

THE IMPACT OF PERCEPTIONS OF INTERACTIVITY ON CUSTOMER TRUST AND TRANSACTION INTENTIONS IN MOBILE COMMERCE

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ABSTRACT

The interest in the concept of “interactivity” has increased as we are entering an “always-on” society where people can interact anytime and anywhere. Despite the importance of interactivity in Mobile Commerce (MC) environment, this topic has been given little attention in the academic literature. This paper identified the components of interactivity and investigated the impact of perceptions of interactivity on customer trust and transaction intentions in MC. Empirical results indicate that the addition of MC-specific components of interactivity (perceived ubiquitous connectivity and perceived contextual offer) improves the model fit. Also the perceptions of user control, responsiveness, connectedness, ubiquitous connectivity, and contextual offer have a significant effect on customer trust in MC. Especially, ubiquitous connectivity and contextual offer have a direct positive effect on transaction intentions in MC. Based on these empirical results, this paper suggests managerial implications of new marketing strategies, focusing on the contextual marketing communication that link online, mobile, and offline environment.

Keywords : Contextual offer; Interactivity; Mobile commerce; Trust; Ubiquitous connectivity

1. Introduction

The rapid proliferation of wireless devices such as mobile phones has transformed mobile commerce (MC) as a major driving force for the next wave of electronic commerce (EC) [Liang and Wei 2004]. Although there is as yet no standard definition, MC used in the study refers to all the market activities where wireless devices (particularly mobile phones) are exploited to conduct electronic business transactions, such as product offering, fund transfer, and stock trading [Kalakota and Robinson 2001].

Interest in the concept of “interactivity” has emerged in EC environment, and interactivity has regarded as the crucial element of successful online marketing [see Bezjian-Avery et al. 1998; Deighton 1996; Hoffman and Novak 1996; Peppers and Rogers 1997]. The importance of interactivity will increase in MC environment. Through mobile devices, business entities are able to reach customers anywhere at anytime. Technological advancement in MC makes it feasible to deliver customized service. In MC environment, it is possible to identify the users and their geographical position by tracking the technical address of the mobile device. Using the information on the users’ identity, position, access time and profiles, mobile service provider can offer the users with the optimal information or services that are contextually relevant to them at the point of need. For example, mobile service provider may send the information or coupon for blue jeans to a consumer who enters the department store to purchase jeans. In short, interactive contacts with customers will become closer and shift to a real-time basis in MC environment. This kind of interactivity in MC environment is conceptualized as ubiquitous interactivity or continued interactivity [see Kanna, Chang, and Whinston 2001].

Despite the importance of interactivity in MC environment, this topic has been given little attention in the academic literature. And there has been little academic study on the comprehensive review of construct of “interactivity”. Furthermore, very little research has addressed the effects of perceptions of interactivity on customer trust and transaction intentions in MC environment. Although there has been a large body of research on interactivity in EC environment, previous researches have several void that need to be addressed.

First, although it is apparent that perceptions of interactivity are based on multiple dimensions, there is no general agreement as to the nature or content of the dimensions. A call for research that specifically examines the “dimensionality” of the interactivity construct has yet to be successfully addressed.

Second, previous literature discussing issues surrounding interactivity is dominated by conceptual efforts to describe the components of interactivity. Few empirical studies have been made to identify the components of

interactivity.

Third, most interactivity literature focuses on EC environment. No attempt has been made to extend interactivity construct to MC environment. It is necessary to review the concept and new components of interactivity in MC environment.

Given this general void in the literature, the purpose of the study is exploring the impacts of perceptions of interactivity components on customer trust and transaction intentions in MC environment through developing comprehensive model and employing large sample empirical test. In order to provide a solid theoretical basis on consumer behavior in MC environment, this paper integrates two important streams of literature : (a) the literature on the interactivity [Alba et al. 1997; Anderson 1996; Dholakia, Zhao, Dholakia and Fortin 2000; Ha and James 1998; Heeter 1989; Ku 1992; Lee 2000; McMillan and Hwang 2002; Steuer 1982; ; Rafaeli 1988; Rice 1984; Wu 2000] and (b) the literature on the nature of MC environment [e.g. Figge 2002; Kenny and Marshall 2000; Mort and Drennan 2002].

2. Background

2.1. The Concept of Interactivity

Interactivity has been defined in many ways. Definitions of interactivity can be categorized on the basis of the primary focus of the authors on features, process, perception, or combined approaches [McMillan and Hwang 2002]. Rice [1984] define interactivity as the capability of a computer-enabled communication system that allows exchange of roles between sender and receiver in real or delayed time so that communicators can have more control over the pace, structure and content of the communication. Steuer [1992, p. 84] suggests that interactivity is “the extent to which users can participate in modifying the format and content of a mediated environment in real time”. In the feature perspective, scholars focus on user control.

In the process perspective, scholars focus on activities such as interchange and responsiveness, that are key to interactivity [McMillan and Hwang 2002]. For example, Rafaeli [1988, p. 111] defines interactivity as “an expression of the extent that in a given series of communication exchanges, any third (later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions”. Alba et al. [1997] indicated that two key dimensions of interactivity are “response time” and “response contingency”, which refer to the degree to which the response of one party is a function of the message made by the other party.

Lee [2000] suggests that interactivity should not be measured by analyzing processes or counting features. Rather, researchers should investigate how users perceive and/or experience. The focus on perception is consistent with marketing, advertising, and communication traditions [McMillan and Hwang 2002]. Wu [2000, p. 41] define perceived interactivity as “the extent to which a person perceives he or she controls over the interaction process, his or her communication counterpart (a person, a mass-mediated environment, or a computer-mediated environment) personalizes and responds to his or her communicative behavior.

2.2. Components of Online Interactivity

There have been several researches on the dimensions (or components) of interactivity in online environment [e.g. Anderson 1996; Dholakia, Zhao, Dholakia and Fortin 2000; Ha and James 1998; Heeter 1989; Ku 1992; Wu 2000]. Heeter [1989] conceptualizes interactivity as a six-dimensional construct comprising (1) complexity of choice available; (2) the amount of effort users must exert to access information; (3) the responsiveness to the user; (4) the potential for monitoring information use; (5) the ease for the user to add information to system; and (6) the potential to facilitate interpersonal communication.

