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# DETERMINANTS OF USER SATISFACTION WITH MOBILE APPLICATIONS: CASE OF FACEBOOK AS A MOBILE APP IN TURKEY

## Abstract:

A mobile app is a computer (software) program designed to run on smartphones, tablet computers and other mobile devices (Wikipedia). The increased use of mobile devices and mobile Internet has led to an explosion of the development and download of mobile applications. Businesses started competing to have a mobile application to gain competitive advantage or stay competitive. But despite the success of some, the majority of mobile applications fails outright or is not as successful as expected. So this study aims to define the factors that affect user satisfaction as a success measure of mobile applications. I/S Success Model is used as a basis for this study, and the model is expanded with the constructs related to flow. The research framework includes seven antecedents (system reliability and design, perceived ease of use, content usefulness, content quality, focused attention, perceived enjoyment, and flow) of user satisfaction that were derived from existing information systems, m-commerce and applications literature. The structural equation modeling (SEM) method was applied to evaluate the hypothesized relationships among the constructs in the theoretical model developed. The results of the study showed that system quality and information quality are important determinants of user satisfaction, but flow does not have a direct influence on user satisfaction. The most striking finding of this study is that perceived enjoyment is a significant determinant of satisfaction with mobile applications. Based on the findings, companies involved in m-commerce should focus on not only to improve the usefulness or quality of the system but also the design features of the applications that enhance enjoyment and the experience must also be considered carefully.

## Keywords:

M-commerce, Mobile applications, User satisfaction, System quality, Content quality, Flow experience, Perceived enjoyment, Hedonism

**JEL Classification:** M31

## Introduction

A mobile app is a computer (software) program designed to run on smartphones, tablet computers and other mobile devices (Wikipedia). The increased use of mobile devices and mobile Internet has led to an explosion of the development and download of mobile applications. As of June 2014, 1.2 million apps were available in Apple's App Store, which is visited roughly 300 million times each week (O'Brien, 2014). In April 2013, mobile analytics vendor Flurry released a summary of category of app usage across smartphones and tablets and it shows that app usage (80% of time) dominates browser usage (Bosomworth, 2015). Data from Nielsen on mobile media time also shows the consumer preference for mobile apps that account for 89% of media time (Colwyn, 2014). So people are spending much more time using apps than they do access the web from a desktop computer.

On the other hand, as mobile phones are becoming as more as a part of our daily life, we use mobile apps much more for communication, shopping and working. The size of the apps market more than doubled in 2011, reaching one million in December (Deloitte, 2012). In 2014, mobile applications for "Shopping, Utilities & Productivity", and "Messaging" experienced triple-digit growth, and they were the key drivers (Khalaf, 2015). By the end of 2017, it is expected that more than 2 billion mobile users will make a mobile commerce transaction by using mobile apps (Munir, 2015). Beside m-commerce, mobile apps can also help businesses to provide customer service and enhance customer relationships. Considering all these advantages and potential growth, many experts states that "in today's mobile world, there should be no question as to whether a business should have a Mobile App, the question is when". Therefore, businesses are competing to have a mobile application to gain competitive advantage or stay competitive. According to available statistics in 2012, over 80% of businesses are actively looking into creating a Mobile Application within the next 12 months (AB Mobile Apps, 2012). But despite the success of some, the majority of mobile applications fails outright or is not as successful as expected (Deloitte 2012). So to be used effectively and gain a competitive advantage in mobile marketing, businesses need to be sure that their mobile applications are of high quality and provide a great user experience.

Contrary to e-commerce, m-commerce and mobile applications are a much less studied topic in marketing because of its short history. There are some studies in the management information systems field focusing on the usability features (see Hoehle and Venkatesh, 2015 for a detailed literature review), critical success factors (Xu and Gutiérrez, 2006) and acceptance (Anckar and D'Incau, 2002; Malik, Kumra and, Vandana, 2013; Rahman, 2013, Wei et.al, 2009) of m-commerce and applications but there is still little research on consumer satisfaction in the field of marketing. E-commerce research has shown us that consumer satisfaction is a vital factor for website success. M-commerce satisfaction is also found to be the fundamental performance variable affecting customer perceptions (Siau et al., 2004) concerning m-commerce. User satisfaction has become the prevailing proxy construct for measuring system success, and it is therefore frequently measured in past studies (Wang and Liao, 2007).

In this study, we preferred to use “user satisfaction” as a success measurement of mobile applications and the aim of the study is to define the factors that affect user satisfaction of mobile applications.

## M-Commerce and Mobile Applications

There are two different perspectives on the definition of m-commerce. In the first category, m-commerce is considered as an extension of e-commerce as “mobile e-commerce”. The only difference is that transactions are carried out via mobile devices with wireless Internet. There are some common features between e-commerce and m-commerce such as reachability, accessibility, localization and identification (Malik, Kumra and Srivastava, 2013). But as many researchers state (Feng et al., 2006; Tiwari, Buse and Herstatt, 2006), m-commerce is a more comprehensive concept. From this point of view, in the second category, m-commerce is defined as a new and innovative opportunity in commerce and business with its unique characteristics (such as ubiquity, immediacy, instant connectivity, pro-active functionality, simple authentication procedure) and functions (Tiwari, Buse and Herstatt, 2006).

