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行動服務品質量表建構

Constructing the Measurement Scale of Mobile Service Quality

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謝辭

人總要不斷地成長、前進，18 年的學生身分在此先暫時告一段落，也許一路上懵懵懂懂，即使心中不免有所恐懼與不安，但走過的路都不曾白費，也為我的人生增添許多色彩。研究所兩年的時光過得真快，很感謝也十分慶幸自己能遇到很好的老師—管郁君老師、林勝為老師。謝謝管老師無論在課堂、論文指導、或生活上的幫助與經驗分享，感謝老師的悉心照顧與鼓勵，讓我面對自己的不足時，給予我很大的力量！記得管老師曾與我分享過一段話：「人一輩子都會有所恐懼，要讓自己能克服恐懼。」這句話對我而言十分受用，讓我往後每當遇到困難感到迷惑的時候，腦中都會浮現這句話，帶領我繼續前往正確的路，而每一步都是如此踏實並充滿力量。同樣地，我也十分感謝我的另一位指導老師—林勝為學長，謝謝學長的親切、耐心，與許多細節的指導和提醒。從念 paper 到寫論文的整個過程，謝謝管老師與勝為學長總是有問必答，給予我許多建議及鼓勵，讓我順利地完成論文。最感動的事莫過於兩位老師都親自為我的論文編修，逐字逐句地審閱並修改論文，以及在資料分析階段時，管老師在實驗室花了整個上午的時間，讓我順利地處理完資料分析的工作。研究所兩年，從兩位老師身上學習到認真的處事態度與真誠待人的心，感謝兩位老師總是願意替學生著想！

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管老師常說我是十分幸福的孩子，的確，我也覺得自己十分幸福與幸運！我所遇到的人，都是很好的人與善良的朋友，在我遇到問題、需要幫助的時候，總會有人願意伸出援手；在我感到傷心時，總會有人關懷問候；而快樂的事，也總是有可以一起分享的夥伴。我珍惜這一切，同時我也希望自己會是很好的人，謝謝那些美好的人、美好的事。

Abstract

To deliver superior mobile service quality, mobile service providers must understand consumers' perceptions of mobile services. As there are many different types of mobile services, this research attempts to grasps the essential characteristics of mobile services. This article conceptualizes, constructs, refines, and tests a multiple-item scale (M-S-QUAL) for measuring the service quality in mobile environment. According to Hinkin's guide to the development of scales, item generation can be conducted using a deductive approach based on a theoretical foundation. The preliminary M-S-QUAL scales developed in the research are 50-item scale for tangible products and 49-item scale for intangible products in nine dimensions: efficiency, fulfillment, system availability, privacy, responsiveness, compensation, contact, content, and billing. The scales will demonstrate good psychometric properties based on findings from a variety of exploratory factor analysis (EFA), confirmatory factor analysis (CFA), reliability and validity tests. These analyses resulted in a 4-construct, 15-item instrument for measuring mobile service quality in tangible product shopping and a 5-construct, 16-item instrument for measuring mobile service quality in intangible product transactions. We further proceeded to conduct a regression analysis between M-S-QUAL and both perceived value (PV) and loyalty intentions (LI) which were adopted as the criterion variables to establish the nomological validity. The results show that the M-S-QUAL scale demonstrates good psychometric properties.

Keywords: Mobile commerce, Mobile service, Service quality, Scale development.

摘要

隨著網路科技、行動手持裝置的發展，多元的行動服務開始被廣泛開發及應用，為了能提供更好的行動服務，行動服務提供者必須了解使用者對行動服務的認知與想法。此研究希望透過不同行動服務類型的特性，定義行動服務品質(Mobile service quality; M-S-QUAL)之適用範圍，並根據 Hinkin 所建議之量表建構方法，發展出一份有效衡量行動服務品質之量表(M-S-QUAL)，以歸納法自既有的服務品質文獻發展初步的問項。由於行動服務提供有形商品與無形商品的交易與交換，因此，M-S-QUAL 也同時包含有形與無形商品行動服務品質量表，初步的 M-S-QUAL 包含九構面：系統效率(efficiency)、履行性(Fulfillment)、系統可用性(System availability)、隱私性(Privacy)、反應性(Responsiveness)、補償性(Compensation)、聯絡性(Contact)、內容(Content)、帳務議題(Billing)，而有形/ 無形商品行動服務品質量表分別以 50/ 49 題問項衡量。此份量表透過問卷調查法進行資料的蒐集，並透過探索性因素分析(Exploratory factor analysis; EFA)及驗證性因素分析(Confirmatory factor analysis; CFA)萃取出四構面、15 題問項之有形商品行動服務品質量表與五構面、16 題問項之無形商品行動服務品質量表，此研究亦針對 M-S-QUAL 量表進行信、效度檢驗並利用不同校標(感知價值與忠誠意圖)進行迴歸分析以建立校標關聯效度。研究結果顯示本研究所發展的行動服務品質量表具有良好的心理計量特質(psychometric properties)。

關鍵字：行動商務、行動服務、服務品質、量表建構

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Chapter 1 Introduction

With the development of handheld devices such as personal digital assistants (PDAs), tablets, and smart phones, wireless and mobile technologies and their associated applications have become essential tools. According to the International Data Corporation (IDC), in 2009 there were more than 450 million mobile Internet users worldwide, a figure that will exceed the 1 billion mark by 2013. There were 5.3 billion mobile subscribers, representing 77 percent of the world's population. In 2010, 1388.2 million mobile handsets were sold, up 18.5 percent compared with 2009. Smartphones have shown the strongest growth, with total shipments in 2010 of 302.6 million units, up 74.4 percent from 2009, representing 21.8 percent of all handsets shipped. The fast-growing smartphone market is predicted to grow more than four times the rate of the overall mobile phone market this year. IDC expected smartphone vendors to ship up to 472 million smartphones in 2011 (107 million smartphones were sold worldwide in the second quarter of 2011), and predicted that the figure will nearly double to 982 million by the end of 2015 (IDC, 2011). In contrast, Gartner expected global sales of tablet PCs to reach 7 million units in 2011, and predicted that sales in 2012 would reach 108 million units, but global tablet PC sales in 2010 were only 1.76 million units. This implies a very rapid evolution of Internet access and the mobile market, with more people starting to use handheld devices. Wireless technology has thus become a very important issue.

Advanced and mature wireless communication technology has facilitated the development of various mobile commerce (m-commerce) applications. Many mobile applications have emerged as a result, such as location-based services (LBS), mobile reading services, electronic books, mobile TV, and mobile music. Positioning technology such as the GPS provides localization services for mobile devices (Rao & Minakakis, 2003). Over 300,000 mobile applications (apps) were developed in the three years from 2007 to 2010. IDC indicates that in 2010 alone these 300,000 applications were downloaded 10.9 billion times. They predict that global downloads will reach 76.9 billion times in 2014 and will be worth US$35 billion (IDC,

2010). The most popular categories of apps are games, news, maps, social networking, and music. The most used apps across all smartphones in the United States, according to Nielsen (Nielsen, 2010), are Facebook, Google Maps, and the Weather Channel (TWC). New m-commerce applications are developing and m-commerce market is growing.

There are several differences between m-commerce and e-commerce. For example, a particular mobile characteristic that must be considered is that when mobile consumers search for a thing, it is possible that we are near the area relating to the thing. For instance, if we type the keywords “101” and “restaurant”, we may be planning to have a meal in a restaurant around the Taipei 101 shopping mall, and in these mobile times, it is likely that we are close to the mall now and want to have dinner later. The main characteristics of m-commerce that are not found in general e-commerce are the use of the user’s location, non-planned events, and instant business behavior. Positioning technology such as GPS provides localization services for mobile devices, which has allowed the development of location-based applications that connect to a user’s location directly (Rao & Minakakis, 2003). The main LBS applications are those that allow users to navigate with their smart phones if they lose their way. Another use of LBS is the “check-in” function in applications such as Facebook and Foursquare. As the mobile service applications market grows, companies will inevitably strive to enter the mobile market to search for new opportunities.

A great deal of literature is available on service quality, covering both offline services (traditional services) and online services (e-services). However, there are potential opportunities for further research due to the development of new technologies and service delivery channels. Service quality describes the gap between consumers’ expectations and performance. If consumers’ initial service expectations are higher than their perceptions after receiving the service, then the total perceived service quality will decrease. Service quality evaluations also involve processes (Sasser et al., 1978), such as the way in which services are delivered. The SERVQUAL service quality scale was developed by Parasuraman, Berry, and Zeithaml in 1985, and further be refined in 1991. For several decades, research on service quality in the field of

commerce has been strongly influenced by the work of Parasuraman et al. With the development of the Internet, electronic commerce (e-commerce), and services that are provided online, Parasuraman et al. (2005) developed a multiple-item scale for assessing electronic service quality (E-S-QUAL) specifically for the e-commerce context. However, to date there has been limited research on the development of a scale of mobile service quality (m-SQ). The gaps of research are: (1) it is not clear that factors influence of wireless-based applications to be used effectively in m-commerce environment, (2) there is not well-defined measuring and lacks of strict methodology scale development to measure M-S-QUAL, (3) a success of M-S-QUAL cannot be evaluated by a single-item scale, such as global service quality. To fill this gap, this research attempts to develop a new multi-dimensional instrument to measure M-S-QUAL.

The objective of this research is to develop a sound instrument for measuring m-SQ, and to identify the dimensions of m-SQ. To deliver superior mobile service quality, mobile service providers must understand consumers' perceptions of mobile services. As there are many different types of mobile services, this research attempts to grasps the essential characteristics of mobile services. A core M-S-QUAL measurement scale is then developed that is suitable for assessing consumers' perceptions of the service quality of mobile applications. The procedure used in generating items, collecting data, and validating the multi-item scale is described in following chapters. This study carefully examines the evidence of reliability, content validity, convergent validity, and discriminant validity by using the statistic software AMOS to analyzing data from sample.

Chapter 2 Literature review

2.1 Mobile commerce

The convergence of wireless telecommunications and the Internet has provided many exciting possibilities for the growth of m-commerce. The penetration of both technologies has driven many changes in our daily lives, including how we work, live, and learn, and how we consume. The following sections give an introduction to and review of the m-commerce literatures are discussed in the following sections.

2.1.1 From e-commerce to m-commerce

Using wired communication devices to deal with business activities outside of enterprises is traditionally termed electronic commerce (e-commerce). Advanced and mature wireless and mobile technologies have helped e-commerce to develop from using wired networks to using wireless networks. Mobile commerce (m-commerce) can be viewed as a subset of e-commerce (Coursaris & Hassanein, 2002; Kwon & Sadeh, 2004), and refers to any transaction with a monetary value conducted via a mobile network (Clarke, 2001). It typically involves the use of handheld mobile devices and connections via an always-on and high-speed Internet link to engage in communication, interaction, and transaction activities. In m-commerce wireless communication devices are used to conduct business activities outside enterprises, such as buying a product via a mobile phone that connects to a website.

