THE EFFECTS OF INTERACTIVITY CONSTRUCTS ON CUSTOMER LOYALTY IN MOBILE ENVIRONMENTS

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THE EFFECTS OF INTERACTIVITY CONSTRUCTS ON CUSTOMER LOYALTY IN MOBILE ENVIRONMENTS FOCUSED ON MOBILE INTERNET SERVICE

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Abstract

Mobile environments are becoming one of the major interests for the marketing researchers and discovering a way to perform effective marketing activities in such environments is a priority task for many business organizations as we are entering an "always-on" society where people can interact "anytime" and "anywhere". Interest in the concept of "interactivity" has emerged in online environments, and it has been regarded as the crucial element of successful online marketing. This work identifies multidimensional constructs of interactivity and explores the differential effects of the identified constructs on customer trust, attachment, commitment, and customer loyalty in mobile environments by developing a comprehensive model and carrying out an empirical study with large sample data. The results indicate that in mobile environments, user control and instant connectivity are positively related to trust in mobile internet service and personalization and contextual sensibility have a positive effect on attachment to mobile internet service. So eventually the components of interactivity of mobile environment give an influence on customer loyalty. Based on these empirical results, this study addresses implications for new marketing strategies with regard to customer relationship management, focusing on the integration of customer communication channels in online setting to those in mobile setting.

Keywords : mobile, interactivity, customer relationship, customer loyalty.

1. INTRODUCTION

The rapid spread of mobile phones and wireless internet connection augments the importance of Customer Relationship Management (CRM) and marketing activities in mobile environments that have been mainly addressed in the online environment of wired internet connection. CRM activities in mobile environments have some advantages over the traditional marketing environment thanks to the
assured mobility that are relatively free from temporal and spatial limitations. For example, the realization of true location-based marketing (i.e., all consumers are within relative proximity of your place of business) is possible; the real-time information around customers can be used to promote purchase and repurchase in a timely manner (i.e., information providers are enabled with the technology to send advertising directly to a consumer's mobile phone); and the development of one-to-one relationship marketing (i.e., providing services or products customized for an individual customer) can be undertaken more efficiently.

However, despite the arrival of mobile environments enabling interactive communication between consumers and providers without restrictions of time and space, little research has been carried out on the identification of interactivity constructs in mobile environments and on how these elements are associated with customer relationship building. Considering the fact that the development of lifelong relationships with customers is one of the critical issues in marketing, it is worth performing the research that examines how mobile-specific characteristics are related to customer loyalty that contributes consequentially to a positive long-term customer relationship. Thus this study identifies multidimensional constructs that characterize interactivity between customers and providers in mobile environments and examines how these constructs are related to loyalty building. By clarifying the role and usefulness of the mobile-specific interactivity components in relationship marketing, the study aims to provide valuable information for establishing marketing strategies with regard to Customer Experience Management (CEM) and Customer Relationship Management (CRM). It is also hoped that some guidance and insights are derived from the study for the integrated customer communication strategies combining existing online and offline setting with mobile setting, new CRM strategies oriented towards U-commerce, and context-based marketing communication strategies.

2. BACKGROUND

2.1. Research Plan

2.1.1. Conceptual Model and Research Hypotheses

In order to examine how the interactivity constructs perceived by mobile internet service users influence in building loyalty to a service provider, a research model is designed. The model is depicted in a circle-and-arrow figure in which single-headed arrows indicate causation, as shown in Figure 1. This conceptual model is developed to understand the causal link between the identified interactivity constructs in mobile environments and the key relationship marketing constructs of trust, attachment, commitment, and loyalty.

![Figure 1. Research Model](image-url)

The research starts with identification of research questions and their subsequent hypotheses. Overall, two research questions and 10 research hypotheses are established. The first research question is to examine how the characteristics arising in interaction between mobile internet service users and
providers or in user-to-user intercommunication influence in building customer loyalty to a service provider. The identified characteristics are named “interactivity constructs”. The second research question is to examine how the important constructs of trust, attachment, and commitment that are studied in the existing research work on customer relationship marketing influence customer loyalty.

The underlying rationale for the research questions described above is that given the fact that introduction of new communication medium allows to build increasing interactive relationships between customers and providers as well as between customers and customers, it is important to ascertain such interactivity actually gives a direct and positive effect on maintaining stable long-term relationships with customers. In addition, it is also important to examine how distinguishable characteristics in mobile environments such as mobility, ubiquity, contextual sensibility, etc. are functioning in customer relationship establishment and whether they are positively related to trust, attachment and loyalty.