**Figure 1. Different Types of M-Commerce Applications**


*Source: Rahman, 2013, p.81.*

However, in the first period of m-commerce, many definitions stressed upon the “monetary and financial transactions” and excluded other types of transmissions that do not include the ownership of a material object. But in today's’ mobile world, this perspective has lost its validity. Many of the applications on communication and entertainment neither include the transfer of ownership of a material object nor a financial transaction. Most of the applications are free today. So taking into account all these factors, Tiwari, Buse and Herstatt (2006) define m-commerce as “any transaction,

involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobiles access to computer-mediated networks with the help of mobile devices".

In the present case, there are many different types of mobile applications in m-commerce, and as mentioned above, most of them don't include a monetary transfer. These diverse m-commerce applications can be grouped as seen in Figure 1.

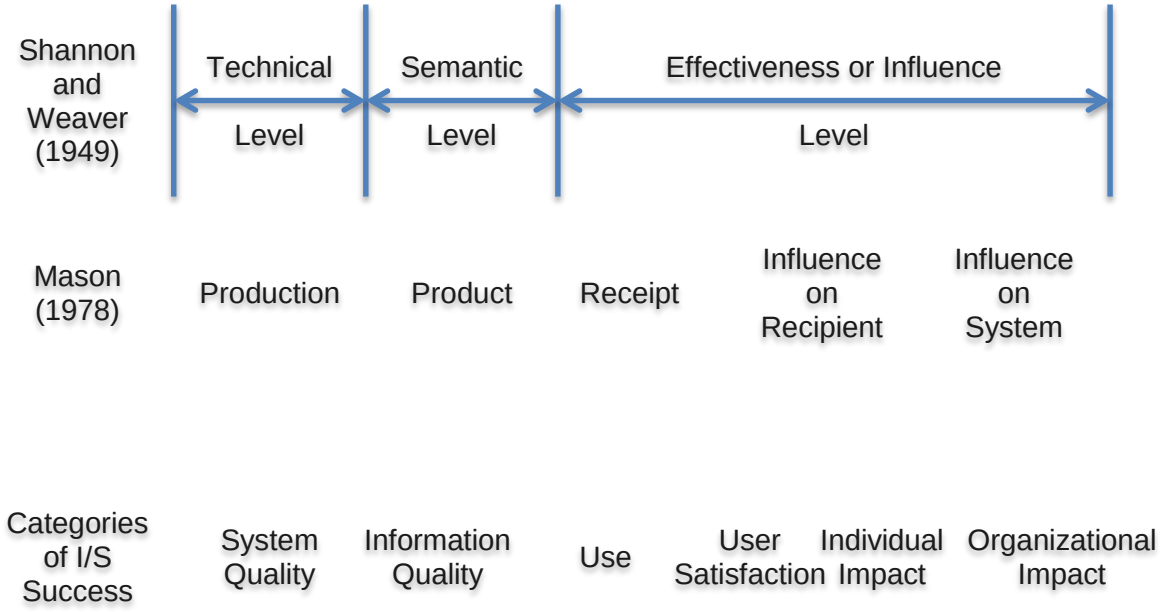
In this study, Facebook was preferred as a mobile application because it is still the most popular mobile application as of April 2014 (Heaton, 2014). Despite the high usage rates of smartphones in Turkey (%67), the use and download rates of mobile apps are very low (Deloitte, 2013). In the same research, Facebook is found to be the most preferred mobile app to be used unlimitedly with a fixed payment. Facebook serves as both a communication and entertainment app. Respondents were first asked whether they had ever used Facebook from their hand-held devices; if they replied in the affirmative, they were invited to participate in the survey.

## I/S Success Model

User satisfaction is a widely used construct of system success for information systems. In their work, DeLone and McLean (1992) defined categories of I/S success based on the work of Shannon and Weaver on communication. An information system or the message in the communication can be measured on three different levels; technical, semantic and effectiveness levels. According to Shannon and Weaver (1949) technical level is defined as the accuracy and the efficiency of the system. The semantic level is defined by the success of conveying the information in intended meaning. And at last, effectiveness level is defined as the effect of the information on the receiver. Based on this flow, Mason (1978) adapted the theory to the measurement of information systems. Mason (1978) relabeled the three levels as shown in Figure 2. In this sense, information flows through a series of stages from its production through its use or consumption to its influence on individual and organizational performance (DeLone and McLean, 1992).

Founded on this expanded view of I/S success, DeLone and McLean (1992) define six distinct categories or aspects of information systems; System quality, information quality, use, user satisfaction, individual impact and organizational impact (Figure 2). In the past, different researchers prefer to use different measures. Some prefer to focus on the characteristics of the system and measure system quality. Others prefer to focus on the produced information to define information quality. And also some of them have used user satisfaction or use as a measure of I/S success.