M-commerce is different from e-commerce in that there are no limitations of place. Clarke and Flaherty (2003) identified four characteristics of m-commerce: ubiquity, convenience, localization, and personalization. Companies provide mobile services to consumers based on these characteristics. The evolution of m-commerce has gone through several generations. The first and second generations (1G/2G) provided voice calls and text messages, and 2.5G provided information transmission. Dynamic multimedia became available in the third generation (3G) due to advancements in data transmission per unit of time, which gave rise to many new applications.

The fourth generation (4G) is devoted to speeding up the data transmission, which will result in richer mobile service applications that provide virtually any service that a consumer might need. M-commerce integrates personnel communication, data transmission, broadcast services, and multimedia entertainment applications, and provides convenient, secure, and personalized applications.

2.1.2 Scope of m-commerce applications

M-commerce involves a chain of value-added activities that terminates with the consumer, and an extensive array of applications. The European Commission (1996) developed a framework to describe these activities, the concept of which is taken from the traditional value chain analysis provided by Porter and Millar. The basic model consists of six core processes in two main areas: content and infrastructure and services. The m-commerce value chain framework is adaption from the European Commission (1996) specification shown in Figure 1.

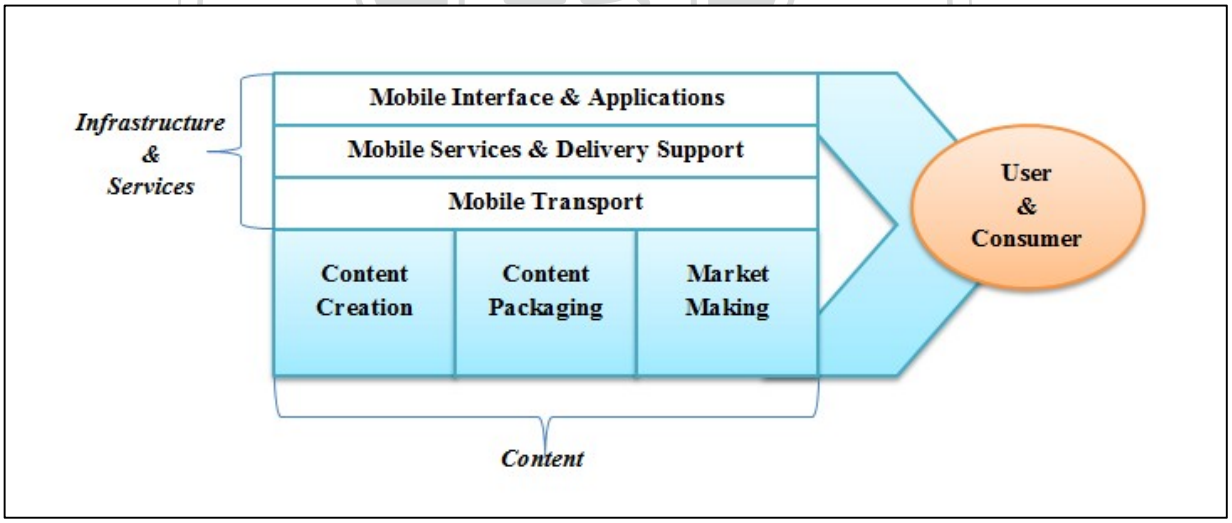

Figure 1. The m-commerce value chain

Infrastructure and services concern transmission technologies, services supporting technologies, and application development. The part includes mobile transport, mobile services and delivery support, and mobile interface and applications. The infrastructure and services support users and consumers access to networks and mobile services. The other part is service

content which is covering content creation, packaging, and market making. From original information and information processing to content and service applications received by users. The six core processes provide m-commerce a clear and concise framework and scope definition.

2.1.3 Products and services in mobile services

From 1G to 3.5G, m-commerce became richer, and many types of products and services have been developed. The classification of mobile services by FIND rests on the type of service provided and the mobile communication technique used. The service types are divided into three service categories: mobile telecoms, mobile multimedia video/entertainment services, and mobile commerce services, services and content of service as shown in Table 1.

Table 1. Types of m-services (FIND, 2008)

Type of Service	Services	Content of Service
Mobile Phone Service	Call Service	(1) General Call (2) Text Message (3) Voice Message (4) Multi-party call (5) Push to Talk
Mobile Multimedia Entertainment Service	Leisure/Recreation Service	(1) Mobile Game (2) Music Multimedia (3) Adult Entertainment (4) Sport (5) Other
	Personalized Service	(1) Ringtone Download (2) Picture Download (3) Voice Greetings
Mobile Commerce Service	Mobile Positioning Service	(1) Game/Community (2) Location tracking (3) Travel/Transportation (5) Security & Other
	Information Access Service	(1) Entertainment (2) Travel/Transportation (3)Directing (4) Finance Information (5) Other
	Business Application Service	(1) Software Sharing (2) Message Transmission (3) Intranet/Extranet Access (4) Database Access (5) Job Scheduling & Assignment

2.2 Service quality

There is a large volume of studies that discuss service quality. The most influential research is the SERVQUAL instrument of service quality developed by Parasuraman, Berry, and Zeithaml (1988). Although the scale has been criticized because of the reliability and validity of the research, today most service quality research is based on their concept and original framework. With the development of technology and the shifting of the service delivery channel from offline to online, an electronic service quality measurement scale (E-S-QUAL) was developed by the same authors to measure the quality of the services provided by online shopping websites. The concept of service quality is reviewed in the following section.

2.2.1 Conceptualization of service quality

Service quality is more difficult for consumers to evaluate than the quality of tangible goods because service is intangible, and price sometimes becomes a pivotal quality indicator when information is not available. Service quality perception is the gap between consumer expectations and actual service performance. Quality perception includes not only the outcome of the service, but also the service delivery process. Parasuraman et al. (1985) conducted an exploratory study to investigate the concept of service quality in which they suggested that there were gaps between consumers and marketers, and that if marketers wish to satisfy the demands of consumers, then they must strive to bridge these gaps.

Parasuraman et al. (1988) developed the SERVQUAL service quality model and identified the determinants of perceived service quality components to be *reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding/knowing consumers, and tangibles.* The same authors later published several articles about the development of multiple-item scales for measuring consumer perceptions of service quality. The final scale consists of three dimensions: expectations, perceptions, and a point-allocation question assessing the importance of features the service company providing to consumers. The first two parts measure service quality across five dimensions: *tangibles, reliability, responsiveness,*

assurance, and empathy. T*angibles* construct is about tangible facilities, equipment, and the appearance of personnel. *Reliability* assesses the ability to perform the promised service dependably and accurately. *Responsiveness* is about willingness to help consumers and provide a prompt service. *Assurance* assesses the knowledge and courtesy of employees and their ability to inspire trust and confidence. *Empathy* is about caring individualized attention the firm provides its consumers (Parasuraman et al., 1991).

The focus of the SERVQUAL scale is on the traditional services provided by banks, appliance repair firms, assurance companies, and telephone companies. Services of these service types are delivered by companies' staffs. Consumer's perceived service quality is involving full service delivering process and abilities and attitude of staffs of service provider.

2.2.2 Electronic service quality

The original SERVQUAL instrument measures offline and people-delivered services. The later e-service quality multiple-item scale is more appropriately used to measure the service quality delivered by websites. The scale has two parts. The first is the basic E-S-QUAL scale consisting of 22 items in four dimensions: *efficiency, fulfillment, system svailability,* and *privacy.* The dimension of *efficiency* measures the speed and ease with which the website is accessed and used. *Fulfillment* assesses the extent to which the service provider deals with problems concerning order delivery and item availability. *System Availability* measures the technical functions of the website. *Privacy* is the degree to which the site protects consumer information. The items of these four dimensions can be answered by respondents having online shopping experiences because they are about routine works.

Because of the ambiguity of meaning of certain items, the researchers further developed a new e-recovery service quality scale (E-Rec S-QUAL) that consists of 11 items in three dimensions: *Responsiveness, compensation,* and *contact* (Parasuraman et al., 2005). The items of these three dimensions are about non-routine process of online shopping, so not all respondents have experiences about incurring online shopping problems. *Responsiveness* is to assess effective

handling of problems and returns. *Compensation* is defined as the extent to which the site compensates consumers for problems. *Contact* is about telephone or online representatives the site providing to assist consumers.

2.2.3 Mobile service quality

There are some discrepancies between Internet-based and non-Internet-based service quality measurements. Because of the features of m-commerce, mobile service quality is different from either traditional or electronic service quality. E-S-QUAL not only considers the service that companies deliver but also the effect of technology on the service quality. Mobile commerce refers to the mobile characteristics of wireless devices that support electronic service transactions. Although mobile commerce is frequently characterized as an extension of e-commerce, it can also be regarded as a separate channel that delivers unique value to consumers (Balasubramanian et al., 2002). Several studies have investigated the quality of mobile services. According to the suggestions of developing a scale provided by Hinkin (1998), converged related reviews which discussed mobile service in this research to develop scale items (The related dimensions in mobile service quality construct are shown as in Table 2). Some dimensions in mobile service quality construct which are not focusing on service, but on service providers' corporate image, technical network quality, or other influences will not be considered in this research.

Table 2. Dimensions related to the mobile service quality construct in previous studies

Author	Title	Dimensions related to the mobile service quality construct
Turela, Serenko, 2006	Satisfaction with mobile services in Canada: An empirical investigation	• Perceived quality
Wang & Liao, 2007	The conceptualization and measurement of m-commerce user satisfaction	• Content quality • Service quality
	The relationships among service quality, perceived value, customer satisfaction, and post-purchase intention in mobile value-added services	• Content quality • Navigation and visual design • Management and customer service • System reliability and connection quality
Lu, Zhang, & Wang, 2009	A multidimensional and hierarchical model of mobile service quality	• Design • Punctuality • Tangibles
Denga, Lua, Weib, & Zhanga, 2010	Understanding customer satisfaction and loyalty: An empirical study of mobile instant messages in China	• Service quality
Akter, D'Ambra, & Ray, 2010	Service quality of m-Health platforms: development and validation of a hierarchical model using PLS	• Service reliability • System efficiency • System availability • System privacy • Responsiveness • Assurance • Empathy • Functional benefit • Emotional benefit
Kumar & Lim, 2008	Age differences in mobile service perceptions: comparison of Generation Y and baby boomers	• Functional quality • Mobile service quality • Billing service • Consumer service
Santouridis & Trivellas, 2010	Investigating the impact of service quality and customer satisfaction on customer loyalty in mobile telephony in Greece	• Value-added services • Customer service • Pricing structure • Billing system

2.3 Scale development

Questionnaire surveys are an important and commonly used research method. A scale instrument can facilitate the conceptualization and operationalization of surveys (Chae et al., 2002). Hinkin (1988) provided a conceptual framework and a straightforward guide for scale development for survey research provides an overview of the main steps in this framework.

