Article

Analysis of Demand and Supply for Mobile Payments in the UAE during COVID-19

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Abstract: The COVID-19 pandemic impacted many if not all aspects of our lives, including the way we handle money. This paper takes mobile payments as an example to show how COVID-19 affected the United Arab Emirates. Many researchers rushed into writing their first impressions in response to the pandemic to produce early study results. This paper uses these early electronic articles and blogs as valuable data sources for a first-level analysis. It attempts to assess the impact of COVID-19 on mobile payment services in the post-pandemic world from the demand and supply perspective in the UAE. The previous literature has been reviewed to understand the scope of the services present in the UAE before the onset of the pandemic. Further, an online questionnaire with open- and closed-ended questions was used to gather data from 125 vendors capable of receiving mobile payments. Regression analysis with two time periods has been included to develop a better perception of mobile payment services before and after the spread of the coronavirus. It was found that COVID-19 has created a suitable environment for mobile payments, with significant positive relationship in both periods. The reasons for using mobile payments during the pandemic were to apply social distancing and to avoid physical touch, a requirement in the COVID-19 period, resulting in a move towards creating a positive attitude towards a cashless society.

Keywords: COVID-19; mobile payment; demand and supply; analysis; UAE

1. Introduction

The development of information and communication technology the world has witnessed in recent decades has influenced all aspects of life. With this development, the world has become like a connected village. Data and information are exchanged according to desire and need. Among the most important of these modern technologies are mobile phones. This device has gained significant importance in communication between individuals and bridging the distances between them, and has therefore become essential for everyone, regardless of age, educational level, living conditions, or geographic region. Mobile phones have become an essential part of many people's lives.

The recent development of making phones smart devices has prompted many applications to be developed, enabling customers and businesses to execute processes digitally through these smartphones. One necessary process is payment. Payment methods, however, vary a lot as people prefer to pay using different methods. Some prefer to pay using cash, others prefer debit or credit cards, and others like bank transfers, and now, mobile payment (MP) has become a new option.

Mobile payments turn the electronic gadget into a digital wallet (henceforth mobile wallet) that stores currency and allows users to make payments for goods and services online (Sherman 2014). Service providers have developed applications with banks to allow customers to store and pay with various payment cards. Mobile wallets are classified as

either proximity or remote mobile wallets (Slade et al. 2015). Proximity mobile wallets, which are used when customers are close to the acceptance entity, allow the storage of visual valuables such as QR codes and textual codes, or enable card emulation using secure elements and near field communication (NFC). Customers with NFC-enabled smartphones approach a store's POS terminal (NFC-enabled), and the assistant enters the purchase as a standard credit card payment. The customer then opens their preferred mobile wallet app, selects the desired credit card, and taps their phone on the machine. Processing is the same as traditional "card presence" credit cards. In contrast to proximity wallets, remote wallets are used when customers and acceptance entities are not physically close to each other (Slade et al. 2013). As technology exceeds our expectations, advanced applications for payment and banking have been developed as mobile applications.

Another important term, mobile banking, in which users can use bank applications as a channel to make payments, bill inquiries, withdrawals, transfers, and deposits, should not be confused with mobile payment. Zhang and Yuan (2002) anticipated that mobile payments would surpass mobile banking owing to technology, the nature of services and business models. Despite the apparent ease of use of mobile payments, many people do not know what they are and how they are used, and they are a complicated payment method, especially in Arab countries (Alkhowaiter 2020). Mobile wallets, however, are containers only of digitized valuables and become meaningful only when they are used for payments. Such a service has only a business context for the value stored in the mobile wallet. To this end, the term mobile payment service (MPS), defined as payment using mobile wallets (proximity or remote) for goods and services, was used for the purpose of this study.

In the United Arab Emirates (UAE), a mobile wallet project was launched in 2014 as part of an innovative government initiative requiring electronic payments to replace cash payments for merchants and retailers. Increasing numbers of people are starting to use their smartphones as mobile wallets. Mobile payment purchases witnessed a remarkable growth of 78% in hypermarkets in the UAE during the first quarter of 2020 compared with the first quarter of 2019 (Geronimo 2020).

The outbreak of COVID-19 and the fear of getting infected by others became the perfect environment to use smartphones to make money transactions to remain safe and hassle-free (Alber and Dabour 2020). Digitalization was already becoming an emerging trend in the UAE, and the onset of COVID-19 acted as a catalyst and accelerated the call to action. Mobile payments became popular due to the need to transact while maintaining the government's social distancing restrictions. As a result, the study's goal is to examine the impact of COVID-19 on customers' use of mobile payments in the UAE.

Much research has focused on adoption by identifying factors influencing people's intentions to use mobile payments. However, far less has dealt with the demand and supply requirements for successful adoption (Kongaut and Lis 2017). This research seeks to answer the question "What is the impact of COVID-19 on MPS from the demand and supply perspective in the UAE".