Based on the notion of access and control, Ku [1992] proposed interactivity consists of six dimensions: (1) immediacy of feedback, (2) responsiveness, (3) source diversity, (4) communication linkages, (5) equality of participation, and (6) ability to terminate. Ha and James [1998] identified five dimensions of interactivity capable of fulfilling different communication needs: (1) playfulness, (2) choice, (3) connectedness, (4) information collection, and (5) reciprocal communication. Dholakia, Zhao, Dholakia and Fortin [2000] identified key components of interactivity from the perspective of Web site visitors including user control, responsiveness, real time interactions, connectedness, personalization/customization and playfulness. Also, Wu [2000] proposed perceived interactivity consist of three dimensions : (1) perceived user control, (2) perceived responsiveness, and (3) perceived personalization.

As shown in Table 1, this study propose key components of online interactivity based on the review of interactivity literature [e.g. Anderson 1996; Dholakia, Zhao, Dholakia and Fortin 2000; Ha and James 1998; Heeter 1989; Ku 1992; Wu 2000] : (1) user control, (2) responsiveness, (3) personalization, and (4) connectedness.

User control refers to the extent to which an individual can choose the timing, content, and sequence of a communication [Dholakia, Zhao, Dholakia and Fortin 2000]. This is related to communication system property such as machine interactivity [Hoffman and Novak 1996].

Responsiveness is the relatedness of a response to earlier messages [Dholakia, Zhao, Dholakia and Fortin 2000]. The concept of responsiveness consist of four components in online environment: response probability, response speed, response relevance, and response elaboration [Wu 2000]. In this study, responsiveness is primary focused on response probability and speed while personalization deals with response relevance and elaboration in accordance with Wu [2000].

Personalization reflects the degree to which information or service is tailored to meet the needs of the individual visitor [Dholakia, Zhao, Dholakia and Fortin 2000].

Ha and James [1998, p. 462] defines connectedness as “the feeling of being able to link to the outside world to broaden one’s experience easily. In this study, connectedness is defined as “the extent to which users can share common interest and exchange useful information through such as online community, bulletin board, news group, online chatting room”. Connectedness reflects social interaction, namely consumer-consumer interaction.

Table 1. Components of Online Interactivity

Characteristic of interaction	Components	Related literature
Mechanical	User Control	multiple information flow [Anderson 1996], user control [Dholakia, Zhao, Dholakia and Fortin 2000], choice [Ha and James 1998], complexity of choice available [Heeter 1989], ease of adding information [Heeter 1989], ability to terminate [Ku 1992], perceived user control [Wu 2000]
	Responsiveness	real-time feedback [Anderson 1996], intelligent and responsive interaction [Anderson 1996], real time interaction [Dholakia, Zhao, Dholakia and Fortin 2000], responsiveness to the user [Heeter 1989], immediacy of feedback [Ku 1992], responsiveness [Dholakia, Zhao, Dholakia and Fortin 2000; Ku 1992; Wu 2000]
Dyadic	Personalization	customizer of content [Anderson 1996], personalization [Dholakia, Zhao, Dholakia and Fortin 2000; Wu 2000]
Social	Connectedness	connectedness [Dholakia, Zhao, Dholakia and Fortin 2000; Ha and James 1998], facilitation of interpersonal communication [Heeter 1989], communication linkage [Ku 1992], source diversity [Ku 1992]

2.3. Mobile Interactivity

Above-categorized components of interactivity are focused on online environment. MC environment has features not available to online environment – mobility [Kalakota and Robinson 2001], ubiquity, personal identity and localization [Kannan, Chang, and Whinston 2001]. This study proposes “Ubiquitous Connectivity” and “Contextual Offer” as the new components of interactivity in MC environment [see Figure 1].

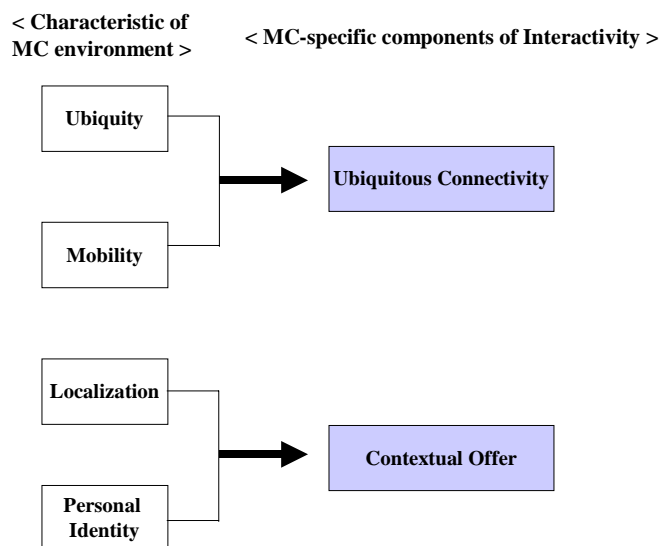


Figure 1. Components of Mobile Interactivity

In MC environment, users can access to mobile Internet services “anywhere, anytime”. Users can interact with companies, product, offers and services wherever they have connectivity through a mobile device. In this study, this kind of interactivity is conceptualized as “Ubiquitous Connectivity”. Another new component of interactivity is “Contextual Offer”. The concept of contextual offer that applies features specific to MC environment (namely, personal identity and localization) is one approach in building intimate customer relationship. It takes advantage of the strong relationship between a user and his mobile device, which makes it possible to determine the geographic position of users by locating the mobile device.

Due to the *mobile* characteristics of wireless devices and network, the emerging MC operates in an environment very different from e-commerce conducted over the wired Internet [Siau, Lim and Shen 2001]. As significant advantage of MC, it can deliver to a user the individualized/customized, relationship-based, timely and location-specific packets of information.

The service provider may send location, situation or event-related information on the basis of user profile. For example, it can transmit to a car driver the information about the location of available gas station, a traveler well targeted information about suitable accommodation, an investor the latest changes of stock prices, or a sports fan the needed sport results. As the type of problem varies with the context in which a customer accesses service, the service based on information of the specific context is likely the user’s favorite [Figue 2004].