<Research Theme 1> A set of interactivity constructs in mobile environments, do they influence user’s trust in a provider and his attachment to a mobile service?

<Hypothesis 1> User control influences user’s trust.

According to the research “Building Trust On-line” by Sandeep Dayal et al. (1999), high levels of user control over the transaction are likely to lead to high levels of trust to the relationship. Sheth and Parvatiyar (1995) have posited a number of factors that cause consumers, in general, to want a relationship with a given provider. They pointed out that consumers engage relational market behavior to achieve greater efficiency in their decision making, reduce information processing, achieve more cognitive consistency in their decisions, and reduce the perceived risks associated with future choices, so they will develop a long-term relationship with a website that provides higher level of user control.

<Hypothesis 2> Responsiveness influences user’s trust.

Responsiveness concerns promptness or response time regarding how fast a company responds to customer requirements and enquiries. Moorman et al. (1993) stated in their research that communication, especially timely communication, helps foster trust by assisting in resolving disputes. That is, the level of trust of a buyer is increased by the timely exchange of information (Morgan and Hunt 1994).

<Hypothesis 3> Personalization influences attachment.

Personalization is related to the ability to make the customers feel that they are being spoken to or treated as a valued individual. Personalization utilizes accurate and up-to-date customer data to introduce individual amendments for each and every customer which refer to past interaction, account information or preferences. For example, marketers will be able to customize the on-line store ambience for each consumer. According to the research in social psychology field, people have more attachment and commitment to an object that they have looked after and invested in (Rusbult 1983).

<Hypothesis 4> Connectedness influences attachment.

Connectedness means the degree of exchanging valuable information and sharing common interest and personal viewpoint between customers via online communities such as bulletin boards, newsgroups, chatrooms, etc. In mobile environments, such online interactions can be possible anytime and anywhere. According to the social identity theory of intergroup behavior, solidarity and attachment to the group can be formed through computer-mediated interactions (Postmes, Spears, and Lea 1998).

This study aims to discuss interactivity of mobile based on characteristics of mobile environment.
Hence, this study hypothesizes that instant connectivity and contextual sensibility influence trust and attachment respectively as constituent factors of interactivity, which needs to be take into consideration newly in mobile environment.

**<Hypothesis 5> Instant connectivity influences trust.**
It means a degree to provide customers with most efficient and suitable information and service in taking totally all the circumstances such as time and location that an individual is placed in (Ho-young, Kim, Jin-woo, Kim 2002).

**<Hypothesis 6> Contextual sensibility influences attachment.**
It means a degree to provide customers with most efficient and suitable information and service in taking totally all the circumstances such as time and location that an individual is placed in. (Mort and Drennan 2002, Figge 2002)

**<Research Theme 2> Trust, Attachment and Commitment, do they influence customer loyalty?**

**<Hypothesis 7> Trust influences attachment.**

**<Hypothesis 8> Trust influences commitment.**

**<Hypothesis 9> Attachment influences commitment.**

**<Hypothesis 10> Commitment influences loyalty.**

Since the separation of “relational exchange” from “discrete transactions” in Marketing, trust in terms of relationship marketing models between buyers and suppliers has become more important (Dwyer et al. 1987; Anderson and Narus 1990; Morgan and Hunt 1994; Doney and Cannon 1997; Javenpaa et al. 2000). Relationship marketing concentrates on the relational aspects of exchange as opposed to purely contractual short-term profit based exchange transactions. Commitment is considered as a core concept in long-term relationships established by trust. According to Moorman et al. (1992), commitment involves an enduring desire to maintain a valued relationship. Morgan and Hunt (1994) pointed out that trust gives a significant impact on commitment as it creates valuable business exchange relationships, and there exist many other research suggesting that trust gives a positive effect on sustaining relationships (Crosby, Evans, and Cowles 1990; Mohr and Spekman 1994; Kumar 1996). The research by Moorman, Zaltman, and Deshpandé (1992) suggests that trust leads to commitment in “relational exchanges”.

