EXAMINATION OF CUSTOMER SATISFACTION
AND REPEAT USAGE INTENTIONS’
DETERMINANTS IN THE CONTEXT OF MOBILE
FOOD SERVICE APPLICATIONS: THE ROLE OF
PERCEIVED RISK AND PERCEIVED VALUE

By

JOO AHN

Bachelor of Science in Electronic Engineering
Chosun University
Gwangju, South Korea
2006

Master of Science in Hospitality and Retailing
Management Texas Tech University
Lubbock, Texas
2012

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Dissertation Approved:

Dr. Lisa Slevitch
Dissertation Adviser

Dr. Hailin Qu

Dr. Willie Tao

Dr. Isaac Washburn
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“No temptation has seized you except what is common to man. And God is faithful; he will not let you be tempted beyond what you can bear. But when you are tempted, he will also provide a way out so that you can stand up under it.” First of all, I would like to thank God for showing me wisdom and strength for the long journey. I was not afraid as long as I stay with you.

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I know that this pleasure moment is short, and I should prepare another short or long journey to proceed with my life advancement. I will not give them up even though there is hardship in the future. Because these experiences and memory of the last few years made me strong and gave courage I can be in the face of adversity. From now on, I will imagine a picture of how I can be different in my life.
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Title of Study: EXAMINATION OF CUSTOMER SATISFACTION AND REPEAT USAGE INTENTIONS’ DETERMINANTS IN THE CONTEXT OF MOBILE FOOD SERVICE APPLICATIONS: THE ROLE OF PERCEIVED RISK AND PERCEIVED VALUE

Major Field: BUSINESS ADMINISTRATION

Abstract: The purpose of the study was to investigate the relationships among mobile commerce application (MCA) quality components, customer satisfaction, and repeat usage intentions in the light of the mobile commerce (MC) success model in the restaurant context. The objectives of this study were to: (1) examine the components of MCA quality (2) analyze how each component (ubiquitous connectivity, contextual offer, transaction accuracy, and content quality) impacts customer satisfaction and repeat usage intentions; (3) introduce potential moderators (perceived value and perceived risk) and examine moderating effects in the relationship between customer satisfaction and repeat usage intentions. Therefore, this study employed causal research design to build and test the proposed research model. A self-selected convenience sampling method was used to identify U.S. customers. The target population of this study was customers who had at least one previous food delivery mobile application experience within the past 12 months at the time of the survey and could be recruited from Amazon Mechanical Turk. A total of 439 responses were used for data analysis. Descriptive statistics, confirmatory factor analysis, and path analysis of structural equation modeling were used for data analysis. The results of this study supported significant relationships among ubiquitous connectivity, contextual offer, transaction accuracy, content quality, customer satisfaction and repeat usage intentions as well as moderating effects such as perceived value and perceived risk as hypothesized in the study. This study re-specified information quality, system quality, and service quality from the electronic commerce (EC) model to apply them to the mobile commerce context. This study contributed to the development of a mobile commerce model by looking into the moderating effect of perceived value and perceived risk on the relationship between customer satisfaction and repeat usage intentions. In this sense, this study identified the notion and impact of perceived value and perceived risk more precisely and broadens recent literature regarding perceived risk by extending findings in line with previous studies that stressed the vital role of perceived value.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Background</td>
<td>1</td>
</tr>
<tr>
<td>Problem Statement</td>
<td>4</td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td>7</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>8</td>
</tr>
<tr>
<td>Organization of the Dissertation</td>
<td>9</td>
</tr>
<tr>
<td>II. REVIEW OF LITERATURE</td>
<td>10</td>
</tr>
<tr>
<td>Mobile Commerce and Mobile Application</td>
<td>10</td>
</tr>
<tr>
<td>Information System Success Model</td>
<td>14</td>
</tr>
<tr>
<td>Electronic Commerce Success Model</td>
<td>17</td>
</tr>
<tr>
<td>Ubiquitous Connectivity</td>
<td>22</td>
</tr>
<tr>
<td>Contextual offer</td>
<td>24</td>
</tr>
<tr>
<td>Transaction Accuracy</td>
<td>26</td>
</tr>
<tr>
<td>Content Quality</td>
<td>29</td>
</tr>
<tr>
<td>Satisfaction and Repeat Usage Intention</td>
<td>32</td>
</tr>
<tr>
<td>Effect of Perceived Value</td>
<td>35</td>
</tr>
<tr>
<td>Effects of Perceived Risk</td>
<td>37</td>
</tr>
<tr>
<td>Summary of Research Hypotheses</td>
<td>39</td>
</tr>
<tr>
<td>III. METHODOLOGY</td>
<td>41</td>
</tr>
<tr>
<td>Data Collection and Sampling</td>
<td>41</td>
</tr>
<tr>
<td>Target Population</td>
<td>42</td>
</tr>
<tr>
<td>Sample Size</td>
<td>42</td>
</tr>
<tr>
<td>Survey Instrument</td>
<td>43</td>
</tr>
<tr>
<td>Pilot Test</td>
<td>46</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>47</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>IV. RESULTS</td>
<td></td>
</tr>
<tr>
<td>Data Screening</td>
<td>51</td>
</tr>
<tr>
<td>Demographic Profiles</td>
<td>53</td>
</tr>
<tr>
<td>Measurement Model</td>
<td>55</td>
</tr>
<tr>
<td>Path Analysis of the Hypothesized Model</td>
<td>61</td>
</tr>
<tr>
<td>The Moderating Role of Perceived Value and Perceived Risk</td>
<td>64</td>
</tr>
<tr>
<td>Summary of Hypotheses Testing Results</td>
<td>67</td>
</tr>
<tr>
<td>V. CONCLUSION</td>
<td>68</td>
</tr>
<tr>
<td>Summary of Findings</td>
<td>68</td>
</tr>
<tr>
<td>Theoretical Implications</td>
<td>72</td>
</tr>
<tr>
<td>Practical Implications</td>
<td>74</td>
</tr>
<tr>
<td>Limitations and Future Research</td>
<td>76</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>79</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>110</td>
</tr>
</tbody>
</table>
# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Essential Factors of Mobile Commerce for Customer Satisfaction</td>
<td>11</td>
</tr>
<tr>
<td>2 Proposed Measurement Items</td>
<td>45</td>
</tr>
<tr>
<td>3 Goodness-of-fit indices and Acceptable Range</td>
<td>49</td>
</tr>
<tr>
<td>4 Descriptive Statistics of Respondents’ Characteristics</td>
<td>54</td>
</tr>
<tr>
<td>5 Means, Standard Deviation, and Correlations</td>
<td>57</td>
</tr>
<tr>
<td>6 The Results of the Measurement Model</td>
<td>59</td>
</tr>
<tr>
<td>7 Discriminant Validity among the Constructs</td>
<td>61</td>
</tr>
<tr>
<td>8 The Structural Path Estimates</td>
<td>63</td>
</tr>
<tr>
<td>9 Result of moderating effects of perceived value</td>
<td>65</td>
</tr>
<tr>
<td>10 Result of moderating effects of perceived risk</td>
<td>66</td>
</tr>
<tr>
<td>11 Summary of Hypotheses Testing Results</td>
<td>67</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Grubhub</td>
<td>12</td>
</tr>
<tr>
<td>2 D &amp;M IS Success Model</td>
<td>15</td>
</tr>
<tr>
<td>3 Updated D&amp;M IS Success Model</td>
<td>17</td>
</tr>
<tr>
<td>4 Electronic Commerce Systems Success Model</td>
<td>20</td>
</tr>
<tr>
<td>5 The Proposed Conceptual Framework</td>
<td>40</td>
</tr>
<tr>
<td>6 The Results of Research Model Testing</td>
<td>64</td>
</tr>
<tr>
<td>7 Interaction effect of customer satisfaction and perceived value on repeat usage intentions</td>
<td>65</td>
</tr>
<tr>
<td>8 Interaction effect of customer satisfaction and perceived risk on repeat usage intentions</td>
<td>66</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Background

Adoption and usage of new technologies is a common practice, and more and more people have adopted new technologies in their daily lives (Islam, Kim Cheng Low, & Hasan, 2013). In particular, technologies related to mobile devices have had a deep effect on people’s daily life. Mobile technologies provide people with convenience and efficiencies and change traditional spatial boundaries (Dery & MacCormick, 2012). In light of that, hospitality industry practitioners have recognized possibilities of mobile technologies to interact with customers (Chong, 2013). The growth of mobile technology has contributed to the development of a high-speed mobile network (Kleijnen, Wetzels, & De Ruyter, 2004). Specifically, the advancement of mobile technology has led to the development of mobile commerce (MC) thanks to the high-speed mobile network (Wang & Lin, 2012).

With the prevalence of smartphones, MC customers can purchase products or services at any time or place as long as they can access wireless Internet (Okazaki & Barwise, 2011).
As a result, smartphones are used as the main tool in MC (Pousttchi, Tilson, Lyytinen, & Hufenbach, 2015; Wang, Malthouse, & Krishnamurthi, 2015). MC allows user mobility, which makes MC dependent on the dynamical location where the mobile user operators (Schneiderman, 2000). MC is operated without any interaction between sellers and buyers who might be in different locations at different times, leading to faster and more diverse mobile service (Yadav, Sharma, & Tarhini, 2016). Consequently, the amount of mobile transactions has increased with emerging mobile technologies, such as smartphones, tablets, and wearable devices. For example, MC customers can buy movies or flight tickets and use financial services on their mobile devices or gain information from mobile websites through their smartphones (Chandrasekhar et al., 2018; Mallat, Rossi, & Tuunainen, 2004). According to Statista (2017), more than 1.6 billion people use their smartphones for online shopping and the number of smartphone users doing online shopping is expected to approach 2.87 billion worldwide in 2020.

The growth of smartphones has provided MC service providers with opportunities to create mobile commerce applications (MCA). A mobile application is a software that performs certain tasks for mobile device users in MC (Islam, Islam, & Mazumder, 2010). These applications are a prevalent form of the mobile channels providing users with information and service for their tasks without the limitations of time and place (Palos-Sanchez, Saura, & Debasa, 2018).

MCA providers are constantly attempting to improve applications in order to attract customers. For example, food delivery mobile applications provide customers with advance ordering, allowing them to pick up or deliver their order through the application (Jin, Li, & Cheng, 2018). In particular, the MCA in foodservice industries can be an
important channel for improving services for customers (Jin et al., 2018). Specifically, customers can search, reserve, and order their meals or drinks through such applications. Additionally, these applications give customers direct access to menus with the ability to customize their preferences from all sorts of nearby places according to their preferences. Once customers place their order through an application, they choose the option to pick it up or have it delivered (Tapingo, 2018). Thus, customers can save time and avoid waiting for their orders. In the case of Starbucks, when customers order coffee through the Starbucks application in advance, they can pick up their drink according to the waiting time stated on the app.

These applications also offer discount coupons and promotions from time to time, which is a pleasant benefit for cash-strapped customers (Ahmed & Sarwar, 2018). Thus, food delivery mobile applications can help customers spend money effectively and help restaurant companies boost revenues (Gao & Su, 2016). On the basis of the application development, customers’ life quality is improving as their foodservice experiences are becoming more convenient and efficient (Gao & Su, 2016). Therefore, the application can bring positive outcomes for customers as well as restaurant operators.

Keeping in mind the importance of MCA in foodservice, the current study aims to develop a success model, which can help practitioners to design applications that meet customer expectations. In this respect, the current study adopts the electronic commerce (EC) systems success model (Wang, 2008). The EC systems success model explains the relationships among system quality, information quality, service quality, perceived value, user satisfaction, and intention to reuse, building on the updated DeLone and McLean IS Success model (DeLone & McLean, 2003). Since food delivery mobile applications are a
type of EC, components of the EC systems success model are adapted and replaced to
develop the MC success model.

**Problem Statement**

Mobile commerce application (MCA) developers can build applications if they
know several computer programs. Earning potential can depend on which application
platforms they are built upon (Wasserman, 2010). Accordingly, MCA offers numerous
opportunities in making a profit for MCA providers. However, due to low barriers to
entering the market, a number of untested MCA providers have broken into the MCA
market and been involved in disputes concerning MCA quality (Holzer & Ondrus, 2011).

Restaurant customers using food delivery mobile applications should be able to
access the applications anytime and anywhere and get optimal information concerning
their orders. However, poor-quality system configuration can lead to difficulties for
customers (Xu, Peak, & Prybutok, 2015). More specifically, customers who are less
technologically advanced could experience problems accessing and ordering using the
application due to low system configuration. It is imperative that system configuration is
of high quality and flows well so that customers' intentions to use food delivery mobile
applications increase (Koo, 2016). Thus, system quality of the electronic commerce (EC)
success model can be modified to include such quality components as ubiquitous
connectivity and contextual offer in the MC success model.

With respect to service quality in the MC success model, food delivery mobile
applications allow transactions without face-to-face interaction between customers and
restaurants independent of time and place via mobile devices. That is to say, customers
can request detailed information regarding order status, cancellation, and refund through mobile applications. In the wake of that, when the delivery time is longer than expected, customers experience more difficulty locating their order status because there is a gap between the application response time and the customer’s request. Further, the gap can affect transaction procedures, which in turn impact how customers’ cancellations are received as well as timing of their refunds (orders2.me, 2016). Accordingly, customers need to know and trust the whole process from ordering to refund because customers perceive high monetary risks regarding their orders in addition to possible psychological burdens concerning transaction uncertainty (Leontiadis, Efstratiou, Picone & Mascolo, 2012). Consequently, the current study respecifies service quality of the EC success model as transaction accuracy in the MC success model.

Customers place orders in food delivery mobile applications through the information shown. Therefore, information in the mobile applications should provide customers with exact, up-to-date and relevant content (Tarute, Nikou, & Gatautis, 2017). Based on Feng et al. (2006), content quality is composed of information that is up-to-date, timely and precise. For example, if application providers do not update content with current menu information, customers would not be able to find food items easily and in timely manner. Further, this can lead to customers’ confusion when they order and cause low usage and retention rate (UX Collective, 2016). Hence, this study defines information quality of the EC success model as content quality in the MC success model.

