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# When IS Success Model Meets UTAUT in a Mobile Banking Context: A Study of Subjective and Objective System Usage

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# WHEN IS SUCCESS MODEL MEETS UTAUT IN A MOBILE BANKING: MEASURING SUBJECTIVE AND OBJECTIVE SYSTEM USAGE

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## ABSTRACT

The objective usage of mobile banking (MB) reflects more validated measure when compared to subjective usage. Although objective system usage has been seldom studied, it has been never investigated in a MB context to the best of our knowledge. This research in progress develops an integrative conceptual framework that incorporates relevant-context factors into well-established models of IS success and UTAUT to examine their direct and indirect effects on MB usage. This examination can expand our knowledge of system usage in the context of mobile banking. Contribution and implications are discussed.

### Keywords

UTAUT, IS Success, MB, subjective and objective system usage

## INTRODUCTION

IS scholars have used various IT acceptance models, particularly technology acceptance model (TAM), to measure behavioral intention more frequently than to measure actual system use (Turner et al., 2010). Behavioral intention reveals the state that a person is willing to use, however, it is more important to look beyond the willing and intention stage to the actual use of system (Petter et al., 2013). Actual use reflects the real act of engagement and involvement with IS/IT application, which is a key to determine the success of information system and provides a better indication of user satisfaction (DeLone and McLean, 2003). Wu and Du (2012) call to shift the focus of future studies to actual system use instead of intention to use. This call has been answered to a certain degree in IS research, however, this research has mostly examined actual system use via self-reported data. One general concern associated with self-reported studies, besides validity threat, is the potential bias generated from overestimating or underestimating the perceived system usage (Collopy, 1996). Therefore, relying only on self-reported data can lead to misleading conclusions (de Reuver and Bouwman, 2015). One way to reduce self-reported bias for measuring system usage is to shift from subjective measurement (survey data) to objective measurement (system log data). Objective system measurement can capture the richness of the system usage, which includes intensity and appropriateness of use, besides usage frequency and duration (Delone and McLean, 2003).

Attention to objective measurement of system usage has faded in the IS domain, especially since 2011 and hardly ever applied in a mobile usage context (Walldén et al., 2015). This has motivated us to examine both subjective and objective usage measures in MB by integrating IS Success model with UTAUT. Both models have been widely used and validated across various contexts including the usage of mobile technologies (Chatterjee et al., 2009; Lee and Chung, 2009; Chung and Kwon, 2009; Zhou, 2013; Baptista and Oliveira, 2015). IS Success model is developed to measure satisfaction and system usage by observing the impact of system quality, service quality and information quality (DeLone and McLean, 2003) while UTAUT is developed by synthesizing previous IS adoption models providing four fundamental factors: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003).

Our integrative framework can provide new insights into MB research because each model predicts usage from a different perspective. UTAUT focus is on users' acceptance of the system based on their expectations of overall productivity, community influence, sufficient resources and knowledge. On the other hand, IS Success model focus is on the impact of inner system qualities like flexibility, reliability, attractiveness, responsiveness, personalization, security, information relevance, accuracy, and sufficiency. System quality of IS Success overlaps with effort expectancy of UTAUT in capturing the easiness part of the system. Thus, we have decided to remove effort expectancy and keep system quality because the latter measures, besides easiness, attractiveness and responsiveness of the system. The great value behind combining these two models is that such

combination allows us to examine factors external to the system (UTAUT) and factors internal to the system (IS Success) that affect system usage. We have not found any IS adoption study that has combined both models in a MB context. Yet, we believe these two models are complementary and can provide a comprehensive theoretical grounding for predicting MB system usage and accordingly providing higher explanatory power.

This study, in brief, contributes to theory and practice by introducing a holistic framework that incorporates internal and external factors affecting the system use. Second is to communicate the results to both software vendors and banks so that they can work together on improving the embedded services and promoting a higher usage of MB. The rest of the paper reviews the previous work in UTAUT and IS Success model, compares objective versus subjective system usage, followed by developing of our research framework and the hypotheses and then concluding with our study's potential contributions and conclusion

## AN INTEGRATIVE FRAMEWORK: IS SUCCESS AND UTAUT

Both IS Success and UTAUT are primarily used to measure IS acceptance at an individual level. In particular, both models have been employed to understand mobile user behaviors. Chatterjee et al. (2009) applied the three quality pillars of IS Success to examine mobile work in healthcare. Kim et al. (2009) adapted IS Success model, too, to examine the ubiquitous computing use. While Zhou et al. (2010) and Baptista and Oliveira (2015) utilized UTAUT to examine mobile banking adoption among smartphone users. As the mentioned studies lack to provide a pronounced explanatory power, it is necessary to augment such power through a deliberate integration.