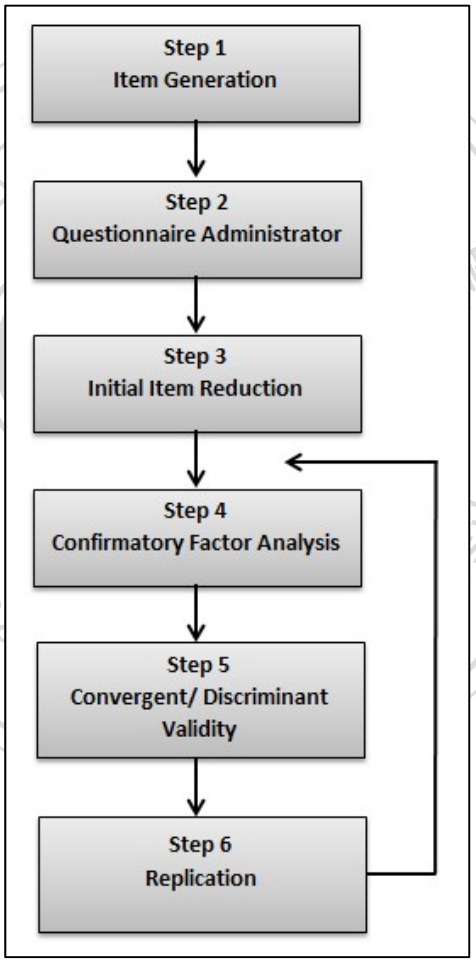

Figure 2. Scale development process

The first step is item generation. There are two methods for generating items. One is the deductive approach, which assumes that there is sufficient theoretical foundation to generate the initial set of items. The other is inductive scale development, which is appropriate when the

construct meaning cannot be easily identified and there is no adequate theory with which to generate the items. There are numerous guidelines that should be followed in writing items. For example, statements should be simple and as short as possible, and the language used should be familiar to the target respondents. All of the items in the same construct should be consistent, and items that assess behavior should not be mixed up with items that assess affective responses. After items have been generated, they should be examined a content validity assessment. It will take a pretest to permit the deletion of items that are deemed to be conceptually inconsistent by factor analysis. Factor loading 0.4 or greater on the appropriate factor with no major cross loading were judged as meaningful. Harvey, Billings, and Nilan (1985) suggested that at least four items are needed to test the homogeneity of each latent construct.

Finally, the fourth step uses confirmatory factor analysis to allow the researcher to quantitatively assess the quality of the factor structure, thereby providing further evidence of the construct validity of the new measure. The convergent and discriminant validity are then assessed. The replication should include confirmatory factor analysis, assessment of internal consistency reliability, and convergent, discriminant, and criterion-related validity assessment. Theses analyses can provide researcher stronger evidences for a new good measure scale.

Chapter 3 Research method

The purpose of this study was to develop a scale for measuring mobile service quality. The development process was based on the steps proposed by Hinkin (1998). The approach and processes of constructing the scale are: (1)items development, (2)items simplification and content validity establishment, (3)pretesting and initial item reduction, (4)exploratory factor analysis and item reduction, (5)confirmatory data analysis, (6)convergent and discriminant validity assessment, (7)the regression analysis between constructs of M-S-QUAL and *perceived value* and *loyalty intentions*. Each step is explained in the following sections.

3.1 Questionnaire design

The method of developing the questionnaire items is using the deductive approach, which assumes that there is sufficient theoretical foundation to generate the initial set of items. Due to the theories about SERVQUAL are developed well, the deductive approach is suitable. The questionnaire scale will be developed from constructs of electronic services quality scale and correlative literatures. The questionnaire is including four parts: (1) demographic data, (2) handheld devices usage, (3) Mobile service use experiences, (4) overall service assessment. The third part mobile service use experience is M-S-QUAL measurement, and the fourth part is the overall quality assessment to establish nomological validity.

3.1.1 Modifying E-S-QUAL to mobile scenario

The foundation used for constructing the questionnaire was the multiple-item scale for assessing electronic service quality, including both of its original parts E-S-QUAL and E-RecS-QUAL parts. E-S-QUAL is a 22-item scale with the four dimensions of *efficiency, fulfillment, system availability,* and *privacy*. E-RecS-QUAL is salient to consumers who have non-routine encounters with a site, and contains 11 items in three dimensions: *responsiveness, compensation*, and *contact*. E-S-QUAL defines the degree to which a website allows for effective and efficient shopping, purchasing, and product or service delivery. This is different from assessments of the

quality of traditional e-commerce services. E-S-QUAL is an important instrument with an extensive scope, it not only includes the traditional dimensions of service quality, but also covers the technical level, such as ease of use, speed of browsing, privacy and security, and other technical considerations. Mobile commerce is a subset of electronic commerce, and in this context consumers use different devices to purchase online. When consumers use mobile service applications, they will have opinions about the site or application's usefulness, ease of use, speed of launching, and functions. Thus, the dimensions of technical quality are needed to assess the technical aspects of mobile services.

The original 33-item SERVQUAL scale developed by Parasuraman et al. (2005) forms the foundation of M-S-QUAL. As the survey respondents are likely to be of different ages and their main language will be Chinese, the formal questionnaire was generated in Chinese by translating the original items into Chinese, with some modification of the descriptions to suit the mobile service context. There are also slight differences in the consumer behavior of electronic commerce and mobile commerce customers. E-commerce consumers buy products or services online because it is convenient and can save both time and money. However, in m-commerce, consumers want to consume in their present location and at a certain time. Further, there are additional types of intangible products in m-commerce, such as applications and ring tone downloads. To avoid making it difficult for the respondents to answer the questionnaire, some of the dimensions were thus separated into two parts: tangible and intangible shopping. For example, the dimension of *fulfillment* was separated into tangible and intangible products. The delivery of intangible products such as application downloads is different from tangible product delivery. Consumers accomplish application downloads in a matter of minutes, whereas tangible products need deliverymen and may take several days.

3.1.2 Developing a preliminary scale

According to Hinkin's guide to the development of scales, item generation can be conducted using a deductive approach based on a theoretical foundation. There are many studies of m-commerce satisfaction, consumer loyalty, and mobile service quality. Turela and Serenko

(2006)0 used the construct of *perceived expectations* to represent both previous service experience and forward-looking beliefs about a provider's ability to offer the desired quality. *Perceived quality* is the served market evaluation of recent service usage experience. It is derived from degree of personalization and service reliability. *Perceived value* is the price dimension of perceived quality, and addresses the perception of value for money. The three constructs are all related to service quality, but as the service quality assessed in our research relates to mobile services and consumer expectations before use are not considered, the construct of perceived expectations was not used. Perceived service quality is applied instead. The price dimension of perceived quality is not considered in E-S-QUAL. The mobile service quality measurement dimensions are identified as *network coverage, mobile device, value-added services, billing system, convenience*, and *price structure* (Choi et al., 2007). Santouridis and Trivellas (2010) identified the crucial factors that lead to consumer loyalty in the mobile telephone sector to be service quality and consumer satisfaction. The mediation effect of consumer satisfaction on the relationship between service quality and consumer loyalty was also examined. We adapted their *bill* construct to measure the perception of quality in terms of price and billing, which includes how economical the service is and whether it provides convenient payment procedures (Wang & Liao, 2007). Other items were modified from the basic scale to fit the new dimensions.

Although the basic scale contains a technical dimension, the content of mobile services varies. Wang and Liao (2007) addressed this concern by using the conceptualization and measurement of m-commerce user satisfaction (MCUS) constructs. The MCUS is separated into four sub-constructs that include content quality, appearance, service quality, and ease of use. Kuo, Wub, and Deng (2009) developed an instrument to evaluate the quality of value-added mobile services and further investigated the relationships among service quality, perceived value, consumer satisfaction, and post-purchase intention. The construct of service quality was initially grounded on four dimensions (content quality, navigation and visual design, management and consumer service, and system reliability and connection quality) and was measured by 24 items adapted from Chae et al. (2002). The construct of content quality measures whether the mobile site provides the appropriate and correct information.

The M-S-QUAL scale contains some additional dimensions and items to the original scale, such as billing and content quality. The billing issue of m-commerce is different from e-commerce and payment method is also usually different. Due to the content richness of mobile service is more various than electronic service, mobile site's content should be assessed, too. The research model in Figure **3** shows the dimensions we used to measure the mobile service quality. An exploratory M-S-QUAL instrument involving 50/ 49 items representing all facets of the M-S-QUAL domain formed our initial scale of tangible/ intangible products shopping scope, with two global measures *perceived value* (10 items) and *loyalty intentions* (5 items) as criterion (Parasuraman et al., 2005). The M-S-QUAL instrument was developed using a seven point Likert-type scale, ranging from ''strongly disagree'' to ''strongly agree''. The 50/49 items cover 9 dimensions (as shown in Appendix A), and the concise definitions of which are stated as follow.

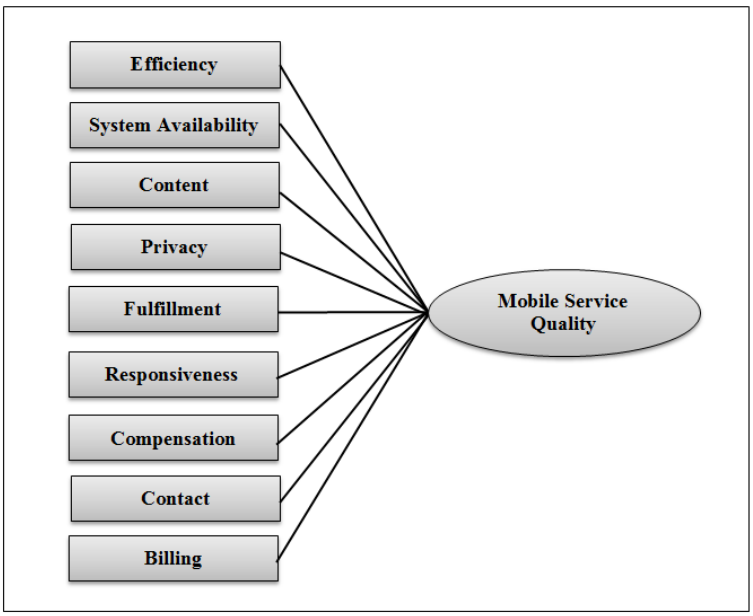

Figure 3. Research model

- *Efficiency*: The degree to which the site is easy and quick to use
- *System Availability*: The possibility of getting the required technical functions and an accurate service promise

- *Content*: Whether the information on the mobile site is appropriate and correct
- *Fulfillment*: The extent to which the site's promises about order delivery and item availability are fulfilled
- *Privacy*: The degree to which the consumer perceives the site to be safe and the extent to which their personal information is protected
- *Responsiveness*: The effectiveness of problem handling and the returns policy of the site
- *Compensation*: The degree to which the site compensates consumers for problems that they encounter
- *Contact*: The availability of assistance through telephone or online representatives
- *Billing*: Value for money and billing

3.1.3 Items simplification and content validity establishment

After items have been generated, they should be subjected to an assessment of content validity. This process will serve as a pretest, permitting the deletion of items that are deemed to be conceptually inconsistent. It is to provide ten naive respondents with construct definitions, asking them to match items with their corresponding definition, also providing an "unclassified" category for items that are determined not to fit one of definitions. An acceptable agreement index is the percentage of respondents who correctly classify an item which minimum of 75% (Mackenzie et al., 1991). The retained items should represent a reasonable measure of the construct under examination and reduce the need for subsequent scale modification.

