value	Standardized path coefficient
Ubiquity → Mobile Internet Service Quality	0.222	0.039	5.701	0.281
Personalization→ Mobile Internet Service Quality	0.023	0.039	0.573	0.028
Localization → Mobile Internet Service Quality	0.023	0.046	0.506	0.025
Reachability → Mobile Internet Service Quality	0.145	0.045	3.242	0.183
Convenience → Mobile Internet Service Quality	0.008	0.047	0.173	0.010
Instant Connectivity → Mobile Internet Service Quality	0.295	0.046	6.444	0.327
Mobile Internet Service Quality → Mobile Internet Service Risk	-0.021	0.074	-0.284	-0.016
Mobile Internet Service Quality → Mobile Internet Service Satisfaction	0.756	0.048	15.658	0.661
Mobile Internet Service Risk → Mobile Internet Service Satisfaction	-0.021	0.037	-0.567	-0.024
Mobile Internet Service Risk → Continuance Intention	0.023	0.047	0.485	0.023
Mobile Internet Service Quality → Continuance Intention	0.345	0.082	4.214	0.267
Mobile Internet Service Satisfaction → Continuance Intention	0.359	0.072	5.011	0.318

4.3 HYPOTHESES TEST

4.3.1 Tests of Hypotheses from H1 to H6

Hypotheses H1 to H6 tested positive relationships between six mobile internet service attributes and mobile internet service quality. The higher the six mobile internet service attributes the greater mobile internet service quality. H1 stated the 'ubiquity' attribute of mobile internet service has a positive influence on mobile internet service quality. The results show that H1 is supported at the .01 level of significance (t=5.701, p=0.0001, standardized path coefficient=0.281).

H2 presented that the 'localization' attribute of mobile internet service has a positive effect on mobile internet service quality. The t-value and standardized path coefficient are 0.573 (p=0.5737) and 0.028 respectively. Thus, H2 was not supported at the 0.05 level of significance. H3 suggested that the 'personalization' attribute of mobile internet service has a positive effect on mobile internet service quality. The results with regards to H3 do not provide support at the .05 level of significance (t=0.506, p=0.6190, standardized path coefficient=0.025).

H4 proposed that the 'reachability' attribute of

mobile internet service has a positive effect on mobile internet service quality. The results indicate support for H4 (t=3.242, p=0.0045, standardized path coefficient is 0.183 at the .01 level of significance. H5 investigated the positive impact of the 'convenience' attribute of mobile internet service on mobile internet service quality. The results indicate that H5 was not supported (t=0.173, p=0.8646, standardized path coefficient=0.010).

H6 suggested a positive relationship between the 'instant connectivity' attribute of mobile internet service and mobile internet service quality. According to the results (t=6.444, p=0.0001, standardized path coefficient=0.327), H6 was significant at the 0.01 level. Table 4.8 summarized the results of hypothesis tests for H1 through H6.

4.8 The Results of Hypotheses Tests (from H1 to H6)

Hypothesis	Estimates	Standardized Error	T-value	Standardized path coefficient
H1: Ubiquity of mobile internet service will have a positive effect on service quality.	0.222	0.039	5.701	0.281
H2: Localization of mobile internet service will have a positive effect on service quality.	0.023	0.039	0.573	0.028
H3: Personalization of mobile internet service will have a positive effect on service quality.	0.023	0.046	0.506	0.025
H4: Reachability of mobile internet service will have a positive effect on service quality.	0.145	0.045	3.242	0.183
H5: Convenience of mobile internet service will have a positive effect on service quality.	0.008	0.047	0.173	0.010
H6: Instant connectivity of mobile internet service will have a positive effect on service quality.	0.295	0.046	6.444	0.327

4.3.2. Test of Hypotheses H7 and H8

Hypotheses H7 examined a negative relationship between mobile internet service quality and mobile internet service risk and suggested higher mobile internet service quality would lead to less mobile internet risk. The results of the test of H7 (t=-0.284, p=0.7797, standardized path coefficient=0.016) do not support the hypothesis at the 0.05 level of significance. H8 is about the positive relationship between mobile internet service quality and

mobile internet service satisfaction. Based on the results t=15.658, p=0.0001, standardized path coefficient=0.661), H8 was supported at the 0.01 level of significance. Table 4.9 summarizes the results of the tests of H7 and H8.