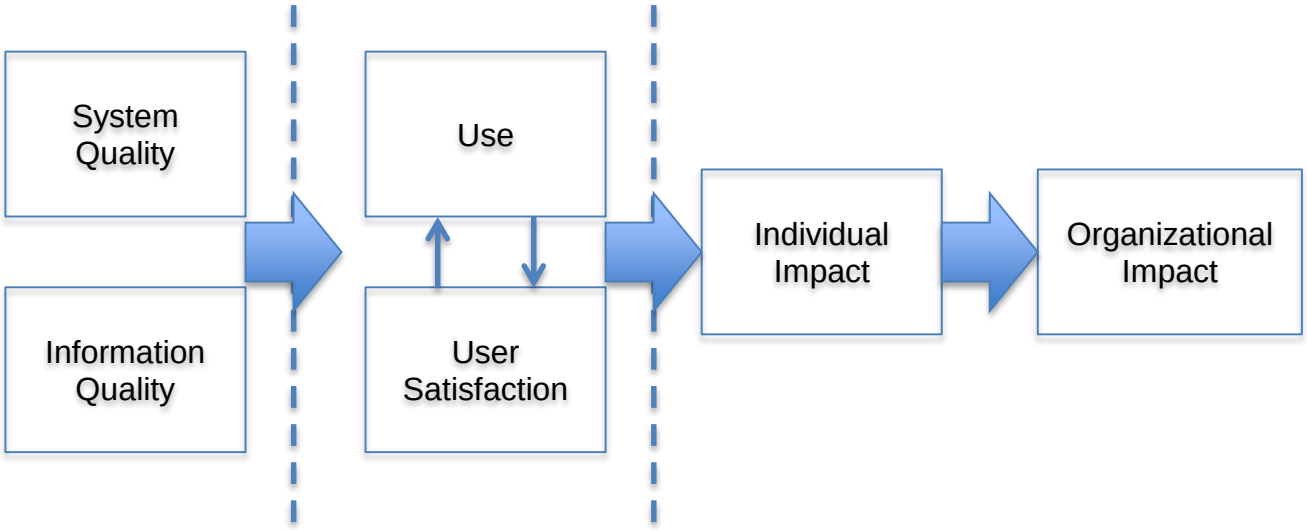
**Figure 2. Categories of I/S Success**




*Source: DeLone and McLean, 1992.*

All these factors are critical measures of I/S success, but all reflects different levels. So it is necessary to remember that there are many success measures, and they are all interrelated and interdependent in the process. Starting from this point of view, DeLone and McLean (1992) rearranged these success categories and proposed a richer model of I/S success measurement to provide a more comprehensive view (Figure 3). In their model, system quality and information quality singularly and jointly affect both use and user satisfaction. Use and user satisfaction are direct antecedents of individual impact. And at last individual impact affects organizational impact.

**Figure 3. I/S Success Model**




*Source: DeLone and McLean, 1992*

I/S Success Model has the potential to offer a holistic and comprehensive view on our topic. Therefore I/S Success Model (DeLone and McLean, 1992) is used as a basis for this study and the model is expanded with the constructs related to flow. The research model is depicted in Figure 4.

## User Satisfaction

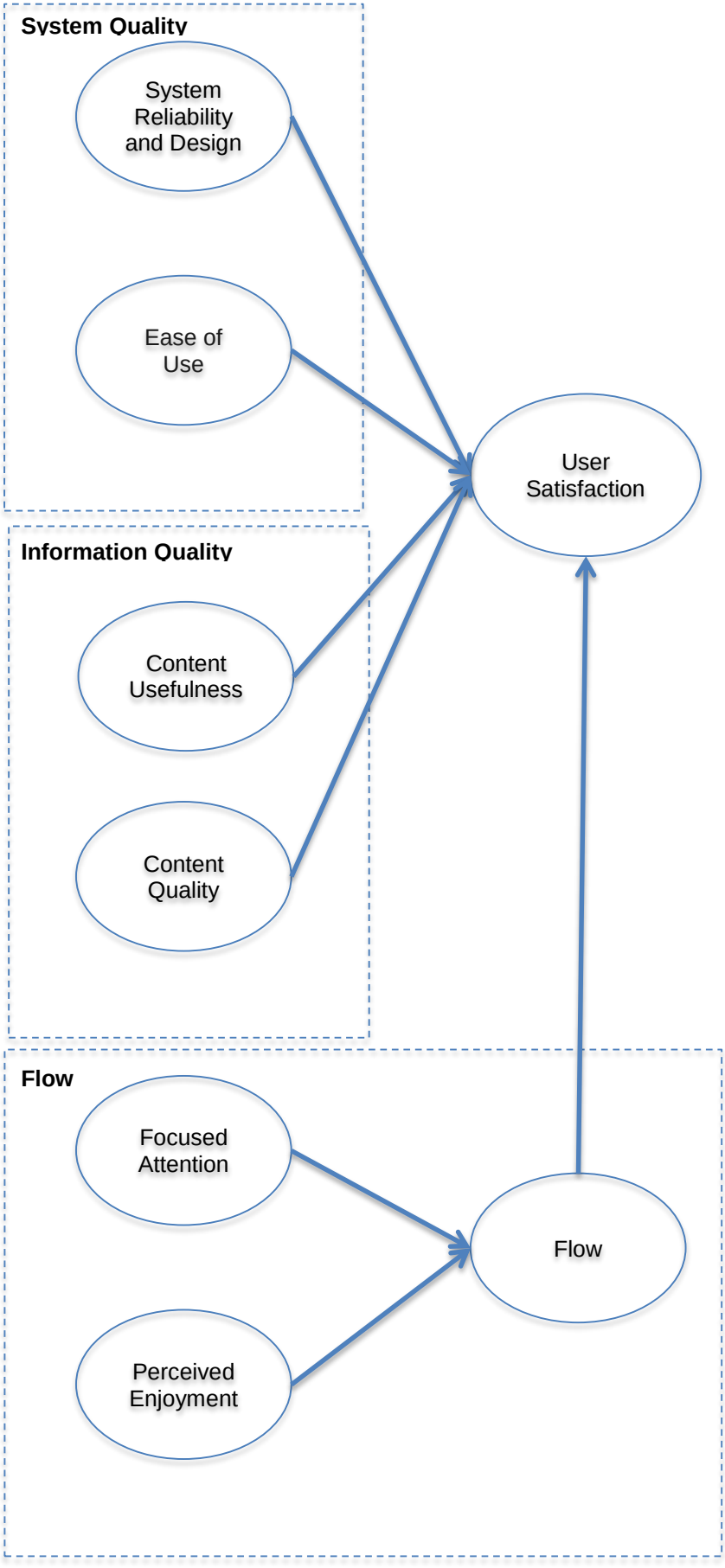
As mentioned before, there are different measures of system success such as user satisfaction, system use or perceived usefulness of a system. In fact, it would be misleading to consider the system use construct alone as a success metric of a system because as DeLone and McLean (1992) state “more use will not yield more benefits”. Similarly, Seddon (1997) argues that user satisfaction taps a wider range of needs, costs, and benefits of IT application use than merely perceived usefulness. But it is very hard to deny the success of a system that its users say they like it (DeLone and McLean, 1992). Instead of system use or usefulness, user satisfaction is seen as a better metric of system success. Siau et al. (2004) also showed that satisfaction was the fundamental performance variable affecting customer perceptions concerning m-commerce.

