

# Conceptualization of the Factors Affecting the Quality of Mobile Health Services of Active SMEs in Healthcare System

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## Abstract

Development of new technologies, particularly information technology (IT) has a great impact on the health care area and the quality of life style. IT advancement and integration of the internet and digital technologies in mobile health (M-Health) platform has made the health care delivery, affordable and accessible around the world through mobile phones. Although the m-Health has many benefits, it causes increasing concerns about improvement of the service quality in this field. Improvement of the M-Health service quality has attracted much attention in the academic and practitioner communities in recent years. However, empirical research in this area is not sufficiently adequate. This paper deals with identifying the factors affecting on m-health service quality which is required by health clients in small and medium-sized enterprises in Iran. This study has been conducted via a qualitative approach which includes semi-structured interviews with 12 professionals and experts of the information technology and e-health fields. Results have been demonstrated based on the encoding method. Furthermore, the findings have been compared with other studies. As a result of this study, a new conceptual model for m-health service quality has been developed. Finally, it is argued that the results of this study are applicable in organizations, which involve in e-health field to improve the quality of mobile services for health.

**Keywords:** Mobile health, service quality, system quality, interaction quality, information quality.

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## Introduction

Health care is one of the fastest growing portions in economic services (Andaleeb 2001). This growth arises from aging population, mounting aggressive pressures (Abramowitz, Coté, and Berry 1987), increasing consumerism, and emerging treatments and technologies (Ludwig-Beymer et al. 1993; O'Connor, Trinh, and Shewchuk 2000). Quality of health care is currently at the forefront of professional, political, and managerial attention, primarily because it is being seen as a means to achieve the increased patronage, competitive advantage, and long-term profitability (Brown and Swartz 1989; Headley and Miller 1993) and ultimately as an approach for achieving better health outcomes for consumers (Dagger and Sweeney 2006; Marshall, Hays, and Mazel 1996; O'Connor, Shewchuk, and Carney 1994). Against this background, service quality has become an important corporate strategy for health care organizations. The advancement of technology in the health sector has growth potential and development of healthy lifestyle. Although mobile health creates positive change in the world, there are significant concerns about the perceived quality of such services and overall impact on patient satisfaction and quality of life. However, little researches have been conducted on the evaluation of this type of service, which describes the analysis (Strom et al, 2010). The mobile health service provider companies are trying to develop patient-centered care and quality improvement measures to increase significantly and its impact on the development of the structures for these new services. The role of service quality in fostering the growth of m-Health services has gained much attention in the academic and practitioner communities. However, empirical research in this area is not sufficiently adequate and in particular, the lack of sufficient research on the factors affecting the service quality is clearly evident.

Although a considerable amount of researches have been published in the field of service quality perceptions, much of them has focused on the development of generic service quality models (e.g., Brady and Cronin 2001; Parasuraman, Zeithaml, and Berry 1985). Despite the importance of developing appropriate models to assess factors affecting the quality of the organizations active in the field of health, relatively few researches has been done on the development of such special treatments. Given that m-Health implementation is in its infancy, a review of the literature has revealed few studies that directly explore service quality in this field. However, few researchers have examined factors affecting the service quality of care in mobile health care. The purpose of this paper is to present a new framework for the influencing factors on new mobile services in the field of health in corresponding organizations.

## Literature review

Donabedian (1992)'s studies showed that in health care, customers play an important role in determining their quality and designing of service delivery systems. Oliver (1993) introduced the service quality as a powerful concept due to its strong correlation with customer satisfaction. In 1987, Zeithaml described perceived quality of service as consumers' (or patients') judgment about the overall excellence or superiority of a mobile health service. Gronroos (1982) has defined perceived service quality as measuring performance against expectations. Berry and Parasuraman (1988) introduced service quality as the gap between expected and perceived service.