Customer satisfaction depends on customers’ overall experience with products/services (Anderson & Sullivan, 1993). Accordingly, customer satisfaction with ubiquitous connectivity, contextual offers, transaction accuracy, and content quality in
the MC success model can be evaluated based on how well those components are effectively operationalized. However, customers have concerns with MCA quality components, including whether an application can run smoothly on a given smartphone platform and whether it quickly responds to user inputs and delivery in a reliable manner (Xu, Peak, & Prybutok, 2015). Due to such anxieties, customer satisfaction causes controversy with respect to MCA.

Presently, in the EC context, customers’ perceived risk is a serious impediment in purchasing products and services due to frequent online fraud and privacy crimes (Ow, Spaid, Wood, & Ba, 2018). Nevertheless, the EC systems success model does not account for perceived risk, which is relatively important in the context of EC. In food delivery mobile applications, data and content stored on devices during the transaction process might be accessed and lost by anyone who possesses the devices due to a lack of a proper authentication system. Accordingly, customers would hesitate to use an application due to security concerns regarding privacy (Chopdar, Korfiatis, Sivakumar, & Lytras, 2018). Thus, customer satisfaction with food delivery mobile application usage might be affected by perceived risk and may impact whether they choose to continue using the application (Hsu & Chiu, 2004). Thus, customer perceived risk in the MC success model may play a role in the relationships between customer satisfaction and repeat usage intentions.

As noted earlier, currently, there are numerous food delivery mobile applications with many similarities. Thus, customers can easily change their main application depending on the benefits a given application provides them. (Anderson & Srinivasan, 2003; Chang, 2006). Thus, even though customers may be satisfied with a previous
application, they can choose to use a different application that provides more benefits or presents a better value. Thus, in terms of the MC success model, perceived value may impact the relationships between user satisfaction and repeat usage intentions.

**Purpose of the Study**

The purpose of the current study is to investigate the relationships among mobile commerce application (MCA) quality components, customer satisfaction, and repeat usage intentions in the light of the MC success model in the restaurant context. The objectives of this study are to: (1) examine the components of MCA quality (2) analyze how each component (ubiquitous connectivity, contextual offers, transaction accuracy, and content quality) impacts customer satisfaction and repeat usage intentions; (3) introduce potential moderators (perceived value and perceived risk) and examine moderating effects in the relationship between customer satisfaction and repeat usage intentions.

The current study also aims to answer the following questions: (1) How ubiquitous connectivity, context offer, transaction accuracy, content quality in the context of MCA would influence customer satisfaction with MCAs? (2) How would customers’ perceived value and perceived risk impact the relationship between MCAs’ customer satisfaction and repeat usage intentions?
Significance of the Study

The current study provides several theoretical contributions to hospitality research. The study empirically examines mobile commerce application (MCA) quality components and identifies how those components impact customer satisfaction with MCA. Such examination is important because these components can be important evaluation indicators for food delivery mobile applications. In addition, the current study re-examines facts related to perceived value and perceived risk, which played a role in the relationship between customer satisfaction and repeat usage intentions in terms of food delivery mobile applications.

The study produces implications for practitioners and MCA providers involved in the restaurant industry. The current study offers suggestions to MCA providers on how to configure quality components so that they can satisfy customers who are willing to use food delivery mobile applications in casual dining restaurants. Additionally, the higher the perceived risk associated with mobile commerce application, the more concerned and critical customers MCA assessment would be (Gross, 2016). Moreover, the higher the perceived MCA value, the greater the likelihood that customers are willing to use it (Chen, Hsiao, & Wu, 2018). This study investigates the impact of perceived value and perceived risk on the relationship between customer satisfaction and MCA repeat usage intentions. Accordingly, this study presents empirical evidence to show the role of perceived value and perceived risk to practitioners and MCA providers in order to prevent customer switching behavior and increase customer willingness to use MCA repeatedly.
Organization of the Dissertation

The dissertation consists of five chapters. Chapter 1 describes a background, problem statement, purpose of the study, significance of the study, and organization of the study. Chapter 2 provides literature review that is related to MCA, theoretical background, proposed constructs, the research model and proposed hypotheses. Chapter 3 presents the research design, methods, measurement, sampling and data collection, and data analysis methods. Chapter 4 describes the results of the study. Chapter 5 explains the findings of the study including theoretical and managerial implications. Additionally, limitations and suggestions for future research are discussed in this chapter.
CHAPTER II

LITERATURE REVIEW

This chapter reviews the relevant literature presenting the theoretical background for the current study. The first section provides a general overview and development of mobile commerce application (MCA). In the second section, literature related to the mobile commerce (MC) success model is discussed to provide support for the hypothesized relationships between the key components. Next, literature related to moderating effects is examined. Finally, a research model exhibiting all the predicted connections is displayed at the end of the section.

Mobile Commerce and Mobile Application

Mobile commerce (MC) is considered a type of electronic commerce (EC) that enables customers to use their mobile devices anywhere and anytime via wireless internet to interact with service or product providers (Kleijnen, De Ruyter, & Wetzels, 2007). MC is also described as transactions of monetary value conducted through mobile networks (Lehner & Watson, 2001). Accordingly, MC is defined as an electronic transaction or information interaction conducted using mobile devices and mobile network that leads to a transfer of real or perceived value in the exchange of information, services or products (Lee, 2005). As of 2017, EC accounted for
approximately $440 billion in U.S. retail sales per year while MC is predicted to reach $669 billion in worldwide sales by 2018 (Statista, 2017).

Given that most customers have access to mobile websites through their smartphones, customers can utilize MC anytime and anywhere (Thakur & Srivastava, 2013). For example, MC customers buy movies or flight tickets, use financial services, or gain information from mobile websites through their smartphones when they need it, regardless of where they are (Chandrasekhar et al., 2018; Mallat, Rossi, & Tuunainen, 2004). As a result, researchers acknowledge that the growing smartphone market is contributing to the growth of MC. Smartphones facilitate the development of mobile device technology and promote the improvement of mobile commerce application (MCAs) (Kim, Park, & Lee, 2017).

Mobile commerce applications are a third-party software program, and customers install applications to perform tasks on their smartphones such as gaming, music, online shopping, and financial payments (Islam et al., 2010). An increasing number of application companies have been established because of the popularity of smartphones and improved opportunities to provide customers with information and services through mobile commerce applications (Kang, 2014). For instance, an application can offer opportunities to initiate and realize healthy eating. Such applications allow customers to track their diets, exercise routines, and health status and to calculate summary statistics for the day. They can help customers to choose low-calorie menu items in restaurants. As a result, such applications assist customers in realizing healthy eating behavior and creating healthy behavioral changes (Okumus & Bilgihan, 2014).
Mobile commerce applications (MCAs) have penetrated customers’ life, acceptance of MCAs leads to customer use of the applications, which, in turn, results in customer satisfaction. Seven important factors with respect to customer satisfaction have been studied, namely, convenience, transaction process, mobile portal reliability, information, security/privacy, usefulness, and use behavior (Choi et al., 2008). Sub-factors and prominent researchers about each factor are shown in Table 1.

**Table 1. Essential Factors of Mobile Commerce for Customer Satisfaction in Previous Research**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Description</th>
<th>Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>Perceived ease of use</td>
<td>Cheong and Park (2005), Wu and Wang (2005), Kim et al. (2005)</td>
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<tr>
<td></td>
<td>Ease of navigation</td>
<td></td>
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<tr>
<td>Transaction process</td>
<td>Transaction time</td>
<td>Ghinea and Angelides (2004), Kim et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>Transaction process</td>
<td></td>
</tr>
<tr>
<td>Mobile portal reliability</td>
<td>Systems</td>
<td>Cheong and Park (2005), Wu and Wang (2005), Kim et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>Perceived risk</td>
<td></td>
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<td></td>
<td>Perceived system quality</td>
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<td>Compatibility</td>
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<td>Product</td>
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<td></td>
<td>Perceived content quality</td>
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<td></td>
<td>Degree of content up-to-date</td>
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<td></td>
<td>Variety of content</td>
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<td>Information</td>
<td>Categorization of information</td>
<td>Kim et al. (2005)</td>
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<td></td>
<td>Naming of information</td>
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<tr>
<td>Usefulness</td>
<td>Perceived usefulness</td>
<td>Cheong and Park (2005), Wu and Wang (2005), Kim et al. (2005)</td>
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<td></td>
<td>Usefulness of content</td>
<td></td>
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<tr>
<td>User behavior</td>
<td>Attitude to mobile commerce</td>
<td>Cheong and Park (2005), Wu and Wang (2005)</td>
</tr>
<tr>
<td></td>
<td>Intention to use</td>
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In particular, restaurant operators recognize the importance of food delivery mobile applications among MCAs because such applications can assist them in increasing service quality, customer satisfaction, and customer loyalty (Crick & Spencer, 2011; Chong, 2013; Okumus & Bilgihan, 2014). Food delivery mobile applications such as Seamless, Grubhub, Postmates, DoorDah, and Tapingo became popular channels for casual dining restaurants to connect with customers (Digital trends, 2018). Customers pick out their favorite food from the list of restaurants. Next, they ask to pay before the order can be placed. Once the transaction is complete, the restaurant receives an order and an employee is assigned to pick it up and deliver it to the customer. While customers are waiting for delivery, they can track the status of their order. The applications let customers know the status and location of the delivery driver. Figure 1 shows Grubhub’s website, which is an example of food delivery mobile applications.

Figure 1. Grubhub (from https://www.grubhub.com)
Food delivery mobile applications tend to have features such as menu listings, nutrition facts, online coupons, order placing, geolocation, order histories, and deals on meals (Aksenova, 2017; Wirth, 2017). Order placing, and customizing features make the mobile applications different from other kinds of MCAs. Ordering with smartphones increases convenience because customers can pre-order meals, pay in advance, and directly pick-up their meals without waiting in a line (Okumus & Bilgihan, 2014). Additionally, order placing features can enhance restaurant efficiency by reducing the interaction time between customers and cashiers (Aksenova, 2017). Such benefits and features can make casual dining restaurants more profitable.

Previous studies have examined how to facilitate customer intentions to use mobile commerce applications when ordering meals in restaurants using the technology acceptance model (TAM) (Okumus & Bilgihan, 2014). These studies have developed a conceptual model for the precursors of customer intent to use mobile commerce applications to order food and drink in restaurants, such as perceived enjoyment, perceived usefulness, perceived ease of use, self-efficacy, and social norms. However, the focus of these studies was on facilitating healthy eating behavior through applications and few studies have explored use of food delivery mobile applications. The literature remains silent on how to facilitate and increase food delivery mobile application use from the customers’ point of view in the context of MCA quality components. The current study aims to fill this gap by developing and testing an MC success model through food delivery mobile applications.
DeLone and McLean (1992) proposed an information system (IS) success model. The model was developed in 1992 and consisted of six different factors: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. It also illustrated the temporal relationships between these six factors: system quality and information quality influence use, which in turn results in user satisfaction, individual impact, and finally organizational impact. System quality measures technical success and information quality measures empirical success. Also, use, user satisfaction, individual impacts and organization impact measure effectiveness (Delon & Mclean, 1992). The IS success model reviews comprehensive empirical literature, which is an important step to build the knowledge of IS success measures (Seddon, 1997). In the wake of that, a number of studies have begun empirical investigations of the multidimensional relationships among the measures of IS success model (Goodhue & Thompson, 1995; Guimaraes & Igbaria, 1997; Jurison, 1996; Rai, Lang, & Welker, 2002; Saarinen, 1996; Seddon & Kiew, 1996). The Delone and McLean model is illustrated in Figure 2.
The IS success model is one of the most significant milestones in the IS field for explaining electronic framework performance and defining the criteria that are helpful in accomplishing tasks (Petter, DeLone, & McLean, 2008). The model has been widely used to study user IS adoption. For instance, Song and Zahedi (2008) examined the effects of system quality and information quality regarding user trust in heath infomediaries. Chang and Chen (2009) used the IS success model in the context of online shopping to predict user intention. Teo, Srivastava, and Jiang (2008) combined trust and the IS success model to explain electronic government success. Thus, many of these studies positioned the measurement and development of their dependent variables in terms of the IS success model (Delone & McLean, 2003).

Several researchers have stated that the IS success model is inadequate in explaining more complicated IS trends (Seddon, 1997; Seddon & Kiew, 1996). They
have asserted that the combination of variance and process explanations in the original model could be confusing. Accordingly, the IS success model should be reformed as a model including behavior intention of IS use (Seddon, 1997). As a result, DeLone and McLean (2003) incorporated the suggestions of these critics and extended the IS success model. They proposed an updated IS success model by adding service quality as a third dimension of the model and by grouping all of the impact into a category called net benefits. Use and intention to use are considered important measures of IS success in the updated IS success model (DeLone & McLean, 2003). This model became the most frequently used model to measure IS performance and success. The major constructs of the updated IS success model are illustrated in detail in Figure 3, below.
Figure 3. Updated D & M IS Success Model


Electronic Commerce Success Model

Delone and McLean (2004) studied how the updated IS success model can be applied to the establishment and specification of electronic commerce (EC) system success. However, there were difficulties with a few constructs from the updated IS success model. First, the net benefit measured in the model was not easy to define because the construct does not address issues such as what qualifies as a benefit and for whom. Second, DeLone and McLean (2004) proposed several EC systems success
measures identified in the management information system (MIS) and marketing literature. However, a practical structure among perceived value of IS, satisfaction, and loyalty connection in the marketing and consumer behavior literatures was not consistent. As a result, a study is required to combine the updated IS success model with the marketing research literature in the context of EC (Zeithaml, 1988; Cronin et al., 2000; Parasuraman & Grewal, 2000; Hellier et al., 2003; Durvasula et al., 2004). Consequently, Wang (2008) attempted to deal with the challenges and difficulties facing the updated IS success model and respecified the model into an EC system success model.

In the EC systems success model, system quality refers to the performance of an EC system and is measured by adaptability, availability, reliability, response time and usability. Information quality relates to the content displayed on the website. On the website, content should be personalized, relevant and easy to understand. Information quality is measured by accuracy, timeliness, and relevance. Service quality is the overall support delivered by the service provider. In other words, the service quality is the difference between perceived performance and expected performance in terms of EC services and is measured by assurance, empathy and responsiveness (Pitt et al., 1995; DeLone & McLean, 2004).