Table 4.9 Results of Hypotheses Tests (H7 and H8)

Hypothesis	Estimates	Standardized Error	T-value	Standardized path coefficient
H7: Mobile internet service quality will have a negative effect on service risk.	-0.021	0.074	-0.284	-0.016
H8: Mobile internet service quality will have a positive effect on service satisfaction.	0.756	0.048	15.658	0.661

4.3.3. Tests of Hypotheses H9 and H10

Hypotheses H9 investigated the positive influence of mobile internet service risk on mobile internet service satisfaction. In other words, the greater mobile internet service risk the lower mobile internet service satisfaction. H9 was not supported (t=-0.567, p=0.5777, standardized path coefficient=-0.024). Hypotheses H10 examined the negative relationship between mobile internet service risk and continuance intention. The results do not provide support

for H10 (t=-0.485, p=0.6335, standardized path coefficient=-0.023). Table 4.10 summarizes the results of the tests of H9 and H10.

Table 4.10 Results of Hypotheses Tests

Hypothesis	Estimates	Standardized Error	T-value	Standardized path coefficient
H9: Mobile internet service risk will have a negative effect on service satisfaction.	-0.021	0.037	-0.567	-0.024
H10: Mobile internet service risk will have a negative effect on continuance intention.	0.023	0.047	0.485	0.023

4.3.4. Tests of Hypotheses H11 and H12

Hypotheses H11 tested the hypothesized relationship that mobile internet service quality will have a positive effect on continuance intention. This suggests that higher quality mobile internet services will lead to higher continuance intention. The results (t=4.214, p=0.005, standardized path coefficient=0.267) support the hypothesis. H12 suggested a positive relationship between mobile internet service satisfaction and continuance intention. The higher the individual's satisfaction with mobile

internet service, the higher the continuance intention. The hypothesis was supported (t=5.011, p=0.0001, standardized path coefficient=0.318. Table 4.11 summarizes the results of the tests of H11 and H12.

Table 4.11 Results of Hypotheses Tests (H11 and H12)

Hypothesis	Estimates	Standardized Error	T-value	Standardized path coefficient
H11: Mobile internet service quality will have a positive effect on continuance intention.	0.345	0.082	4.214	0.267
H12: Mobile internet service satisfaction will have a positive effect on continuance intention.	0.359	0.072	5.011	0.318

4.4 GOODNESS OF FIT OF THE RESEARCH MODEL

There are several indexes for goodness of fit. Kline (2004) recommended at least four tests: chi-square; GFI, NFI, or CFI; NNFI; and SRMR. In this study, chi-square, CFI, NFI, and SRMR were used to test the goodness of fit of the research model. The first measure for the overall model is the chi-square (χ^2) test. The χ^2 statistic is used more as a descriptive index of fit rather than as a statistical test. Relative χ^2, also called normal χ^2, is the χ^2 fit index divided by degree of freedom. The smaller the χ^2, the better the fit of the model. Many researchers have recommended that a χ^2/df ratio as low as 2 or as high as 5 indicates an inadequate fit (Byrne, 1989; Marsh and Hocevar, 1985; Medsker et al., 1994). However, χ^2 is sensitive to the sample size. With a large sample size, the χ^2 values will be significant statistically (Marsh and Hocevar, 1988; Schumacker and Lomax, 2004)). In general, a χ^2 two or three times as large as the degrees of freedom is acceptable (Carmines and McIver, 1981). In the path analysis of this study, the χ^2/df ratio is 2.63 (χ^2 = 47.402, degrees of freedom = 12) and p-value is 0.0002. Thus, the model fit is acceptable.

The second measure for the overall model is the comparative fix index (CFI). It measures the proportionate improvement in fit by comparing a target model with a more restricted, nested baseline model. If CFI is close to 1, this indicates a very good fit. A value between 0.90 and 0.95 indicates a good fit. Traditionally, the CFI should be equal to or greater than 0.90 in order to accept the model. CFI is independent of the sample size. CFI is more appropriate than NFI for finite samples. The value of CFI in this study is 0.932, which exceeds the recommended value (> 0.90). Thus, this measure of model fit is encouraging as well.