While location-based services only focus on the position of a user, the concept of contextual offer goes even further by determining the whole context in which a user accesses a service. It can offer, therefore, information (or services) that suits the user’s actual demand. Users will be provided with optimal information (or services) that is contextually relevant to them based upon where they are and what they are doing.

The key difference between online interactivity and mobile interactivity is consumers can continue their interaction with any aspect of their commercial activity-whether searching for information, exchanging information or data, and transacting business-irrespective of their location and movement. This makes it ideal for seamless interaction. “*Fluid interaction*” is characteristic of mobile interactivity.

Thus, interactivity may be perceived to consist of six components in MC environment: (1) user control, (2) responsiveness, (3) personalization, (4) connectedness, (5) ubiquitous connectivity, and (6) contextual offer. And the concept of interactivity has been extended in online and MC environment. Figure 2 represents the extension of interactivity.

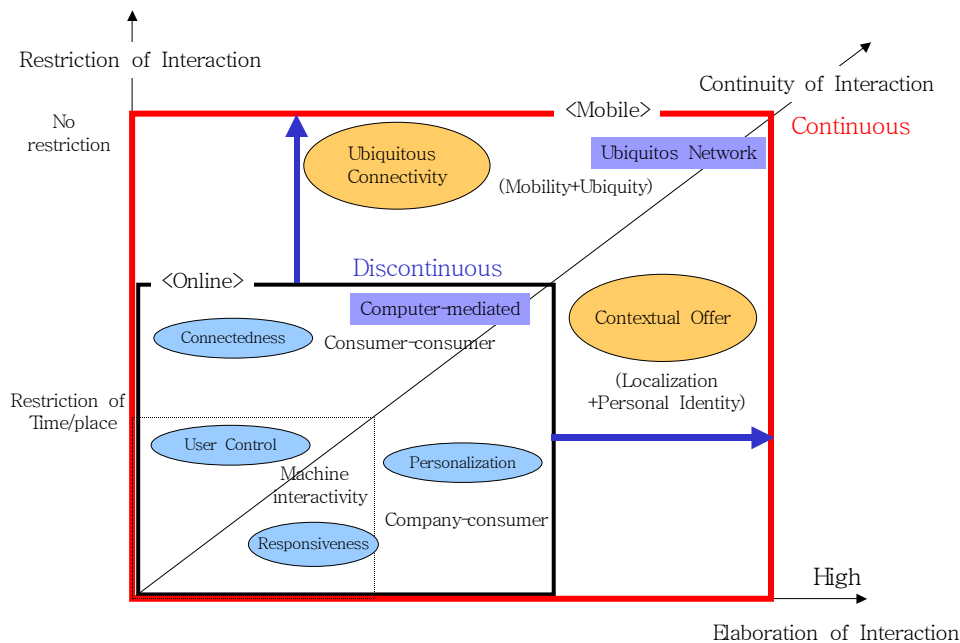


Figure 2. Extension of Interactivity Concept

2.4. Trust in the MC environment

Trust has long been regarded as a catalyst in consumer-marketer relationships because it provides expectations of successful transactions [Schurr and Ozanne 1985]. Especially trust has always been an important element in influencing consumer behavior and has been shown to be of high significance in uncertain environments, such as the Internet-based EC context [Jarvenpaa and Tractinsky 1999; Jarvenpaa, Tractinsky and Vitale 1999].

Several researchers have proposed trust as an important element of B2C e-commerce [e.g. Gefen 2000; Jarvenpaa and Tractinsky 1999; Keen 1999; Palmer, Bailey, and Faraj 2000]. Gefen [2000] showed that trust is essential in the acceptance of Internet technologies. Palmer, Bailey, and Faraj [2000] argued that building consumer trust in Web retailers is fundamental to the growth of B2C e-commerce. Jarvenpaa and Tractinsky [1999] empirically showed that trust has a direct significant effect on consumer purchase intentions in multiple cultures. Keen [1999] proposed that trust is the foundation of EC, focusing on the strategic implications of trust for consumer-marketer relationships.

Trust is also likely to be an important element in consumer acceptance of MC, considering the uncertainty and infancy of MC environment. Despite the importance of trust in MC environment, this topic has been little attention in the MC literature. And there has been little academic study on the relationship between interactivity components and customer trust in MC context. This study proposes research model for building customer trust and transaction intentions in MC, focusing on the perceptions of interactivity.

There are several different ways of defining the concept of trust. Morgan and Hunt [1994, p. 23] conceptualize trust as existing when one party has confidence in an exchange partner's reliability and integrity. Moorman et al. [1993, p. 82] define trust as "a willingness to rely on an exchange partner in whom one has confidence". Based on previous studies, McKnight and Chervany [2002] presented an interdisciplinary typology of trust that is related to e-commerce consumer actions. Following the work of McKnight and Chervany [2002], trust in MC is defined here as the belief allows consumers to willingly become vulnerable to mobile Internet site after having taken the Internet site's characteristics into consideration.

3. Hypotheses

Figure 3 presents the proposed model, referred to as the MC acceptance model. The research model for this study was designed to investigate the impact of customers' perceptions of interactivity on their acceptance of MC, based on literature relating to the interactivity and MC environment. The model includes customer trust as the mediating factor of the relationship.

It is expected that ubiquitous connectivity and contextual offer, the new components of interactivity in MC, are likely to influence behavioral intention to use MC directly because these components can be regarded as POP (point of purchase) promotion from the marketing communication perspective. POP promotion leads to purchase because it has the ability to reach potential buyers at the time and place at which the buying decision is made.