In the marketing field, managers have focused on customer perceived value as a main strategic component to explain repeat purchase behavior, brand loyalty and relationship commitment (Patterson & Spreng, 1997). Perceived value is often conceptualized as customer assessment of the ratio of perceived quality to perceived sacrifice (Zeithaml, 1988; Dodds et al., 1991). Perceived sacrifice is influenced by perceived monetary price and non-monetary price (Zeithaml, 1988). Parasuraman and
Grewal (2000) explored that perceived value was the difference between the benefits that a buyer receives from a transaction and the monetary and non-monetary costs that the buyer incurs. Thus, perceived value has a wider range of costs and benefits of EC system use. Accordingly, Wang (2008) replaced use and intention to use with perceived value because the concept of perceived value was larger than use or intention to use. Agarwal and Prasad (1997) asserted that initial system use and intention of future system use differed. Specifically, intention to use something in the future was more important than initial system use intention in the EC context. Similarly, Wang (2008) replaced net benefits with intention to reuse because future intention was more important than initial use. As a result, the system, information, and service quality influence perceived values and user satisfaction, which in turn affects intention to reuse in the EC systems success model (Wang, 2008). Major constructs of the EC systems success model are discussed in detail in Figure 4, below.
Figure 4. Electronic Commerce Systems Success Model


Since electronic commerce (EC) and mobile commerce (MC) have similar purposes, and MC is a category within EC systems, MC is expected to include the system, information and service quality of the EC systems success model (Krummert, 2016). However, MC has mobility, location tracking, convenience, and transaction process, security/privacy, and usefulness when compared to EC (Choi et al., 2008). Accordingly, the EC systems success model may not be applied to the MC context. Therefore, each quality in the EC system success model needs to be modified or
respecified to fit the MC context. Based on the EC systems success model, the current study uses the MC context to examine each component in system quality, service quality, information quality with regard to food delivery mobile applications.

**Ubiquitous connectivity & contextual offer as mobile application quality**

In the electronic commerce (EC) system success model, system quality is defined as the quality revealed in a system’s overall performance and is measured by people’s perceptions (Delone & McLean, 2003; Liu & Arnett, 2000; Schacklett, 2000). For instance, if customers perceive a service providers’ system to be of high quality, they will be willing to spend their time and money on the providers’ offerings (McKnight, Choudhury, & Kacmar, 2002). Hamilton and Chervany (1981) measured system quality in terms of responsiveness time, system flexibility and ease of use. According to Seddon and Kiew (1996), system quality was measured by ease of use and ease of navigation. In an EC context, Lin and Lu (2000) measured system quality by the responsiveness time, security, and website error recovery speed. As such, the researchers of the several studies related to system quality have had similar definitions and measurements with regard to system quality.

In the mobile commerce (MC) context, system quality is that customers need to use mobile technologies to communicate and transact with services providers at the point of need (Lee, 2005). In food delivery mobile applications, system quality is how well the applications is configured to find customers locations and deliver their order status and information from MC context. Accordingly, the system quality component of food
delivery mobile application in the current study can be defined as ubiquitous connectivity and contextual offer.

**Ubiquitous connectivity**

Mobile devices use wireless internet and have features such as mobility, instant connectivity, and ubiquity (Kannan et al., 2001). User mobility makes mobile commerce (MC) dependent on the dynamic location of the mobile user (Schneiderman, 2000). Accordingly, if customers carry mobile devices, they can access MC services. MC also has ubiquity, that is, it operates without any interaction between sellers and buyers who might be in different locations at different times, leading to faster and more diverse mobile services (Yadav et al., 2018). Through the ubiquity feature, customers use MC anytime and anywhere. With mobility and ubiquity, customers are able to connect to the internet to receive necessary information, services, and products anytime and anywhere. Accordingly, MC operates based on mobility and ubiquity.

Lee (2005) defined ubiquitous connectivity, which includes mobility and ubiquity from portability in mobile environment feature. Ubiquitous connectivity is accessing information or mobile Internet services at the point of need, irrespective of where customers are. They interact with companies wherever they have connectivity through their mobile devices. In the context of mobile services such as e-mails, chats, games, and banking, Tojib and Tsarenko (2012) found that ubiquitous connectivity was positively associated with enjoyment, ease of use, time convenience, and experiential value, all of which were associated with increased customer satisfaction and actual service use. Moreover, ubiquitous connectivity enables users to access social network services (SNS)
via smartphone and to maintain seamless, constant and timely connections with friends and associates, which satisfies SNS users’ principal need to get together anytime and anywhere (Choi, 2016). In other words, through smartphone applications, users can connect to SNS with other users without limitations of time and space on the basis of ubiquitous connectivity (Ellison, Steinfield, & Lampe, 2007; Valenzuela, Park, & Kee, 2009).

Ubiquitous connectivity is the most noticeable feature of MC, enabling customers to conduct their business anytime and anywhere, without temporal and spatial constraints (Choi et al., 2008; Kleijnen et al., 2007; Nysveen, Pedersen, & Thorbjørnsen, 2005; Pousttchi et al., 2015). Customers typically access the mobile Internet via their smartphones, and if they have questions about products or services in MC, they can contact providers immediately, leading to the ultimate interaction (Yang & Lee, 2017) and thereby influencing consumer behavior while using MC. In other words, customers can be “always on” with MC service providers, without an inherent time lag (Chun et al., 2012). Therefore, ubiquitous connectivity in the current study is defined as customers using a food delivery mobile application, staying with the application providers at all times, and using the applications without any time or location restrictions via their smartphones. Customers can order their meals and drinks wherever smartphones are used. Therefore, the current study assumes that ubiquitous connectivity might influence customer satisfaction in using food delivery mobile applications because customers can access the applications whenever they wish to order from their favorite food place. Therefore, the following hypothesis can be developed:
HI: Ubiquitous connectivity has a positive impact on customer satisfaction with mobile commerce application.

**Contextual offer**

In MC, customers use their smartphones and they have individual phone numbers. This offers personal identity when customers use MC in order to verify identification and authentication (Kannan, Chang & Whinston, 2001). Through ubiquity and personal identity, MC has localization, which is location-specific information and products. Accordingly, MC service providers know customers’ locations and offer them with appropriate services through the localization (Figge, 2004). Therefore, contextual offer from personal identity and localization is conceptualized as an intimate user relationship formed in the MC environment. The contextual offer provides the advantage of a strong relationship between customers and their mobile devices that makes it possible to discover the geographic position of customers through locating their mobile devices (Lee, 2005).

Contextual offer refers to the instance in which customers desire a service or product, and the providers offer customers optimal information or service that is contextually relevant to customers based on their profile and position. For example, providers timely deliver personalized, customized, and location-based services (LBS), and maintain seamless relationships with customers (Tojib & Tsarenko, 2012). Specifically, LBS are services that provide customers with a variety of conveniences to improve productivity based on the location information. With this service, customers use social network services (SNS) and augmented reality with their smartphones (Balduini et
al., 2012). Gorlenko and Merrick (2003) stated that contextual offer was to realize customers’ location, environment and mobility. Lee and Jun (2007) noted that contextual offer was measured by timely information, interesting information, location-specific information, and optimal information. Shen, Sun and Wang (2013) identified contextual offer as involving localization, immediacy, and customization. Leppaniemi and Karjaluoto (2005) suggested that location awareness and personalization through mobile devices positively influenced customers’ willingness to adopt information. Accordingly, the contextual offer provides information or services that suit customer demands, which are relevant to them based on where they are and what they are doing, i.e. travelers getting information about the location of a nearby gas station or learning where a suitable hotel is available (Lee & Jun, 2007).

Consequently, the contextual offer is important for MC. Zhou (2014) discovered that contextual offer was a factor that influences customers’ trust in terms of MC because they provided customers with the most relevant information and services based on customers’ allocation and preferences. Contextual offer in the current study refers to customers location based on the contextual situation and provides them with available information services such as order status in food delivery mobile applications. An important advantage of food delivery mobile applications is that providers deliver personalized order statuses to customers based on their profiles and location awareness. Specifically, when providers present optimal information about customers’ orders, it creates a strong relationship between customers and providers through food delivery mobile applications that makes it possible to determine the geographic position of customers through smartphone locations services (Shen, Sun, & Wang, 2013). Thus, the
contextual offer in the food delivery mobile applications is more likely to positively influence customer satisfaction. Hence, the following hypothesis can be developed:

H2: Contextual offer has a positive impact on customer satisfaction with mobile commerce application.

Transactions Accuracy as mobile application quality

The definition of service quality differs depending on academic fields. Thus, Gronroos (1984) asserted that service quality was more vague than product quality because quality evaluations depend on service outcomes and a delivery process. The most widely used model in service quality was developed by Parasuraman et al. (1985). They defined service quality as the difference between customers’ expectations and their perceptions based on actual service performance. They developed a service quality model based on gap analysis in the evaluation of service quality. Based on the gap model, a scale called SERVQUAL was created in order to measure customers’ perceptions of service quality such as reliability, responsiveness, tangibles, assurance, and empathy.

To measure customers’ perception of service quality, the SERVQUAL instrument has been commonly used (Parasuraman, Zeithaml, & Berry, 1988). Service quality is generally defined as how well a delivered service matches customers’ expectation in terms of customers’ perception (Pitt, Watson, & Kavan, 1995; Fang, Chiu, & Wang, 2011). Among the SERVQUAL dimensions, DeLone and McLean (2003) adopted three: responsiveness, empathy and assurance. However, the SERVQUAL instrument did not include a phase of electronic commerce (EC) service quality concerning the interaction
between customers and web sites. Accordingly, new service quality dimensions regarding EC are required.

Parasuraman et al. (2005) suggested the e-service quality (ES-QUAL) scale to measure service quality in EC such as efficiency, fulfillment, system availability, and privacy. Efficiency is defined as the ease and speed of accessing and using the site. Fulfillment is the extent to which the site’s promises about order delivery and item availability are fulfilled. System availability is the correct technical functioning of the site. Privacy is the degree to which the site protects customer information.

In the context of online shopping, service quality is defined as the perception of the degree to which the service provided by the online store meets the customer’s expectations. It embraces responsiveness, contact, and privacy. The first element, responsiveness, refers to concerns of effectiveness in handling problems and returns through the EC website (Parasuraman et al., 2005). Contact is the availability of assistance by online representatives. Online service providers should maintain numerous methods for customers to contact online vendors to gain assistance. By doing so, online service providers can improve service quality and prevent customer dissatisfaction (Collier & Bienstock, 2006). The third element is privacy, which is defined as customers’ hesitancy to shop online because they feel credit and debit card use is not secured from potential hackers (Bauer, Falk, & Hammerschmidt, 2006). As an accomplishment factor of online shopping, Jarvenppa and Todd (1997) emphasized transaction service quality, which was prompt processing of customer requests and ordering. In this respect, service quality in the online shopping context can be defined as overall customer evaluations and judgments concerning the quality of online service delivery (Santos, 2003). Following
that, Zeithaml et al. (2002) defined service quality as the extent to which a website facilitates efficient shopping, purchasing, and product delivery.

To date, customers have quickly adopted online shopping, and they often use websites to purchase products. As online shopping developed from something unique to an ordinary routine, website quality has become more important because websites that have high quality are able to attract more shoppers (Donthu, 2001). Among the components of website quality, promptness of online processing and interactive responsiveness to customer requests are reported as important characteristics (Loiacono, Watson, & Goodhue, 2002).

Whereas mobile devices are convenient for online shopping, most mobile devices have small screens and keypads that make it difficult for customers to read the displayed information. As a result, providers who operate online shopping developed mobile commerce applications (MCAs) to provide customers with clarity in transaction processes (Yang & Kim, 2012). Accordingly, customers systematically perform the transaction process as explicitly and quickly as on regular websites through efficient and clear ordering in the MCAs (Bansal, McDougall, Dikolli, & Sedatole, 2004).

Food delivery mobile applications allow transactions between customers and restaurants independent of time and place via smartphones. Accordingly, customers need to know and trust the whole process from ordering to refund when customers use the mobile applications. Thus, the current study can respecify service quality to transaction accuracy as a component of mobile application quality. Applying this feature, transaction accuracy in the current study refers to the clarity, from beginning to end, of the ordering
process, including order procedures, payment methods, cancellation, and return methods (Guo et al., 2016).

In the transaction process, food delivery mobile applications should be efficient, clear, and have a short response time when displaying estimated delivery or pick up time. For example, the process should clearly identify what step of the transaction customers are on, and the response time for each step should be satisfying. In other words, accuracy about order processing, payments, cancellations, returns and order changing is a significant aspect of customer satisfaction (Kim et al., 2017). Additionally, the overall transaction process from menu selecting to purchasing should be clear, and the time from start to transaction completion should give satisfaction to customers. Hence, transaction accuracy can lead to customer satisfaction in the use of food delivery mobile applications and the following hypothesis can be formed:

H3: Transaction accuracy has a positive impact on customer satisfaction with mobile commerce application.

Content Quality as mobile application quality

Information quality represents information system outputs measured by accuracy, precision, timeliness, and reliability of information provided (Pitt, Watson, & Kavan, 1995). Information quality applies online, and it allows customers to assess valuable aspects and attributes concerning products and services on an online website (Chae et al., Kim, 2002). Thus, information quality refers to customers’ perceptions of the features and exhibition of information on websites and carries out traits such as relevance,
understandability, accuracy, completeness, and timeliness (Kim & Niehm, 2009; Fang et al., 2011).

Providing customers with high-quality information is an important determinant for the success of the mobile commerce (MC) (Chae et al., Kim, 2002). Since customers cannot experience products and services until after they purchase, purchase effect about the products and services depends on appropriate information provided to customers (Arambewela & Hall, 2006). However, since MC has ubiquitous connectivity, customers can browse the latest information about services and products, and it affects customer behavior (Yang, Cai, Zhou, & Zhou, 2005). Thus, information quality is recognized by customer perception and is an important factor in predicting customer behavior (Bailey & Pearson, 1983; Jeong & Lambert, 2001).