3.2 Data collection

The items of questionnaire in this research are based on the related literature. In order to consolidate the quality of the scale instrument, we will take a pretest and revise the content of scale, and strengthen completeness of the items. After, the study will conduct an online survey to collect a sample of mobile users.

3.2.1 Sampling and data collection

We contacted the potential respondents and screened them to determine whether they have sufficient experiences of mobile services. The online questionnaire's link was posted at Facebook public activity page and discussion boards in PTT Bulletin Board System (BBS).

Potential respondents must have used mobile services or applications for a least three months and have at least three mobile shopping or application download experiences. Mobile services are still in the growth stage, and there are many new users who may not have sufficient mobile service usage experience, who would be inappropriate for the sample. Concise questions will be developed to filter out inappropriate respondents. The answers that the respondents give to the first three questions will determine the questions that they then answer, which will be appropriate to their situation. Qualified respondents will be asked to set the best or the worst mobile service which they have used. That is easier for respondents to answer the M-S-QUAL questionnaire because the best or the worst service experience is usually impressed. The best or the worst mobile service setting for respondents is random, and it is to exam the correlation between M-S-QUAL and *perceived value* and *loyalty intentions*.

3.3 Statistical methods for data analysis

In this study, we employed descriptive statistical analysis, item correlation analysis, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA), and also examined the reliability and validity of the scale. Descriptive statistical analysis is used to summarize the characteristics of respondents and the results of the research variables. Item analysis was

undertaken before exploratory factor analysis, and included missing values analysis and corrected item-total correlation checking. Item analysis can discriminate between related items on the same construct by way of corrected item-total correlations, for which the value should be greater than 0.7. After completing the item analysis, exploratory factor analysis was used to establish the factor structure of each construct and reduce the set of observed variables to a smaller set of variables according to factor loading threshold (greater than 0.4).

Quantitative analysis of the questionnaire was conducted using SPSS18 and AMOS18 software. Confirmatory factor analysis was then undertaken to confirm the factor structure we extracted in the EFA and assess construct validity, both convergent and discriminant. To evaluate the fit of the models, the ratio of the x^2 to the degree of freedom (x^2 /df), the goodness of fit index (GFI), the incremental fit index (IFI), and the normed fit index (NFI) were employed. The value of x^2/df should be less than 3 and that a good fit is normally assumed when the GFI, IFI, and NFI are close to 1, for example, greater than 0.9. A smaller value of $x^2$is more desirable in that it supports the proposed theoretical model, but values of x^2also increase as the sample size increases. Hair et al. (2010) indicated that the goodness-of-fit of the overall model is indicated by how well it reproduces the observed covariance matrix among the indicator items. It can be classified into the following four categories: Chi-square measures including chi-square, degree of freedom (df) and probability. Measures of absolute fit, including the goodness-of-fit index (GFI), root mean square error of approximation (RMSEA), root mean square residual (RMR), standardized root mean square residual (SRMR) and normed chi-square. Incremental fit measures including the normed fit index (NFI) and the comparative fit index (CFI). Parsimony fit measures including the adjusted goodness-of-fit index (AGFI) and the parsimony normed fit index (PNFI). Chi-square (x^2) is a basic measurement of the differences between the observed and estimated covariance matrices (Hair et al. 2010). GFI was an early attempt to produce a fit statistic. The range of possible GFI values is between 0 and 1, and if the value is 0.90 or higher the fit is considered to be good (Hair et al. 2010); however, MacCallum and Hong (1997) suggested that the GFI value could decrease to 0.80 in usage.

Reliability measures the internal consistency and stability of the measurement instrument, which adopted Cronbach-α coefficient to measure the consistency of the items in the same dimension. The α coefficient of these measures is expected to over the threshold of 0.7 to provide an indication of strong item covariance. Validity is the degree to which the instrument can measure the specific content of the construct precisely. The convergent, discriminant, and criterion-related validity was estimated in this research.

3.4 Pretesting and initial item reduction

Subjects of the pretesting questionnaire survey were the college students of department of Management Information Systems of National Chengchi University. We delivered 140 questionnaires and the overall response was 118. We got rid of the sample that respondents' experiences were not sufficient (under one month), and the valid sample size was 96.

In the pretest phase, EFA was used to pretest the questionnaire in order to reduce the items to a manageable and meaningful set of factors, and the reliability of the internal consistency was measured using Cronbach's coefficient alpha. Results of the Kaiser Meyer Olkin (KMO) test and of Bartlett's sphericity test were obtained before performing the factor analyses. The KMO test indicated whether a sufficient number of items had been predicted by each construct, and Bartlett's test indicated whether the items were sufficiently highly correlated to provide a reasonable basis for factor analysis. The value of KMO should be greater than 0.7 and the Bartlett's sphericity test should reach the significant level. In the EFA stage, all constructs reached the threshold of KMP test and Bartlett's sphericity. Items would be deleted with the factor loading on one factor was lower than 0.6 or the loadings on more than two factors. There were six items deleted at pretest stage

Chapter 4 Data analysis and scale purification

4.1 Sampling data

The data used to test the measurement model were gathered from a sample of respondents surfing the PTT Bulletin Board System (BBS) and Facebook. The link to the online questionnaire was posted on the Facebook public activity page and the discussion boards of PTT BBS (the iPhone, Android, WindowsPhone, Q_ary, and Graduate boards). Respondents were first asked whether they had ever used mobile services on mobile handheld devices. If they replied in the affirmative, they were asked to participate in the survey. It took two weeks to gather data from 702 respondents. These respondents were screened by how long they had been using mobile services; only those who had used mobile services for more than three months were directed to the complete the self-administered multiple-item questionnaire. Of the initial 702 respondents, 578 did so for a valid response rate of 82%. The respondents gathering result is shown in Table 3. They were instructed in the questionnaire to answer the questions by assessing either their perceived best or worst mobile service, and the data were categorized according to whether the mobile service is pertaining to tangible or intangible product transactions. For each question, respondents were asked to choose the response which best described their level of agreement.

Table 3. Respondents gathering result

	Number	Rate (%)
Overall respondents	702	100
Invalid questionnaires	124	17.66
Valid questionnaires	578	82.34

Table 4 summarizes the demographic descriptive statistics of the sample. The demographic descriptive statistics for the sample showed it included 338 (58.5%) males and 240 (41.5%) females. The percentage of males was greater than that of females. Most of the respondents were between 21 and 35 years old (89.6%), had a bachelor's or master's degree (94.6%), and had a monthly disposable income of NT$20,000 or less (66.7%). Many respondents were professionals in information technology-related industries or college students. (59.4%).

Table 4. Demographic descriptive statistics

Measure	Option	Frequency	Rate (%)
Gender	Male	338	58.5
	Female	240	41.5
Age	<20	39	6.7
	21-25	334	57.8
	26-35	184	31.8
	36-45	20	3.5
	>46	1	0.2
Educational level	Junior high school	2	0.3
	Senior high school	20	3.5
	Bachelor	336	58.1
	Master	211	36.5
	Ph. D	9	1.6
Occupation	Administrative personnel	34	5.9
	Professional	18	3.1
	Academic/ education	39	6.7
	Computer/ engineering	98	17.0
	Mechanical technician	2	0.3
	Service industry	43	7.4
	Junior staff	2	0.3
	Sales/ marketing	16	2.8
	Trade	5	0.9
	College students	245	42.4
	Middle/ elementary school students	5	0.9
	Household industry	4	0.7
	Self-employee	2	0.3
	Job hunting	13	2.2
	Retired	1	0.2
	Other	51	8.8
Seniority	Student	264	45.7
	1-3 years	186	32.2
	3-5 years	48	8.3
	5-7 years	26	4.5
	7-9 years	23	4.0
	9-11 years	14	2.4
	11-13 years	8	1.4
	13-15 years	4	0.7
	>15 years	5	0.9
Monthly disposable income (NT dollar)	<10,000	239	41.3
	10,001-20,000	147	25.4
	20,001-30,000	74	12.8
	30,001-40,000	58	10.0
	40,001-50,000	32	5.5
	>50,000	28	4.8

Most respondents' handheld devices were smartphones (73.9%), and they used their handheld devices for between one and two hours per day (33%). We also looked into the distribution of the respondents across telecommunications services operators. The proportions of respondents who were customers of Chunghwa Telecom, Taiwan Mobile, Far Eastone Telecommunications, VIBO, and Asia Pacific Telecom were 64.9%, 20.8%, 10.7%, 1.6%, and 0.3%, respectively (Table 5).

Table 5. Handheld devices usage descriptive data

Measure	Option	Frequency	Rate (%)
Handheld devices	3G mobile phone	100	17.3
	Smartphone	427	73.9
	Tablet	42	7.3
	Portable game system	2	.3
	Other	7	1.2
Usage per day	0~1 hour	88	15.2
	1~2 hours	195	33.7
	2~3 hours	145	25.1
	3~4 hours	53	9.2
	4~5 hours	30	5.2
	More than 5 hours	67	11.6
Telecommunications services operator	Chunghwa Telecom	375	64.9
	Taiwan Mobile	120	20.8
	Far Eastone Telecommunications	62	10.7
	VIBO	9	1.6
	Asia Pacific Telecom	2	.3
	Other	10	1.7
Telecommunications monthly fee	Below NT$200	42	7.3
	NT$200-600	138	23.9
	NT$600-1,100	192	33.2
	NT$1,100-1,500	179	31.0
	More than NT$1,500	27	4.7

Table 6 shows the respondents' mobile service use experiences. 488 (84.43%) respondents answered the questionnaires based on their intangible product shopping experience, and 90 (15.57%) answered the questionnaires according to their experience of shopping for tangible products.. The ranking of service types were messaging/voice calls (27.5%), mobile

socializing (21.5%), games and entertainment (13.7%), and information services (13.7%), to positioning and navigation (12.7%).