According to the research of (Gronroos, 1984; Parasuraman et al. 1988) service quality has been defined based on the consumer's perceptions, and the dimensions of service quality must be multi-dimensional and also according to Brady and Cronin in 2001, hierarchical concept and based on the findings of Dagger et al 2007, whose evaluations are likely to be context dependent. The European Union's Research & Development in Advanced Communications Technologies in the Europe (RACE) program defines service quality as "a set of user perceivable attributes of that which makes a service what it is (RACE, 1994). Then, Brady and Cronin (2001) introduced quality of service as a multi-dimensional concept that underscores the findings of Dabholkar et al (1996). Fassnacht and Koese (2006) and Just et al. (2007) stated that service quality is a hierarchical concept and Dabholkar et al (2000) in their studies showed that the factors affecting the service quality is likely specific to a particular area to that confirmed Caraman (1990) and Babakas and Gregory (1992).

Voss et al (2004) introduced service quality as an important factor and particularly relevant in almost all kinds of services and showed that it must be stated as a user-understandable language and manifests it as a number of parameters, all of which have either subjective or objective values". According to Nelson et al (2005)' findings, concepts of quality are interrelated and should be based on consumer perceptions. Dagger and Sweeney (2006) introduced service quality as an important factor due to the relationship between service quality and quality of life.

Based on Sarkr et al (2009), service quality is defined as evaluation of Performance, which confirmed the findings of Babakas and Gregory (1992) and Cronin and Taylor (1992).

Akter et al (2013) argue that the service quality of m-Health is an interdisciplinary domain that must be explored through generic theories from marketing, information systems (IS) and healthcare literature. In this study based on a definition from Akter et al (2013), service quality is defined as consumers' (or patients') judgment about the overall excellence or superiority of a mobile health service. Although existing research developed service quality as a general model, in many cases, there is not a new successful attempt, except to repeat existing ideas in new settings (Brady and Cronin, 2001; Parasuraman et al, 1988). In health care, most service quality research has focused on either Gronroos's two-dimensional model (i.e., functional quality and technical quality) or Parasuraman et al.'s five dimensional SERVQUAL model (i.e., reliability, responsiveness, assurance, empathy and tangibles). In addition, several studies have followed Donabedian's model, which measures service quality under two dimensions: technical and interpersonal quality. According to this framework, technical quality refers to the application of medical science and technology to health care, whereas interpersonal quality refers to the interaction that occurs between the service provider and consumer. Aligned with these findings, Brook and Kathleen in 1975 advanced a conceptualization in which technical care reflects how well diagnostic and therapeutic processes are applied and interactive care is concerned with the interactive behavior between the service provider and user. In a similar vein, other researchers have introduced service quality models in health care. More recently, Dagger et al (2007) have produced a context-specific, multi-dimensional and hierarchical model for measuring health service quality in general healthcare settings. The authors identify four

primary dimensions (interpersonal, technical, environment, and administrative) and nine sub-dimensions (Interaction, relationship, information, expertise, atmosphere, tangibles, timeliness, operation, and support) for measuring service quality in a hierarchical manner. Varshney (2006) investigated the impact of the information systems (IS), technological, managerial and medical perspectives of wireless health care. Akter and D'Ambra (2010) proposed a conceptual model of service quality in m-Health based on platform quality, interaction quality, and outcome quality.

### Research model

Regarding to the purpose of the research, Identify the affecting factors the M-health service quality, the conceptual framework used in this study is conceptual model from the study by Ahkter et al (2013) that is shown in the Fig. 1.

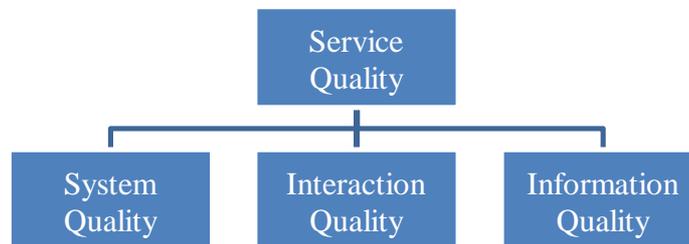


Figure 1: The research model from service quality model for m-health

### Research methodology

#### *Qualitative analysis*

In this paper, to identify factors affecting the m-health service quality that is required by health clients in small and medium-sized enterprises in Iran, qualitative approach has been used. The method of sample size determination is based on the Snowball sampling and interview until saturation. The adequacy logic of the data collected as the full extent of the data is represented. To achieve this, interviews were conducted with twelve it experts in health and treatment area and after carry out the eleventh interview, it is concluded that the information of the interviewees was repeated and reached to saturation level. So, it is not required to continue the interview. After that, using coding method, the pivotal factors affecting on the new services in organizations were obtained. The results of these interviews are shown in the Table 1.