Content, in terms of information quality, needs to be evaluated in MC because customers place orders using the information shown in the MC websites. Many researchers have found that content quality is regarded as the most important factor for customers when evaluating the overall quality of mobile services (Chae et al., 2002). McKinney et al. (2002) argued that high content quality of mobile websites was a foundation to measure information quality. To provide content information of high quality, Chae et al. (2002) found that content quality combined such characteristics as objectivity, believability, and completeness of information, and furthers its relevance to customers’ tasks. Zhou (2013) found that it was typically measured by several attributes, such as conciseness, timeliness, and up-to-date information (Stefanovic, Marjanovic, Delić, Culibrk, & Lalic, 2016). Yang et al. (2017) noticed that customers looked at
usability, usefulness of content, adequacy of information, accessibility and interaction in order to measure the perceived content quality in the MC they visited.

Mobile websites providing updated information can be a communication channel between mobile service providers and customers. For example, mobile websites which are well-designed are useful in providing customers with sufficient information for making decisions about their purchases (McKnight & Chervany, 2001). In particular, the content quality of the MC website plays an important role in appealing to and retaining customers in mobile services (Ranganathan & Ganapathy, 2002). Accordingly, Vlachos and Vrechopoulos (2008) indicated that content quality was used to determine customers’ attitudes toward mobile service.

In MC, content quality involves maintaining updated information and providing accurate information to customers. When customers spend much effort and time on scrutinizing and assessing information due to a lack of content quality, customer satisfaction may suffer. In other words, content quality, as assessed by customers, can affect their satisfaction (Bharati & Chaudhury, 2004; Johnson & Misic, 1999; Kim, Shin, & Lee, 2009). Wolfinabarger and Gily (2003) reported that content quality that included usefulness and valuable information was an important predictor of customer satisfaction.

Content in food delivery mobile applications should provide customers with exact, up-to-date and relevant content (Tarute, Nikou, & Gatautis, 2017). Therefore, this study can define information quality as content quality in the MC context. Content quality in the current study refers to useful and up-to-date information provided in the food delivery mobile applications (Luna-Nevarez & Hyman, 2012). In other words, if customers are provided with the latest, most objective and credible information that is
highly relevant to their tasks, they are likely to be satisfied with the use of the mobile applications. Hence, the following hypothesis can be developed:

\textit{H4: Content quality has a positive impact on customer satisfaction with mobile commerce application.}

\textbf{Satisfaction and Repeat Usage Intentions}

Customer satisfaction refers to a psychological state resulting when disconfirmed expectations have arisen with the customer’ prior feelings regarding the consumption experience (Oliver, 1981). Based on existing literature, customer satisfaction can be viewed from a transaction-specific perspective or a cumulative perspective (Yi, 1991). The transaction-specific perspective states that customer satisfaction is an evaluation based on the recent purchase experiences while the cumulative perspective emphasizes overall evaluations and indicates that evaluations of customer satisfaction should be based on all the purchase experiences of the customer, regardless of any specific purchase experience (Boulding, Kalra, Staelin, & Zeithaml, 1993; Johnson & Fornell, 1991).

Parasuraman et al. (1988) asserted that the cumulative perspective was more efficient in evaluating service performance and more effective in predicting customers’ post-purchase behaviors than the transaction-specific perspective (Wang et al., 2004). Thus, customer satisfaction is a customer’s post-purchase evaluation and perceptual response to the overall product or service experience and is considered an important predictor of customer behaviors such as repurchase intentions, word-of-mouth (WOM) recommendations, or loyalty (Eggert & Ulaga, 2002). In other words, satisfied customers have a higher usage level of products and services than those who are not satisfied, and
they are more likely to possess a stronger continuous intention and to make recommendations to their friends or relatives (Zeithaml, Berry & Parasuraman, 1996).

Brand loyalty is defined as a deep commitment to repatronize preferred products and services in the future (Oliver, 1999). If service providers can satisfy customer desires better than its competitors, it can create brand loyalty (Oliver, 1999). Johnson and Fornell (1991) noted that high customer loyalty was mostly caused by high customer satisfaction, and Clarke (2001) found that effective satisfaction created loyalty among customers. Based on previous studies, customer satisfaction positively affects customer loyalty and negatively affects switching intentions (Walsh, Dinnie & Wiedmann, 2006). Thus, Sivadass and Baker-Prewitt (2000) have examined that customer loyalty was the vital objective of customer satisfaction measurement.

Customer loyalty can be formed at one time or it can take more frequent interactions, depending on customer intentions. In order to sustain customer loyalty, a long-term relationship between customers and sellers needs to be formed (Geyskens, Steenkamp, & Kumar, 1999). They noticed that customer satisfaction had a role in supporting long-term relationships between customers and sellers. Further, Ganesan et al. (1994) found that customer satisfaction influenced repeat purchases of customers and long-term relationship between customers and sellers.

Repurchase intention has relevance to repurchase behavior and customer retention (Rust & Zahorik, 1993). Cronin and Taylor (1992) noted that repurchase intentions meant that customers were willing to utilize current products and services next time. Biong and Selnes (1996) defined repurchase intention as the tendency for customers to repeatedly use products and services in the future. In other words, repurchase intention is the
tendency for customers to purchase the products or services at the same store based on past purchase experiences (Cronin et al., 2000; Wang et al., 2004; Zeithaml et al., 2002).

Many studies of satisfaction report a positive relationship between customer satisfaction and repurchase intentions (Brady & Cronin, 2001; Cronin et al., 2000; Johnson & Fornell, 1991). Customers with a higher level of satisfaction have a stronger intention to repurchase and recommend the purchased product (Zeithaml, Berry, & Parasuraman, 1996). In other words, when customer satisfaction increases, repurchasing is more likely.

In online-based customer satisfaction, Lee and Chung (2009) noticed that customer satisfaction was evaluated based on how well the system on the web was operated (Lee & Chung, 2009). Luo and Seyedian (2003) found that online shopping retailers who provided real-time services and personalized information to customers were at an advantage relative to competitors obtaining customer re-visititation and satisfaction. Several studies of online shopping have reported that customer satisfaction is positively related to repurchase intention which is relative to web-based systems (Collier & Bienstock, 2006; Lee, 2005). Bai et al. (2008) examined that customers who were satisfied with an online store have a preference for the store. Accordingly, they often visit and purchase products from that store.

In the MC environment, when compared to loyal customers, non-loyal customers are more willing to be influenced by negative information about products and services (Donio, Massari & Passiante, 2006). Therefore, retaining existing customers and reinforcing customer repurchase intentions seem to be essential for MC providers to gain competitive advantage. Siau et al. (2004) noticed that satisfaction was a fundamental
performance element in affecting customer perceptions with respect to MC. Lin and Wang (2006) discovered that customer satisfaction was customers’ total response to their purchase experiences. Since customer satisfaction reflects the degree of a customer’s positive feeling for a service provider in the MC context, it is important for service providers to understand customer preference for their services.

Numerous companies focus on maximizing customer satisfaction in order to increase customer repurchase intentions (Chiu et al., 2014). Repeat usage intentions in the current study are that customers have repeat intentions to use food delivery mobile applications in the future. Consequently, satisfaction with the applications can be a strong predictor of customers’ willingness to continue using them (Bhattacherjee, 2001; Kuo, Wu, & Deng, 2009). Accordingly, when customers experience satisfaction with food delivery mobile applications, they have a higher likelihood of repeat usage intention about the applications. Hence, the following hypothesis is developed:

\[ H_5: \text{Customer satisfaction has a positive impact on repeat usage intentions of mobile commerce applications.} \]

**Effects of Perceived Value**

Customers’ perceived value is defined as their perspectives of benefits (i.e. coupons or promotions) for products or services (Bishop, 1984). Equity theory defines perceived value as the ratio of consumers’ inputs and outcomes in comparison with the service provider’s inputs and outcomes (Oliver & DeSarbo, 1988). Perceived value can be described as customers’ overall judgement of the utility of a product/service based on the perceptions of what customers gave and of what they received (Parasuraman &
Grewal, 2000). Perceived value has been identified as one of the main factors influencing purchase intentions (Sweeney, Soutar, & Johnson, 1997). Also, many researchers have reported positive relationships between perceived value and the intention to purchase and repurchase (Chiu et al., 2005; Parasuraman & Grewal, 2000).

The relationship between customer satisfaction and repeat usage intentions may differ based on the context, i.e. traditional commerce vs. electronic commerce (EC). Customers who were satisfied with offerings in traditional commerce had positive repeat patronage intentions. However, in the context of EC, customers who were previously satisfied with an offering, are likely to find to competing offerings with a higher perceived value. In other words, when the perceived value is low, customers are more inclined to head for competing providers in order to increase their perceived value (Anderson & Srinivasan, 2003).

Low perceived value leads to decreased repeat usage intentions because customers may choose not to purchase or use a product/service when they feel that they are not receiving the best value for their money, even when they are satisfied. Instead, they seek other offerings with better value (Anderson & Srinivasan, 2003; Chang, 2006). In essence, the strength of the relationship between satisfaction and repeat usage intentions can significantly vary under different perceived value conditions (Jones & Sasser, 1995; Oliver, 1999; Anderson & Srinivasan, 2003).

In the current study, perceived value is defined as a customer’s perspectives about benefits in terms of continuance use of food delivery mobile applications when the applications provide attractive value to customers. Therefore, it can be expected that perceived value can positively moderate the relationships between customer satisfaction
and repeat usage intentions towards food delivery mobile applications. Consequently, the following hypothesis can be proposed:

\[ H6: \text{Perceived value moderates the relationship between customer satisfaction and } \]

\[ \text{repeat usage intentions, such that the effect of customer satisfaction on repeat usage intentions will be stronger when perceived value is high.} \]

**Effects of Perceived Risk**

Perceived risk refers to customers’ subjective assessment of possible negative results that affect their behavior (Bauer, 1960). When uncertainty is high or when negative outcomes are expected, perceived risk is high (Sheth & Venkatesan, 1968). Accordingly, Dowling and Staelin (1994) posited that when perceived risk increased, customers tended to switch to different types of activities or alternatives. Accordingly, they focused on perceived risk as a critical factor in customers’ behavior.

Compared to traditional offline shopping, online shopping is considered riskier to customers because of the uncertainty produced by the lack of face-to-face interaction (Lee & Turban, 2001; Wu & Chen, 2005). Three types of risks are determined to be prevalent: financial risk, product risk, and information risk in online shopping (Bhatnagar, Misra, & Rao, 2000). Financial risk includes time and opportunity cost and is focused on the idea that online transactions may be duplicated and are therefore unsafe. Product risk is connected with the product itself, i.e. the fact that products customers purchase may have defects. Information risk is associated with transaction privacy (Kim, Ferrin, & Rao, 2008). When customers complete a payment in online shopping, they may become apprehensive due to the possibility of credit card fraud because customers
generally offer service providers personal information and financial data (Fram & Grady, 1997). Therefore, perceived risk in the online context is a serious impediment to online customers who are considering whether to make an online purchase. (De Ruyter, Wetzels, & Kleijnen, 2001).

In the current study, perceived risk is defined as a customer’s belief about the negative consequences of online transactions when customers use food delivery mobile applications. Customers cannot control the process and, therefore, their perceived risk increases, which might impact whether they choose to continue using the applications (Hsu & Chiu, 2004). Accordingly, their perceived risk about food delivery mobile application usage may negatively impact the relationships between customer satisfaction and repeat usage intentions. Therefore, it can be assumed that perceived risk can moderate the relationship between customer satisfaction and repeat usage intentions for food delivery mobile applications. Hence, the following hypothesis is proposed with regard to mobile commerce application (MCA):

**H7: Perceived risk moderates the relationship between customer satisfaction and repeat usage intentions, such that the effect of customer satisfaction on repeat usage intentions will be weaker when perceived risk is high.**
Summary of Research Hypotheses

A summary of research hypotheses is as following:

H1: Ubiquitous connectivity has a positive impact on customer satisfaction with mobile commerce application.

H2: Contextual offer has a positive impact on customer satisfaction with mobile commerce application.

H3: Transaction accuracy has a positive impact on customer satisfaction with mobile commerce application.

H4: Content quality has a positive impact on customer satisfaction with mobile commerce application.

H5: Customer satisfaction has a positive impact on repeat usage intentions of mobile commerce application.

H6: Perceived value moderates the relationship between customer satisfaction and repeat usage intentions, such that the effect of customer satisfaction on repeat usage intentions will be stronger when perceived value is high.

H7: Perceived risk moderates the relationship between customer satisfaction and repeat usage intentions, such that the effect of customer satisfaction on repeat usage intentions will be weaker when perceived risk is high.

Additionally, Figure 5 visually represent the proposed hypotheses
Figure 5. The Proposed Conceptual Framework
CHAPTER III

METHODS

Research design

This chapter presents the research methods used in the current study, including sampling and data collection processes, measurements, and data analysis approaches. The objective of the current study is to examine relationships among the mobile application quality factors, customer satisfaction, and repeat usage intentions in the mobile commerce (MC) context and further investigate the moderating effects between customer satisfaction and repeat usage intentions. The current study employs a cross-sectional survey to collect the data during the April 2019 and empirically test the proposed hypotheses.

Data Collection and Sampling

A self-selected convenience sampling method was used to identify U.S. customers who have experience with food delivery mobile applications and have Amazon Mechanical Turk (MTurk) accounts. Though inferior relative to random sampling, a convenience sampling has been used by numbers researchers to examine theoretical relationships with new measurements in new systems (Lucas, 2003).
Therefore, the convenience sampling was viewed as a suitable method for the current study. MTurk was used to collect data. MTurk has several advantages over paper-based surveys, such as; 1) unlimited geographical access, 2) short response time, and 3) low costs (Koh & Kim, 2004). Moreover, previous research indicates that the data quality gained from MTurk has similar reliability and quality in comparison with other convenience sampling methods (Behrend et al., 2011). However, an MTurk survey has fundamental limitations, such as; 1) small population, 2) limited diversity, and 3) limited selective recruitment (Litman et al., 2017). Nevertheless, MTurk usage was chosen due to the many benefits associated with the data collection tool (Goodman, Cryder, & Cheema, 2013).

**Target Population**

The target population of this study was customers who had at least one previous food delivery mobile application experience within the past 12 months at the time of the survey. Conner and Abraham (2001) specified a period of 12 months in order to provide a common timeframe. In terms of tourist behavior study, Cheng, Lam, and Hsu (2005) showed that 12 months were the appropriate recall period. Law and Hsu (2006) demonstrated 12 months were the appropriate time period for Internet customers to remember website use experience.