Table 6. Mobile service use experience descriptive data

Measure	Option	Frequency	Rate (%)
Product types	Tangible products	90	15.6
	Intangible products	488	84.4
Mobile service use experience	Messaging/ voice calls	159	27.5
	Positioning and navigation	71	12.3
	Value-added service (e.g. music/ magazine subscriptions)	32	5.5
	Mobile trading services (e.g. Shopping and financial services)	29	5.0
	Mobile socializing	124	21.5
	Games and entertainment	79	13.7
	Information services (e.g. news, stock quotes, weather, etc.)	79	13.7
	Other	5	0.9

4.2 Item analysis and reliability estimation

The 45-item and 43-item instruments were refined by analyzing the pooled data which were collected from experienced users across tangible and intangible products shopping and on different types of mobile handheld devices. Because the primary purpose of this study was to develop a reliable instrument that accurately measures M-S-QUAL for various types of mobile service, it was considered appropriate to pool the sample data.

The first step in purifying the instrument was to delete items based on Cronbach's α and corrected item-total correlations (Cronbach, 1951). Next, prior to identifying its underlying dimensions using exploratory factor analysis, based on the assumption that all items in the M-SQ instrument share a common core, the coefficient α and corrected item-total correlations for the 45-item/43-item M-SQ instrument of tangible/intangible products scope were calculated. Initially, the value of the Cronbach's α ranged from 0.83 to 0.97 across nine constructs of both tangible and intangible products transactions (Table 7). We then used the item's corrected item-total correlation of each item as the criterion for deciding whether to delete the item. Although the

corrected item-total correlation value recommended is greater than 0.5 (Churchill, 1979), we chose a stricter criterion of 0.7. If the corrected item-total correlation value was below 0.7, the item was deleted.

Table 7. Item analysis – reliability

Construct	Tangible products		Intangible products	
	Number of items	Cronbach's α	Number of items	Cronbach's α
Efficiency	4	0.96	4	0.94
System available	3	0.92	3	0.94
Content	7	0.96	7	0.94
Privacy	3	0.93	3	0.93
Contact	7	0.97	7	0.96
Billing	7	0.96	7	0.95
Fulfillment	7	0.95	5	0.90
Responsiveness	4	0.93	4	0.93
Compensation	3	0.83	3	0.92

We then recalculated the Cronbach's α values for the remaining items, examined the new corrected item-total correlations, and deleted more items if necessary. The cut-off values were considered high enough to ensure that the items retained were adequate measures of the M-S-QUAL construct. Three items were eliminated at this stage, resulting in a 44-item scale for measuring tangible products M-S-QUAL and a 41-item scale for measuring intangible products M-S-QUAL (as shown in Table **8**).

Table 8. Item analysis – corrected item- total correlation

Item code	Item	Corrected item-to-total correlation	
		Tangible products	Intangible products
Ef_1	It enables me to complete a transaction quickly.	0.91	0.89
Ef_2	It loads its pages fast.	0.90	0.87
Ef_3	This site is simple to use.	0.88	0.80
Ef_4	This site enables me to get on to it quickly.	0.92	0.88
SA_1	This site launches and runs right away.	0.86	0.85
SA_2	This site does not crash.	0.80	0.87
SA_3	Pages at this site do not freeze after I enter my order information.	0.85	0.87
Ctt_1	The content of the mobile web site is concise.	0.87	0.82
Ctt_2	The content of the mobile web site is accurate.	0.88	0.84
Ctt_3	This web site provides complete content.	0.85	0.84
Ctt_4	This web site provides appropriate content.	0.86	0.87
Ctt_5	This web site provides important content.	0.84	0.86
Ctt_6	This web site provides fashionable content.	0.81	0.72
Ctt_7	This web site provides regularly updated content.	0.86	0.75
Pr_1	It protects information about my web-shopping behavior.	0.87	0.85
Pr_2	It does not share my personal information with other sites.	0.89	0.88
Pr_3	This site protects information about my credit card.	0.80	0.83
Con_1	Friendliness when reporting complaint.	0.91	0.86
Con_2	Service agents provide consistent advice.	0.90	0.87
Con_3	Customer service representative is polite.	0.89	0.87
Con_4	Call center personnel are able to help with problems.	0.86	0.89
Con_5	It offers the ability to speak to a live person if there is a problem.	0.90	0.86
Con_6	This site provides a telephone number to reach the company.	0.89	0.86
Con_7	This site has customer service representatives available online.	0.85	0.81
Bi_1	The mobile web site provides convenient payment procedures.	0.85	0.81
Bi_2	Provides accurate billing.	0.89	0.86
Bi_3	Makes it easy to understand and resolve billing issues.	0.84	0.83
Bi_4	Resolves billing issues quickly.	0.92	0.88
Bi_5	Variety of price schedules	0.83	0.83
Bi_6	Possibility of freely choosing price schedules	0.80	0.82
Bi_7	When the download was completed, the trading information was sent back in a timely fashion.	0.80	0.80
Ful_p_1	It delivers orders when promised.	0.85	-
Ful_p_2	This site makes items available for delivery within a suitable timeframe.	0.90	-

Item code	Item	Corrected item-to-total correlation	
		Tangible products	Intangible products
Ful_p_3	It quickly delivers what I order.	0.80	-
Ful_p_4	It sends out the items ordered.	0.89	-
Ful_p_5	It has in stock the items the company claims to have.	0.81	-
Ful_p_6	It is truthful about its offerings.	0.80	-
Ful_p_7	It makes accurate promises about delivery of products.	0.82	-
Re_p_1	It provides me with convenient options for returning items.	0.84	-
Re_p_2	This site handles product returns well.	0.85	-
Re_p_3	This site offers a meaningful guarantee.	0.88	-
Re_p_4	It tells me what to do if my transaction is not processed.	0.75	-
Com_p_1	This site compensates me for problems it creates.	0.74	-
Com_p_2	It compensates me when what I ordered doesn't arrive on time.	0.79	-
Ful_v_1	It delivers orders when promised.	-	0.76
Ful_v_2	This site makes items available for delivery within a suitable timeframe.	-	0.83
Ful_v_3	It quickly delivers what I order.	-	0.80
Ful_v_4	It has in stock the items the company claims to have.	-	0.83
Re_v_1	It provides me with convenient options for returning items.	-	0.87
Re_v_2	This site handles product returns well.	-	0.89
Re_v_3	This site offers a meaningful guarantee.	-	0.89
Com_v_1	This site compensates me for problems it creates.	-	0.87
Com_v_2	It compensates me when what I ordered doesn't arrive on time.	-	0.87
Com_v_3	It picks up items I want to return from my home or business.	-	0.76

4.3 Identifying the factor structure of the M-S-QUAL construct

An exploratory factor analysis (EFA) was conducted to examine the factor structure of the 44- and 41-item instruments in more detail. Data on tangible products M-S-QUAL (90valid responses) and intangible products M-S-QUAL (488 responses) were analyzed separately. Before proceeding with our exploratory factor analysis, we measured KMO and conducted Bartlett's sphericity test to check whether the inter-correlation matrix contained sufficient common variance. As shown in Table 9, a KMO measure of greater than 0.7 and a significant,Bartlett's sphericity test result, indicating exploratory factor analysis should be conducted.

Table 9. KMO measure and Bartlett's sphericity test

		Tangible products	Intangible products
Kaiser-Meyer-Olkin measure of sampling adequacy		0.922	0.885
Bartlett's sphericity test	x^2 value	9437.043	2280.642
	df	171	231.000
	Significance level	0.000	0.000

4.3.1 Exploratory factor analysis

We then conducted an EFA to identify the dimensionality of the 44- and 41-item scale using the principle component analysis as the extraction technique, and the varimax orthogonal rotation method. We extracted factors with eigenvalues greater than or equal to 1, yielding four factors for tangible products M-S-QUAL and five factors for intangible products. The employed decision rules applied to identify the factors underlying the M-S-QUAL construct were (1) delete items with a factor loading of less than 0.7 or the loading of greater than 0.3 on two or more factors, (2) mantain a simple factor structure, and (3) exclude single-item factors from the perspective of parsimony (Hinkin, 1998; Straub, 1989).

Three iterative runs based on the aforesaid rules resulted in the deletion of 29 *tangible product* M-S-QUAL items. At the end of the factor analysis procedure, we obtained a 4-construct, 15-item instrument. The four constructs were interpreted as efficiency, fulfillment, contact, and recovery, explaining 81.34% of the variance in the dataset. Due to the small sample size (90) for the tangible products shopping experiences, it was not appropriate to conduct CFA in the next stage. For CFA, a minimum sample of 200 has been recommended (Hoelter, 1983), so the factor analysis of tangible products M-S-QUAL ended in this stage. Table 10 summarizes the factor loadings for the condensed 15-item instrument. The significant loading of items on each factor indicates convergent validity, while the discriminant validity of the instrument found supports from the fact that items showed little cross-loadings

Table 10. EFA results for tangible products M-S-QUAL

Construct	Item code	Item description	Rotated factor loading	Eigenvalue	Variance explained (%)	Composite reliability	Average variance extracted
Efficiency	Ef_4	This site enables me to get on to it quickly.	.880				
	Ef_1	It enables me to complete a transaction quickly.	.858				
	Ef_2	It loads its pages fast.	.826	8.50	55.46	0.91	66.70%
	SA_3	Pages at this site do not freeze after I enter my order information.	.804				
	SA_2	This site does not crash.	.704				
Fulfillment	Ful_p_2	This site makes items available for delivery within a suitable timeframe.	.894				
	Ful_p_4	It sends out the items ordered.	.826				
	Ful_p_1	It delivers orders when promised.	.791	1.85	66.59	0.89	66.52%
	Ful_p_6	It is truthful about its offerings.	.744				
Contact	Con_5	It offers the ability to speak to a live person if there is a problem.	.838				
	Con_6	This site provides a telephone number to reach the company.	.820	1.57	75.92	0.86	66.57%
	Con_2	Service agents provide consistent advice.	.789				
Recovery	Re_p_2	This site handles product returns well.	.811				
	Re_p_3	This site offers a meaningful guarantee.	.767				
	Re_p_1	It provides me with convenient options for returning items.	.766	1.00	81.34	0.82	61.09%

The EFA of intangible products M-S-QUAL also followed the rules, and 11 items were deleted. We obtained a 7-factor, 29-item instrument in this stage and used the result to proceed to CFA (see Table 11).