A review of the existing literature indicates a wide variance in the definitions of satisfaction. But, Wang and Liao (2007) conclude that the measures used in the context of user satisfaction are not applicable in the context of m-commerce as they are targeted primarily towards either mainframe, PC or wire-based technologies of times gone by. Because of the different aspects of the mobile commerce and devices a new conceptualization is required. Depending on the Giese and Cote’s (2000) findings, Wang and Liao (2007) defined m-commerce user satisfaction as “a summary affective response of varying intensity that follows mobile commerce activities, and is stimulated by several focal aspects, such as information quality, system quality, and service quality’’. Wang and Liao’s (2007) definition provides a functional basis for our research framework.

## System Quality

System quality reflects the design and engineering-oriented performance characteristics of the system. Perceived quality is an important antecedent of satisfaction. Therefore, there are different studies that consider system quality as an antecedent of system satisfaction in mobile commerce applications (Lee and Chen, 2014; Lee and Mills, 2010; Wang and Liao, 2007). System reliability (Bansal et al., 2004; Donthu, 2001; Francis and White, 2002; Loiacono et al., 2002,; Schaupp and Belanger, 2005; Zeithaml et al., 2000) and ease of use (Bansal et al., 2004; Donthu, 2001; Francis and White, 2002; Loiacono et al., 2002; Schaupp and Belanger, 2005; Szymanski and Hise, 2000; Zeithaml et al., 2000) are the most commonly used measures of e-commerce system quality.

**Figure 4. Research Model**



Interface design can also determine whether a user stays or continues using the system (Cyr, Head and, Ivanov, 2006; Magrath and McCormick, 2013). Hoehle and Venkatesh, (2015) concur that mobile application usability leads to higher consumer satisfaction. According to the results of a Delphi study (Xu and Gutiérrez, 2006), killer applications not only have to provide a compelling value to the customer but also must be simple and easy to offer by the providers. According to the findings of the study, ease of use is one of the four factors that will drive m-commerce to succeed. Yeh and Li (2009) also found that ease of use has a positive influence on customer satisfaction in m-commerce. So we expected that both ease of use and system reliability and design factors of the mobile application would impact user perceptions of satisfaction.

H1. System reliability and design of a mobile application positively influences satisfaction.

H2. Perceived ease of use of a mobile application positively influences satisfaction.

## Information Quality

Information quality is the quality of the information system output, or, in other words, the quality of the information that the system produces. Information is the core benefit of IS, so the quality of the information or the content have the potential of keeping the users inside the application. Information quality is comprised of various measures in different studies including accuracy, precision, sufficiency, understandability, freedom from bias, comparability, currency, timeliness, reliability, completeness, conciseness, format, relevance and usefulness (DeLone and McLean, 1992). Chae et al. (2002) determine four dimensions focusing on information quality for mobile Internet services namely: connection quality, content quality, interaction quality and contextual quality. Wang and Liao (2007) define content quality as a sub-construct of m-commerce user satisfaction. Although information quality is a related concept with user satisfaction, the scope of the measure is not clear. It seems that different studies use the same constructs but with different conceptualizations. Within the framework of this study, we prefer to use two measures of information quality; content usefulness and content quality. Content usefulness refers to the inherent value and usefulness of the information provided by the mobile application. Content quality is a much broader measure consisting the accuracy, currency, reliability and completeness of the information provided by a mobile application. We expected that both content usefulness and content quality of the mobile application would affect user perceptions of satisfaction.

H3. Content usefulness of a mobile application positively influences satisfaction.

H4. Content quality of a mobile application positively influences satisfaction.

## Flow

Information systems not only provide information to the user but also facilitate their experience in the system. Therefore, besides the system and information quality, the quality of the lived experience of the use of mobile applications has to be considered in determining the success of the app. The optimal experience theory proposed by Csikszentmihalyi (1975) can be used to examine the quality of experience.

The flow construct refers to those optimal, extremely enjoyable experiences that occur when an individual becomes deeply absorbed in an activity and enters a mode which is characterized by a highly focused, narrow band of awareness and concentration, loss of self-consciousness, responsiveness to clearly defined goals and associated feedback, and a sense of control of the environment (Csikszentmihalyi, 1975). Flow is the holistic sensation that people feel when they act with total involvement (Csikszentmihalyi, 1975). A consumer's action in the flow state is experienced as a unified flowing from one moment to the next, in which he is in control of his actions, and in which there is little distinction between self and environment, between stimulus and response, or between the past, present, and future (Csikszentmihalyi 1975).