The third measure for the overall model is the normed fix index (NFI), also known as the Bentler-Bonett normed ft model. NFI does not reflect parsimony. The more parameters are in the model, the larger the NFI coefficient will be. NFI is also affected by sample size. The values of NFI will be higher for larger sample sizes. If NFI is 1, the model is a perfect fit. Values of NFI above 0.95 are good. Values between 0.90 and 0.95 are acceptable. A NFI less than 0.90 indicates a need to respecify the model. Some authors have argued 0.80 is acceptable in terms of more liberal perspective (ZenCaroline, 2007). The value of NFI in this

model is 0.898, which is a marginal value for the model fit.

Table 4.12 Results of Goodness of Fit Test

Research Model	Values	Recommended Values
χ^2 / df	2.63 (47.402/12)	< 10 interpreted, 2-5 Good, < 2 overfitting (Medsker et al., 1994)
Comparative fit index (CFI)	0.932	> 0.90 good, (Jöreskog and Sörbom, 1989)
Normed fit index (NFI)	0.898	0.8 cuffoff (ZenCaroline, 2007) > .90 good, (Jöreskog and Sörbom, 1989)
Root mean square error of approximation(RMSEA)	0.072	< 0.08 good, < 0.05 excellent (Browne and Cudeck, 1993)

The final index for the overall model is root mean square error of approximation (RMSEA), also called root mean square (RMS), root mean square error (RMSE), or discrepancy per degree of freedom. RMSEA is used to provide guidance on the number of optimal sub-constructs to use. Traditionally, RMSEA less than or equal to 0.05 indicates good model fit. A RMSEA less than or equal to 0.08 is indicative of adequate model fit (Browne and Cudeck, 1993). The RMSEA values are classified into four categories: close

fit (0.00-.05), fair fit (0.05-0.08), mediocre fit (0.08-0.10), and poor fit (over 0.10). The value of RMSEA in this model is .072, which falls in the mediocre fit category. This provides additional evidence of acceptable model fit.

In this study, the overall fitness of the proposed research model is satisfactory on several measures for goodness of fit (χ^2 = 47.402, p = 0.002, degrees of freedom = 12, χ^2/df =2.63, CFI = 0.932, NFI = 0.898, RMSEA = 0.072). Table 4.12 summarizes the results of goodness of fit indicators.

4.5 DISCUSSION

Twelve hypotheses were tested to study the relationships among ten constructs. Results of all the hypothesis tests are shown in Table 4.13 and Figure 4.1. Of the mobile internet service attributes, instant connectivity has the greatest effect on mobile internet service quality. It is followed by ubiquity and reachability, which have positive effects on mobile internet quality. These results imply that customers want a satisfactory level of basic and foundational factors when

using mobile internet service. Instant connectivity and reachability are essential conditions compared to other factors such as personalization or localization.

In general, wireless internet service has a tendency to be less secure when compared to wired internet service and is restricted by time and location due to the relative immaturity of mobile technology. For example, the use of mobile internet services might be limited in certain subways after midnight due to connection or reachability problems. As was suggested by the results of this study, instant connectivity and reachability are considered as key factors influencing mobile internet services quality. This may be related to download services being a major reason for mobile internet service usage in the previous chapter.

The attribute of 'ubiquity' also had a positive impact on mobile internet service quality. The concept of ubiquity can be conceptualized as being available anytime and anywhere, which is the ultimate goal of mobile internet service. Ubiquity is the relative advantage mobile internet service has over wired internet. In other words, mobile internet service is relatively ubiquitous, while wired internet service is restricted to locations with wired outlets. With the guarantee of instant connectivity and

reachbility, ubiquity is a more powerful factor influencing mobile internet quality in terms of the customer's perception.

Unlike reachability, instant connectivity, and ubiquity, personalization and localization have no significant effect on mobile internet service quality. It is assumed that personalization and localization are relatively supplementary functions of mobile internet service and have not become widely available to the public. Thus, some customers do not perceive personalization and localization as advantages over wired internet service or other existing services.