**Sample Size**

Structural equation modeling (SEM) analysis was used to test hypotheses in the proposed model. Sample size is important in SEM and, thus, an appropriate sample size
is critical for data analysis (Hair et al., 2010). The sample size is justified based on the complexity and measurement of model features; for a complex model, more respondents are necessary. Models with more parameters require more estimates, so larger samples are needed for reasonably steady results.

Several recommendations served as guidelines in determining the sample size (Hair et al., 2006). Stevens (2009) recommended that a ratio of 15 observations to one observed variable was required. Bentler and Chou (1987) recommended at least five cases per parameter estimate including error terms and path coefficients. According to Kline (2011) and Stevens (2009), a ratio of response: observed variable of 15:1 or 20:1, respectively, was appropriate.

In the current study, following the suggestions of Kline (2011) and Stevens (2009), the collected sample was 489. To test moderator effects in SEM analysis, a sample size of more than 400 is needed. The sample size for finding reasonable results in SEM analysis is between 200 and 400 (Hair, Anderson, Tatham & William, 1998; Hair et al., 2006). Consequently, the collected sample met with the conditions for SEM analysis.

**Survey Instrument**

A self-reported questionnaire was used, and an online survey was conducted to collect the data and validate the research model shown in Figure 5. The research questionnaire was designed based on the previous literature on the subject. Existing validated measurement scales were used to investigate the hypotheses. Multiple measurement items were utilized to assess each construct (See Table 2). All constructs were assessed by the measurement scales adopted from previous studies (Bhattacherjee,
2001; Bhattacharjee & Hikmet, 2008; Cao, Zhang, & Seydel, 2005; Chae et al., 2002; Choi et al., 2008; Choi, 2016; Chun, Lee, & Kim, 2012; Cronin Jr et al., 2000; Dodds, Monroe, & Grewal, 1991; Jarvenpaa, Knoll, & Leidner, 1998; Lai, 2004; Lin & Wang, 2006; Palvia, 1996; Stone & Grønhaug, 1993; Vlachos & Vrechopoulos, 2008). To measure ubiquitous connectivity, four items were adopted from Choi (2016) and Chun et al. (2012). The contextual offer scale was measured by three items from Chae et al. (2002), Vlachos and Vrechopoulos (2008). The transaction accuracy construct was measured by four items from Choi et al. (2008). Content quality was measured by four items from Cao et al. (2005). The customer satisfaction scale consisted of three items borrowed from Bhattacharjee (2001) and Lin and Wang (2006). The repeat usage intentions were measured by four items from Bhattacharjee and Lin (2008). To measure perceived value, three items were adopted from Cronin et al. (2000) and Lai (2004). Perceived risk was measured by four items from Jarvenpaa et al. (1998), Stone and Grønhaug (1993). A paper-based version of the questionnaire was reviewed by university faculty members and doctoral students to check the appropriateness and wording of items regarding each scale, the length of the instrument, and the format of the scales (Hunt & Sparkman, 1982). Subsequently, the instrument was revised based on the obtained comments.

Consequently, a total of 29 items for the eight constructs was included in the survey questionnaire. Table 2 provides a summary of the measurement items. These items were measured on a seven-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree. In addition, a screening question “Do you have a recent experience using food delivery mobile applications?” was placed at the beginning of a survey in
order to determine whether respondents have the qualification to take part in a survey. After developing the survey instrument and measurements with clarity and relevance, research approval was obtained from Oklahoma State University Institutional Review Board (IRB) to conduct the main survey.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubiquitous connectivity</td>
<td>1. I could access this mobile application anywhere.</td>
<td>Choi (2016); Chun et al. (2012)</td>
</tr>
<tr>
<td></td>
<td>2. I could access this mobile application anytime.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. I could communicate with the mobile application provider anytime.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. I could communicate with the mobile application provider anywhere.</td>
<td></td>
</tr>
<tr>
<td>Contextual offer</td>
<td>1. The mobile application provided me with restaurant information based on my location.</td>
<td>Chae et al., (2002); Vlachos &amp; Vrechopoulos (2008)</td>
</tr>
<tr>
<td></td>
<td>2. The mobile application provided me with delivery time information based on my location.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. The information that the mobile application sent to me was tailored to my situation.</td>
<td></td>
</tr>
<tr>
<td>Transaction accuracy</td>
<td>1. Navigation experience in the mobile application was satisfying.</td>
<td>Choi et al., (2008)</td>
</tr>
<tr>
<td></td>
<td>2. It was easy to know which step of the transaction process I was in.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. The overall time from start to transaction confirmation was satisfying.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. The overall transaction process in the mobile application was clear.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. The mobile application provided updated information.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. The mobile application was informative.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. The mobile application provided relevant information.</td>
<td></td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>1. I feel pleased with the mobile application.</td>
<td>Bhattacherjee (2001); Lin &amp; Wang (2006)</td>
</tr>
<tr>
<td>Repeat usage intention</td>
<td>1. I intend to continue using the mobile application in the near future.</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. I intend to increase the mobile application usage in the future.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. I will always try to use the mobile application in my daily life.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. I will keep using the mobile application as regularly as I do now.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived value</th>
<th>1. I feel the mobile application provided me with a good value.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. The mobile application service is valuable to me.</td>
</tr>
<tr>
<td></td>
<td>3. I feel I am getting good service from the mobile application for what I invested into it.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceived risk</th>
<th>1. Using the mobile application makes me concerned about experiencing potential financial loss.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Using the mobile application makes me concerned about experiencing potential loss of privacy information</td>
</tr>
<tr>
<td></td>
<td>3. My personal information may be used in an unintended way by the mobile application providers.</td>
</tr>
<tr>
<td></td>
<td>4. My personal information given to the mobile application may be shared with other mobile application providers without my consent.</td>
</tr>
</tbody>
</table>

**Bhattacherjee & Lin (2008)**

**Perceived value**

**Cronin et al. (2000); Lai (2004).**

**Perceived risk**

**Jarvenpaa et al., (1998); Stone & Grønhaug (1993)**

### Pilot Test

Prior to the main survey, a pilot test was conducted to examine the validity and reliability of the instrument in March 2019. After IRB approval, the original survey questionnaire was designed on Qualtrics.com, which is an online survey platform. The questionnaire for the pilot test was distributed via MTurk to 75 participants with experience using food delivery mobile applications. To improve data quality, this survey offered a $0.50 reward to participants who finished the last question and received a generated verification code by Qualtrics. The data with a missing value under questions...
was removed through a data screening process. Based on Figure 5 and Table 2, latent variables with four items estimates 5 residuals, 5 intercepts, 4 factor loadings, and one variance. To run confirmatory factor analysis (CFA), at least 75 participants (5 residuals + 5 intercepts + 4 factor loadings + one variance times 5 response) were needed to identify standardized factor loading with respect to validity (Kline, 2011).

According to Hair et al. (2010), reliability was assessed based on the internal consistency of a measure using Cronbach’s alpha when multiple items were used to measure a single construct. Cronbach’s alpha estimate of 0.7 or higher is recommended in social science research (Nunnally & Bernstein, 1994), and this cut off value was used in the current study.

The pilot test results revealed that all path estimates were significant, and standardized factor loading of each construct was from 0.54 and 0.92, surpassing the minimum value of 0.5 (Hair et al., 2006). In addition, Cronbach’s alphas of the constructs ranged from 0.72 to 0.92, all above the minimum of 0.70 (Hair et al., 2006). In sum, the results of the pilot test implied the validity and reliability of the instruments were deemed appropriate for actual survey using.

**Data Analysis**

To achieve the objective of this study, confirmatory factor analysis (CFA), descriptive analysis, and path analysis of structural equation modelling (SEM) were performed using the statistical software packages of SPSS 24.0 and Mplus 7.0. Data analysis for the current study involved five steps. First, the data screening procedure was applied to check whether the collected data had missing values and outliers. This process
is essential because missing value can create bias and lead to incorrect results (Kline, 2011). In order to remove the univariate and multivariate outliers, the box plot and the Mahalanobis distance method were used (Hair et al., 2010). Next, the data was tested to see if several assumptions for SEM were met. Assumptions such as normality, linearity, homoscedasticity, and multicollinearity should be met to reach precise conclusions on statistical significance for testing the research hypotheses.

To check the normality of the data, skewness and kurtosis values were examined (Kline, 2011). Skewness value should be below 3.0 while kurtosis value should be less than 10 (George & Mallery, 2010; Kline, 2011). To test the assumption of linearity, a scatter plot was tested. If the scatter plot follows a linear pattern, it shows that linearity assumption is met. The homoscedasticity assumption was checked by a scatter plot with the variables on the y-axis and the variables on the x-axis (Hair et al., 2010). In addition, the tolerance and variance inflation factor (VIF) values were assessed to check for multicollinearity. If the tolerance value is less than .1 and the VIF value is less than 10, it is considered as a linear combination of other independent variables (O’Brien, 2007).

Second, a descriptive analysis was conducted to examine respondents’ demographic profiles: age, gender, ethnicity, annual income, education level, and food delivery mobile application use. Third, confirmatory factor analysis (CFA) was used to assess the measurement model’s validity by using Mplus 7.0. To assess model fit, various goodness-of-fit indices were evaluated, such as Chi-square ($\chi^2$), Normal fit index (NFI), Comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square (SRMR). Table 3 provides a summary of cut-off points for fit indices and criteria used to assess the model fit.
Table 3. Goodness-of-fit indices and Acceptable Range

<table>
<thead>
<tr>
<th>Fit indices</th>
<th>Acceptable Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square ($\chi^2$)</td>
<td>$p &gt; 0.05$</td>
</tr>
<tr>
<td>Normal fit index (NFI)</td>
<td>$\geq 0.90$</td>
</tr>
<tr>
<td>Comparative fit index (CFI)</td>
<td>$\geq 0.90$</td>
</tr>
<tr>
<td>Root-mean-square error of approximation (RMSEA)</td>
<td>$&lt; 0.05$</td>
</tr>
<tr>
<td>Standardized root mean square (SRMR)</td>
<td>$&lt; 0.08$</td>
</tr>
</tbody>
</table>

Sources: Hair et al. (2006) and Kline (2005)

Fourth, reliability was checked using Cronbach’s alpha as the measurement of internal consistency reliability by SPSS 24.0. The Cronbach’s alpha value of 0.70 was used as a cut-off point for reliability (Nunnally, 1978). Construct validity was examined by assessing convergent and discriminant validity (Anderson & Gerbing, 1988). Convergent validity evaluates whether constructs that have to be related are, in fact, related (Hair et al., 2006). Convergent validity was evaluated using standardized factor loading, construct reliability (CR) and average variance extracted (AVE). To confirm convergent validity, the standardized factor loadings should be statistically significant, CR should be greater than 0.5, and AVE should be above 0.5 (Hair et al., 2006).

Discriminant validity assesses whether constructs are distinct and unrelated (Hair et al., 2006). To assess discriminant validity, all AVE values should be greater than the squared correlation between the constructs in a measurement model (Hair et al., 2006).

Lastly, path analysis using observed variables was implemented to estimate the relationships in a system of structural model among ubiquitous connectivity, contextual offer, transaction accuracy, content quality, customer satisfaction and repeat usage.
intentions as well as moderating effect of perceived value and perceived risk through Mplus 7.0 (Hair et al., 2010; Pedhazur, 1997). As a segment of SEM, path analysis with observed variables is the oldest variety of structural equation modeling (Kline, 2005; Soga et al., 2016). Path analysis is previously known as causal modeling and the initial process in path analysis was the specification of a structural model with all the causal relations among variables described in the model (Kline, 2005). In the current study, the path analysis approach was used to investigate the relationships and test the significance hypotheses among quality of food delivery mobile application, customer satisfaction and repeat usage intentions. Additionally, the moderator effect of perceived value and risk was examined to determine whether they have an effect on the relationship between customer satisfaction and repeat usage intentions via the path analysis.
CHAPTER IV

This chapter presents the results of data analysis and hypothesis testing. First, the descriptive statistics are reported from the respondents’ demographic information. Second, confirmatory factor analysis (CFA), reliability, and construct validity tests were examined to find the underlying dimensions of ubiquitous connectivity (UC), contextual offer (CO), transaction accuracy (TA), content quality (CQ), satisfaction (SA), repeat usage intentions (RU), perceived value (PV), and perceived risk (PR). Third, path analysis was used to test the hypotheses including a moderating effect among the study constructs presented based on the proposed model.

RESULTS

Data screening

Responses were collected and data screening procedures were performed. Among 489 responses collected originally, responses that failed to pass the screening question and attention check question were removed. As Little (1988) states, missing data is a prevailing problem in survey data, which can cause problems in multivariate analysis. Researchers in social sciences such as the marketing and hospitality fields have faced such challenges and offered solutions, including to disregard cases with substantial amounts of missing data (Rezaei et al., 2016).
Accordingly, responses that had more than either two or three missing values at each construct were disregarded. Minor missing values were replaced via mean value substitution, which is appropriate with small numbers of missing values in the dataset (Hair et al., 2006). Hence, items with either one or two missing values in each construct were replaced via mean value. Values were calculated in SPSS 24.0.

For data analysis, univariate and multivariate outliers should be removed from the dataset. Univariate outliers were identified using box plot and multivariate outliers were identified by a Mahalanobis distance \((D)\) test to measure the distances between each case and the multidimensional mean of distribution (Hair et al., 2006; Kline, 2011). Using these techniques, extreme outliers were eliminated from further data analysis.

Skewness and kurtosis values were checked for normality. The absolute value of skewness should be below 3.0 and kurtosis should be less than 10.0 in order to be considered within the acceptable range (Kline, 2011). The absolute values of skewness ranged between 0.587 and 1.531 while kurtosis values were between 0.427 and 3.010, indicating that the data is unlikely to have a non-normal distribution. Based on the values of skewness, the distribution in this study was moderately skewed.