2.1.2. Definition of Interactivity Constructs

1) **Interactivity Constructs in Mobile Environments**

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).” In this work, user control in terms of information control is emphasized, and thus it is defined as the degree to which a user can choose information flow corresponding to his needs. Responsiveness is defined as the extent to which user requirements and enquiries are promptly and timely responded. Personalization refers to the extent to which a firm develops and provides customized products and services for specific customers. Connectedness refers to the feeling of being connected to the outside via "hypertext links" related to one’s personal interest such as bulletin boards, newsgroups, chatrooms, etc. (Ha and James 1998). This work redefines it as the extent to which valuable information is exchanged and common interest and individual perspective are shared via online communities functioning as a social interaction medium for customers. Instant connectivity indicates the extent to which real-time information of product and services are provided and reciprocal communication takes place by accessing to internet anytime and anywhere without limitation of time and location. Contextual sensitivity is related to the
degree of providing personalized, real-time information to customers at the point of need by considering collectively customers' perceived environments, e.g., temporal and spatial condition.

2) Loyalty Building Constructs

According to Morgan and Hunt (1994), trust is “confidence in an exchange partner’s reliability and integrity”. Trust is also defined as the “perceived credibility and benevolence of a target of trust” (Doney and Cannon 1997). For the purposes of this research, the definition of trust is adapted to mobile environments; it is defined as “a degree of trust in mobile internet service providers and in their services”.

Attachment is defined as a behavioral intention or the strength of the cognitive and emotional bond connecting a consumer with a provider, a product, or a particular trade name, appearing in connection with self-image or surrounding environments (Fournier 1998).

Crosby and Taylor (1983) define commitment as a stable preference that is bound by an attitude of resistance to change. This work defines it as the degree of resisting to change and maintaining relationships with regard to mobile internet services.

Czepiel and Gilmore (1987) define customer loyalty as a specific attitude to continue in an exchange relationship based on past experiences. Their definition implies that levels of customer loyalty can be assessed by attitudinal measures such as the repeated purchase of products or services over a given period of time that is a result of a preference, attitude or market share. This study emphasizes the aspect of future expectation as described in Rama (1990), and thus customer loyalty is defined as “customer intent to sustain a relationship with the current service provider taking into account past experience and future expectation”.

3. EMPIRICAL STUDY

3.1 Method of Data Collection and Analysis

3.1.1. Sampling

In sampling, the population of concern is students and office workers, ages ranged from 20 to 30 years, who are familiar with accessing to internet via mobile phones. In the view of experience of the users, average use times of internet for a week were 33.3% (1~10 times), 24.9% (11~20 times) and 17.4% (21~30 times) respectively. Therefore, average use time for a week was below 20 times for most of users and the users with over 41 use times occupied over 10%.

In addition, average use times of internet for a month were 81.5 (under 1 time) and 13.8% (1~5 times) respectively and most of the users had under 1 use time. Use experience of internet was 89.2% (over 5 years) and it shows that most of the users had over 5 years experiences. Also, use experience of cell-phone and mobile were 54.7% (over 5 years), 25.0% (3~4 years) and 14.3% (1~2 years) respectively, and the users with over 5 years experiences occupied a majority.

The respondents of other ages are not included because they are not generally familiar with mobile internet service and thus they might distort the result of the study. By restricting the respondents to relatively young students and white-collar workers, the influence of demographic exogenous variables can be minimized.

3.1.2. Study Procedures

The questionnaire used for this study is composed of the items already used in the existing literature and of those newly introduced. A pilot test was conducted with small samples, and its feedback was used to make modifications in the questionnaire. Data collection then took place during the 7 days from November 21, 2008 to November 28, 2008. Only a person who has experience in using mobile
internet service was chosen as a respondent. From the total 701 questionnaires collected, 680 samples were analyzed excluding 21 questionnaires that have insufficient or inappropriate data.

3.1.3. Analysis Method

The collected data was processed using the SPSS 12.0 and the AMOS 4.0 for statistical analysis. Frequency analysis is performed to figure out the demographic characteristics and general status. Cronbach’s alpha and confirmatory factor analysis were carried out to measure the reliability and the validity of the studied items (i.e., the identified interactivity constructs in mobile setting). For the verification of the proposed hypotheses, path analysis using a structural equation model is employed. Correlation between the variables and goodness of fit of the research model are analyzed. All the analysis performed have the significance level $p<.05$.