Table 11. EFA results for intangible product M-S-QUAL

Construct	Item code	Item description	Rotated factor loading	Eigenvalue	Variance Explained (%)
Contact	Con_4	Call-center personnel are able to help with problems.	.829		
	Con_5	It offers the ability to speak to a live person if there is a problem.	.791		
	Con_2	Service agents provide consistent advice.	.782	9.53	49.15
	Con_6	This site provides a telephone number to reach the company.	.758		
	Con_1	Friendliness when reporting a complaint.	.751		

Construct	Item code	Item description	Rotated factor loading	Eigenvalue	Variance Explained (%)
Recovery	Re_v_3	This site offers a meaningful guarantee.	.904		
	Re_v_2	This site handles product returns well.	.891		
	Re_v_1	It provides me with convenient options for returning items.	.873	2.33	60.35
	Com_v_3	It picks up items I want to return from my home or business.	.718		
Fulfillment	Ful_v_2	This site makes items available for delivery within a suitable timeframe.	.884		
	Ful_v_1	It delivers orders when promised.	.837	2.08	70.36
	Ful_v_4	It has in stock the items the company claims to have.	.758		
	Ful_v_3	It quickly delivers what I order.	.741		
Privacy	Pr_2	It does not share my personal information with other sites.	.856		
	Pr_1	It protects information about my web-shopping behavior.	.779	1.17	75.60
	Pr_3	This site protects information about my credit card.	.733		
Efficiency	Ef_2	It loads its pages fast.	.813		
	Ef_1	It enables me to complete a transaction quickly.	.780	1.1	80.39
	Ef_4	This site enables me to get on to it quickly.	.777		

4.3.2 Confirmatory factor analysis

The purpose of the analysis in this stage was to test whether the intangible products M-SQ's seven dimensions resulted from EFA were appropriate indicators of mobile service quality. The factor structure extracted by EFA needs to be confirmed by drawing model in AMOS Graphics and linking the valid sample data to the model to calculate path coefficients and model fits. We deleted the items, namely, the observed variables in AMOS, with the low path coefficients (below 0.7) and checked the model fits iteratively.

CFA is a part of structural equation modeling (SEM) which is permitting existence of measurement errors or residuals between exogenous variables and endogenous variables. Modification indices suggested remedies to discrepancies between the proposed and estimated model. However, there was not much we can do by way of adding regression lines to fix model

fit, as all regression lines between latent and observed variables are already in place. We looked the modification indices for the covariances in CFA. We could not covary error terms with observed or latent variables, or with other error terms that are not part of the same factor. The modification available to us is to covary error terms that are part of the same factor.

The other model adjustment method depends on the standardized residual covariances among observed variables. If the values of the standardized residual covariances were too high (greater than 2), the items could be considered for deletion. The above three methods were executed until the model fits were good. The final model after CFA is shown in Figure 4, and all paths in the model were confirmed, indicating a good fit between the model and the data. We obtained a 4-construct, 16-item instrument, and used the standardized factor loading to calculate composite reliability and average variance extracted (AVEs) of each construct to verify the convergent validity (see Table 12).

Table 12. CFA and reliability results (intangible products)

Construct	Item code	Item	Factor loading	Composite reliability	Average variance extracted
Efficiency	Ef_4	This site enables me to get on to it quickly.	0.90	0.939	83.79%
	Ef_1	It enables me to complete a transaction quickly.	0.91		
	Ef_2	It loads its pages fast	0.93		
Fulfillment	Ful_v_3	It quickly delivers what I order.	0.92	0.924	80.26%
	Ful_v_1	It delivers orders when promised.	0.88		
	Ful_v_2	This site makes items available for delivery within a suitable timeframe.	0.88		
Privacy	Pr_3	This site protects information about my credit card.	0.88	0.930	81.59%
	Pr_1	It protects information about my web-shopping behavior.	0.91		
	Pr_2	It does not share my personal information with other sites.	0.93		
Contact	Con_1	Friendliness when reporting a complaint.	0.92	0.916	78.36%
	Con_2	Service agents provide consistent advice.	0.92		
	Con_5	It offers the ability to speak to a live person if there is a problem.	0.82		
	Con_6	This site provides a telephone number to reach the company.	0.80		
Recovery	Re_v_1	It provides me with convenient options for returning items.	0.92	0.956	87.81%
	Re_v_2	This site handles product returns well.	0.94		
	Re_v_3	This site offers a meaningful guarantee.	0.94		

Model fit measures can be obtained to assess how well the proposed model captures the covariance between all items or measures in the model. If the constraints the researcher has imposed on the model are inconsistent with the sample data, then the results of statistical tests of model fit will indicate a poor fit and the model will be rejected. Poor fit may be due to some items measuring multiple factors, or may be attributable to some items under a factor being more related to others (wiki). The Chi-square (x^2) statistic is used most often as a descriptive index of fit, rather than as a statistical test. A smaller x^2 value indicates s better fitting models with an insignificant x^2 being desirable. In larger sample sizes, power is so high that even models with only trivial misspecifications are likely to be rejected. The recommended values for goodness-of-fit and the CFA results are summarized in Table 13. The overall structural fit results of these analyses showed the model provided a reasonable degree of fit.

Table 13. Comparisons of goodness-of-fit indices for the model

Model Fit Indices	Criterion Guidelines	CFA Results (Intangible)
Chi-square (x^2)		232.675
Degree of freedom		92
Absolute fit measures		
GFI	＞.80 (MacCallum & Hong, 1997)	0.945
RMSEA	＜.10 (Steiger, 1990)	0.056
SRMR	＜.05 (Jöreskog & Sörbom, 1992)	
Normed chi-square (x^2/df)	＜3 (Hair et al., 2010)	2.529
Incremental fit measures		
NFI	＞.90 (Bentler, 1992)	0.97
CFI	＞.90 (Gerbing & Anderson, 1992)	0.982
Parsimony fit measurement		
AGFI	＞.80 (MacCallum & Hong, 1997)	0.918

4.4 Assessing reliability and validity

Reliability measures the internal consistency and stability of the measurement instrument, in which the Cronbach's-α coefficient is used to measure the consistency of items in the same dimension. The α coefficients of such measures are expected to be over the threshold of 0.7 to provide an indication of strong item covariance. Validity represents the degree to which the

instrument measures the specific content of the construct. In this study, we measured the convergent, discriminant and criterion-related validity of the instruments.

4.4.1 Reliability

Reliability was evaluated by assessing the internal consistency of the items representing each factor using Cronbach's α. Table 14 summarizes the Cronbach's α calculations, showing a very high degree of reliability for each factor.

Table 14. Value of Cronbach's α for each factor

Construct	Tangible products		Intangible products	
	Number of items	Cronbach's α	Number of items	Cronbach's α
Efficiency	5	0.953	3	0.939
Fulfillment	4	0.932	3	0.902
Contact	3	0.935	3	0.931
Recovery	3	0.931	4	0.955
Privacy	-	-	3	0.929

4.4.2 Discriminant and convergent validity

We used items' factor loadings which were analyzed by CFA to test the validity. First, the standardized factor loadings and average variance extracted (AVEs) of each construct were used to verify the convergent validity. For each construct, the standardized factor loading was above the threshold of 0.7 (Barclay et al., 1995) and the AVE was higher than 0.5 (Fornell & Larcker, 1981). Besides, the composite reliability for each construct was also above the recommended value of 0.7 (Bagozzi & Yi, 1988). The instrument had good convergent validity as shown in Table 10.

To examine the discriminant validity, we compared the squared correlation coefficients between factors with average variance extracted (AVE). If the AVE of one factor was above the square of its correlation coefficients with other factors, then the sample had good discriminant validity (Fornell & Larcker, 1981). Table 15 shows the correlations among factors. Diagonal elements (in bold) are the square root of the average variance extracted (AVE). These results showed that the instrument had good discriminant validity.

Table 15. Correlation matrix for intangible products

	Efficiency	Privacy	Contact	Fulfillment	Recovery
Efficiency	**0.91**				
Privacy	0.49**	**0.90**			
Contact	0.55**	0.65**	**0.88**		
Fulfillment	0.56**	0.37**	0.40**	**0.89**	
Recovery	0.39**	0.37**	0.50**	0.33**	**0.93**

** p<0.01

4.4.3 Nomological validity

Nomological validity was evaluated by regression analysis. We used perceived value (PV) as the dependent variables. In the intangible products M-S-QUAL, R^2 is 0.724, and the results of regression showed that the effect of efficiency, contact, and recovery are significant. Thus, the nomological validity was established.

Table 16. Result of regression analysis of M-S-QUAL and PV

Variable	Perceived value	
	Standardized regression coefficient	Variance Inflation Factor
Efficiency	0.27***	1.852
Fulfillment	0.064	1.832
Contact	0.259***	2.203
Recovery	0.253***	1.508
Privacy	-0.19	1.389
F= 534.395***, R^2=0.724		

*** p<0.001

We also used loyalty intentions (LI) as dependent variables to conduct a regression analysis. The value of R^2 is 0.724, and the results of regression showed that the effect of efficiency, contact, and recovery are significant. Again, the nomological validity was established.

Table 17. Result of regression analysis of M-S-QUAL and RI

Variable	Loyalty intentions	
	Standardized regression coefficient	Variance Inflation Factor
Efficiency	0.296***	1.852
Fulfillment	-0.007	1.832
Contact	0.348***	2.203
Recovery	0.189***	1.508
Privacy	0.39	1.389
F= 408.018***, R^2=0.676		

*** p<0.001

4.5 Data analysis result

In this study, we tested a model of mobile service quality based on the results of exploratory and confirmatory factor analysis. The proposed model comprises nine constructs obtained by deduction. Some items in the initial scale were deleted as a result of exploratory factor analysis in the pretest stage and confirmatory factor analysis of the survey data. These analyses yielded a 15-item instrument for measuring mobile service quality in tangible product shopping and a 16-item instrument for measuring mobile service quality in intangible product transactions. The structure of the items comprising each of the two instruments was determined, and their figh degree of reliability and validity were examined and proven. Their model fits were also estimated by CFA, showing a good degree of fit between the proposed model and the dataset. The final model for intangible products M-S-QUAL was as Figure 4.

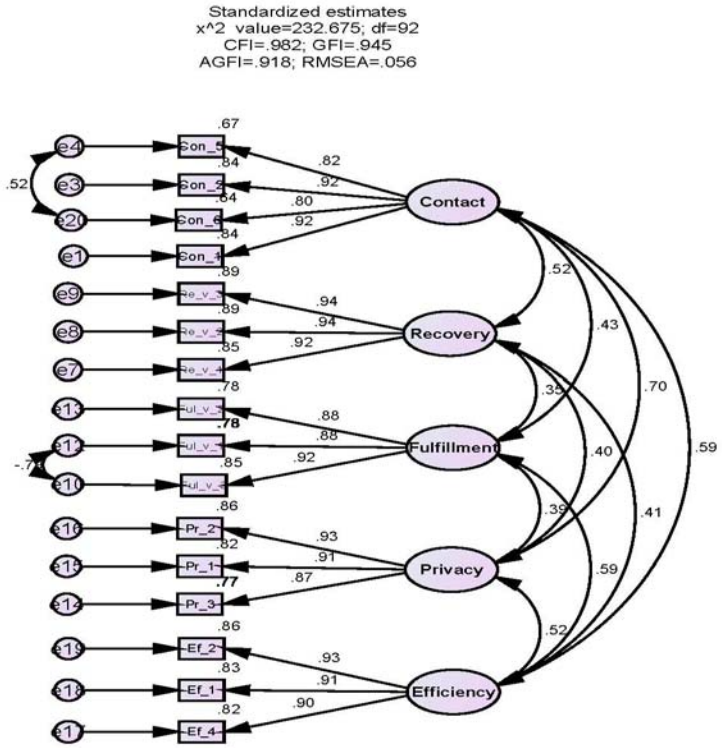

Figure 4. CFA model

Chapter 5 Discussions and conclusion

Based on results from exploratory and confirmatory factor analysis, we tested a model of mobile service quality. In the proposed model, there were nine constructs which were conducted by deductive methods. Some items were deleted as a result of exploratory factor analysis in the pretesting stage and confirmatory factor analysis of the survey data. Intangible products M-S-QUAL was constructed with high reliability and validity. However, the sample size of tangible products M-S-QUAL was too small to conduct CFA, and the factors and items were determined in the EFA phase, Since CFA was not conducted for tangible products M-S-QUAL, reliability and validity could not be firmed established by testing the models fit. In this chapter, we interpret the model's implication, summarize this research's contributions, point out limitations in this research, and give directions to future research.