Throughout the scatter plot matrix, homoscedasticity and linearity were checked among variables. None of the relationships in the scatter plot matrix presented serious problems with linearity and homoscedasticity. In terms of multicollinearity, all of the VIF and tolerance were within the suggested range. As such, there is not likely to be a serious multicollinearity issue among variables (O’ Brien, 2007). After these data screening procedures were completed, 439 responses were retained for further data analysis.
Demographic profiles

Table 4 shows the demographic information of the respondents. There were more male respondents (65.6%) than female respondents (34.4%). The majority of the respondents were between 21 and 39 years old (85.2%). Most of the respondents were White (49.9%). 46.0% of respondents were single and 40.5% were married. Over 90% of respondents had received a two-year college education or more. The majority of respondents were employed (75.4%). More than 50% of respondents had an annual income between $20,000 and $60,000. Fewer than 87% respondents used the food delivery application at least once a month. Most of the respondents (88.6%) used the application in the evening (51.3%). In addition, most of the respondents ordered their meals at home and the majority of respondents (67.6%) paid a price between $20 and $39 when they used the food delivery mobile application. 56.0% of respondents considered delivery speed to be the most important factor affecting food delivery mobile application quality.
<table>
<thead>
<tr>
<th>Categories</th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>288</td>
<td>65.6</td>
</tr>
<tr>
<td>Female</td>
<td>151</td>
<td>34.4</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-20</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>21-29</td>
<td>215</td>
<td>49</td>
</tr>
<tr>
<td>30-39</td>
<td>159</td>
<td>36.2</td>
</tr>
<tr>
<td>40-49</td>
<td>40</td>
<td>9.1</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>219</td>
<td>49.9</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>26</td>
<td>5.9</td>
</tr>
<tr>
<td>Black or African American</td>
<td>25</td>
<td>5.7</td>
</tr>
<tr>
<td>Native American or American Indian</td>
<td>9</td>
<td>2.1</td>
</tr>
<tr>
<td>Asian/ Pacific Islander</td>
<td>149</td>
<td>33.9</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>202</td>
<td>46</td>
</tr>
<tr>
<td>Dating/ Cohabitant</td>
<td>52</td>
<td>11.8</td>
</tr>
<tr>
<td>Married</td>
<td>178</td>
<td>40.5</td>
</tr>
<tr>
<td>Widowed</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Divorced</td>
<td>4</td>
<td>0.9</td>
</tr>
<tr>
<td>Separated</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school degree</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td>High school degree</td>
<td>36</td>
<td>8.2</td>
</tr>
<tr>
<td>Associate’s degree</td>
<td>80</td>
<td>18.2</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>146</td>
<td>33.2</td>
</tr>
<tr>
<td>Advanced degree</td>
<td>172</td>
<td>39.3</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>331</td>
<td>75.4</td>
</tr>
<tr>
<td>Self-employed</td>
<td>85</td>
<td>19.4</td>
</tr>
<tr>
<td>Not employed, looking for work</td>
<td>11</td>
<td>2.5</td>
</tr>
<tr>
<td>Not employed but not currently looking for work</td>
<td>5</td>
<td>1.1</td>
</tr>
<tr>
<td>Student</td>
<td>4</td>
<td>0.9</td>
</tr>
<tr>
<td>Retired</td>
<td>3</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>72</td>
<td>16.4</td>
</tr>
<tr>
<td>$20,000 - $39,999</td>
<td>110</td>
<td>25.1</td>
</tr>
<tr>
<td>$40,000 - $59,999</td>
<td>115</td>
<td>26.2</td>
</tr>
<tr>
<td>$60,000 - $79,999</td>
<td>76</td>
<td>17.3</td>
</tr>
<tr>
<td>$80,000 or more</td>
<td>62</td>
<td>14.1</td>
</tr>
<tr>
<td>Prefer note to disclose</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Frequency of using the application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within a week</td>
<td>206</td>
<td>46.9</td>
</tr>
<tr>
<td>Within a month</td>
<td>183</td>
<td>41.7</td>
</tr>
<tr>
<td>Within three months</td>
<td>38</td>
<td>8.7</td>
</tr>
<tr>
<td>Within six months</td>
<td>11</td>
<td>2.5</td>
</tr>
<tr>
<td>Within twelve months</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Time of using the application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mornings</td>
<td>30</td>
<td>6.8</td>
</tr>
<tr>
<td>Noon</td>
<td>58</td>
<td>13.2</td>
</tr>
<tr>
<td>Afternoon</td>
<td>103</td>
<td>23.5</td>
</tr>
<tr>
<td>Evenings</td>
<td>225</td>
<td>51.3</td>
</tr>
<tr>
<td>Other</td>
<td>23</td>
<td>5.3</td>
</tr>
<tr>
<td>Order place when using the application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>322</td>
<td>75.6</td>
</tr>
<tr>
<td>Work</td>
<td>86</td>
<td>19.6</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>4.8</td>
</tr>
<tr>
<td>Expense when using the application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20</td>
<td>61</td>
<td>13.9</td>
</tr>
<tr>
<td>$20 - $29</td>
<td>184</td>
<td>41.9</td>
</tr>
<tr>
<td>$30 - $39</td>
<td>113</td>
<td>25.7</td>
</tr>
<tr>
<td>$40 - $40</td>
<td>40</td>
<td>9.1</td>
</tr>
<tr>
<td>$50 or more</td>
<td>41</td>
<td>9.4</td>
</tr>
<tr>
<td>Most important factor in using the application</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td>246</td>
<td>56.0</td>
</tr>
<tr>
<td>Stability</td>
<td>93</td>
<td>21.2</td>
</tr>
<tr>
<td>Look and feel</td>
<td>39</td>
<td>8.9</td>
</tr>
<tr>
<td>Navigation</td>
<td>36</td>
<td>8.2</td>
</tr>
<tr>
<td>Other</td>
<td>25</td>
<td>5.7</td>
</tr>
</tbody>
</table>

**Measurement model**

A confirmatory factor analysis (CFA) was conducted to validate the measurement model (Hair et al., 2006). Mplus 7.0 was utilized to estimate the measurement model in CFA (Muthen & Muthen, 2012). A total of 28 items were used: ubiquitous connectivity (4 items), contextual offer (3 items), transaction accuracy (4 items), content quality (4 items), customer satisfaction (3 items), repeat usage intention (3 items), perceived value (3 items), and perceived risk (4 items). The overall model fit was checked and was in
acceptable range ($p < 0.001$, $\text{CFI} = 0.925$, $\text{TLI} = 0.912$, $\text{RMSEA} = 0.065$, and $\text{SRMR} = 0.044$). All path estimates were significant, and the standardized factor loadings ranged from 0.512 to 0.885, surpassing the minimum value of 0.5 (Hair et al., 2006).

Although the overall model fit indices indicated were acceptable, there was a chance to improve the model fit by using a modification index. The result of the modification index showed that there was high correlation between the observed variables of items 3 and 4 in the ubiquitous connectivity. The two items were reviewed, and it was found that both of the item questions shared similar words. They were in the same construct of ubiquitous connectivity, not compromising other constructs; therefore, the model of the study was modified in order to correlate errors of those two items. After doing this, CFA was reconducted to assess the measurement model. The revised measurement model fit has improved ($p < 0.001$, $\text{CFI} = 0.937$, $\text{TLI} = 0.926$, $\text{RMSEA} = 0.059$, and $\text{SRMR} = 0.045$). All path estimates were also significant, and the standardized factor loadings ranged from 0.510 to 0.885, surpassing the minimum value of 0.5 (Hair et al., 2006). Table 5 presents the means, standard deviations, and correlations among the constructs.
Table 5. Means, Standard Deviations, and Correlations

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ubiquitous Connectivity</td>
<td>5.78</td>
<td>1.12</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Contextual Offer</td>
<td>5.86</td>
<td>1.08</td>
<td>.696</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Transaction Accuracy</td>
<td>5.79</td>
<td>1.08</td>
<td>.766</td>
<td>.813</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Content Quality</td>
<td>5.84</td>
<td>1.08</td>
<td>.741</td>
<td>.787</td>
<td>.839</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Satisfaction</td>
<td>5.79</td>
<td>1.09</td>
<td>.680</td>
<td>.711</td>
<td>.757</td>
<td>.711</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Repeat Usage Intentions</td>
<td>5.41</td>
<td>1.13</td>
<td>.621</td>
<td>.630</td>
<td>.666</td>
<td>.659</td>
<td>.639</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Perceived Value</td>
<td>5.61</td>
<td>1.11</td>
<td>.596</td>
<td>.663</td>
<td>.729</td>
<td>.715</td>
<td>.762</td>
<td>.692</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>8. Perceived Risk</td>
<td>4.62</td>
<td>1.54</td>
<td>.115</td>
<td>.073</td>
<td>.054</td>
<td>.090</td>
<td>.085</td>
<td>.228</td>
<td>.093</td>
<td>1.00</td>
</tr>
</tbody>
</table>

N= 439. All values are statistically significant at p <.01 and p <.05

Once the measurement model was evaluated, reliability and construct validity with respect to convergent validity and discriminant validity for each of the constructs were assessed. Reliability was examined with the composite reliability (CR) of each construct and was calculated by the sum of square factor loadings divided by the total of sum of squared factor loadings and sum of the error variance for the construct (Hair et al., 2006). A value of 0.50 or higher is a good indicator of reliability. In the table 6, all values of CR ranged between .765 and .904.

Convergent validity was tested with the standardized factor loadings of each indicator, the Cronbach’s alpha and the average variance extracted (AVE) values of each construct (See table 6). Standardized factor loadings are expected to be statistically significant and need to be 0.50 or, ideally, 0.70 or higher (Hair et al., 2006). All standardized factor loadings were statistically significant at p <.001 and standardized
loading estimates ranged between 0.510 and 0.885. Cronbach’s alpha should be greater than 0.70 and the value of each construct was indeed above 0.70 (Bagozzi, 1980; Hair et al., 2006). AVE is calculated by the sum of the squared standardized factor loadings of all items divided by the number of items under each construct. The rule of thumb is an AVE of 0.50 or higher to ensure convergent validity (Hair et al., 2006). If the AVE is less than 0.50, this suggests there are more errors in the items than the variance explained by the construct (Hair et al., 2006). In the result, even though repeat usage intentions’ AVE was below 0.50, it was acceptable. Therefore, convergent validity of the construct in this study was supported for the measurement model.

For discriminant validity, the AVE of each construct should be greater than the squared correlations between the construct (Hair et al., 2006). As shown in table 7, except for the transaction accuracy construct, the AVE values were indeed higher than the squared correlations between constructs. Although the squared correlation of the transaction accuracy construct was below recommended levels, it was extremely close to the level in order to accept the difference (Arnold & Reynolds, 2009; Clark & Watson, 1995). Therefore, it is assumed that the discriminant validity was supported for the measurement model.
Table 6. The Results of the Measurement Model

<table>
<thead>
<tr>
<th>Construct and Indicators</th>
<th>Std. loading&lt;sup&gt;a&lt;/sup&gt;</th>
<th>CR&lt;sup&gt;b&lt;/sup&gt;</th>
<th>AVE&lt;sup&gt;c&lt;/sup&gt;</th>
<th>α&lt;sup&gt;d&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ubiquitous connectivity (UC)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I could access this mobile application anywhere.</td>
<td>.834</td>
<td>.560</td>
<td>.847</td>
<td></td>
</tr>
<tr>
<td>I could access this mobile application anytime.</td>
<td>.820</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I could communicate with the mobile application provider anytime.</td>
<td>.642</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I could communicate with the mobile application provider anywhere.</td>
<td>.680</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contextual offer (CO)</strong></td>
<td></td>
<td>.807</td>
<td>.583</td>
<td>.796</td>
</tr>
<tr>
<td>The mobile application provided me with restaurant information based on my location.</td>
<td>.755</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The mobile application provided me with delivery time information based on my location.</td>
<td>.811</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The information that the mobile application sent to me was tailored to my situation.</td>
<td>.723</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transaction accuracy (TA)</strong></td>
<td></td>
<td>.842</td>
<td>.572</td>
<td>.849</td>
</tr>
<tr>
<td>Navigation experience in the mobile application was satisfying.</td>
<td>.763</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It was easy to know which step of the transaction process I was in.</td>
<td>.769</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The overall time from start to transaction confirmation was satisfying.</td>
<td>.761</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The overall transaction process in the mobile application was clear.</td>
<td>.732</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Content quality (CQ)</strong></td>
<td></td>
<td>.878</td>
<td>.644</td>
<td>.886</td>
</tr>
<tr>
<td>The mobile application provided accurate information.</td>
<td>.799</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The mobile application provided updated information.</td>
<td>.803</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The mobile application was informative.</td>
<td>.774</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The mobile application provided relevant information.</td>
<td>.835</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction (SA)</strong></td>
<td></td>
<td>.827</td>
<td>.615</td>
<td>.817</td>
</tr>
<tr>
<td>I feel pleased with the mobile application.</td>
<td>.737</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The mobile application has met my expectations.</td>
<td>.796</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The overall mobile application quality was excellent.</td>
<td>.818</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repeat usage intention (RI)</strong></td>
<td></td>
<td>.765</td>
<td>.455</td>
<td>.775</td>
</tr>
</tbody>
</table>
I intend to continue using the mobile application in the future.  
I intend to increase the mobile application usage in the future.  
I will always try to use the mobile application in my daily life.  
I will keep using the mobile application as regularly as I do now.

**Perceived value (PV)**

I feel the mobile application provided me with a good value.  
The mobile application service is valuable to me.  
I feel I am getting good service from the mobile application for what I invested into it.

**Perceived risk (PR)**

Using the mobile application makes me concerned about experiencing potential financial loss.  
Using the mobile application makes me concerned about experiencing potential loss of privacy information.  
My personal information may be used in a way I did not intend by the mobile application providers.  
My personal information given to the mobile application may be shared with other mobile application providers without my consent.