3.2. Reliability and Validity of Interactivity Constructs

3.2.1. Reliability Verification

Cronbach’s alpha coefficient is used to examine the reliability (i.e., internal consistency) of the measured variables. Internal consistency ranges between zero and one. Even though there are no consistent standards for what is considered an acceptable reliability, a commonly-accepted rule of thumb is that a Cronbach's $\alpha$ of 0.6 indicates acceptable reliability, and higher score indicates good reliability. As shown in Table 1, Cronbach’s $\alpha$ are higher than 0.6 for all the variables, so the reliability of the variables is acceptable (i.e., they are internally consistent).

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Variables</th>
<th>Cronbach’s Alpha ($\alpha$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>User control</td>
<td>.901</td>
</tr>
<tr>
<td></td>
<td>Responsiveness</td>
<td>.879</td>
</tr>
<tr>
<td></td>
<td>Personalization</td>
<td>.884</td>
</tr>
<tr>
<td></td>
<td>Connectedness</td>
<td>.923</td>
</tr>
<tr>
<td></td>
<td>Instant Connectivity</td>
<td>.898</td>
</tr>
<tr>
<td></td>
<td>Contextual Sensibility</td>
<td>.894</td>
</tr>
</tbody>
</table>

| Mediating variables | Trust | .924 |
|                     | Commitment | .900 |
|                     | Attachment | .930 |

| Dependent variables | Loyalty | .908 |

Table 1. Reliability Analysis of Interactivity Constructs

Table 2 presents the correlation coefficient ($r$) of the studied items. The correlation between loyalty and commitment shows the highest coefficient $r=.748(p<.01)$, which indicates a strong positive relationship between two variables. In addition, the result of correlation analysis shows that loyalty has a positive relationship with trust and attachment with coefficient scores $r=.618(p<.01)$ and $r=.661(p<.01)$ respectively. It appears that commitment to the relationship with a mobile internet service provider is positively related with trust and attachment, correlation scores $r=.702(p<.01)$ and $r=.652(p<.01)$ respectively. There is also a positive relationship between trust in a mobile service provider and attachment to their service with the correlation score $r=.440(p<.01)$. According to the presented correlation scores, trust has a positive relationship with user control, responsiveness, and instant connectivity; i.e., $r=.467(p<.01)$, $r=.441(p<.01)$, and $r=.613(p<.01)$ respectively. Similarly, attachment has a positive relationship with the variables personalization, connectedness, and contextual sensibility; the respective correlation coefficients are $r=.592(p<.01)$, $r=.452(p<.01)$, and $r=.506(p<.01)$.

In summary, the correlation analysis manifests that levels of trust increases as levels of user control, responsiveness, and instant connectivity increase; and in a similar sense, levels of attachment increase...
as levels of personalization, connectedness and contextual sensibility increase. In addition, a high level of trust and attachment will increase the level of commitment and then ultimately the level of loyalty.

<table>
<thead>
<tr>
<th>Variables</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMR</th>
<th>MSEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Control</td>
<td>0.941</td>
<td>0.923</td>
<td>0.032</td>
<td>3.645</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>0.925</td>
<td>0.917</td>
<td>0.05</td>
<td>3.542</td>
</tr>
<tr>
<td>Personalization</td>
<td>0.947</td>
<td>0.923</td>
<td>0.043</td>
<td>3.342</td>
</tr>
<tr>
<td>Connectedness</td>
<td>0.945</td>
<td>0.923</td>
<td>0.051</td>
<td>3.348</td>
</tr>
<tr>
<td>Instant Connectivity</td>
<td>0.927</td>
<td>0.901</td>
<td>0.05</td>
<td>2.317</td>
</tr>
<tr>
<td>Contextual Sensibility</td>
<td>0.935</td>
<td>0.911</td>
<td>0.052</td>
<td>3.367</td>
</tr>
<tr>
<td>Commitment</td>
<td>0.934</td>
<td>0.900</td>
<td>0.037</td>
<td>3.749</td>
</tr>
<tr>
<td>Attachment</td>
<td>0.937</td>
<td>0.921</td>
<td>0.042</td>
<td>3.356</td>
</tr>
<tr>
<td>Loyalty</td>
<td>0.934</td>
<td>0.903</td>
<td>0.036</td>
<td>3.743</td>
</tr>
</tbody>
</table>

Table 3. Confirmatory Factor Analysis of Interactivity Constructs

3.2.2. Confirmatory Factor Analysis

Confirmatory factor analysis is conducted to assess the variables in the proposed research model; i.e., structural equation modeling is used for analysis. Table 3 presents the result of the confirmatory factor analysis carried out, which shows that the established variables in the model and relationships between the variables fit reasonably well to the data. All the path coefficients presented in Table 3 indicate that the variables give a positive effect on one another at the significance level p<.01. In addition, there is no correlation coefficient over 0.8 (i.e., r>0.8) as presented in Table 2, so it can be concluded that there is no redundant variable and thus each of them is valid.