Table 1: The results of interview coding related to the affecting factors on m-health service quality

Interview code	Verbal statement	Open code	Pivotal code	Main code
I1,I3,I6,I5,I8,I11,I4,I12	m-health should be accessible and clients can use it when they need	M-health System Reliability		
	The clients should access to the system whenever they need and system should have the high accessibility			
	Clients and patients should be able to receive the services in a high speed			
	Clients should not wait for a long time to be responded of m-health			
	Clients should not need complicated teaching for using m-health. In other word, they should be able to use these services with any level of literacy			
I1,I3,I4,I7,I10,I9,I6	The way of using m-health should be simple and the patients should be able to communicate with this system simply.	System Efficiency	System Quality	M-health service quality
	Clients should be able to use m-health services easily			
	Clients should not need high level of technology knowledge to use this system.			
	M-health should fulfill all types of client's requirements.			
	M-health should have the ability to respond to various requirements of clients in different parts of the country.			
I1,I3,I5,I7,I4,I9,I11,I2,I12	This system should be able to protect personal information of the clients and the clients should rely on this system.	System privacy of The M-health Users		
	The personal information of each user should not be available to other user.			
	M-health should assure remarkably related to protecting of his privacy.			
	In case of any disturbance or misuse of personal information, this system should be able to track and also the user should be able to track the abusing of his personal information.			
I2,I4,I1,I5,I7,I10,I8,I11	Physicians should be willing to help patients	Mutual Cooperation of The service Provider with users	System Interaction Quality	
	The physicians should express their interest in solving of clients problems			
	Provider of these services should be able to represent the services immediately after the first communication and try to interact			

	<p>bilaterally with patients</p> <p>The provider of services should be able to give these services in a specified time and according to the schedule</p>			
I4,I1,I3,I1,I5,I6,I7,I11,I10,I12	<p>The performance of the physicians and providers of these services should be able to attract the users trust.</p> <p>Behaviors and performance of physicians and service providers should make the patients feel relaxed and safe during their consulting with physicians</p> <p>Service provider should have ability to interact with various users with different personalities,</p>	gain the confidence of the patient and causing psychological security		
I5,I1,I7,I6,I11,I3,I9,I4,I12	<p>Service providers of m-health services should have competence to provide these services</p> <p>Physicians should try to express their consideration toward patients</p> <p>Physicians and service providers should realize the particular requirements of patients and try to solve them.</p> <p>Physicians and service providers should have common goals and interests with patients.</p>	Commitment to care and special attention to patients		
I3,I4,I1,I6,I7,I5,I10,I9,I2,I12	<p>Information system of m-health should give their services accurately and properly.</p> <p>Receiving of information from m-health system should be valuable for patients.</p> <p>Use of information services should be profitable for patients.</p> <p>Using m-health should improve the knowledge of clients about health ad should be profitable for them.</p> <p>Use of m-health information system should increase the client's knowledge in in dealing with technology.</p> <p>Enjoyment of using information system should encourage patients to use it steadily.</p> <p>Use of information system of m-health should give patients a sense of hope toward their problems and requirements.</p> <p>This system should encourage users to get information and using it more</p> <p>Patients using m-health must feel that the system will improve their health in the future</p> <p>The most important thing is causing sense of satisfaction in clients especially the satisfaction of not having to visit physicians through using mobile health services</p>	<p>Utilitarian of Information Receiving</p> <p>Causing Satisfaction Feeling in Users by Hedonic services receiving</p>	System Information Quality	

## **Analysis model**

As it can be seen in table, all the interviews have emphasized the confirmation of the three main factors and eight pivotal sub-factor elements. According to the expert's ideas, some of the recognized factors changed in Akter's model. During coding of the concepts which obtained from the literature review and interviews, some concepts have been considered as the factors affecting the m-health services quality that required by health clients in small and medium-sized enterprises in Iran.