Flow is a widely used construct in IS and electronic commerce contexts (Agarwal and Karahanna, 2000; Chen, Wigand, & Nilan, 1999; Hoffman & Novak, 1996; Hoffman and Novak, 2009; Hsu and Lu, 2004; Koufaris, 2002; Lee et al., 2007; Novak, Hoffman, & Yung, 2000; Skadberg and Kimmel, 2004; Wu and Chang, 2005). These studies indicate that online user behavior is significantly affected by the flow experience. There are also some studies adapting the flow theory to the mobile commerce context (Swilley and Cowart, 2015; Zhou, Li and Liu, 2010; Zhou and Lu, 2011) but the results are inconsistent.

Because flow is an elusive and broad concept, existing research lacks a universal viewpoint about its components (Zhou, Li and Liu, 1010). One perspective advocates "flow as a unidimensional construct while another view considers it as multidimensional". Also, there is no agreement among the researchers about the dimensions of flow in multidimensional measurement. We used a unidimensional flow construct but also included two antecedents of flow (Hoffman and Novak, 2009), focused attention, and perceived enjoyment, to better understand the relationships in the process. Focused attention refers to the individual's intense concentration on the activity itself. When a person becomes absorbed in the activity, the concentration is so intense that there is no attention remaining, irrelevant perception and thoughts are filtered out, and worries about other problems disappear (Csikszentmihalyi, 1975). Perceived enjoyment reflects users' pleasure and enjoyment when they use mobile applications (Zhou, Li and Liu, 2010). There are also inconsistencies in how flow is modeled. As Hoffman and Novak (2009) noted, "what one researcher considers an antecedent of flow, another considers a consequence of flow, or perhaps a part of flow itself". In their literature review, there are two researches that use satisfaction as a consequence of flow or dependent variable. The results of these studies (Woszczynski et al., 2002; Shin, 2006) showed that flow is a significant predictor of satisfaction. Thus

we expected that flow would impact user perceptions of satisfaction; focused attention and perceived enjoyment are antecedents of flow.

H5. Focused attention will positively influence flow.

H6. Perceived enjoyment will positively influence flow.

H7. Flow will positively influence satisfaction.

## Research Methodology

This research discusses the antecedent factors that form satisfaction of Facebook users as a mobile application. In addition, the research attempts to detect whether flow experience Facebook provides is a determinant of user satisfaction. Thus, the study aims to provide an understanding of user satisfaction framework for mobile applications and to offer practical suggestions based on empirical findings.

## Questionnaire Design and Data Collection

As shown in Figure 4, the research framework includes eight constructs that were derived from existing information systems, m-commerce and applications literature and each construct was measured with multiple items to improve content validity (Straub et al., 2004). The operational definition of each construct used in the research is listed in Table 1.

After the determination of the measurement scales for each construct, scale items were translated into Turkish and adapted for wording where necessary. Following this process, a web-based questionnaire was developed where all scale items were expressed as statements for which the respondents were offered a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5) for their answers.

The sampling frame of the research consists of users of Facebook's mobile application for smartphones and tablet computers. The questionnaire was shared on the Facebook and respondents self-completed the questionnaires. A total of 256 questionnaires were collected out of which 11 were excluded due to the high rate of missing response. Thus, 245 questionnaires were deemed eligible for analysis, which is consistent with sample size requirements of Structural Equation Modelling (SEM).

**Table 1. Operational Definitions of Research Constructs**

| Construct | | Operational Definition | References |
|---|---|---|---|
| **System Quality** | System Reliability and Design (SRD) | Design and engineering-oriented performance characteristics of the mobile applications | Seffah et al., 2006 |
| | Perceived Ease of Use (PEU) | Usability of the interface design of the mobile application | Seffah et al., 2006 |
| **Information Quality** | Content Usefulness (CU) | Inherent value and usefulness of the information provided by the mobile application | Gravestock and Greenleaf, 2008; Zhou et al., 2010 |
| | Content Quality (CQ) | Accuracy, currency, reliability and completeness of information provided by mobile application | Gravestock and Greenleaf, 2008; Zhou et al., 2010 |
| **Flow Experience** | Focused Attention (FA) | Users' intense concentration on mobile application where they become absorbed in application. | Novak et al., 2000; Zhou et al., 2010 |
| | Perceived Enjoyment (PE) | Users' pleasure and enjoyment when they use mobile applications | Zhou et al., 2010 |
| | Flow (FL) | Optimal, extremely enjoyable experiences that occur when users become deeply absorbed in the mobile application | Novak et al., 2000 |
| **User Satisfaction (US)** | | Affective responses of varying intensity that follows mobile commerce activities | Rose et al., 2012 |

Demographic details of sample profile are presented in Table 2. 55% of the respondents are female, and 45% are male; more than 60% of them are aged between 18 and 30. 70% of the respondents use Facebook mobile application a few times a day.

## Data Analysis and Findings

The structural equation modeling (SEM) method was applied to evaluate the hypothesized relationships among the constructs in the theoretical model developed by this study. SEM is a family of statistical techniques that incorporates and integrates factor analysis and path analysis. It can be utilized to model multivariate relationships and to test multivariate hypotheses. In recent years, the application of SEM is becoming increasingly prevalent in the field of psychometric, consumer behavior, and web research. SEM model building consists of a two-stage process (Jöreskog and Sörbom, 1996), in which the measurement models are tested before testing the structural model.