The convenience attribute was also not associated with mobile internet service quality. It is assumed that this is due to 'convenience' being too general for respondents to recognize the convenient characteristic of mobile internet service. With the development of information technology, wired internet service has developed functions as convenient as those of wireless mobile internet. For example, wired internet service can be used in subways with outlets. In this case, wired internet service is usable during transportation, resulting in it being perceived as convenient.

No hypotheses regarding mobile internet service and risk were supported. Mobile internet service quality did not influence mobile internet service risk significantly. Moreover, mobile internet service risk affects neither mobile internet service satisfaction nor continuance intention. In other words, mobile internet service risk was not reduced by high quality of mobile internet service and mobile internet service risk did not lower mobile internet service satisfaction. The t-value between mobile internet service risk and continuance intention was positive, but was not statistically significant.

There might be several reasons for these results, but two seem to be the most likely. First, customers may perceive that mobile internet service risk is separate from mobile internet service quality, mobile internet service satisfaction, and continuance intention. Although consumers perceive high quality of mobile internet service, they may think that there are always informational and monetary risks. Thus, the high quality of mobile internet service does not lower customers' risk perceptions.

Customers take risks to obtain various mobile internet service benefits, which results in being satisfied with mobile internet service. In addition, customers intend to

continually use mobile internet service while at risk for information and/or monetary losses. The advantages of mobile internet service seem to outweigh risks of mobile internet service.

The second reason is the cultural effect. According to Jarvenpaa et al. (1999), perceived risk varies by country. They also found that risk perception can be influenced by cultural values and IT infrastructure. For example, China is a highly interdependent society where customers might attempt to reduce risk by encouraging others to use the service when high personal risk is inherent in the service. In this case, the risk is reduced gradually as the number of customers increase (Keh and Sun, 2008). The republic of Korea is also a highly interdependent society and the culture is relatively collective compared with western countries (Calhoun et al., 2002).

The collectivism can be also explained by the "group diffusion effect" (Yamaguchi, 1998), where people tend to perceive a greater sense of safety or less risk when others are exposed to the same risky situations. To convince other people to use or purchase the service, they must show

satisfaction toward the service and diffuse the positive word of mouth about the service.

In contrast to the effects of mobile internet service risk, the effects of mobile internet service quality on mobile internet service satisfaction and continuance intention were significant, as in many previous studies. The difference here was that mobile internet service satisfaction was a mediating factor. The total effect between mobile internet service quality, mobile internet service satisfaction, and continuance intention is 0.477 (0.267 + (0.661x0.318), which is the sum of the direct effect of mobile internet service quality on continuance intention (0.267) and the indirect effects of mobile internet service quality on continuance intention (0.661) and mobile internet service satisfaction on continuance intention (0.318).

In terms of the meditational effect of mobile internet service satisfaction, the incorporation of satisfaction into the model expressed 44 percent (0.21/0.4777)of the total effect of mobile internet service on continuance intention. The effect of mobile internet service satisfaction as a mediating variable is an indirect effect (0.661x0.318 = 0.21) which is effects of mobile internet

service quality on continuance intention (0.661) and mobile internet service satisfaction on continuance intention (0.318).

According to these results, the role of mobile internet service satisfaction as a mediating variable was significant. It means that continuance intention will be greater when customers are satisfied with the mobile internet service quality (Bou-Llusar et al., 2001). This result also supports Wixom and Todd's argument (2005) that object-based beliefs (quality) influence object-based attitudes (satisfaction), which affects behavior intention (continuance intention).