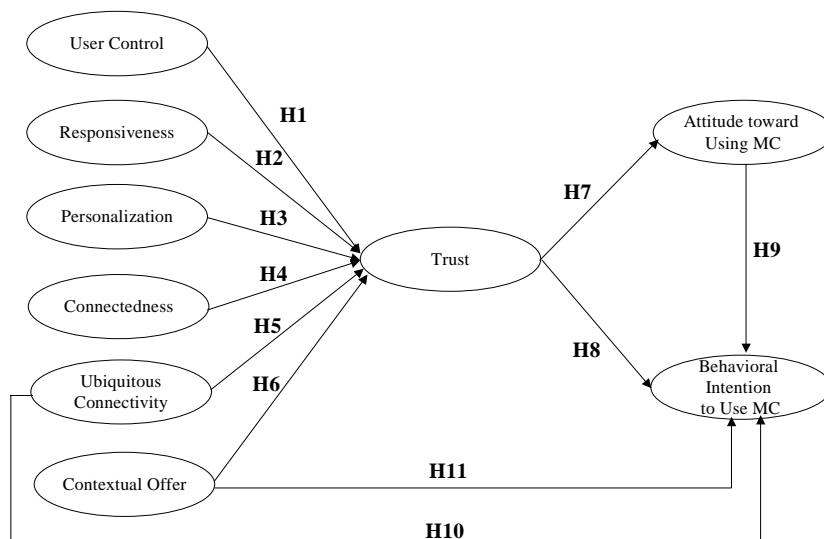


Figure 3. Research Model and Hypotheses

3.1. Perceptions of Interactivity and Trust

Perceived User Control

According to Dholakia, Zhao, Dholakia and Fortin [2000], user control refers to the extent which an individual can choose the timing, content, and sequence of a communication. Newman [1991] hold that interactivity is a quality of electronically mediated communications characterized by increased control over the communication process by both the sender and receiver.

Environmental psychology has shown that those who perceive they have more control tend to feel and behave more positively [Proshansky, Ittelson, and Rivlin 1974]. Dayal et al. [2001] proposed that those who perceive they have more control over purchase process tend to perceive high level of trust in online environment. Thus, the following hypothesis is proposed:

H1: Perceived user control has a positive impact on a customer's trust in MC.

Perceived Responsiveness

Perceived responsiveness is primary focused on response speed or time. Users gauge responsiveness of a system from direct communication as in a reply to an e-mail [Dholakia, Zhao, Dholakia and Fortin 2000]. It is related to how quickly marketers respond to consumers' request or questions. Faster the response, greater the perception of interactivity.

Perceived responsiveness is closely related to timeliness of information which has been discussed in communication area. Fast response to consumers' request will be regarded as timely information to the consumer. According to Moorman et al. [1993], timely communication fosters trust. Morgan and Hunt [1994] has also shown that communication result in greater trust. Thus, the following hypothesis is proposed:

H2: Perceived user responsiveness has a positive impact on a customer's trust in MC.

Perceived Personalization

The one-to-one marketing paradigm advocates vigorously emphasize the benefits of personalization [Hoffman and Novak 1996; Peppers and Rogers 1993]. Schultz and Bailey [2000] argued that "individualization" clearly defines the new interactive marketplace as opposed to the traditional, outbound mass market. The online environment has allowed marketers to build profiles of its customers and develop an interactive relationship so that marketing communications could be personalized to meet the needs and wants of a small segment of homogeneous audience or even down to an individual [Wu 2000]. Nowak et al. [1999] reveals that personalized messages increase participants' motivation to attend to marketing-related information and induce favorable attitudes toward the ad and advertiser. Based on these arguments, the following hypothesis is proposed:

H3: Perceived personalization has a positive impact on a customer's trust in MC.

Perceived Connectedness

In online environment, electronic communities are forming around groups of consumers with a common interest and give consumers an unprecedented means of interacting with each other [Champy, Buday, and Nohria 1996]. These communities have become dynamic places for consumers to pursue their interests. This kind of social interaction need can be fulfilled regardless of where users are in MC environment.

Bickart and Schindler [2001] argued that product information presented in Internet forums is more interesting to consumers than that from the company, and contents of Internet forums are more persuasive than company-made Web contents. According to Punj and Staelin [1983], consumers are likely to get information or advice for purchase from others.

Hoffman et al. [1998] proposed that online communities are useful for building site trust in order to reduce the perceived risk of consumers. Thus, the following hypothesis is proposed:

H4: Perceived connectedness has a positive impact on a customer's trust in MC.

Perceived Ubiquitous Connectivity

In MC environment, consumers can access to information or mobile Internet service at the point of need regardless of where they are. This suggests that there are always-on communication channel between marketers and consumers.

Previous research shows that communication among marketing system participants leads to mutual trust [Anderson and Narus 1990; Doney and Cannon 1997; Sharma and Patterson 1999]. And according to Morgan and Hunt [1994], frequent communication has a positive impact on trust. Thus, the following hypothesis is proposed:

H5: Perceived ubiquitous connectivity has a positive impact on a customer's trust in MC.

Perceived Contextual Offer

Communication can be defined broadly as the formal as well as informal sharing of meaningful and timely information between firms [Anderson and Narus 1990, p. 44]. Sharing of timely information fosters trust [Moorman et al. 1993; Morgan and Hunt 1994; Sharma and Patterson 1999].

Contextual offer in MC environment refers to the extent to which marketers provide consumers with optimal

information or service that is contextually relevant to them based upon customer profile and position, time information. This means that consumers are provided with timely information or service which they need. Based on these arguments, the following hypothesis is proposed:

H6: Perceived contextual offer has a positive impact on a customer's trust in MC.

3.2. Trust and Attitude, Behavioral Intention

According to Fishbein and Ajzen's theory of reasoned action (TRA) model, attitude toward a behavior is determined by relevant beliefs [Davis et al. 1989]. Gefen [2000] defines trust as "my confident belief in my favorable expectations about what the other party will do, based on our previous interactions."

Previous research has consistently argued that there is a positive relationship between trust and attitude [e.g. Grazioli and Jarvenpaa 2000; Macintosh and Lockshin 1997; Suh and Han 2003]. Grazioli and Jarvenpaa [2000] argued that customers' attitudes are determined by their trust in the context of an Internet shopping mall. Macintosh and Lockshin [1997] has shown that customers' trust in a store has a positive impact on their attitude toward the store, concluding that attitude toward a store is a major component of loyalty to the store. And Suh and Han [2003] has also shown that trust is positively related to customers' attitude toward using e-commerce. Thus, the following hypothesis is proposed:

H7: Trust has a positive impact on a customer's attitude toward using MC.

Trust reduces uncertainty by ruling out possible but undesirable and unfavorable future actions of other parties [Gefen 2000]. In the case of MC, trust would be a important mechanism for reducing customers' uncertainty and will, therefore, influence their transaction intentions.