3.3. Validation of Research Model and Hypotheses

In order to analyze inter-relationship between the interactivity constructs in mobile environments (user control, responsiveness, personalization, connectedness, instant connectivity, and contextual sensibility) and the relationship marketing constructs (trust, attachment, commitment and loyalty), a structural equation model is developed. The established model and the research hypotheses based on the model are then tested using AMOS 4.0.
3.3.1. Goodness of Fit Test

Table 4 presents the result of goodness of fit test of the research model. GFI (Goodness of Fit Index) is a measure indicating how well any model is fitted for the overall data. The GFI should be between 0 and 1 where 1 indicates a perfect fit. The recommended model fit cutoff value is 0.9. AGFI is the GFI adjusted for the degrees of freedom available for testing the model. Acceptable values are above 0.90. RMR (Root Mean-Square Residual) is the square root of the average amount that the sample variances and covariances differ from their estimates. Smaller values are better. Acceptable values are ranged from 0.05 to 0.08. NFI (Normed Fit Index) compares the improvement in the minimum discrepancy for the specified (default) model to the discrepancy for the independence model. A value of the NFI below 0.90 indicates that the model can be improved. Value between .90 and .95 is acceptable; above .95 indicates good fit. CFI (Comparative Fit Index) is the difference between the two models’ chi-squares divided by the chi-square for the independence model (with a noncentral chi-square). It ranges from 0 to 1, like the NFI, and .95 (or .9 or higher) indicates good fit. CMIN/DF is the ratio of the minimum discrepancy to degrees of freedom. Values should be close to 1.0 for correct models.

The chi-square index is not included to determine the goodness of fit of the model because it is known that chi-square value is increased abnormally where the sample size is over 200. Instead, X²/DF (chi-squared divided by degrees of freedom) is employed. A model is considered fit or acceptable if X²/DF are below 3.0.

Overall, both absolute fit measures and incremental fit measures in Table 4 indicate a good fit for the model.

<table>
<thead>
<tr>
<th>Index</th>
<th>Recommended values</th>
<th>Measured values</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN/DF</td>
<td>Less than 3.0</td>
<td>1.634</td>
</tr>
<tr>
<td>GFI (Goodness of Fit Index)</td>
<td>1</td>
<td>.939</td>
</tr>
<tr>
<td>AGFI (Adjusted GFI)</td>
<td>1</td>
<td>.917</td>
</tr>
<tr>
<td>RMR (Root Mean-Square Residual)</td>
<td>Less than 0.05</td>
<td>.049</td>
</tr>
<tr>
<td>NFI (Normed Fit Index)</td>
<td>1</td>
<td>.963</td>
</tr>
<tr>
<td>CFI (Comparative Fit Index)</td>
<td>1</td>
<td>.995</td>
</tr>
</tbody>
</table>

Table 4. Goodness of Fit Measures of the Research Model

3.3.2. Validation of Research Hypotheses

The maximum likelihood method is used to examine the significance of the path hypotheses in the model (i.e., Hypothesis 1 to 10 presented in Section 2.1.1). The critical ratio (C.R.) is used as a test of significance. A causal path is considered significant if a critical ratio is greater than 1.96 (C.R. > 1.96) at the significance level 5%. In this study, all the standardized regression coefficients except the pairs of “responsiveness-trust” and “connectedness-attachment” are determined significant at the p<0.05 level. More details and interpretations of the path analysis of each hypothesis is described below. Confirmatory factor analysis (CFA) allows to test the hypothesis that a relationship between observed variables and their underlying latent constructs exists. Additionally, it can be concluded that most of the factor coefficients of the manifested variables (observed variables) over latent variables (unobserved variables) are significant.