4.6 SUMMARY OF RESULT AND DISCUSSION

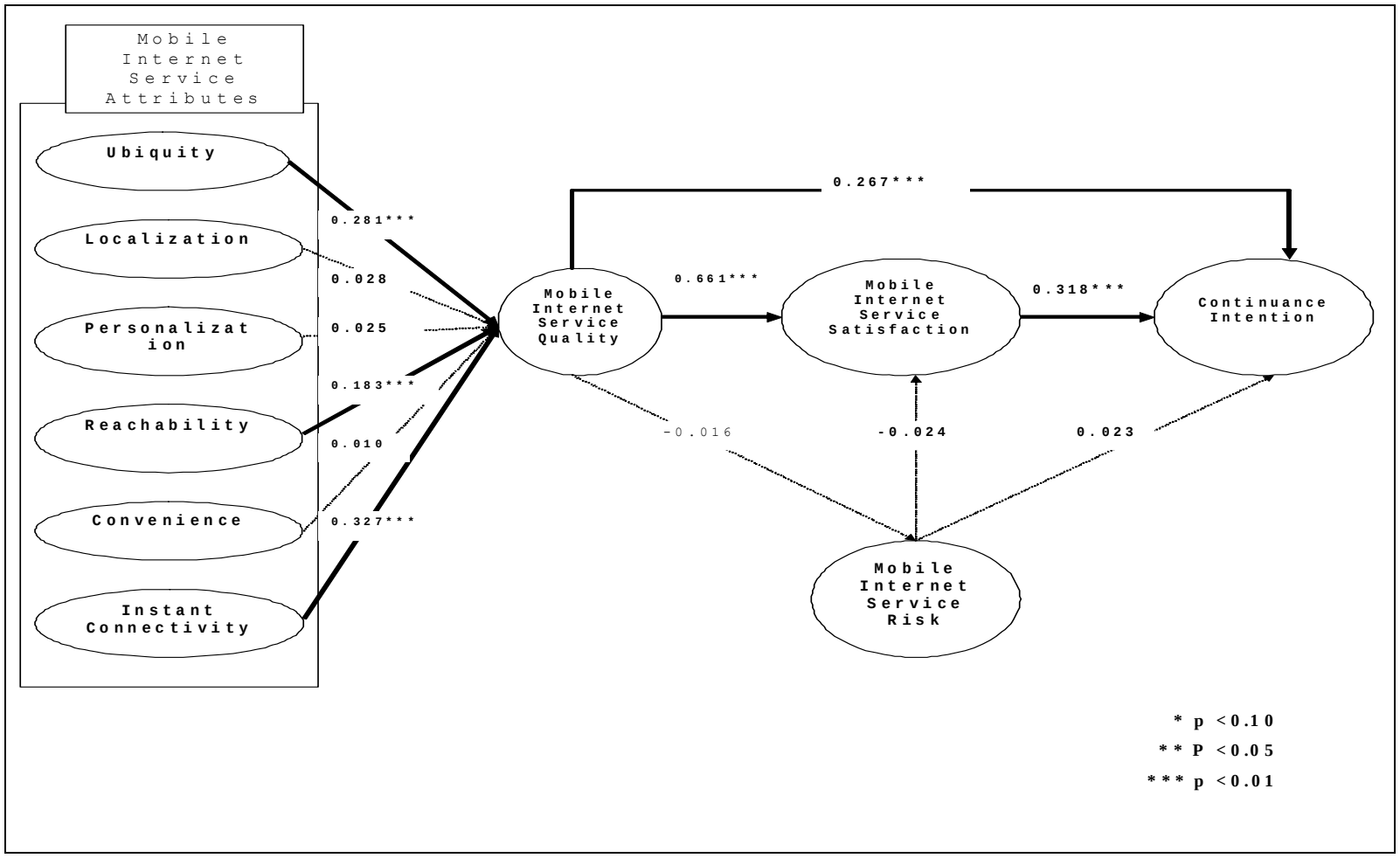
This chapter presented the results of the study. Before examining the twelve research hypotheses, reliability and validity tests were conducted. The Cronbach's α and a confirmatory factor analysis supported the internal consistency of the measurement scales and suggested the research variables were adequately measuring what was intended. Twelve research hypotheses were empirically investigated utilizing path analysis. Six out

of twelve hypotheses were supported. Ubiquity, reachability, and instant connectivity had significant impacts on mobile internet service quality, which in turn affected mobile internet service satisfaction and continuance intention, respectively. Finally, mobile internet service satisfaction positively impacted continuance intention. The results of this study support previous research on the relationships among quality, satisfaction, and behavioral intention.