**Table 2. Demographic Profile of the Sample**

| Gender | % | Frequency of Facebook app use | % |
|---|---|---|---|

| | |
|---|---|
| Female | 55,0 |
| Male | 45,0 |
| | |
| **Age** | **%** |
| 18 - 24 | 38,5 |
| 25 - 29 | 24,6 |
| 30 - 34 | 10,7 |
| 35 - 39 | 12,7 |
| 40 - 44 | 9,4 |
| 45 + | 4,1 |
| | |
| **Total** | **100,0** |

| | |
|---|---|
| A few times a day | 69,7 |
| Once a day | 18,0 |
| Once in a few days | 7,4 |
| Once a week | 2,9 |
| Less frequent than once a week | 2,0 |
| | |
| **Education** | **%** |
| High school degree | 25,5 |
| College degree | 8,2 |
| Bachelor's degree | 32,1 |
| Graduate degree | 34,2 |
| **Total** | **100,0** |

## Measurement Model

For examining the reliability and validity of the research framework, we first conducted a confirmatory factor analysis (CFA), and then examined the structural model to test the research hypotheses (Anderson and Gerbing, 1988). The standardized loadings, t-values, average variance extracted (AVE), composite reliability (CR) and Cronbach Alpha values are listed in Table 3. All standardized loadings are larger than 0.5, except one item (CQ1) but all are significant at 0.001. Consequently, we did not exclude this variable. AVE values of five constructs exceed 0.50 – the recommended level – while the AVE values of System Reliability and Design (0.39) and Perceived Ease of Use (0.47) are lower than this level. However, as these two values are close to the recommend level of AVE and as all the CR values exceed 0.7, the scales are considered to have good convergent validity (Gefen et al., 2000). In addition, all Alpha values are larger than 0.7, showing a good reliability (Nunnally, 1978).

Confirmatory factor analysis also provided the fit indices of the measurement model ($\chi^2$ = 733.71; df = 432; $\chi^2$ / df = 1.70; RMSEA = 0.054; CFI = 0.97; NFI = 0.94; NNFI = 0.97; GFI = 0.84)[1]. The fit indices showed that the relationships between the observed and latent variables are significant and the measurement model has a good fit, and thus is suitable for testing the structural model.

**Table 3. Standardized Loadings, t-values, Average Variance Extracted (AVE), Composite Reliability (CR) and Cronbach Alpha Values in the Measurement Model**

[1] $\chi^2$ / df is the ratio between the Chi-square and degrees of freedom; RMSEA is the Root Mean Square Error of Approximation;CFI is the Comparative Fit Index; NFI is the Normed Fit Index; NNFI is the Non-Normed Fit Index; GFI is Goodness of Fit Index.

| Factor | Item | Standar. item loadings | t-value* | AVE | CR | Alpha |
|---|---|---|---|---|---|---|
| **System Reliability and Design (SRD)** | SRD1 | 0.52 | 8.02 | 0.39 | 0.789 | 0.82 |
| | SRD2 | 0.66 | 10.79 | | | |
| | SRD3 | 0.67 | 10.97 | | | |
| | SRD4 | 0.67 | 10.91 | | | |
| | SRD5 | 0.58 | 9.24 | | | |
| | SRD6 | 0.67 | 10.95 | | | |
| **Percieved Ease of Use (PEU)** | PEU1 | 0.65 | 10.15 | 0.47 | 0.777 | 0.74 |
| | PEU2 | 0.68 | 10.62 | | | |
| | PEU3 | 0.71 | 11.25 | | | |
| | PEU4 | 0.58 | 8.91 | | | |
| **Content Usefulness (CU)** | CU1 | 0.60 | 9.49 | 0.61 | 0.819 | 0.77 |
| | CU2 | 0.86 | 14.55 | | | |
| | CU3 | 0.75 | 12.35 | | | |
| **Content Quality (CQ)** | CQ1 | 0.42 | 6.35 | 0.55 | 0.759 | 0.72 |
| | CQ2 | 0.83 | 13.05 | | | |
| | CQ3 | 0.75 | 13.38 | | | |
| **Focused Attention (FA)** | FA1 | 0.75 | 12.38 | 0.50 | 0.794 | 0.82 |
| | FA2 | 0.83 | 14.67 | | | |
| | FA3 | 0.76 | 12.83 | | | |
| | FA4 | 0.80 | 13.99 | | | |
| **Perceived Enjoyment (PE)** | PE1 | 0.81 | 14.87 | 0.71 | 0.907 | 0.89 |
| | PE2 | 0.76 | 13.57 | | | |
| | PE3 | 0.85 | 15.94 | | | |
| | PE4 | 0.85 | 16.16 | | | |
| **Flow (FL)** | FL1 | 0.92 | 18.56 | 0.76 | 0.903 | 0.92 |
| | FL2 | 0.89 | 17.42 | | | |
| | FL3 | 0.88 | 17.22 | | | |
| **User Satisfaction (US)** | US1 | 0.66 | 11.10 | 0.58 | 0.871 | 0.84 |
| | US2 | 0.75 | 13.13 | | | |
| | US3 | 0.64 | 10.73 | | | |
| | US4 | 0.80 | 14.45 | | | |
| | US5 | 0.74 | 12.81 | | | |

* $p < 0.001$

## Structural Model

After confirmatory factor analysis, we tested the overall fit of the structural model that investigates the correspondence between the observed input matrix with the proposed model as well as produces the necessary outputs for hypothesis testing. The structural model and the overall fit indices are presented in Figure 5.

The overall fit indices of the research model showed good fit values with no substantive differences and the Goodness-of-Fit Index exceeded the recommended value of 0.80. Therefore, the structural model of the research was an adequate representation of the entire set of casual relationships.