5.1 Practical implications

After deleting some items and even entire constructs deleted from the initially collected pool of items, the procedure followed in this study produced a 15-item, 4-construct tangible products M-S-QUAL instrument and a 16-item, 5-construct intangible products M-S-QUAL instrument. Of the original set of constructs, content, compensation, privacy, and billing were omitted from the tangible product M-S-QUAL instrument, and content, compensation, and billing were eliminated from its intangible product counterpart. The two instruments are discussed in the following paragraphs.

In the m-commerce context, triggers for shopping were neither similar to traditional brick-and-mortar shopping nor the online shopping in the past decade which was not mobile. The characteristics of m-commerce, ubiquity, convenience, localization, and personalization result in diverse patterns of consumption. With the development of e-commerce, exchange of information was fast. Many people now are accustomed to purchasing on e-commerce websites gradually, and because they cannot see and touch products, products information such as specifications, brand, whether in stock, etc. and even products photos, is much more important than the brick-and-

mortar era. Presenting complete and accurate content has become a basic criterion to operate an e-commerce website, not to mention a m-commerce store. In m-commerce context, especially, customers' demands prompt information and real-time responsiveness. In such environment, clear and accurate content becomes a survival necessity; it is a matter of life-and-death for mobile retailer, and no longer constitute a factor that can promote perceived value or loyalty intention. As to billing issues, regardless of e-commerce or m-commerce, if solid billing function was not in place, it is almost impossible for customers to trade. Customers nowadays are alert to unsafe billing, after privacy invasion incidents, like credit card or bank account information and even personal profile leakage, were covered in the media. Content, billing, and privacy used to be measures of service quality in the non-mobile e-commerce realm. As e-commerce becomes mobile, these aspects no longer constitute service quality measure criteria but just indispensable. In addition, mobile commerce context makes instant gratitude more attainable than ever before. And perhaps, people are experiencing not spending too much and getting the instant gratitude, therefore whether marketers compensate or how they compensate in the case of unsatisfactory products is not a big deal. All the customers care about is completing the transaction fast and getting the products instantly.

According to the sample data, most respondents chose to answer the questionnaire by targeting intangible products, with messaging and voice calls, mobile socializing, and positioning and navigation services being the mostly used. These applications come with smartphones and various handheld devices; their proliferation grows with the market penetration of the mobile devices. Payment and free applications in Apple App store via iOS, the operating system for iPhone, iPad, and Macbook, and in Android Market via Andriod operating system are downloaded by users. These applications (app) are intangible, intangible products, and currently many of them are free of charge. Even if some do require payments, the payment accounts are established beforehand; the purchasing process is just one click (touch) by customer and the application will start to download to the device. The notion of consumption that customers are taking money out of their pockets is thus very vague in customers' mind. Billing for customers is like inexistent.

5.2 Conclusion and limitations

A primary contribution of our work was to have started a stream of work to develop and validate a generic instrument for measuring service quality for mobile services in mobile commerce. Since there do not exist an integrated scales for measuring mobile service quality, the development of service quality measures in wireless commerce environment becomes necessary. We provide a tool for mobile service providers to assess the qualities of their services. The result of regression analysis between M-S-QUAL and perceived value and loyalty intentions has shown significant effects of efficiency, contact, and recovery. Contact and recovery are related to communicating with customers. This implies that good service quality means good communications with customers, and good communications is the key mechanism for retaining customers, in mobile context.

Even though the rigorous validations procedure allowed us to develop a generic instrument to measure mobile service quality, this research has limitations resulted from attainable sample data. At present, mobile device users are generally young with lower income, and heavy users are males rather than females. This profile is clearly the composition of our sample data, which were mostly male (58.5%) and with low income (66.7% had monthly disposable income less than NT$20,000). This potential bias is unavoidable until mobile commerce becomes widely accepted by people of all ages and all walks of life.

We eliminated respondents with less than three months of mobile service experience. This is because we think new users may lack the concept of service quality and honeymoon bias may exist among new users. The service quality perceptions between new and experienced users may be different. Second, the sample was separated to two parts by transactions of tangible and intangible products. Because of limitations of time and cost, the data of tangible products M-S-QUAL was insufficient to reach the recommended sample size of CFA, so we only conducted EFA to determine factor structure. M-S-QUAL of tangible products should be further tested in the future. Finally, culture differences should be considered when applying our results to other regions.

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Appendix A

With development of handheld devices such as smartphone and tablet PCs, the mobile commerce generation is coming. Users can browse web site, make transactions via applications on handhelds. The common mobile services are mobile shopping services(including tangible products purchasing, application/ data download, and intangible product transaction), mobile bookstores (electronic books), mobile music services, location-based services (providing dynamic traffic or public transportation information), and mobile financial services, etc.

Have you ever have experiences of Internet surfing by mobile handheld devices?

□Yes
Accumulated experiences:
□0-1 months □1-3 months □ 3-6 months □6-9 months □9-12 months □more than 12 months

□No

Part A: Demographic data

1. Gender:□Male □Female
2. Age: □Under 20 □21-25 □26-35 □36-45 □46 and older
3. Educational level: □Elementary school □Junior high school
   □Senior high school □ Bachelor □Master □Ph.D
4. Occupation:
   □Manufacturing □Financial industry □Service □trade
   □Information industry □High tech industry □Wholesale and retail
   □Armed force catholicism □Student
   □Mass media dissemination/advertisement □Other
5. Seniority: □1-5 years □6-10years □11-15years □More than 15years □Other
6. Disposable income per month:
   □Below NT$10,000 □NT$10,001-20,000 □NT$20,001-30,000
   □NT$30,001-40,000 □NT$40,001-50,000 □More than NT$50,000

Part B: Handheld devices usage

Please check the box or circle the number that best matches your handheld devices usage.
Please answer the questions below with respect to your current mobile phone, or the mobile phone you are most frequently using, or the phone you were using.

7. The type and brand of the current handheld devices usage：
   □Smartphone：_____ □Tablet PC：_____
   □Handheld game console：_____ □Other：_____
8. Current network telecommunications services provider company：
   □Chunghwa Telecom □Taiwan Mobile □Far Eastone Telecommunications
   □VIBO □Asia Pacific Telecom
9. How long did you contact call center of your telecom provider company?
   □Within one month □1-3months □4-6 months
   □7-9 months □10-12 months □More than 12 months

10. How much time do you spend on using handheld device roughly one day?
    □0.5hr □0.6-1hr □1-2hr
    □2-3hr □3-4hr □4-5hr □More than 5hr
11. The average monthly fee (calling and 3G Internet surfing)?
    □Below NT$200 □NT$201-600 □NT$601-1100
    □NT$1101-1500 □NT$1501 up
12. Is your 3G network access unlimited on the fixed fee contract?
    □Yes □No
13. What do you primarily use your mobile phone for:
    □Personal □Work □Emergencies □Other (explain)：_____
14. Please specify all mobile services you use (check all applicable categories)
    □Free voice calls □Download games □Play games
    □Free text message (ex. Whatsapp, Viber, Line…)
    □Voicemail □Download ringtones and icons □Activated dialing
    □Mobile transaction (ex. shopping & financial services)
    □Location/ map/ direction services
    □Value-added services (ex. payment music download & subscription)
15. □Roaming (using your mobile phone in a foreign country)
16. □Information services：□News □Stock quotes □Weather □Sport □Other
17. □Other

Part C: Mobile service use experiences.

Please answer the following questions according to your mobile service use -experiences. The questions focus on assessing the multi-dimension of quality of mobile services, and answers of each item adopt 7-level scale (1: Strongly Disagree, 7: Strongly Agree).

Efficiency

1. This mobile site makes it easy to find what I need.
2. It makes it easy to get anywhere on the mobile site.
3. It enables me to complete a transaction quickly.
4. Information at this mobile site is well organized.
5. It loads its pages fast.
6. This mobile site is simple to use.
7. This mobile site enables me to get on to it quickly
8. This mobile site is well organized.

System Availability

1. This mobile site is always available for business.
2. This mobile site launches and runs right away.
3. This mobile site does not crash.
4. Pages at this mobile site do not freeze after I enter my order information.

Content

1. The content of the mobile web site is concise.
2. The content of the mobile web site is accurate.
3. This mobile web site provides complete content.

4. This mobile web site provides appropriate content.
5. This mobile web site provides important content.
6. This mobile web site provides fashionable content.
7. This mobile web site provides regularly updated content.
8. I can fully understand the content provided.

Privacy

1. It protects information about my mobile-shopping behavior.
2. It does not share my personal information with other mobile sites.
3. This mobile site protects information about my credit card.

Contact

1. Friendliness when reporting complaint.
2. Service agents provide consistent advice.
3. Customer service representative is polite
4. Call center personnel is able to help with problems

Billing

1. The mobile web site provides convenient payment procedures
2. Provides accurate billing
3. Makes it easy to understand and resolve billing issues
4. Resolves billing issues quickly
5. The prices of the products and services available at this site (how economical the site is)
6. Variety of price schedule
7. Possibility of freely choosing price schedules

Fulfillment (tangible products)

1. It delivers orders when promised.
2. This mobile site makes items available for delivery within a suitable time frame.
3. It quickly delivers what I order.
4. It sends out the items ordered.
5. It has in stock the items the company claims to have.
6. It is truthful about its offerings.
7. It makes accurate promises about delivery of products.
8. When the order completes, the order information was sent back in a timely fashion.
9. When order completes, the service provider can provide customized information.

Fulfillment (intangible products)

1. It delivers orders when promised.
2. This mobile site makes items available for delivery within a suitable time frame.
3. It quickly delivers what I order.
4. It has in stock the items the company claims to have.
5. It is truthful about its offerings.

6. It makes accurate promises about delivery of products.
7. When the download completes, the trading information was sent back in a timely fashion.
8. When the download completes, the service provider can provide customized information.

Responsiveness (tangible products)

1. It provides me with convenient options for returning items.
2. This mobile site handles product returns well.
3. This mobile site offers a meaningful guarantee.
4. It tells me what to do if my transactiRon is not processed.
5. This mobile site provides a telephone number to reach the company.
6. This mobile site has customer service representatives available online.
7. It offers the ability to speak to a live person if there is a problem.