Table 4.13 Overall Results of Hypotheses Tests

Hypothesis	t-value	β	p-value	Results
H1: Ubiquity of mobile internet service will have a positive effect on service quality.	**5.701**	**0.281**	**0.0001*** **	**Supported**
H2: Localization of mobile internet service will have a positive effect on service quality.	**0.573**	**0.028**	**0.5737**	**Rejected**
H3: Personalization of mobile internet service will have a positive effect on service quality.	**0.506**	**0.025**	**0.6190**	**Rejected**
H4: Reachability of mobile internet service will have a positive effect on service quality.	**3.242**	**0.183**	**0.0045*** **	**Supported**
H5: Convenience of mobile internet service will have a positive effect on service quality.	**0.173**	**0.010**	**0.8646**	**Rejected**
H6: Instant connectivity of mobile internet service will have a positive effect on service quality.	**6.444**	**0.327**	**0.0001*** **	**Supported**
H7: Mobile internet service quality will have a negative effect on service risk.	**-0.284**	**-0.016**	**0.7797**	**Rejected**
H8: Mobile internet service quality will have a positive effect on service satisfaction.	**15.658**	**0.661**	**0.0001*** **	**Supported**
H9: Mobile internet service risk will have a negative effect on service satisfaction.	**-0.567**	**-0.024**	**-0.5777**	**Rejected**
H10: Mobile internet service risk will have a negative effect on continuance intention.	**0.485**	**0.023**	**0.6335**	**Rejected**
H11: Mobile internet service quality will have a positive effect on continuance intention.	**4.214**	**0.267**	**0.0005*** **	**Supported**
H12: Mobile internet service satisfaction will have a positive effect on continuance intention.	**5.011**	**0.3180**	**0.0001*** **	**Supported**

Figure 4.1 Research Model and Results of Hypotheses



CHAPTER 5: CONCLUSION

5.1 SUMMARY

This study dealt with mobile internet service from a service operations management (SOM) perspective. Based on previous studies, six attributes of mobile internet service were identified to study their relationship with mobile internet service quality. Among these six attributes, ubiquity, reachability, and instant connectivity were found to be key factors influencing mobile internet service quality. From the customer's perspective, these factors are the essential and foundational attributes affecting mobile internet service quality.

An enormous amount of research has demonstrated the causal relationships among quality, satisfaction, and behavior intention. The findings of this study also showed that mobile internet service quality has a positive effect on mobile internet service satisfaction which influences mobile internet service continuance intention. However, mobile internet risks, such as loss of money security, or privacy were not significantly affected by mobile internet service quality and did not have a positive effect on

mobile internet service satisfaction and mobile internet service continuance intention. The findings of this study provides various theoretical as well as practical contributions and suggest possibilities for future research.

5.2 CONTRIBUTION OF THE STUDY

This study has several important theoretical and practical contributions.

5.2.1 Theoretical Contribution

On the theoretical side, this study showed that cross-functional studies in service operations management (SOM) research have much to offer. Many researchers (Bowen and Hallowell, 2002; Boudreau et al., 2003; Iacobucci, 1998; Johnston, 1999, Karmarkar, 1996; Schneider, 1994) have argued the needs for cross-functional studies including service operations and other functional areas. However, few studies have been conducted that incorporate the operations perspectives (Pullman et al., 2001; Roth and van der Velde, 1991). To conduct this study on mobile internet service in service operations management, this study viewed mobile internet service as services rather than information systems or technology, but adopted concepts from the

management information systems area. Moreover, three important constructs, quality, satisfaction, and behavior intentions, were applied in this study.

Second, this study examined six attributes of mobile internet service such as ubiquity, localization, personalization, reachability, convenience, and instant connectivity. Although there have been white papers and conceptual research dealing with mobile internet service, there has been no study which empirically identified attributes of mobile internet service in the context of SOM. Thus, this study contributes to mobile internet research domains which are at the early development stage.

The final academic contribution is that this study confirmed the relationships among service quality, satisfaction, and behavior intention found in previous studies. In the context of mobile internet service, this research found a causal relationship whereby mobile internet service quality affected mobile internet satisfaction which in turn influences mobile internet service continuance. The results also verified the relationships of 'object-based beliefs → object-based attitudes → behavior intention' suggested and examined by Wixom and Todd (2005). In other words, mobile internet

service quality (an object-based belief) had an effect on mobile internet service satisfaction (an object-based attitude). This internet service satisfaction affected continuance intention (a behavior intention).