Venkatesh et al. (2003 & 2012) emphasized how important to integrate UTAUT with other models, particularly in consumer context in order to expand its theoretical boundaries and to gain greater cognitive understanding of system usage behavior. Driven by this perceptive, we integrate UTAUT with IS Success model and argue about the integration authenticity in mobile research. First, IS Success model addresses technical, semantic and service success within the system (DeLone and McLean, 2003); three key factors predicting system usage. On the contrary, UTAUT highlights the instrumental beliefs of usefulness, community influence, and the necessary resources; three important factors predicting IS acceptance and usage (Zhou, 2013). Hence, it can be stated that IS Success model focuses more on factors internal to the system while UTAUT focuses more on factors external to the system. Second, it is vital to evaluate whether this integration can provide a solid theoretical foundation for examining actual system usage.

In sum, standalone models have lacked to provide a holistic explanation to MB user behavior (Chatterjee et al. 2009; Zhou, 2010; Yu, 2012; Baptista and Oliveira, 2015). It is important, thus, to shift our theoretical base into more comprehensive framework by combining contributions of acceptance models.

## OBJECTIVE SYSTEM USAGE

System usage is defined as to what extent system capabilities are utilized by customers (Petter et al., 2013). Across IT innovations, many studies have looked at subjective system usage but few ones have explored objective system usage by measuring the usage via system log data.

Straub et al. (1995) measured the usage of a voice mail system objectively through computer-recorded data and subjectively through self-reported data using TAM with the purpose of addressing conceptual and methodological issues associated with system usage measurement. The period between 2000 and 2003 is considered as the golden era for objective system measurement because of the huge number of published studies (Walldén et al., 2015). For example, Horton et al. (2001) investigated the acceptance of intranet system by employing questionnaire and capturing system log data. Venkatesh et al. (2003) compared a number of IT acceptance models to develop UTAUT through subjective and objective measurement of system usage. Stoel and Lee (2003) utilized TAM to measure the learning system (WebCT) usage objectively via the number of pages visited in WebCT and subjectively via the duration and frequency of use.

Characterized by a low publishing number of objective system measurement papers, the period (2004-2011) had focused on web-based systems. For example, Klein (2007) adapted theory of reasoned action (TRA) to measure the objective usage of web-based patient–physician communication application via capturing the number of e-mails sent. The focus, however, has shifted to be more on e-learning systems since 2011 till present (Walldén et al., 2015). Ma and Yuen (2011) applied UTAUT to predict the usage of e-learning system in a university setting by the help of system log. Joo et al. (2014) used the access frequency to objectively measure the usage of a mobile learning system among students from South-Korean online university.

## RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

The two acceptance models of IS Success and UTAUT have been adapted to help in measuring MB usage subjectively and objectively via survey and archive, respectively. According to our above argument of providing a comprehensive theoretical

perspective, IS Success (factors internal to the system) and UTAUT (factors external to the system) have been considered complementary and accordingly integrated. Figure 1 visualizes our integrative framework.