---

All item standardized factor loadings are significant at the 0.01 level; Std. Loading$^a$=standardized factor loadings; CR$^b$= composite reliability; AVE$^c$=average variance extracted; $\alpha^d$=Cronbach’s alpha
Table 7. Discriminant Validity among the Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>AVE^b</th>
<th>Squared Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1. Ubiquitous Connectivity</td>
<td>.560</td>
<td>1</td>
</tr>
<tr>
<td>2. Contextual Offer</td>
<td>.583</td>
<td>.484*a</td>
</tr>
<tr>
<td>3. Transaction Accuracy</td>
<td>.572</td>
<td>.586*a</td>
</tr>
<tr>
<td>4. Content Quality</td>
<td>.644</td>
<td>.549*a</td>
</tr>
<tr>
<td>5. Satisfaction</td>
<td>.615</td>
<td>.462*a</td>
</tr>
<tr>
<td>6. Repeat Usage Intention</td>
<td>.455</td>
<td>.385*a</td>
</tr>
<tr>
<td>7. Perceived Value</td>
<td>.592</td>
<td>.355*a</td>
</tr>
<tr>
<td>8. Perceived Risk</td>
<td>.702</td>
<td>.013*a</td>
</tr>
</tbody>
</table>

^a Squared correlation \( * p < .05 \)
^b Average Variance Extracted \( ** p < .01 \)

Path Analysis of the Hypothesized Model

The hypothesized model based on the literature review was analyzed using path analysis. The results of the path analysis tested the effect of mobile application quality on customer satisfaction and the effect of customer satisfaction on repeat usage intentions. The overall fit of the model was acceptable \( (p < 0.001, CFI = 0.969, TLI = 0.869, \) RMSEA = 0.162, and SRMR = 0.028). To improve the model fit and to find issues regarding model specification, a number of additional model diagnostics were executed (Hair et al., 2006). Following Tripathi et al. (2017), who found a direct relationship between ubiquitous connectivity and repeat usage intentions in the setting of cloud
services, the model was revised to include a direct relationship between ubiquitous connectivity and repeat usage intentions in the setting of food delivery mobile applications. As a result, the re-specified model provided good evidence for reasonable, and slightly improved ($p < 0.001$, $CFI = 0.993$, $TLI = 0.958$, $RMSEA = 0.092$, and $SRMR = 0.011$). All of these fit indices indicate that the hypothesized model fits the data well.

Next, statistical significance of each hypothesized path between variables was examined. $H_1$ was to test the positive relationship between ubiquitous connectivity and customer satisfaction. The result indicated that the quality of ubiquitous connectivity of the food delivery mobile application positively influenced customer satisfaction. In other words, ubiquitous connectivity ($\gamma = .17$, $p < 0.01$) had significant effects on customer satisfaction. Accordingly, $H_1$ was supported.

$H_2$ postulated the positive influence of contextual offer regarding the food delivery mobile application quality on customer satisfaction. The result showed that the quality of contextual offer positively influenced customer satisfaction. Contextual offer ($\gamma = .20$, $p < 0.01$) had a significant effect on customer satisfaction. Therefore, $H_2$ was supported.

$H_3$ was to investigate the transaction accuracy quality of the food delivery mobile application with respect to customer satisfaction. The result was that transaction accuracy in food delivery mobile application quality positively influenced customer satisfaction. Transaction accuracy ($\gamma = .35$, $p < 0.01$) had significant effects on customer satisfaction. Consequently, $H_3$ was supported.
H₄ was to inspect the content quality of the food delivery mobile application quality and customer satisfaction. The result showed that content quality positively influenced customer satisfaction. Content quality (γ = .12, p < 0.05) had significant effects on customer satisfaction. Therefore, H₄ was supported.

H₅ was to examine the relationship between customer satisfaction and repeat usage intentions in terms of food delivery mobile application. The result was that customer satisfaction positively influenced repeat usage intention. Customer satisfaction (γ = .23, p < 0.05) had significant effects on repeat usage intentions. Therefore, H₅ was supported.

Table 8. The Structural Path Estimates

<table>
<thead>
<tr>
<th>Structural Path</th>
<th>Standardized Estimate</th>
<th>t-value</th>
<th>Supported /not supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁ Ubiquitous Connectivity → Satisfaction</td>
<td>0.17</td>
<td>3.68**</td>
<td>Supported</td>
</tr>
<tr>
<td>H₂ Contextual Offer → Satisfaction</td>
<td>0.20</td>
<td>3.81**</td>
<td>Supported</td>
</tr>
<tr>
<td>H₃ Transaction Accuracy → Satisfaction</td>
<td>0.35</td>
<td>5.54**</td>
<td>Supported</td>
</tr>
<tr>
<td>H₄ Content Quality → Satisfaction</td>
<td>0.12</td>
<td>2.08*</td>
<td>Supported</td>
</tr>
<tr>
<td>H₅ Satisfaction → Repeat usage intentions</td>
<td>0.23</td>
<td>2.23*</td>
<td>Supported</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01
In order to test the effect of two moderators (i.e., perceived value and perceived risk) between customer satisfaction and repeat usage intentions with respect to food delivery mobile applications, an interaction term was created among perceived value, perceived risk, and customer satisfaction through Mplus 7.0 software. This study proposes that perceived value moderates the relationship between customer satisfaction and repeat usage intentions, such that the effect of customer satisfaction on repeat usage intentions is high when perceived value is high. As expected, the interaction between customer satisfaction and perceived value in relation to repeat usage intentions was significant ($\gamma = .57, p < 0.01$). Therefore, $H_6$ was supported. The result of this analysis is presented in Table 9 and the simple slope in Figure 7 shows the moderating effect of perceived value on the relationships between customer satisfaction and repeat usage intentions. More specifically, customer satisfaction was more strongly associated with repeat usage intentions when perceived value was high.

**Figure 6.** The results of research model testing

*The Moderating Role of Perceived Value and Perceived Risk*

- Ubiquitous Connectivity
- Contextual offer
- Transaction Accuracy
- Content Quality

*p < .05; **p < .01
Table 9 Result of moderating effects of perceived value

<table>
<thead>
<tr>
<th>Path to</th>
<th>Path from</th>
<th>H₀</th>
<th>Standard estimate</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat usage</td>
<td>Customer satisfaction</td>
<td>H₆</td>
<td>.57</td>
<td>2.60**</td>
</tr>
</tbody>
</table>

**p < .01

Figure 7. Interaction effect of customer satisfaction and perceived value on repeat usage intentions.

Next, in relation to the second moderator (perceived risk), this study expects that perceived risk negatively moderates the relationship between customer satisfaction and repeat usage intentions, such that the effect of customer satisfaction on repeat usage intentions is lower when perceived risk is high. The result showed that perceived risk had a significant moderating effect on the association between customer satisfaction and repeat usage intentions. As expected from H₇, the interaction between customer satisfaction and perceived risk in relation to repeat usage intentions was significant (γ = -.89, p < 0.01). Therefore, H₇ was supported. The result of this analysis is presented in
Table 10 and the simple slope in Figure 8 shows the moderating effect of perceived risk on the relationship between customer satisfaction and repeat usage intentions. To be specific, customer satisfaction was more strongly associated with repeat usage intentions when perceived risk was low.

**Table 10 Result of moderating effects of perceived risk**

<table>
<thead>
<tr>
<th>Path to</th>
<th>Path from</th>
<th>$H_0$</th>
<th>Standard estimate</th>
<th>$t$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat usage intentions</td>
<td>Customer satisfaction</td>
<td>$H_7$</td>
<td>-0.89</td>
<td>-3.90**</td>
</tr>
</tbody>
</table>

**$p < .01$**

**Figure 8.** Interaction effect of customer satisfaction and perceived risk on repeat usage intentions.
Summary of Hypotheses Testing Results

This study tested a total of seven hypotheses, and the results of path analysis indicate that all hypotheses predicting direct path relations among constructs were supported. Additionally, the moderating effects of perceived value and perceived risk on the relationship between customer satisfaction and repeat usage intentions were tested. The results showed that there were moderating effects of perceived risk and perceived value between customer satisfaction and repeat usage intentions. A further detailed discussion with both theoretical and practical implications of these results are presented in the next chapter.

Table 11. Summary of Hypotheses Testing Results

<table>
<thead>
<tr>
<th>Structural Path</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_1$ Ubiquitous connectivity $\rightarrow$ Customer satisfaction</td>
<td>Supported**</td>
</tr>
<tr>
<td>$H_2$ Contextual offer $\rightarrow$ Customer satisfaction</td>
<td>Supported**</td>
</tr>
<tr>
<td>$H_3$ Transaction accuracy $\rightarrow$ Customer satisfaction</td>
<td>Supported**</td>
</tr>
<tr>
<td>$H_4$ Content quality $\rightarrow$ Customer satisfaction</td>
<td>Supported*</td>
</tr>
<tr>
<td>$H_5$ Customer satisfaction $\rightarrow$ Repeat usage intentions</td>
<td>Supported*</td>
</tr>
<tr>
<td><strong>Moderating Effect</strong></td>
<td></td>
</tr>
<tr>
<td>$H_6$ Perceived value moderating customer satisfaction $\rightarrow$ Repeat usage intentions</td>
<td>Supported**</td>
</tr>
<tr>
<td>$H_7$ Perceived risk moderating customer satisfaction $\rightarrow$ Repeat usage intentions</td>
<td>Supported**</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01
CHAPTER V

CONCLUSION

Summary of findings

The purpose of this study was to investigate the relationships among mobile commerce application (MCA) quality components such as ubiquitous connectivity, contextual offer, transaction accuracy, content quality, customer satisfaction, and repeat usage intentions in the restaurant context. Specifically, this study aimed to re-specify components of the electronic commerce (EC) success model to apply it to the mobile commerce (MC) context, while including the moderating effects of perceived value and perceived risk between customer satisfaction and repeat usage intentions in terms of food delivery mobile applications. Simultaneously, this study sought to provide practical suggestions and implications for practitioners in the restaurant industry. This chapter summarizes the findings and discusses implications of the study. Additionally, it presents the limitations of the study and suggests possible future research directions.

Mobile commerce application quality and customer satisfaction

As predicted, ubiquitous connectivity, contextual offer, transaction accuracy, and content quality had significant positive impacts on customer satisfaction. Interestingly, transaction
accuracy was the strongest impact factor among the four antecedents. This finding is consistent with the results related to customer satisfaction factors in mobile commerce sites (Choi et al., 2008) as well as the study conducted in the context of mobile backing in Nigeria pointing that all transaction processes should be consistently carried out without being distorted (Ifeonu & Ward, 2017).

Ubiquitous connectivity had a significant positive impact on customer satisfaction with respect to food delivery mobile application usage. This finding is consistent with the premises of MC’s features that customers conduct their business anytime and anywhere, without time and space restrictions (Choi et al., 2008; Kleijnen et al., 2007; Nysveen et al., 2005; Pousttchi et al., 2015). Thus, once the ubiquitous connectivity feature in the application works properly, customers are more likely to use the application. Thanks to this feature, customers can order their meals via food delivery mobile applications anytime and anywhere without location limitation.

With regard to contextual offer, food delivery application providers should suitably build the contextual offer’s features. For instance, if the contextual offer function works appropriately when customers order their meals, the application can find exact customer locations and later track real-time information on customer ordering. In this case, customers are more likely to be satisfied with the application. The positive impact between contextual offer and customer satisfaction is consistent with previous studies showing that contextual offer plays a very important role in customer satisfaction management in the MC context (Leppaniemi & Karjaluoto, 2005; Lee & Jun, 2007). Additionally, this result agrees with Yang and Lee’s (2017) study which proposes that
ubiquitous connectivity and contextual offer in MC site positively influence the level of customer satisfaction.

The positive impact of transaction accuracy on customer satisfaction was also demonstrated. Hence, once customers’ trust is established through the transaction process, from ordering to refund, with respect to food delivery mobile application, customers are more likely to use the application. By doing so, psychological burdens concerning transaction uncertainty can be reduced after building trust between customers and application usage, which then influences customer satisfaction (Leontiadis, Efstratiou, Picone & Mascolo, 2012). The current result is in line with the findings of previous research demonstrating the relationship between trust and customer satisfaction in online shopping (Jin, Park, & Kim, 2008).

Content quality had a positive impact on customer satisfaction with respect to food delivery mobile application usage. This study’s result highlights the importance of providing the latest menu status for customers. With exact descriptions about displayed products, applications can prevent customer confusion when they order their meal. This result supports a previous work showing that content quality is positively related to user satisfaction in the context of mobile internet use (Chae & Kim, 2001).

Customer satisfaction and repeat usage intentions

The study results found a significantly positive impact on customer satisfaction with respect to repeat usage intentions. This means that once customers are satisfied with using a food delivery mobile application, they use the food delivery mobile application when they order their meals in the future. This result agrees with previous studies that
propose customer satisfaction is a strong predictor of repeat purchase intentions in online shopping (Hsu, Chang, & Chuang, 2015).

**Moderating effects of perceived value and perceived risk**

The result of Hypothesis 6 testing supported the positive moderating effects of perceived value on the relationship between customer satisfaction and repeat usage intentions. It showed that customers anticipate perceived value such as discount coupons and free delivery when they use food delivery mobile applications. Accordingly, food delivery mobile application providers should offer promotions to retain customers who use their applications. This result is consistent with previous research showing that customer perceived value has a significant moderating effect on the correlation between customer satisfaction and repurchase intention in the online market (Chang, Wang, & Yang, 2009).

The result of Hypothesis 7 testing showed the moderating effect of perceived risk on the relationship between customer satisfaction and repeat usage intentions. Perceived risk has the main influence on consumer behavior and perceived risk can be considered a function of the uncertainty and unpleasantness associated with outcomes. This demonstrates that customers are concerned about privacy and online fraud when they order meals with their credit cards or debit cards by mobile applications. In order to decrease customers’ anxiety, food delivery mobile application developers should protect privacy by providing customers with a safe procedure to protect customer information leakage. This supports previous research that a lower level of perceived risk has a
positive effect on the relationship between customer satisfaction and purchase behavior about online shipping websites (Ranaweera, McDougall, & Bansal, 2005).

**Theoretical Implications**

This study proposed and tested a comprehensive theoretical model to examine food delivery mobile application quality in the restaurant context by revising the electronic commerce (EC) success model (Wang, 2008). By investigating the impact of food delivery mobile application quality on customer satisfaction, the study provides enhanced insight into how to improve the relationships that trigger customer satisfaction and repeat usage intentions.