Responsiveness (intangible products)

1. It provides me with convenient options for returning items.
2. This mobile site handles product returns well.
3. This mobile site offers a meaningful guarantee.
4. It tells me what to do if my transaction is not processed.
5. This mobile site provides a telephone number to reach the company.
6. This mobile site has customer service representatives available online.
7. It offers the ability to speak to a live person if there is a problem.

Compensation (tangible products)

1. This mobile site compensates me for problems it creates.
2. It compensates me when what I ordered doesn't arrive on time.
3. It picks up items I want to return from my home or business.

Compensation (intangible products)

1. This mobile site compensates me for problems it creates.
2. It compensates me when what I ordered doesn't arrive on time.
3. It picks up items I want to return from my home or business.

Part D: overall assessment

Perceived Value (PV)

1. The overall convenience of using this site is good.
2. The extent to which the site gives you a feeling of being in control.
3. The overall value you get from this site for your money and effort.
4. The overall evaluation of the quality of mobile services is good.
5. The overall evaluation of the extent to which these mobile services meets your personal requirements.
6. The overall evaluation of the extent to which these mobile services is reliable.
7. Variety of value-added services.
8. I always have an excellent experience during the course of the site.
9. The prices of the products and services available at this site (how economical the site is).
10. When the service completes, I usually feel that I had a good experience

Loyalty Intentions

The loyalty measure consisted of five behavioral items; respondents indicated their likelihood of engaging in each behavior on a 7-point scale (1 = *very unlikely*, 7 = *very likely*).

How likely are you to…

1. Say positive things about this site to other people.
2. Recommend this site to someone who seeks your advice.
3. Encourage friends and others to do business with this site.
4. Consider this site to be your first choice for future transactions.
5. Do more business with this site in the coming months.

Appendix B

行動服務品質量表建構

親愛的受訪者　您好：

懇請您撥冗協助填寫此份「行動服務品質量表建構」之學術研究問卷！本問卷希望能透過不同構面的檢視，建構一衡量行動服務品質之量表。問卷共包含四個部分，每項問題皆無特定之標準答案，希望您依個人的使用經驗填答。

本問卷採匿名方式進行，僅供學術研究使用，請放心填答。為了感謝您的熱心參與及支持，本研究提供了一些獎項作為答謝，於問卷結束後抽出 7 名幸運兒，獎項包含：

InfoThink【Avengers 鋼鐵人造型隨身碟】8GB 珍藏版 1 份
ELECOM【繽紛甜甜圈通話用耳麥】1 份
統一超商 100 元禮卷 5 份

在此致上最大的感謝，敬祝您中獎！

祝您　順心如意！

國立政治大學資訊管理學系
指導教授：管郁君 博士、林勝為博士
研究生：范雅筑 敬上

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行動服務

行動服務指的是透過手持裝置以行動版網頁、應用程式（App）進行資料查詢或交易的服務。 常見行動服務類型如： 行動交易：實體商品交易、應用程式下載、資料查詢與下載、虛擬商品購買；行動加值服務：書城、電子書、行動音樂；以使用者位置衍伸的應用（適地性服務）：導航、大眾運輸動態查詢 、鄰近資訊查詢；行動化金融服務、股票下單...等

1. **請問您是否曾經有使用行動手持裝置上網的經驗：**

　　□有　　□無

2. **承上題，請問您使用經驗累積約：**

　　□0~3 個月　　□3~6 個月
　　□6~12 個月　　□12~18 個月
　　□18~24 個月　　□24 個月以上

第一部分： 基本資料

3. 性別:□男 □女

4. 年齡:□20 歲以下 □21-35 歲 □26-35 歲 □36-45 歲 □46 歲以上

5. 教育程度:□國小 □國中 □高中 □大學 □碩士 □博士

6. 職業:

□行政人員 □專業人員(如醫生、律師) □學術界/教育界 □電腦/工程

□機械技術員 □服務行業 □銷售/市場部 □貿易 □高等學院學生

□中/小學生 □家庭工業 □自僱 □待業 □已退休

□其他：_____

7. 工作資歷:□學生 □0-1 年 □1-3 年 □3-5 年 □5-7 年 □7-9 年

□9-11 年 □11-13 年 □13-15 年 □15 年以上

8. 每月可支配金額:

□$10,000 以下 □$10,001~$20,000 □$20,001~$30,000

□$30,001~$40,000 □$40,001~$50,000 □$50,000 以上

第二部分：手持裝置使用經驗

下列有關手持裝置使用習慣的問題，請依您目前的使用情形填選最符合之選項。

9. 目前在使用的手持裝置的類型：

□3G手機 □智慧型手機 □平板電腦 □掌上遊戲機 □其他：___

10. 承上題，請問您使用的手持裝置品牌：_____

11. 一天大約花多少時間在手持裝置上?

□0~1 小時 □1~2 小時 □2~3 小時 □3~4 小時 □4~5 小時 □5 小時以上

12. 您目前使用的電信服務公司：

□中華電信 □台灣大哥大 □遠傳 □威寶 □亞太 □其他：_____

13. 請問您平均一個月電話費大約是（包含通話費與 3G 上網費用）

□200 元以下 □201-600 元 □601-1,100 元 □1,101-1,500 □1,501 以上

14. 承上題，請問您是否為 3G 上網吃到飽的用戶？

□是 □否

第三部分：行動服務品質衡量

此部分需要請您自行設定一個在過去經驗中您曾經使用過「**最好的**」行動服務來回答接下來的題目。

15. 請問您所設定之行動服務屬於下列哪一種類型的行動服務？

□訊息/ 通話服務　□定位/ 導航/ 地圖服務　□社群類型的服務

□行動交易服務(ex: 購物、金融交易)　□遊戲娛樂

□加值服務(ex:付費音樂軟體、訂閱)

□即時資訊查詢服務（ex:財金、氣象、運動、新聞...）

□行動交易(如購物,金融服務)

□其他：_____

16. 承上題，請問您所設定之行動服務主要是**實體**商品交易或**虛擬(無形)**商品、資料查詢下載的服務？

□實體商品　□無形商品

如果你回答'實體商品'，請跳到17.

如果你回答'無形商品'，請跳到31.

	非常不同意	不同意	稍微不同意	普通	稍微同意	同意	非常同意
行動服務提供者**履行性**的衡量：							
17. 完成訂購的商品會按照所訂的時間送達							
18. 於合理的時間內送達訂購商品							
19. 商品運送服務的速度快							
20. 完成訂購的商品會確實送達							
21. 頁面顯示有貨時確實可訂到貨							
22. 提供的商品是讓人相信的商品(非贋品或瑕疵品)							
23. 提供精確的商品運送承諾							
使用行動服務在**回應性**的衡量：							
24. 提供便利的退貨方式與機制							
25. 商品退貨處理得當							
26. 提供明確的退貨保證							
27. 當交易流程未完成時，會清楚地指示後續步驟							
使用此行動服務遇到問題時的**補償**議題：							
28. 商家會對自己造成的錯誤主動補償							
29. 產品沒有準時送達時，商家會主動補償							

30. 若我想退貨時，會有專人來收走商品							
此 題 結 束 請 跳 至 第 43 題 繼 續 作 答							
履行性的衡量：							
31. 選取的無形商品可立即下載							
32. 在合理的時間內虛擬商品即下載完成							
33. 無形商品的下載速度快							
34. 顯示可購買之無形商品確實可下載得到							
35. 下載之無形商品功能完整、沒有瑕疵							
使用此行動服務在**回應性**的衡量：							
36. 提供便利的退貨方式與機制							
37. 無形商品退貨處理得當							
38. 提供明確的退貨保證							
39. 當下載流程未完成時，會清楚地指示後續步驟							
使用此行動服務遇到問題時的**補償**議題：							
40. 提供者會對自己造成的錯誤主動補償							
41. 商品未能順利下載時，服務提供者會主動補償							
42. 若我想退貨時，會有方便的功能執行退貨動作							
使用行動服務之**效率面**的衡量：							
43. 執行動作的速度快							
44. 資料下載的速度快							
45. 功能容易使用							
46. 開啟頁面的速度快							
系統可用性的衡量							
47. 系統開啟快速、運作順暢							
48. 系統穩定、不當機							
49. 系統不會在我輸入資訊後沒反應							
內容的衡量：							
50. 系統提供簡明的內容							
51. 系統提供精確的內容							
52. 系統提供完整的內容							
53. 系統提供適切的內容							
54. 系統提供重要的內容							
55. 系統提供時下流行的內容							
56. 系統時常更新內容							
隱私面的衡量：							
57. 有關個人的消費資訊受到保護							

58. 我的個人資訊不會被分享給其他商家							
59. 個人的信用卡資訊是受到保護的							
使用行動服務在**聯絡面**的衡量							
60. 服務提供者面對客戶抱怨時是友善的							
61. 服務提供者能提供一致的建議與服務							
62. 服務提供者的客戶服務是有禮貌的							
63. 服務提供者的客戶服務可以協助我解決問題							
64. 服務提供者提供多種聯絡方式支援使用者反應問題							
65. 商家提供明確的聯絡方式以供諮詢							
66. 商家提供線上連絡方式可隨時反應狀況							
使用行動服務在**帳務面**的衡量：							
67. 系統提供方便的付款流程							
68. 服務提供者提供正確的帳單							
69. 對我而言，處理帳單問題是容易的							
70. 服務提供者能快速地處理帳單問題							
71. 有不同的搭配方案與清楚的價格							
72. 選擇適合自己需求方案之可能性高							
73. 當下載完成，我會馬上收到訂單資訊							

第四部份：行動服務的整體評估

	非常不同意	不同意	稍微不同意	普通	稍微同意	同意	非常同意
請以您前面所設定的行動服務，針對此行動服務作整體的評估							
74. 使用此行動服務的整體便利性高							
75. 使用此行動服務讓我感覺一切都在我的掌握中							
76. 相對於所花的金錢和時間，使用此行動服務所獲得的整體價值高							
77. 對於使用此行動服務品質的整體評估是良好的							
78. 此行動服務符合我個人的需求							
79. 對於使用此行動服務的評估是可信賴的							
80. 服務提供者能提供多元性服務							
81. 我對於系統的使用程序有良好的經驗							
82. 服務價格符合經濟效益							
83. 應用此服務通常讓我有良好的經驗							
未來使用此行動服務的態度（忠誠意圖）：							

	非常不同意	不同意	稍微不同意	普通	稍微同意	同意	非常同意
84. 向他人描述時，我會給予此服務提供者正面的評價							
85. 我會鼓勵親朋好友使用這個服務							
86. 這個行動服務會是我將來使用的第一選擇							
87. 接下來幾個月我會繼續使用此行動服務							

十分感謝您的填答，祝您心想事成！

本研究於正式發放問卷且回收後進行抽獎，請留下您的電子信箱方便您參加抽獎與後續聯絡，謝謝！

您的電子信箱：_____