There is extensive research that provides evidence of the significant effect of trust on behavioral intention [Crosby et al. 1990; Ganesan 1994; Gefen 2000; Pavlou 2003]. Crosby et al. [1990] viewed trust in the salesperson as a dimension of the relationship quality and they showed that the relationship quality is positively related to anticipated future interactions in the service sales context. According to Ganesan [1994], trust in the supplier is central to a customer's intention to continue the relationship. Gefen [2000] suggested that trust in an e-commerce vendor has a positive impact on people's intention to use the vendor's Web site. Pavlou [2003] has also shown that trust is positively related to customers' intention to transact in e-commerce environment. Thus, the following hypothesis is proposed:

H8: Trust has a positive impact on a customer's behavioral intention to use MC.

Fishbein and Ajzen's TRA model is a general model suggesting that the social behavior of individuals is motivated by their attitude toward the behavior [Davis et al. 1989]. Shu and Han [2003] empirically validated that behavioral intention is determined by the individual's attitude. And there is extensive research that provides evidence of the significant relationship between attitude and behavioral intention using the Technology Acceptance Model (TAM) [Davis 1989; Davis et al. 1989; Straub et al. 1997]. Thus, the following hypothesis is proposed:

H9: Attitude toward using MC has a positive impact on a customer's behavioral intention to use MC.

3.3. Perceptions of Mobile Interactivity and Behavioral Intention

In MC environment, consumers can access to information or mobile Internet service at the point of need regardless of where they are. In other words, consumers are likely to perceive channel accessibility high in MC environment.

Channel accessibility can be defined as the degree to which time and effort are involved in using a channel [Li, Kuo, and Russel 1999]. For instance, access to a retail store may need a car and time driving to the store. For access to the Web a consumer needs a computer or TV with an Internet connection and knowledge of surfing the Internet. Li, Kuo, and Russel [1999] showed that perceived accessibility has a positive impact on online buying behavior. According to Holden and Lutz [1992], brand accessibility is positively related to brand choice. Thus, the following hypothesis is proposed:

H10: Perceived ubiquitous connectivity has a positive impact on a customer's behavioral intention to use MC.

In MC environment, it is possible to take advantage of the strong relationship between a user and his or her mobile device, which makes it easy to identify the user by knowing the technical address of the mobile device. Users can be provided with optimal information or services that are contextually relevant to them based upon where they are, what they are doing and what they are interested in at the point of need. In other words, contextual offer can be regarded as effective POP (point of purchase) promotion. For example, when a consumer enters a NIKE store, he or she can be provided with sale information for NIKE shoes or coupons. The point of purchase is an ideal time to communicate with consumers because this is the time at which many product-and brand-choice decisions are made. Effective POP materials influence product and brand choices at the point of purchase and encourage impulse buying [Shimp 2000].

Following the previous arguments, it is predicted that perceived contextual offer will be regarded as effective POP and thereby lead to behavioral intention to use MC.

H11: Perceived contextual offer has a positive impact on a customer's behavioral intention to use MC.

4. Research Methodology

4.1. Sample

Data were collected through personal interviews with (under) graduate students and business workers in Seoul, Korea. 20 Interviewers were graduate students who were trained about survey procedure and they volunteered for the task in place of completing alternative class assignments. They visited the university and offices and asked people whether they currently using mobile Internet service. The subjects for this study were confined to the mobile users who have experienced mobile Internet service. The surveys began with an introductory statement that asked respondents to administer their own responses, assured them of confidentiality. This was followed by the measures and a request for demographic information. The sample consisted of 384 respondents including 252 (under)graduate students and 132 business workers in Korea. The male/female ratio of the sample was 52.3% and 47.7%, respectively. In the sample, 70.3% were in their twenties and 29.7% were in their thirties. The mean frequency of mobile Internet usage per month was 7.59 times and the mean time of Internet usage per connection was 6.90 minutes.

4.2. Measure Development

Measures of the constructs were developed in several stages. In the first stage, based on the defined constructs, tentative measures were either borrowed or developed from the existing literature. In the second stage, to establish content validity, a list of defined constructs and measures was submitted to a panel of six marketing, electronic commerce academicians who were recognized as authorities on the subject of MC. We requested the panel members to assign each measure to the construct they believed was appropriate and note whether they thought the construct could be represented by any other measures. In the third stage, faculty and doctoral students reviewed a preliminary version of the instrument for precision and clearness. Finally, a pretest was conducted among 20 consumers. During all the stages, the questionnaire was progressively refined, simplified and shortened.

Perceived user control was measured by 2 items on a seven-point ratings of agreement (1=very strongly disagree, 7=very strongly agree ;the seven-point scale was used for all subsequent items, unless noted otherwise) with the following two statements adapted from Wu [2000]: (1) "I was in control over the information display format, condition when using this mobile Internet site", (2) "I was in control over the content of this mobile Internet site that I wanted to see".

Perceived responsiveness was measured by agreement with the following two statements adapted from Wu [2000]: (1) "This mobile Internet site had the ability to respond to my specific questions quickly", (2) "This mobile Internet site had the ability to respond to my specific questions relevantly".

Perceived personalization was measured by agreement with the following three statements adapted from Srinivasan et al. [2002]: (1) "This mobile Internet site enables me to order products or service that are tailor-made for me", (2) "The advertisements and promotions that this mobile Internet site sends to me are tailored to my situation", and (3) "This mobile Internet site makes me feel that I am a unique customer".

Perceived connectedness was measured by agreement with the following three statements adapted from Srinivasan et al. [2002]: (1) "Customers share experiences about the product or service with other customers of the mobile Internet site", (2) "Customers of this mobile Internet site benefit from the community sponsored by the site", and (3) "Customers share a common bond with other members of the customer community sponsored by the site".

Perceived ubiquitous connectivity was measured by agreement with the following four statements adapted from Kim and Kim [2002]: (1) "I can access to this mobile Internet site anytime for the necessary information or service", (2) "I can access to this mobile Internet site anywhere for the necessary information or service", (3) "I can use this mobile Internet site "anywhere", "anytime" at the point of need", and (4) "This mobile Internet site enables me to order products or service anywhere at anytime".