These concepts include three main factors and eight pivotal elements. Three main factors are: m-health system quality, interaction quality and the information quality. Each of these factors has some pivotal elements. The first one, "mobile health system quality" have three pivotal elements, including: m-health system reliability, m-health system efficiency and system privacy of the M-health users. According to the results of the interviews, m-health system reliability in this case refers to accessibility and the possibility of accessing the mobile health for the users, when they need and the short waiting time of receiving the service. The next pivotal element is m-health system efficiency that includes the simplicity of the usage method, the simplicity of receiving the service, getting information without the requirement of high level of the knowledge, and flexibility of the system in responding and system organization in various parts of the country. m-health system privacy of the users is the third pivotal element that includes protection of the personal information of the users, avoiding of sharing of the user's information with other users, providing an appropriate insurance behalf of the provider and following up the abusing of the personal information. The second main factor is "interaction system". This factor is impressed by mutual cooperation of a service provider with users; gain the confidence of the patient and causing psychological security, Commitment to care and special attention to patients, which mutual cooperation of a service provider with users is referring to Physicians Usual willing to help the users, Showing interest to solve user's problems by Physicians, providing service to users at the first time, providing service at a certain time and according to certain schedule. Gaining the confidence of patients and psychological security in users is the second pivotal factor that includes attracts the confidence of the users by medics (Physicians) and service providers, Feeling psychological security during consultation time with providers. The third factor affecting the quality of m-health services, information quality is affected by two pivotal elements, which are the utilitarian of information receiving and causing satisfaction feeling in users by Hedonic services receiving. According to the results, the efficiency the Utilitarian of the information and services receiving are associated with providing services accurately by the system, the value of the information for users, increasing the knowledge related to health issues of the users and increasing their knowledge in technology. The second factor affecting on information quality is causing satisfaction feeling in users through enjoying of service receiving, increasing sense of hope in users, motivate users to receive information, cause users that his/her health circumstance will be improved in the future because of using the health mobile, sense of satisfaction in users because of not need to visit medics using mobile health.

## Result

The result of this study confirms the affecting factors base on Akter model (2013). According to the results of the interviews, it is demonstrated that three main factors affecting on the quality services are: m-health system quality, m-health cooperation quality and m-health information quality. In addition, eight pivotal elements of m-health system reliability, m-health system efficiency, m-health system privacy of the users, affect the m-health system quality. Mutual cooperation between provider and user, gain the confidence of the patients and improve security sense in users, Commitment to care and special attention to patients, affecting on the m-health information quality. The utilitarian of the information and services receiving and causing satisfaction feeling in users through enjoying of service receiving, affects on the m-health information quality the mobile services. So, the new frame of the effective factors on health mobile service in active organizations has been shown in Fig. 2.