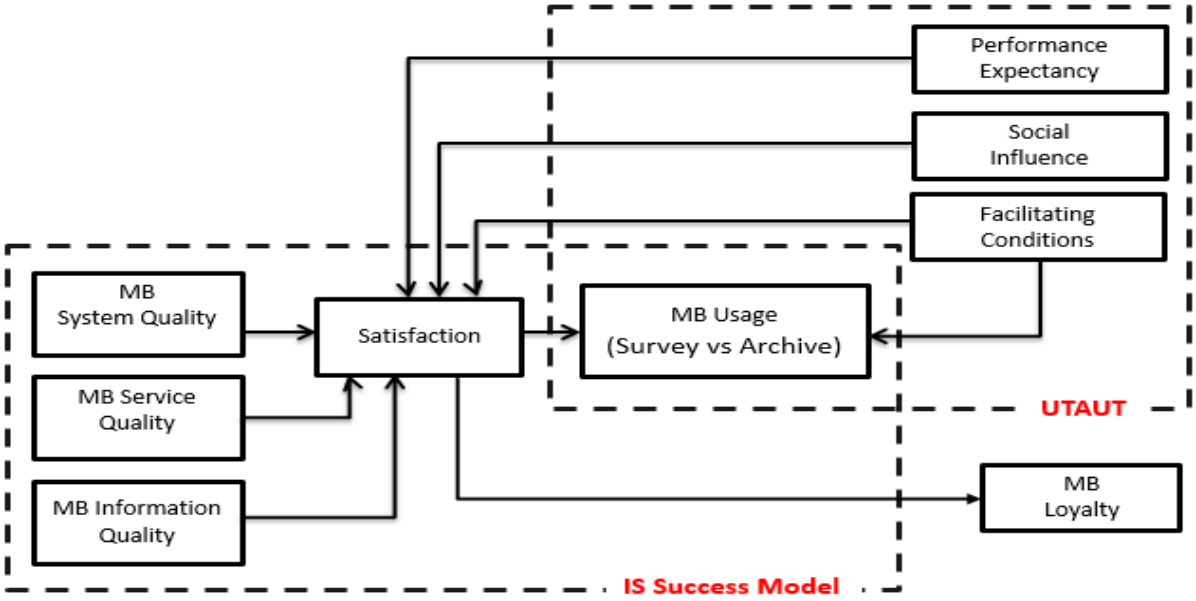


**Figure 1. Research Model**

### MB System Quality

System quality refers to what extent MB systems are visually appealing and easy to use and navigate (Zhou, 2013). Rationally customers who find MB as a friendly-to-use app with an aesthetic interface will tend to show a high satisfaction level towards it. Literature empirically validates this relationship across different IT applications, for example in mobile payment (Zhou, 2013), electronic service (Xu et al., 2013), and e-government system (Teo et al., 2008). Therefore, we suggest that:

***H1:*** *MB system quality will influence positively customer satisfaction.*

### MB Service Quality

Service quality refers to what extent MB provides reliable, timely, responsive, and personalized services (Zhou, 2013). Although service quality has been regarded as an important element of traditional channels like face-to-face interaction, it can play more fundamental role in online channels like MB. Prior research confirms that high service quality can predict customer satisfaction on the empirical plane (Cenfetelli, 2008; Xu et al., 2013). This relationship is also supported in the context of mobile technology (Zhou, 2013). Therefore, we suggest that:

***H2:*** *MB service quality will influence positively customer satisfaction.*

### MB Information Quality

Information quality refers to what extent MB provides sufficient, relevant, and accurate information (Zhou, 2013). Customers may struggle to find relevant banking information because of the small screen size or to find sufficient banking information because of the limited app capacity, addressing such aspects in MB can increase customers' level of satisfaction. An empirical support has been found to relate information quality and customer satisfaction in a context of electronic service (Xu et al., 2013). As MB is also an electronic service, we suggest that:

***H3:*** *MB information quality will influence positively customer satisfaction.*

### Performance Expectancy

Performance expectancy is defined by Venkatesh et al. (2003: p. 447) as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance". Since performance expectancy had been developed from TAM's perceived usefulness (Venkatesh et al., 2003), it is regarded as a key element to user satisfaction (Chan et al., 2010). A

number of studies suggested that performance expectancy is related to positive attitude and satisfaction, for example, in mobile internet services (Thong et al., 2006) and in banking information system (Brown et al., 2008). Therefore, we hypothesize that:

***H4:*** *Performance expectancy will positively influence customer satisfaction for using MB.*

### Social Influence

Social influence refers to what extent a person feels that a MB technology should be used by his/her social network (Miltgen et al., 2013). Individuals may show levels of commitment and satisfaction towards MB when it is being praised and recommended by their social network that includes family members, friends, and workfellows. Chan et al. (2010) suggested that a positive attitude can be affected by the influence of the social circle. Since satisfaction is basically a positive attitude being formed over a course of time of dealing with MB services (Kim et al. 2009), we suggest that:

***H5:*** *Social influence will positively influence customer satisfaction for using MB.*

### Facilitating Conditions

Facilitating conditions show to what extent a person perceives that the use of MB system is supported with organizational and technical infrastructure (Miltgen et al., 2013). Facilitating conditions for technological innovations, which include but not limited to help-desk support, peer support, sufficient resource, and knowledge, can provide a strong foundation to both positive feeling and system usage. A causal link between facilitating conditions and satisfaction and between facilitating conditions and system usage are empirically validated in prior research in the contexts of e-government services (Chan et al., 2010) and mobile banking (Baptista and Oliveira, 2015), thus, we suggest that:

***H6:*** *Facilitating conditions will positively influence customer satisfaction for using MB.*
***H7:*** *Facilitating conditions will positively influence MB usage.*

### Satisfaction

Satisfaction reflects the affective reaction that individuals have when interacting with MB services (Cenfetelli, 2008). Satisfaction has been widely proposed as one of the most IS metric for both behavioral intention and actual use (Delone and McLean, 2003). It is most likely that customers who have an enjoyable and pleasant experience with MB, they will develop a positive attitude and become more loyal toward using it. When banks sustain the satisfaction level among MB users, this may help to sustain the level of MB usage. The positive relationship between satisfaction and system usage has an empirical support in e-learning system (Mohammadi, 2015), which shares a number of similarities with MB. As suggested by Delone and McLean (2003), satisfaction is also a significant predictor of system usage. Additionally, satisfaction has been validated as a determinant of loyalty in mobile phone usability (Lee et al., 2015). Hence, we propose that:

***H8:*** *Customer satisfaction will influence positively MB usage.*
***H9:*** *Customer satisfaction will influence positively MB loyalty.*

## METHODOLOGY

Besides analyzing system log file for MB users, our method will employ a field survey to test our hypothesized relationships. The survey will be provided through an internet link and directed to the target sample. Our sample will comprise from local US bank customers who are currently using MB app. All constructs items have been adapted from previous research to ensure face validity. The items will be measured via a 7-point, Likert-scale with 7 "Strongly agree" and 1 "Strongly disagree". Quality factors (system, information, and service) and satisfaction are adapted from Zhou (2013). UTAUT factors of performance expectancy, social influence, and facilitating conditions are adapted from Chan et al. (2010). Subjective and objective MB usage are adapted from Straub et al. (1995). Subjective MB usage will reflect customers' perceived usage derived from the survey while objective MB usage will reflect customers' actual usage derived from system log data. Demographics will be included to control for their effects.

### Data Analysis

Our data will be analyzed using structural equation modeling (SEM) technique to reveal the significant relationships and path coefficients in the tested model. Confirmatory factor analysis (CFA) will be employed to evaluate reliability through factor loadings, Cronbach's alpha, and composite reliability. Convergent validity will be checked using average variance extracted (AVE) while discriminant validity will be checked through comparing the square root of AVEs with other variables coefficients. Collinearity between variables will be assessed via variance inflation factor (VIF). Common method variance will be tested through conducting a Harman's single-factor test (Zhou, 2013).

## POTENTIAL CONTRIBUTION AND CONCLUSION

This study contributes to the theory and practice by 1) incorporating system-oriented factors (IS Success) with non-system-oriented factors (UTAUT) to evaluate whether this integration can provide a robust theoretical foundation in a MB context. Once the integrative framework is found to provide greater predictive power compared to the standalone models of IS Success and UTAUT, it could be established as a substantial theoretical grounding to guide future research in mobile banking and to help revealing a deeper understating of this phenomenon; 2) using system log data to measure MB usage objectively; such measurement approach has not been yet employed in MB research. This study will enable us to compare the findings between the subjective and objective usage measurement with further examination of their correlation. This would help us to advise on validity aspects of previous IS studies that either used survey or system log data to capture system usage; and 3) if we reveal some significant results, we can help software vendors and banks to address some important aspects and improve them accordingly in order to sustain or even increase the level of satisfaction among their customers. For software vendors, the embedded services could be given more attention and enhanced in the design and refinement process. For banks, the MB services could be promoted with stronger awareness and marketed at a larger scale, in particular, for those customers who lie in the light-user segment.

This research-in-progress paper is an attempt to increase our understating about MB by investigating actual system usage. Our integrated theoretical framework of IS Success and UTAUT would enable us to be informed about the critical aspects influencing MB usage. While the objective measurement of the system usage could provide unbiased results and may help to uncover some research clues for future studies.

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