Perceived contextual offer was measured by agreement with the following three statements developed for this study based on the conceptual study by Mort and Drennan [2002], Kenny and Marshall [2000], and Figge [2004]: (1) "This mobile Internet site offers timely packets of information (e.g. restaurant coupon for lunch) to me", (2) "This mobile Internet site provides me with location-specific packets of information (e.g. sale information for coat when I enter the department store)", and (3) "This mobile Internet site provides me with optimal information or service that is contextually relevant to me based upon where I am and what I am interested".

The measures for trust in the study were based on Doney and Cannon [1997], Jarvenpaa et al. [1999], Suh and Han [2003]: (1) "This mobile Internet site is trustworthy", (2) "This mobile Internet site keeps its promises and commitments", (3) "This mobile Internet site keeps customers' best interest in mind".

Attitude toward using MC was measured by agreement with the following three statements based on Davis et al. [1989], Suh and Han [2003]: (1) "Using this mobile Internet site for MC is a good idea", (2) "Using this mobile

Internet site for MC is a wise idea”, and (3) “Using this mobile Internet site for MC is a appealing idea”.

Behavioral intention to use MC was measured by agreement with the following four statements adapted from Suh and Han [2003], Pavlou [2003]: (1) “Given the chance, I intend to use MC via this mobile Internet site”, (2) “I expect my use of this mobile Internet site for MC to continue in the future”, and (3) “I have intention to purchase product or service via this mobile Internet site”.

4.3. Reliability and Validity of Measures

Internal consistency was assessed by computing Cronbach’s alpha. The alpha coefficients for each construct of this study are presented in Table 2. . As shown in Table 2, Cronbach’s alpha was found to be greater than 0.70, in accordance with Nunnally’s standard [Nunnally 1967].

Following Anderson and Gerbing [1988], we also conducted confirmatory factor analysis to further establish the reliability and discriminant validity of the multi-item scales (see Table 2).

Table 2. Confirmatory factor analysis results (** significant at the .001 level)

Construct /items	Factor loading	t-value	Construct Reliability	AVE	Cronbach’s alpha
<i>Perceived User Control</i>			0.754	0.605	0.754
UC1	0.806**	14.957			
UC2	0.749**	14.040			
<i>Perceived Responsiveness</i>			0.920	0.852	0.926
PR1	0.891**	18.009			
PR2	0.954**	19.369			
<i>Perceived Personalization</i>			0.900	0.749	0.911
PP1	0.861**	21.165			
PP2	0.850**	20.896			
PP3	0.885**	21.911			
<i>Perceived Connectedness</i>			0.871	0.692	0.875
PC1	0.825**	19.029			
PC2	0.831**	19.071			
PC3	0.839**	19.641			
<i>Perceived Ubiquitous Connectivity</i>			0.948	0.822	0.948
PUC1	0.887**	22.061			
PUC2	0.932**	24.036			
PUC3	0.909**	22.997			
PUC4	0.897**	22.427			
<i>Perceived Contextual Offer</i>			0.906	0.764	0.908
PCO1	0.815**	19.085			
PCO2	0.902**	22.477			
PCO3	0.902**	22.333			
<i>Trust</i>			0.901	0.753	0.907
T1	0.917**	23.180			
T2	0.809**	19.095			
T3	0.874**	21.672			
<i>Attitude toward using MC</i>			0.863	0.677	0.860
ATT1	0.755**	16.657			
ATT2	0.885**	20.951			
ATT3	0.824**	18.854			
<i>Behavioral Intention to use MC</i>			0.834	0.629	0.823
BI1	0.804**	18.111			
BI2	0.868**	20.243			
BI3	0.697**	14.976			

Although the chi-square value (516.049, $df=273$) for the measurement model was significant ($p < 0.01$), this statistic is sensitive to sample size and model complexity; as such, the goodness-of-fit index (GFI), nonnormed fit index (NNFI), and comparative fit index (CFI) are more appropriate for assessing model fit here [e.g., Bagozzi and Yi 1988; Bearden, Sharma, and Teel 1982].

GFI (0.906), AGFI (0.879), NNFI (0.961), CFI (0.968), SRMR (0.062) and RMSEA (0.048) indicate satisfactory model fit. Furthermore, all the individual scales exceeded the recommended standards proposed by Bagozzi and Yi [1988] in terms of construct reliability (i.e., greater than 0.60) and average variance extracted (AVE) by the latent construct (greater than 0.50).

Convergent validity is implied by the strength of the factor loading of each observed measure on its proposed latent variable. As shown in Table 2, all the items’ loadings indicated significant t-values, suggesting convergent validity was achieved.

Next, we assessed whether the measurement model satisfied two conditions that demonstrate discriminant validity: (1) For each pair of constructs, the squared correlation between the two constructs should be less than the AVE for each construct [Fornell and Larcker 1981]; (2) the confidence interval for each pair wise correlation estimate (i.e., +/- two standard errors) should not include the value of 1 [Anderson and Gerbing 1988].

As shown in Table 2 and Table 3, the squared correlation between the two constructs is less than all the AVE for each construct. And as shown in Table 3, the confidence interval for each pair wise correlation estimate does not include the value of 1. These results suggest that discriminant validity was achieved.

Table 3. Correlation Matrix

	UC	PR	PP	PC	PUC	PCO	TRU	ATT	BI
UC		0.086	0.270	0.189	0.108	0.038	0.163	0.105	0.099
PR	0.293 (0.056)		0.106	0.058	0.046	0.025	0.087	0.030	0.049
PP	0.520 (0.048)	0.325 (0.050)		0.400	0.116	0.106	0.157	0.158	0.094
PC	0.435 (0.054)	0.240 (0.054)	0.630 (0.037)		0.185	0.148	0.202	0.155	0.147
PUC	0.328 (0.055)	0.214 (0.052)	0.340 (0.049)	0.430 (0.047)		0.402	0.194	0.100	0.140
PCO	0.195 (0.059)	0.159 (0.054)	0.326 (0.050)	0.385 (0.049)	0.634 (0.034)		0.195	0.099	0.153
TRU	0.404 (0.054)	0.295 (0.050)	0.396 (0.049)	0.449 (0.049)	0.441 (0.048)	0.442 (0.048)		0.177	0.181
ATT	0.324 (0.047)	0.172 (0.043)	0.397 (0.044)	0.394 (0.045)	0.316 (0.043)	0.315 (0.043)	0.421 (0.049)		0.129
BI	0.315 (0.045)	0.221 (0.041)	0.307 (0.042)	0.348 (0.043)	0.374 (0.042)	0.391 (0.042)	0.426 (0.049)	0.359 (0.044)	

Note: UC=Perceived User Control, PR=Perceived Responsiveness, PP=Perceived Personalization, PC=Perceived Connectedness, PUC=Perceived Ubiquitous Connectivity, PCO=Perceived Contextual Offer, TRU=Trust, ATT=Attitude toward using MC, BI=Behavioral Intention to Use MC. Construct correlations (and standard errors) appear below the diagonal. Squared correlations appear above the diagonal.