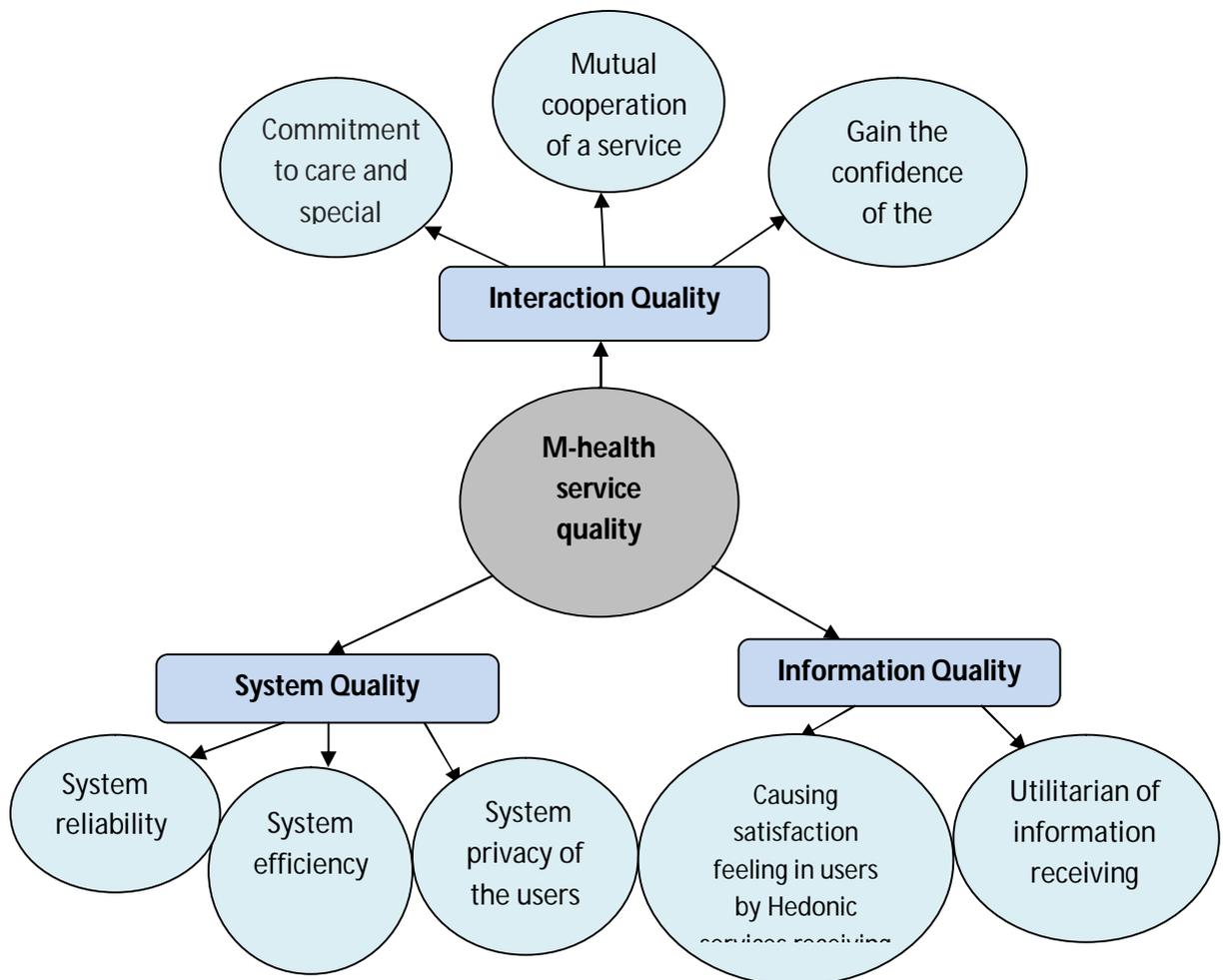


Figure 2: Conceptual model for the factors affecting the quality of mobile health services

## Conclusion

Results could be used to improve m-health service quality for the all health institutions in the field of e-health in all countries, especially the Asian countries. It is suggested to the manager's department health and treatment country active organizations in health areas, to improve mobile health service quality. System reliability of health would be raised with the service users in order to do some items such as mobile access system health. Quickly receive medical services through mobile health systems in the m- health services must be considered. Furthermore, to reduce the waiting time for system response to increase the users' satisfaction and some predictions could be made, so that user-to-use m-health system does not need to have initial training. Since the system privacy is one of the important factors affecting the m-health service quality, this paper recommended service providers not to share users' personal information with others, even the ability for tracking any misuse of the information for grabbing the confidence of users in the system design could be considered. Finally, results of this study showed that the system interaction is the second important factor influencing the service quality of health, so it is better to increase the cooperation between users and service providers, mobile health, as well as the interactions between these two groups to advance the objectives of m-health plans. To increase the efficiency of the system, it is need to simplify the ways in using the benefits of the system services of m-health.

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