We furthermore examined the estimated coefficients of causal relationships between constructs that validated the hypothesized effects. Figure 5 also illustrated the estimated path coefficients and their significance levels in the structural model. The coefficients of five of the seven proposed paths are significant in terms of explaining the relationship between the constructs.

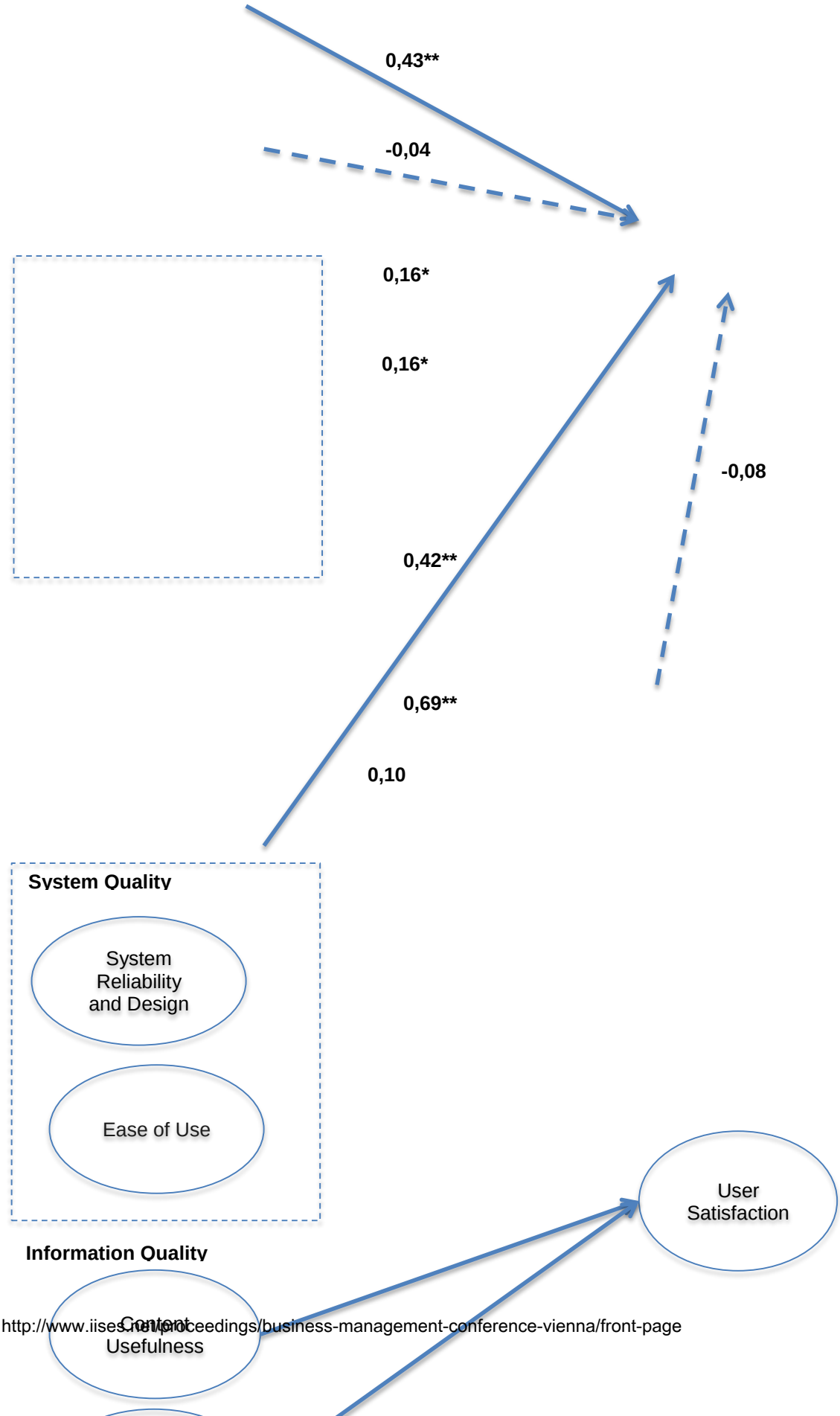
The results in Figure 5 support H1 (path coefficient= 0.43; p< .01) meaning that system reliability and design of a mobile application positively influence user satisfaction. On the other hand, results of the structural model does not support H2 (path coefficient= -0.04; not significant) denoting that perceived ease of use of a mobile application does not positively influence user satisfaction. In case of Facebook as a mobile application, the research showed that interface design and system reliability enhances user satisfaction, but ease of use of Facebook does not contribute to user satisfaction.

The results of the structural model support H3 (path coefficient= 0.16; p< .05) and H4 (path coefficient= 0.16; p< .05) expressing that content usefulness and content quality of Facebook application positively influence Facebook users' satisfaction with application.

The proposed hypothesis H5 is supported by the analysis results (path coefficient= 0.69; p< .01), which means that Facebook users flow experience is positively influenced by focused attention. Facebook users become absorbed in the process of using Facebook, their attention and concentration is highly intensified that there is no attention remaining, irrelevant perception and thoughts are filtered out which in turn produces a flow experience. However, the other construct, which we used as the other antecedent of flow experience, perceived enjoyment of using Facebook application seems not to produce the same kind of flow experience as H6 is not supported by research results (path coefficient= 0.10; not significant). Facebook mobile application users' pleasure and enjoyment don't produce a flow experience but, on the other hand, directly and positively contributes to the satisfaction of users (path coefficient= 0.42; p< .01). Our research showed that perceived enjoyment is one of the significant antecedents of user satisfactions regarding Facebook.