**Hypothesis 1** User control influences trust. **p<.01**

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate (Standardized Coefficient)</th>
<th>S.E.</th>
<th>C.R.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;H1&gt;</td>
<td>Trust -- User Control</td>
<td>0.059</td>
<td>0.022</td>
<td>2.603</td>
</tr>
</tbody>
</table>
Table 5. Relationship of User Control with Trust and Attachment

As the coefficient of the path User Control->Trust is $E=0.059$, and its critical ratio is $t=2.60$, the corresponding hypothesis is significant at the $p<.01$ level. Therefore, $<H1>$ is accepted.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate (Standardized Coefficient)</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;H2&gt; Trust &lt;-- Responsiveness</td>
<td>0.04</td>
<td>0.049</td>
<td>0.807</td>
<td>0.4</td>
</tr>
<tr>
<td>Attachment β- Responsiveness</td>
<td>0.051</td>
<td>0.055</td>
<td>0.919</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Table 6. Relationship of Responsiveness with Trust and Attachment

The path coefficient of Responsiveness->Trust is $E=0.049$ and the critical ratio is $t=0.807$. The causal path is not significant at the $p<.01$ level (i.e., responsiveness does not influence trust). Therefore, $<H2>$ is rejected. Similarly, responsiveness does not influence attachment.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate (Standardized Coefficient)</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;H3&gt; Attachment &lt;-- Personalization</td>
<td>0.286</td>
<td>0.054</td>
<td>5.253</td>
<td>0</td>
</tr>
<tr>
<td>Trust &lt;-- Personalization</td>
<td>0.096</td>
<td>0.052</td>
<td>1.861</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 7. Relationship of Personalization with Trust and Attachment

The path coefficient of Personalization->Attachment is $E=0.28$ and the critical ratio is $t=5.25$. The tested path is significant at the $p<.001$ level. Therefore, $<H3>$ is accepted.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate (Standardized Coefficient)</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;H4&gt; Attachment &lt;-- Connectedness</td>
<td>(-0.012)</td>
<td>0.044</td>
<td>(-0.266)</td>
<td>0.8</td>
</tr>
<tr>
<td>Trust β- Connectedness</td>
<td>0.082</td>
<td>0.04</td>
<td>2.042</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 8. Relationship of Connectedness with Trust and Attachment

The path coefficient of Connectedness->Attachment is $E=-0.012$ and the critical ratio is $t=-0.266$. The path is not statistically significant at the level $p<.05$. Therefore, $<H4>$ is rejected.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate (Standardized Coefficient)</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;H5&gt; Trust &lt;-- Instant Connectivity</td>
<td>0.533</td>
<td>0.067</td>
<td>8.003</td>
<td>0</td>
</tr>
<tr>
<td>Attachment &lt;-- Instant Connectivity</td>
<td>(-0.255)</td>
<td>0.083</td>
<td>(-3.067)</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 9. Relationship of Instant Connectivity with Trust and Attachment
The path coefficient of Instant Connectivity->Trust is $E=0.533$ and the critical ratio is $t=8.003$. The path is significant at the $p<.001$ level. Therefore, <H5> is accepted.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate (Standardized Coefficient)</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment &lt;-- Contextual Sensibility</td>
<td>0.387</td>
<td>0.055</td>
<td>6.994</td>
<td>0</td>
</tr>
<tr>
<td>Trust &lt;-- Contextual Sensibility</td>
<td>0.006</td>
<td>0.052</td>
<td>0.105</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Table 10.                   Relationship of Contextual Sensibility with Trust and Attachment

The path coefficient of Contextual Sensibility->Attachment is $E=0.39$ and the critical ratio is $t=6.99$. The path is significant at the $p<.001$ level. Therefore, <H6> is accepted.