5.2.2 Managerial Contribution

On the practical side, this study provides a better understanding of mobile internet services for operations managers. Due to the lack of an exact definition or categorization of service, the best service may not be designed or delivered by operations people. Services are intangible unlike goods, thus SOM practitioners might not recognize important aspects of service and neglect these when designing and developing services. Thus, this study helps operations managers have a better understanding of service in providing the emerging mobile internet service.

Relating to the first practical contribution, this study redefines the boundaries of service operations. Usually, managers consider operations to be the 'back office.' However, operations managers have to deal with customers' perceptions at the front line to provide high quality service. Unlike goods, services require customers'

involvement in the service process. Traditionally, operations people listen to customer's evaluations through marketing people, resulting possible misunderstandings with regard to service and customers. If operations people do not know exactly what customers want and which elements influence service quality from the customer's perspective, they can not design, develop, and deliver high quality mobile internet service. Thus, service operations managers have to broaden their work boundaries from back office to front office.

Second, this study helps service operations managers understand customers' needs in regards to mobile internet service. The study results clearly indicate that customers want basic and essential features rather than supplementary functions when using their mobile internet services. In general, new and innovative service is developed by service providers rather than by high technology firms. It means that the speed of customers' usage is slower than service providers' technology development. Thus, service operations managers need to make an effort to reduce the gap between customers and service providers.

Finally, the study offers service operations managers' insights on the relationships among service quality,

satisfaction, and continuance intention. Although high mobile internet service quality leads to higher continuance intentions towards mobile internet service usage, the mediating role of mobile internet service satisfaction is also important for customer retention. This is another reason why service operations people do cross-functional works and why they understand the concepts of service quality and satisfaction from the customer's perspective.

In summary, the importance of service will be given a great deal of weight in operations management and customers' expectations for high quality service and satisfaction will become more complicated in the future. Thus, service operations managers' understanding of the nature of service and ability to apply various service concepts from different functional areas will be a key to success in service operations management.

5.3 LIMITATION AND FUTURE RESEARCH

Although the findings are meaningful and useful, the present study has certain limitations which require future research. First, data used in this study may not be representative of the population of mobile internet service users. Ninety four percent of respondents were in their 20s and were students in a university in the Republic of Korea. Although customers in their 20s make up the majority of wireless internet users (NIDA, 2008), other age groups were not well represented in this study. Thus, future studies need to collect data from a wide population and investigate whether differences among various demographic groups exist.

Second, data employed in this study was not segmented by types of mobile internet service. Eighty four percent of respondents were customers using entertainment mobile internet service. Relatively few informational (12.3 percent) and transactional (4.2 percent) mobile internet service users in this study may have caused results of some attributes of mobile internet service not to be significant. Localization, personalization, and convenience might be important factors in searching for information and in transactions via mobile internet service. For example, finding friends' locations belongs to the 'localization'

attribute of mobile internet, and is categorized into information service of mobile internet. Since relatively few respondents (12.3 percent) used information service in this study, localization factor might not have emerged as significant. Mort and Drennan (2005) and Kleijien et al. (2007) argued that customers evaluate mobile service differently based on types of mobile service such as utilitarian or hedonic use. Thus, studies that better examine the type of mobile internet service are needed in the future research. The results could be different and more accurate if data is segmented according to the type of mobile internet service.

Third, mobile internet service is not widespread except for simple services like short message service or personalization of the mobile phone. Mobile transaction service is still in its infancy (Kleijien et al., 2007). The nature of this cross-sectional study might create some confounds. In other words, customers who do not have a good understanding of mobile internet service might not evaluate mobile internet service clearly. As customers' perception or experience with mobile internet service increase, the results of studies like this in the future could be different. Thus, longitudinal data will be needed to ensure

the robustness of the research model and to identify how customers' awareness and behavior change as time passes.

Finally, mobile internet service risk did not have significant relationships with mobile internet service quality, mobile internet service satisfaction, or continuance intention. The reasons for the findings are not clear, but one of several possible reasons was culture. It is assumed that Korean people have a tendency to perceive relatively less risks compared with other western cultures. Lee et al. (2007) found that culture affects customers' perceptions, beliefs, and behaviors in mobile internet usage. Thus, future research should include culture-specific factors to better understand customers' evaluation of mobile internet service. Further, cross-cultural study would also be useful for comparing how different cultural factors influence customers' perceptions, beliefs, and behavior in the context of mobile internet service.