5. Results

5.1. Chi-square difference test

The primary intent of this study was not only to identify four components of interactivity, which have been reviewed in online environment and to test the effect of these components on behavioral intention to use MC mediating trust, but also to test the impact of the new components of mobile interactivity on behavioral intention to use MC. Therefore, it is logical to examine the contribution of the new components in explaining customer trust and transaction intention in MC. Chi-square difference tests were conducted in order to test whether the differences in model fit were statistically significant across models. Results are presented in Table 4.

Table 4. Chi-Square difference test

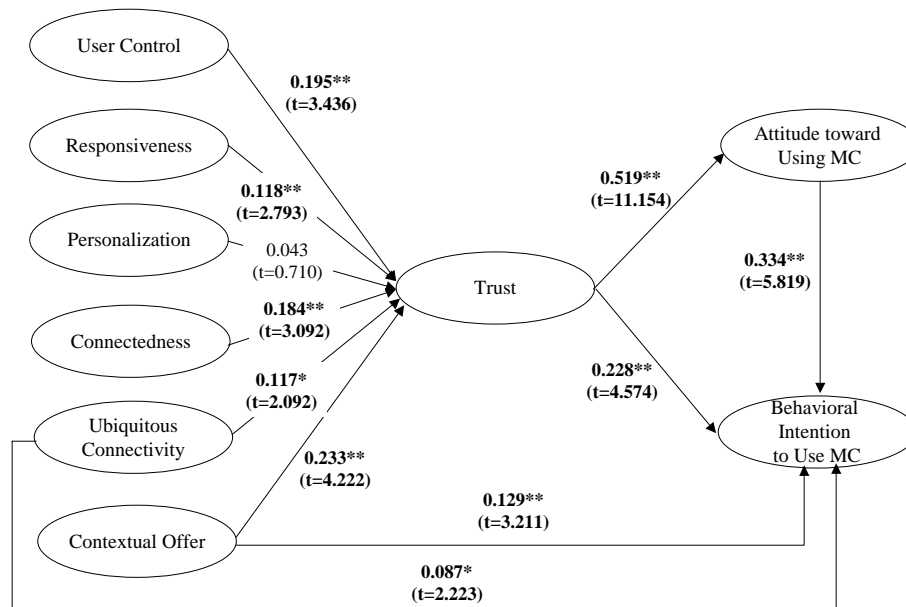
	Restricted Model	Proposed Model
	4 path (PUC→TRU, PCO→TRU, PUC→BI, PCO→BI) were fixed Zero	Allow all parameters to be free
Chi-Square	600.691 (p=0.00)	516.049 (p=0.00)
df	277	273
GFI	0.899	0.906
SRMR	0.110	0.062
RMSEA	0.055	0.048
Chi-square difference test	$\Delta \chi^2 = 84.642$ $\Delta df = 4$ $\chi^2 / df = 21.161 (p < 0.01)$	

The results indicate that the addition of MC-specific components of interactivity improves the model fit. Thus, customer trust and transaction intention in MC are best described by the hypothesized model in which MC-specific components are included.

5.2. Hypothesis testing

AMOS 4.0 was used for testing the model and hypotheses shown in Figure 3. Covariance structure analysis (AMOS 4.0) testing the proposed model (see Figure 3) resulted in a chi-square statistic of 516.049 (DF=273, p < 0.01). Although the chi-square value was significant, this statistic is sensitive to sample size and model complexity; as such, the goodness-of-fit index (GFI), nonnormed fit index (NNFI), and comparative fit index (CFI) are more appropriate for assessing model fit here [e.g., Bagozzi and Yi 1988; Bearden, Sharma, and Teel 1982]. GFI (0.906), NNFI (0.961), CFI (0.968) indicate satisfactory model fit.

Figure 4 illustrates the estimated coefficients and their significance on the structural model.



* p < 0.05, ** p < 0.01

Figure 4. Results of hypotheses tests

The impacts of perceptions of user control (B=0.195, t=3.436), responsiveness (B=0.118, t=2.793), connectedness (B=0.184, t=3.092), ubiquitous connectivity (B=0.117, t=2.092), and contextual offer (B=0.233,

$t=4.222$) on trust are significant. Therefore, H1, H2, H4, H5, H6 can be accepted. However, perceived personalization ($B=0.043$, $t=0.710$) has no significant impact on trust, and thus H3 cannot be accepted.

The coefficient of the causal relationship from trust to attitude is 0.519 ($t=11.154$). Trust has a significant influence on the behavioral intention to use MC ($B=0.228$, $t=4.574$). Therefore, H7 and H8 were supported. And attitude toward using MC was a significant antecedent of behavioral intention to use MC ($B=0.334$, $t=5.819$), validating H9.

In H10 and H11, this study investigated the direct effect of perceived ubiquitous connectivity and perceived contextual offer on the behavioral intention to use MC. Perceived ubiquitous connectivity ($B=0.087$, $t=2.223$) and perceived contextual offer ($B=0.129$, $t=3.211$) have a significant effect on the behavioral intention to use MC. These findings validate H10 and H11, respectively. These results suggest that the new components of mobile interactivity play a important role in consumer transaction intentions.

Among the five significant determinants of trust, perceived contextual offer has the largest standardized coefficient ($\beta =0.257$) and, therefore, might exert the strongest influence on customer trust in MC.