We proposed Flow Experience to be an antecedent of user satisfaction in our research framework. However, the analysis results showed that flow experience does not positively influence user satisfaction regarding Facebook. Thus, the proposed hypothesis H7 is not supported (path coefficient= -0.08; not significant) which brings about the discussion whether flow experience is an antecedent or consequence of user satisfaction or even part of the satisfaction itself.

**Figure 5. Results of the Structural Model and Overall Fit Indices**


0,43**
-0,04
0,16*
0,16*
-0,08
0,42**
0,69**
0,10
System Quality
System Reliability and Design
Ease of Use
User Satisfaction
Information Quality
Content Usefulness

Note: *p<0,05; **p<0,01

| Fit Indices | $\chi^2$ | $\chi^2$ / df | RMSEA | CFI | NFI | NNFI | GFI |
|---|---|---|---|---|---|---|---|
| Recommended values | | < 3 | < 0.08 | > 0.90 | > 0.90 | > 0.90 | > 0.90 |
| Actual values | 763.0 | 1.74 | 0.055 | 0.97 | 0.94 | 0.97 | 0.84 |

Our structural model showed that the proposed antecedents of user satisfaction – except ease of use and flow experience – have a significant combined effect on explaining user satisfaction as the total variance explained $R^2$ is 0.74. System reliability and design (coefficient= 0.43; p< .001) and perceived enjoyment (coefficient= 0.42; p< .001) seem to have larger influence on Facebook users' satisfaction compared to other factors (Figure 5) meaning that users mainly concerned about the system characteristics and enjoyment of the use. In addition, focused attention has a large effect (coefficient= 0.69; p < .001) on flow experience, which also explains 0.57 of the variance by itself, denoting that flow experience occurs when users become absorbed in Facebook but not concerned about pleasure of using the application.

## Discussion and Implications

The purpose of this study was to define the factors that affect user satisfaction of mobile applications. To achieve this purpose, an online survey was conducted with users of Facebook from their hand-held devices. The results of the study showed that system quality and information quality are important determinants of user satisfaction, but flow does not have a direct influence on user satisfaction. The most striking finding of this study is that perceived enjoyment is a significant determinant of satisfaction with mobile applications.

In line with the past studies (Cyr, Head and, Ivanov, 2006; Hoehle and Venkatesh, 2015; Magrath and McCormick, 2013), we found that system reliability and design is a very important determinant of user satisfaction. Xu and Gutiérrez (2006) state that, convenience and ubiquity are the most important factors for the success of m-commerce. System reliability and design serve to this purpose. But unlike previous findings (Yeh and Li, 2009; Xu and Gutiérrez, 2006) the results indicated that ease of use did not directly lead to user satisfaction. This finding may be due to the selected mobile application (Facebook) and user characteristics. As it is the most used application, users might be mastered by using the app. In addition, as youngsters are more aware of innovation, they might have experienced various technologies and therefore might have developed an appropriate basis of knowledge on how to use the technology (Wei et.al, 2009). Thus, the ease-of-use or difficulty level of using the app might have been turned out to be an impressive factor in user satisfaction for this study.

Information quality was previously validated as an important antecedent to user satisfaction in past research. In our research, we also found that content usefulness and content quality, sub-constructs chosen to represent information quality, are important factors affecting user satisfaction. Information and its usefulness and quality are the

most fundamental value or premise of the information systems. So the quality and usefulness of the content in Facebook is seen as a valuable part of the mobile app and have an impact on user satisfaction.

This study attempted to extend DeLone and McLean's model with the inclusion of flow experience proposed by Csikszentmihalyi (1975). But contrary to our expectations, flow experience does not positively influence user satisfaction regarding Facebook. However perceived enjoyment, which was expected to affect flow experience, exhibits a significant influence on user satisfaction, which is congruent with the findings of Lee and Shim (2006). They also found that perceived enjoyment, which represents hedonism, is a much stronger factor than performance expectancy that represents utilitarian benefits, even though the relationship between performance expectancy and satisfaction was found to be non-significant. This implies that hedonism is a crucial determinant of satisfaction with mobile applications.

This research provides some useful managerial implications as well. First of all, understanding the determinants of satisfaction is a fundamental issue both for application designers and providers. Satisfaction is the first step to retention. To retain users and improve loyalty, we need to build satisfaction. Secondly, providing a pleasant and enjoyable experience is as important as the system quality of the application. Therefore, application designers and providers should take both the design features of functionality and experience into consideration, and should not ignore the importance of hedonism. Lastly, content is the core value proposition for most of the mobile applications. Especially for mobile applications that focus on content, the quality, and the usefulness should be deemed as crucial aspects of the content provided. Although system quality is an important first step for user satisfaction, customer retention is possible with the quality of information provided, denoting that application designers and providers should pay particular attention to content management.

## Limitations and Directions For Future Research

The results of this study must be interpreted in the context of its limitations, and future research would be needed to assess the generalizability of our findings. First, this research aims to measure Facebook users' satisfaction as a mobile application. Factors that influence user satisfaction might differ for other m-commerce applications. Thus, further studies could explore antecedents of user satisfaction of various m-commerce applications. Also, as this study explored the factors influencing mobile applications users' satisfaction, there might be other important factors that did not take into consideration by this research. It is suggested, therefore, that future research could explore other possible factors influencing satisfaction. Our research participants reflect a fair band of users of Facebook's mobile application, but they may not be representative of all users of the app. Since the data was collected from Turkish users of Facebook, culture may influence the results of the study. Future research might address the influence of culture on the results of this study. Furthermore, the data in this study was collected through self-administered questionnaires, which may introduce bias.

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