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APPENDIX

Survey Questionnaire

Survey Questions

Guideline: There are two parts in this survey. Part I is about demographic questions and Part II is about mobile internet service. It takes approximately 10~15 minutes to finish this survey. If you have never used mobile internet service, you do not need to submit your answers. Thank you for your participation.

PART I: General Questions
Instruction: Please answer each question by checking or circling each question based on your personal profile. After you complete this page, please move to "Go to Part II".

1. Gender
a) Male b) Female

2. Age
a) 20s b) 30s c) 40s d) 50s and over

3. Education
a) College students b) College degree c) Graduate students
d) Graduate degree

4. Occupation
a) Students b) White-collars c) Self-employed
d) Professionals e) Sales f) Educators h) other

5. Usage duration of mobile internet service
a) Less than 1 year b) More than 1 year
c) More than 2 years d) More than 3 years
e) More than 4 years f) More than 5 years

6. Usage time per access (minutes)
a) Less than 5 min b) 5~10 min c) 10~20 min
d) 20~40 min e) 40~60 min f) more than 60 min

7. Usage expenses($) per month
a) Less than $5 b) $5~$10 c) $10~$15
d) $15~$20 min e) More than $20

8. Reason for using mobile internet service
a) Ubiquity
b) Subjective norm
c) For business
d) Curious about mobile internet service
e) Promotion/giveaways
f) Other ( )

9. Types of mobile internet service usage
a) Entertainments
b) Information search
c) Transaction

10. Specific types of mobile internet service usage
a) MMS/e-mail
b) Decorating phone
c) Download music or movie
d) Mobile game
e) Download Mobile ringtones/character
f) Chatting/blogs
g) Sports
h) News/weather
i) Find frinds/traffic information
j) Information searching
k) Stock trading information
l) Movie/sports ticket purchase
m) Mobile banking
n) Mobile shopping
o) Stock purchase

PART II: Mobile Internet Service Questions

Instruction: There are a total 31 questions as followed. Please provide your mobile internet service experience by checking the most appropriate answer for each question.

Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly
1	2	3	4	5	6	7

The scale ranges from strongly disagree (SD) = 1, neutral (N) = 4, and to strongly agree (SA) = 7. Please circle the most appropriate number.

	SD			N			SA
1. Mobile internet service provides me information anytime.	1	2	3	4	5	6	7
2. Mobile internet service provides me information anywhere.							
3. Mobile internet service provides me real time information.							
4. Mobile internet service provides me information about my location.							
5. Mobile internet service provides me location information about other persons I set.							
6. Overall, mobile internet service is useful for identifying user's location.							
7. Mobile internet service stores my personal information automatically.							
8. Mobile internet service provides me personalized information.							

9. I can personalize mobile internet service based on my preferences.							
10. The connection of mobile internet service is available anytime.							
11. The connection of mobile internet service is available anywhere.							
12. The connection of mobile internet service is not disconnected in use.							
13. I can access mobile internet systems easily.							
14. I can use mobile internet service while in motion.							
15. There are few procedures to access mobile internet service.							
16. The connectivity of mobile internet service is excellent.							
17. The speed of download of mobile internet service is fast.							
18. I can access mobile internet systems instantly.							
19. The information quality of the mobile internet service is excellent.							
20. Overall, the mobile internet service provides me with high-quality information.							
21. In general, I would give the information from the mobile internet service high marks.							
22. In terms of system quality of the mobile internet service, I would rate it highly.							

23. Overall, the mobile internet service provides me with high-quality system.							
24. In general, I would give the system from the mobile internet service high marks.							
25. I am worried about my private information while using mobile internet service.							
26. I am worried about my transaction while using mobile internet service.							
27. Overall, I am very satisfied with the mobile internet service.							
28. In general, the mobile internet service is very satisfying.							
29. I intend to continue using the mobile internet service in the future.							
30. I would not stop using the mobile internet service.							
31. I plan to keep using the mobile internet service frequently.							