6. Discussion and Implications

From the standpoint of research on interactivity, this study identified the components of interactivity in MC context and investigated the effects of customer perceptions of interactivity on customer trust and transaction intentions. The primary contribution of this research is the integration of MC-specific constructs (perceived ubiquitous connectivity and perceived contextual offer) with online interactivity constructs into a coherent and parsimonious model that jointly predicts customer trust and transaction intentions in MC. The results show that the addition of the new MC-specific constructs improves the model fit compared with the previous model. By indicating the relevance of MC-specific constructs in the proposed model, the study makes a theoretical and empirical contribution to the emerging MC literature by validating a theory-driven research model of how to influence customer trust and transaction intentions in MC in terms of interactivity. In addition, to my knowledge, this research is the first attempt to examine empirically the effects of interactivity components on trust and transaction intentions including MC-specific variables.

The new findings are as follows. First, perceived ubiquitous connectivity and perceived contextual offer are shown to be direct antecedents of behavioral intention to use MC, suggesting that context-based marketing communication at the point of need is a key component in consumer acceptance of MC that deserves particular attention. Second, perceptions of interactivity (user control, responsiveness, connectedness, ubiquitous connectivity, and contextual offer) have a significant effect on customer trust in MC, suggesting that interactivity could extend into relationship building to explain customer trust. Third, attitude toward using MC has a significant effect on behavioral intention. This means that the causal relationship from attitude to behavioral intention can be applied to MC environment, in accordance with the TRA model and TAM. In sum, the present paper presents several new findings that enrich our understanding of the unique nature of MC.

6.1. Theoretical Implications

This research points to the need for an integrated theory to explain how the components of interactivity may affect customer trust and transaction intentions in MC context. Although several different theoretical perspectives from a variety of disciplines address specific aspects of online interactivity, the field lacks adequate theory to address mobile interactivity fully.

By reviewing the literature and identifying key components of multidimensional interactivity concept empirically, this research provides theoretical step toward more completely understanding interactivity in MC environment. The notion of interactivity has heretofore not been applied to MC context, but this study adds to MC literature. Hence, the proposed model makes an important contribution to the emerging literature on MC.

This study proposes relational perspective on interactivity, moved away from pure media features perspective, which has been common in previous studies. In MC environment, marketers can interact with customers “anytime” and “anywhere”. Interactivity should be regarded as crucial factor for customer relationship building instead of being regarded as pure media features.

This study offers significant implications for the information systems research on MC technology acceptance and diffusion. Much research focuses on PC-based online environment. However, the advent of the MC has introduced “contextually” and “ubiquity” in system acceptance and use because people need to use mobile technologies to communicate, collaborate and transact with individuals at the point of need. Therefore, contextually and ubiquity are becoming important elements of system use. The integration of new variables (“ubiquitous connectivity” and “contextual offer”) in existing online interactivity opens new foundations for future information systems research.

6.2. Managerial Implications

This study also has several practical implications for understanding MC strategies. The most important implication is that mobile interactivity has a direct effect on transaction intentions. Therefore, it may be worthwhile for managers to think strategically about strengthening the mobile marketing. There are several guidelines for practitioners to develop MC strategies.

First, one practical implication of this study is that marketers should develop integrated strategies of customer communication channels. From the perspective of communication channel integration, mobile devices are crucial media for seamless communication irrespective of user's location and movement. For example: A person is checking stock trading information on PC-based internet, and as he goes out or drives he is able to receive message about stock price change through mobile device. In this case, communication with customers continues without interruption by changing communication mode (or channel) from online to mobile. Mobile communication should never be a stand-alone channel of communication. Rather, the medium should be used to extend the presence of a company or product into an additional channel.

Second, this study provides implications for developing new marketing strategies such as U-commerce. U-commerce won't replace the mobile phone or the PC, but will leverage each tool depending on user need, preference and location. It means leveraging the unique qualities of a mobile device, and tailoring services and products to the consumer's location, context, and personal preferences. Companies with a physical presence, be it physical store locations, a catalog or even a web site, will be able to leverage mobile media to extend their presence to be anywhere the user is at any time. A practical example of this is a bank using these devices to communicate the location of the nearest ATM based upon the identified location of the user. Perhaps more powerful is the example of a brick-and-mortar retailer running an outdoor ad for a sweater which allows the user to type in a code on their mobile device to be directed to the location of the closest store, while also offering the ability to place an order for that sweater [see Carat Interactive 2002]. Based on contextual marketing promotion, marketers can develop new marketing strategies that link online mobile Internet and offline stores.

Third, marketers should develop different interactivity mix for customer relationship management according to marketing objective. For trust building, user control, responsiveness, connectedness, ubiquitous connectivity, and contextual offer are important variables. The results of this study imply that marketing programs focused on ubiquitous connectivity and contextual offer will be effective if the main objective of marketing communication is to invoke transaction intentions.

6.3. Limitations and Further Research

As does any research, this study has some limitations. The focus in this study was on how perceptions of interactivity influence customer trust and transaction intentions in MC. This study included perceptions of interactivity as the only precedent of trust. Other marketing research, however, suggests that such factors familiarity and disposition to trust have an effect on trust [Gefen 2000]. And consumer characteristic or consumer behavior-related variables such as innovativeness, product involvement may influence his or her transaction intentions. Further research should develop more elaborate model including above variables.

This research is based on a static model and cross-sectional analysis. Considering interactivity is dynamic in nature, there is a need for additional studies that investigate effects of interactivity on marketing performance by collecting longitudinal data on actual consumer behavior and including quantitative variables of interactivity such as interaction frequency, interaction interval.

The generalization of the findings in this study may be limited because the sample was drawn primarily from the university students and business workers in their twenties and thirties who are likely to be familiar with mobile Internet service. But, considering the sample consists of similar ratios, compared with actual users of mobile Internet service, it is sufficient to explain mobile consumer transaction behavior which is infantry in marketing.

Besides these limitations, several further research directions follow from this study. Further research could address the comparison of online interactivity with mobile interactivity, especially the effects of interactivity components on transaction intentions in online vs. mobile environment.

Finally, a promising future research would be to develop conceptual model that delineates the formation of customer loyalty in MC environment.

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