<table>
<thead>
<tr>
<th>Path</th>
<th>Estimate (Standardized Coefficient)</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment &lt;-- Trust</td>
<td>0.278</td>
<td>0.055</td>
<td>5.091</td>
<td>0</td>
</tr>
<tr>
<td>Commitment &lt;-- Trust</td>
<td>0.547</td>
<td>0.052</td>
<td>10.55</td>
<td>0</td>
</tr>
<tr>
<td>Commitment &lt;-- Attachment</td>
<td>0.436</td>
<td>0.034</td>
<td>12.68</td>
<td>0</td>
</tr>
<tr>
<td>Loyalty &lt;-- Commitment</td>
<td>0.47</td>
<td>0.068</td>
<td>6.95</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 11.                   Relationship among Trust, Attachment, Commitment, and Loyalty

The coefficient and the critical ratio of the path Trust->Attachment are $E=0.28$ and $t=5.09$ respectively; so the hypothesis H7 is statically significant at the $p<.001$ level. Similarly, the hypothesis H8 on the path Trust->Commitment is significant with the path coefficient $E=0.547$ and the critical ratio $t=10.55$. The result shows that attachment is positively associated with commitment. The path Attachment->Commitment has $E=0.4$ and $t=12.68$ at the $p<.001$ level. Commitment is also positively related to loyalty as indicated in the path coefficient $E=0.47$ and the critical ratio $t=6.95$. In conclusion, the hypotheses from <H7> to <H10> are all accepted.

4. DISCUSSION

4.1. Summary and Implications
Giving particular attention to the importance of interactivity as a means of building positive customer relationships, this work aims to investigate whether and how interactivity plays a significant role in CRM and marketing activities in mobile environments. By integrating the new interactivity elements appearing in mobile environments to the factors influencing online customer loyalty discussed considerably in existing literature, this study has identified a set of interactivity constructs that suppliers in mobile environments should focus on in establishing their customer-oriented strategies. A conceptual model that represents the integrated interactivity constructs and the linkages between the constructs has been built, and the reliability and validity of the proposed model as well as of the hypotheses derived from the model have been empirically analyzed.

The result of the study indicates that user control and instant connectivity perceived by users in using mobile internet services give a positive effect on user’s trust to a service provider and also his commitment to a service, which eventually contributes to increasing user’s loyalty to a certain provider or service. It appears that personalization and contextual sensibility also influence loyalty through user’s attachment and commitment to a provider or a service. On the other hand, the empirical study shows that responsiveness and connectedness does not have a direct and positive impact on building loyalty. Besides, it is observed that connectedness is an element related to trust rather than to attachment.

The study presented in this paper has a few characteristics. Firstly, multi-dimensional interactivity constructs are empirically studied. Secondly, unique features in mobile setting such as mobility, ubiquity, instantaneity, etc., were addressed as a means of building relationships between customer and suppliers. Finally, factors influencing customer loyalty are separated into two groups (the path of trust-commitment and that of attachment-commitment), so the influence of each path on loyalty building can be distinctively examined. Nowadays internet and mobile phones are used as communication media between customers and suppliers in almost every industry field, so the implications and insights with regard to the interactivity constructs of customer relationship management addressed in this study will provide valuable information for all the parties involved (e.g., content providers, advertisers, retailers, public space operators, and more) in building their customer relationship marketing strategies in mobile environments.

In conclusion, this study has a purpose to pay attention to an importance of interaction of mobile as a core means and give implications about strategic use plans of customer management in mobile environment by checking over constituent factors of interactivity that have been studied in existing on-line environment, unifying constituent factors of interactivity, which is on the rise newly in mobile environment and analyzing characteristics of interactivity that we needs to be managed strategically for business to control customers.

4.2. Limitations and Directions for Future Research

From the theoretical point of view, this study has some limitations. The theoretical foundation for interactivity constructs in mobile environments is not sound in comparison with that in online environments. Applying interconnectivity theory of the online environment to the context of mobile environment might lead to ambiguities in terms of their respective scope. In addition, the empirical study has been performed in the environment where the practical use of mobile internet service is not brisk enough to support the concepts in the tested model. For example, two rejected hypotheses regarding responsiveness and connectedness (i.e., H2 and H4) might have been affected by relatively little use of mobile internet service as a medium of communication between customers. Another limitation is that the respondents of the empirical study are solely students and office workers aged from 20 to 30. A restriction in the population of concern was made because it was assumed that they are the main users of mobile internet service; however, this restriction might cause a problem in generalizing the result of the study.

In the present study, customer specific variables such as innovation trend and customer behavior-related variables such as product involvement are not included in the group of loyalty building constructs (i.e., the constructs of trust, attachment, commitment and loyalty). For future research,
these variables should be included to produce a more sophisticated model. In addition, an integrated and refined model taking into account moderators such as product or service characteristics and purchase intent forming process according to situational factors might need to be developed.

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