First, the study re-specifies information quality, system quality, and service quality from the EC success model to apply them to the mobile commerce (MC) context. More specifically, this study transforms each quality in the EC model into ubiquitous connectivity, context offer, transaction accuracy and content quality as antecedents of customer satisfaction in food delivery mobile application. To the best of researcher’s knowledge, this is the first study attempting to model the relationship between food delivery mobile application quality and customer satisfaction by re-specifying the previous EC model in terms of the MC context.

EC and MC have similar purposes, and MC is a category within the EC context. MC, however, has different features such as ubiquity, mobility, and location tracking when using mobile applications (Kannan et al., 2001; Lee, 2005; Guo et al., 2016). EC activities are conducted by desktop computers and laptops so that customers have to look for a place in order to do their transactions. On the other hand, MC involves mobile
device usage, and customers can do their transactions anywhere and anytime as long as they can connect to the Internet on their smartphones and complete transactions. Thanks to mobility, MC can reach a far wider customer base and provides more opportunities to conduct MC than EC. Additionally, the location tracking capability in EC is restricted due to the non-mobility of EC devices while MC can track customers’ locations with the global positioning system (GPS) technology and Wi-Fi (Forbes, 2018). In order to fill a gap between EC and MC, this study adopts the notions of ubiquitous connectivity, contextual offer, transaction accuracy and content quality through revising and modifying the EC success model (Wang, 2008) to the food delivery mobile application context. Hence, this study contributes to the understanding of the impact of mobile application quality, identifying it as a powerful direct driver of customer satisfaction. It is evident that making food delivery applications useful and convenient for customers is linked with their satisfaction. Subsequently, satisfied customers are more likely to reuse well-formulated applications.

Second, this study contributes to the development of an MC model by looking into the moderating effect of perceived value and perceived risk on the relationship between customer satisfaction and repeat usage intentions. The study simultaneously investigates impacts of perceived value and perceived risk. Consequently, this approach broadens the applicability of perceived value and perceived risk and, thus, makes this research valuable relative to the EC model.

The EC model only accounts for perceived value as a mediator and demonstrates the positive impact among perceived value, user satisfaction, and intention to reuse (Wang, 2008). The model, however, did not examine perceived value and perceived risk
as moderators even if the perceived risk had a significant impact on the EC market. In terms of perceived value and perceived risk, previous studies show a significant impact of perceived value in explaining consumer behavior in a service context among perceived value, satisfaction, and revisit intentions (Patterson & Spreng, 1997; Andreassen & Lindestad, 1998; Bloemer & Reyter, 1998; Cretu & Brodie, 2007; Lai et al., 2009; Ryu et al., 2008; Lai-Ming Tam, J, 2012). Accordingly, this study demonstrates evidence related to perceived value and perceived risk and shows that they play a significant role in the relationship between customer satisfaction and repeat usage intentions. In this sense, this study identifies the notion and impact of perceived value and perceived risk more precisely and broadens recent literature regarding perceived risk by extending findings in line with previous studies that stressed the vital role of perceived value.

**Practical Implications**

MC success model can provide practitioners with useful guidelines for developing successful food delivery applications. The current study thus has some important practical implications for food delivery mobile application providers. First, in order to enhance food delivery mobile application quality, providers should configure the quality features of ubiquitous connectivity, contextual offer, transaction accuracy, and content quality so that they satisfy customers who use the application in the context of restaurants. According to the findings, transaction accuracy had the strongest magnitude of influence among all quality features on improving customer satisfaction. This result indicates that to increase customer’s satisfaction, food delivery mobile application providers should focus on strengthening transaction accuracy in terms of the detailed
procedure from order to refund. Additionally, managers in casual dining restaurants that utilize food delivery mobile applications should pay attention to the role of transaction accuracy. Managers should monitor incoming orders and update order statuses, including real-time information about canceled orders, completed orders, orders out for delivery, and refunds. Overall, it is important to keep track of the process in order to maintain satisfaction with applications and ultimately, the restaurants.

Second, in order to reinforce satisfaction and repeat usage intentions, food delivery mobile application providers should consider customers’ concerns and needs with regard to using applications. This study shows that customers have concerns about releasing personal information. Application providers are obligated to protect personal information. To reduce customers’ unease, food delivery mobile application providers should strive to minimize the perceived risk of having customers’ personal information compromised through reconfiguring the range of customer information in application profiles. If customers sense a high perceived risk of their personal information being abused by food delivery mobile application providers, they will not be willing to use the mobile application. Hence, food delivery application providers should strengthen security by using authentication processes such as fingerprint or password when customers use the applications.

To boost a positive perceived value concerning using food delivery mobile applications, providers should offer acceptable promotions such as free delivery and special discount coupons so that customers feel benefits through personal email or mobile messengers in the context of using applications. The findings reveal that if such benefits are of good value for customers, they will be willing to use and support the applications.
On the basis of these benefits, application providers can increase customer satisfaction as well as raise their repeat usage intentions.

**Limitation and Future Research**

This study has several limitations that suggest directions for future research. First, the findings in this study cannot be generalized beyond the target population of the study because this study used a self-selected convenience sampling method. Therefore, this study’s results could have a bias due to nonprobability sampling because the participants who were willing to partake could have different perceptions and characteristics from those who were not willing to participate. Specifically, an online survey through MTurk could create concerns in terms of generalization because only customers who have MTurk account were invited to the study. This might not be representative of general customers who use food delivery mobile applications in the U.S.

Additionally, because all the data was collected by the same questionnaire in the same period of time using cross-sectional design, common method variance (CMV) may present a serious problem. CMV is the “variance that is attributable to the measurement method rather than the constructs the measures represent” (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003, p.879). Researchers agree that bias caused by CMV causes problems in behavioral research (Podsakoff et al., 2003). To address CMV, Harman’s single-factor test is commonly used. Harman’s single-factor test utilizes partial correlation procedures, correlation matrix, and the measured latent marker variable approach. Hence, future study could use broader sampling methods to seek more generalizable result and Harman’s single-factor test should be conducted in order to address CMV.
Second, the dataset was collected from a Western cultural population. Customers’ perceptions could be affected by their culture and background. Customers using food delivery mobile applications in Western countries could potentially have different perspectives in terms of using food delivery mobile applications from those in Asian countries (Yoon & Lim, 1999). Accordingly, intriguing findings could be presented by applying the model in different cultural contexts and by conducting a comparison study, i.e., Western culture versus Eastern culture.

Third, this study applied a quantitative cross-sectional survey to collect the data. To approach an in-depth understanding of mobile application quality, a qualitative research design using customer interviews and group interviews could be utilized in future research.

Fourth, future research can examine additional quality factors that influence customer satisfaction of food delivery applications use. As noted earlier, because the food delivery mobile application market is getting larger, future research needs to consider other mobile application qualities that may affect customer satisfaction.

Lastly, the model initially constructed in the study didn’t show a good model fit. In other words, the local fit is acceptable while the global fit was not, at acceptable standards. As a result, observed variable path analysis was conducted instead of SEM using latent variables to account for measurement error. Path analysis with observed variables as a special case of SEM tests relationships among constructs without any latent variables. However, finding a significant fit of a path model to a data set does not demonstrate that relationships among variables are causal, because causation may be
made by elements external to the statistical process of path analysis. In sum, the data didn’t fit the original research model.

In order to improve the model fit, the original research model was re-specified by adding direct effects. According to previous study, ubiquitous connectivity had positively influenced continuance intention to use cloud computing technology (Tripathi et al., 2017). On the basis of the result, the original research model was re-specified by connecting the direct effect between ubiquitous connectivity and repeat usage intentions. Accordingly, model fit was increased. To provide more detail, more research regarding a relationship between ubiquitous connectivity and repeat usage intentions is needed. It is therefore suggested that future studies should deal with the relationship between ubiquitous connectivity and repeat usage intentions in terms of food delivery mobile applications.


Heo, J.-Y., & Kim, K.-J. (2017). Development of a scale to measure the quality of mobile location-based services. Service Business, 11(1), 141-159.


Palos-Sanchez, P. R., Saura, J. R., & Debasa, F. (2018). The Influence of Social Networks on the Development of Recruitment Actions that Favor User Interface


APPENDICES

APPENDIX A.

Survey questionnaire
Do you have a recent experience using food delivery mobile applications, i.e. Grubhub, UberEATS, DoorDash, Postmates, Caviar, etc.?

1) **Yes**, please continue the survey.
2) **No**, please stop the survey. Thank you for your attention.

When was the last time that you used the food delivery mobile application?

1) Within a week
2) Within a month
3) Within three months
4) Within six months
5) Within twelve months

Please recall your **latest experience** using food delivery mobile application and respond to the following questions.

Please identify which specific mobile application you had the latest experience with:

1) Grubhub
2) UberEATS
3) DoorDash
4) Postmates
5) Caviar
6) Others (please specify) __________

Please indicate your level of agreement with the following statements regarding your **latest experience** with the food delivery mobile application.
<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neutral</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>I could access this mobile application anywhere.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I could access this mobile application anytime.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I could communicate with the mobile application provider anytime.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The mobile application provided me with restaurant information based on my location.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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</tr>
<tr>
<td>The mobile application provided me with delivery time information based on my location.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The information that the mobile application sent to me was tailored to my situation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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</tr>
<tr>
<td>Navigation experience in the mobile application was satisfying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Choose the answer “Strongly disagree”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>It was easy to know which step of the transaction process I was in.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The overall time from start to transaction confirmation was satisfying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The overall transaction process in the mobile application was clear.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Statement</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Somewhat Disagree</td>
<td>Neutral</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
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<tr>
<td>The mobile application provided accurate information.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
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</tr>
<tr>
<td>The mobile application provided updated information.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
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<tr>
<td>The mobile application was informative.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The mobile application provided relevant information.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I feel pleased with the mobile application.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The mobile application has met my expectations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The overall mobile application quality was excellent.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I intend to continue using the mobile application in the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
<td>7</td>
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<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Somewhat Disagree</td>
<td>Neutral</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
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<td>---------------------------------------------------------------------------------------</td>
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<tr>
<td>I intend to increase the mobile application usage in the future.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I will always try to use the mobile application in my daily life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I will keep using the mobile application as regularly as I do now.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I feel the mobile application provided me with a good value.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>The mobile application service is valuable to me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I feel I am getting good service from the mobile application for what I invested into it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
<td>6</td>
<td>7</td>
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<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Somewhat Disagree</td>
<td>Neutral</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
<td>N/A</td>
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</tr>
<tr>
<td>Using the mobile application makes me concerned about experiencing potential financial loss.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Using the mobile application makes me concerned about experiencing potential loss of privacy information.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>My personal information may be used in an unintended way by the mobile application providers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>My personal information given to the mobile application may be shared with other mobile application providers without my consent.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Experience with food delivery mobile application in general

In general, how often do you use food delivery mobile applications?

1) More than once a week  2) Once a week  3) Twice a week
4) Twice a month  5) Once a month  6) Other

In general, when would you most likely use food delivery mobile applications?

1) Mornings  2) At noon  3) Afternoons
4) Evenings  5) Other

How many people are usually included in an order placed through food delivery mobile application?
___________

Where do you get food delivered to?

1) Home  2) Work  3) Other________

On average, how much do you spend per transaction?

1) Less than $20  2) $20 - $29  3) $30 - $39  4) $40 - $49
5) $50 or more

What is the most important food delivery mobile application quality for you?

1) Speed  2) Stability  3) Look and feel  4) Navigation
5) Other (please specify) __________

Demographic information

What is your gender?

1) Male  2) Female  3) Other________

What is your age group?

1) 18 to 20 years old  2) 21 to 29 years old  3) 30 to 39 years old
4) 40 to 49 years old  5) 50 or older
What is your ethnicity?
1) White  2) Hispanic or Latino  3) Black or African American
4) Native American or American Indian  5) Asian/ Pacific Islander
6) Other ________

What is your marital status?
1) Single  2) Dating/ Cohabitant  3) Married  4) Widowed
4) Divorced  5) Separated  6) Other ________

What is your highest level of education?
1) Less than high school degree  2) High school degree  3) Associate’s degree
4) Bachelor’s degree  5) Advanced degree

Which of the following categories best describes your employment status?
1) Employed
2) Self- employed
3) Not employed, looking for work
4) Not employed but not currently looking for work
5) Student
6) Retired
7) Disabled, not able to work

What is your annual household income?
1) Less than $20,000  2) $20,000-$39,999  3) $40,000-$59,999
4) $60,000-$79,999  5) $80,000 or more  6) Prefer not to disclose

Thank you for your participation in this study!
APPENDIX B.

Oklahoma State University

Institutional Review Board (IRB) Approval
Oklahoma State University Institutional Review Board

Date: 03/12/2019
Application Number: HS-19-15
Proposal Title: Determinants of mobile application user satisfaction and usage intention in restaurant context: The role of application quality, perceived value, and perceived risk

Principal Investigator: Joo Ahn
Co-Investigator(s):
Faculty Adviser: Lisa Slevitch
Project Coordinator:
Research Assistant(s):

Processed as: Exempt
Exempt Category:

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:
1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB
VITA

JOO AHN

Candidate for the Degree of

Doctor of Philosophy

Thesis: EXAMINATION OF CUSTOMER SATISFACTION AND REPEAT USAGE INTENTIONS’ DETERMINANTS IN THE CONTEXT OF MOBILE FOOD SERVICE APPLICATIONS: THE ROLE OF PERCEIVED RISK AND PERCEIVED VALUE

Major Field: BUSINESS ADMINISTRATION

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Human Sciences with a Specialization in Hospitality Administration at Oklahoma State University, Stillwater, Oklahoma in December, 2019.

Completed the requirements for the Master of Science in Hospitality and Retail Management at Texas Tech University, Lubbock, Texas in 2012.

Completed the requirements for the Bachelor of Science in Electronic Engineering at Chosun University, Gwangju, South Korea in 2006.

Experience:

Research Assistant, School of Hospitality and Tourism Management (HTM), Oklahoma State University (OSU), Fall 2015 – Fall 2018
Teaching Assistant, HTM, OSU, Fall 2015 – Fall 2018
Room Attendant, Atherton Hotel, OSU, January 2019 – December 2019
Staff in Housekeeping Department, Residence Inn by Marriott, Stillwater, Oklahoma, June 2018 – August 2018
Front Desk Agent, Holiday Inn Park Plaza, Lubbock, Texas, February 2013 – October 2013