The significance of this study is that it will add to the research of previous scholars, as many research papers talk about mobile payments and their importance or what people think of them. Further, it will contribute to the literature by filling a gap in understanding the impact of COVID-19 on mobile payments in the UAE.

The remainder of the paper is divided into seven sections. The related work is presented in Section 2, while Sections 3 and 4 present the research framework and methodology respectively. Section 5 reports the results and presents our findings concerning the survey questionnaire. Section 6 discusses the results, limitations, future works, and implications. Finally, we present the conclusion in Section 7.

2. Related Work

The journey towards digital transactions has come a long way since the advent of the World Wide Web. The extant literature provides trends in mobile payment research. Baskerville and Myers (2009) characterized mobile payments as a fad, while Dennehy and

Sammon (2015) categorized them as an established research domain. At the same time, the ceaseless adoption of smart electronics, coupled with increasing mobile phone usage, is fueling the mobile payment technologies market across the world. Mobile payments allow several scenarios, such as mobile commerce, customer-to-merchant commerce, and merchant-to-merchant commerce, among others (Slade et al. 2013).

Mallat (2007) presented a qualitative study of mobile payments being adopted by consumers. The findings suggested that mobile payment acceptance is complicated, depending on specific situational considerations, such as a lack of other means of payment or urgency. Many other obstacles to adoption were often found, including premium pricing, complexity, lack of critical mass, and potential risks. The results provide the basis for an improved theory on the acceptance of mobile payments and the natural growth of mobile payment services.

The research of Pousttchi and Wiedemann (2007) focused on studying a consumer's behavior and the consumer acceptance model. The experiment was done online as a combination of an experiment and an online survey, and the results showed that the findings on technology acceptance and task technology fitted the literature. In contrast, personal security was not confirmed as a driver of mobile payment acceptance. Another study by Możdżyński and Cellary (2022) found that expected usefulness significantly impacted merchants' behavioral intention, ease of deployment and use, cost and price, and hedonic motivation, but not the perceived risks. Further, a study was conducted for customers in India to understand usage intentions for mobile payments by establishing a relationship between adoption readiness, perceived risk, and personal innovativeness (Thakur and Srivastava 2014). It was mentioned that the study results would vary with different locations or nations, the regulatory framework, and customers' characteristics such as lifestyle.

The adoption of and intention to use mobile payments, however, have been the concern of many researchers, who have investigated not only theories but also the factors that influence the intention to use these technologies in different contexts (Dahlberg et al. 2015; Marinao-Artigas and Barajas-Portas 2020; Możdżyński and Cellary 2022; Staykova and Damsgaard 2020; Verkijika 2020). As per the findings of Kongaut and Lis (2017), successful and widespread adoption of mobile payment services requires strongly growing user demand and the availability of a "killer" application on the supply side.

The widespread adoption of mobile proximity payment systems could radically change how customers buy products and services. However, earlier estimates of the performance of these systems have been substantially reduced owing to the lower-than-expected adoption of supporting near-field communication technologies. An examination of data acquired from 244 UK customers suggests that the extended technology acceptance model and its extension with trust and risk constructs reflect more behavioral intent diversity. However, success expectation remains the best predictor of both models (Slade et al. 2015).

Others have studied the barriers to the growth of mobile payment systems concerning customers' security, and attitudes related to the cost and complexity of the system features compared with cash payments (Braido et al. 2021; Cham et al. 2021; FinCoNet 2016; Humbani and Wiese 2018; Moghavvemi et al. 2021; Pal et al. 2020).

Some of the main reasons why customers prefer mobile payment to other ways of payment are because it is faster and more convenient than paying in cash or through other means (Fintech Middle East 2019). Indeed, with the progression in technology and the development of intelligent mobile payment systems, this has changed with a younger generation keen on online shopping and using the mobile wallet as a payment instrument. Engagement levels can be used to assess e-commerce and the increase in digital wallet use in the UAE (Shuhaiber 2016). The importance of a cashless society and mobile payment systems became very popular, and the market experienced various new players, both local and international (Pal et al. 2021).

In the UAE, many businesses have shown potential and adopted mobile payments as an opportunity for innovation (Alqudah 2018). Initially, mobile payment systems were

not accepted in the UAE owing to the lack of consumer satisfaction (Al Hosni et al. 2010), and cash remains the principal means of payment. Similarly, a study by Khidhir (2014) presented the idea that, although mobile payment systems were widely available, they could not reach a sustainable level of consumer satisfaction to grow the economy truly. Srouji (2020) concluded that the UAE economy remained heavily cash-reliant, with cash accounting for 67% of the total value of payments in 2019, while Al-Qudah et al. (2022) report that mobile payment services have increased significantly in the past two years in the UAE.

The PayNT360 report has mentioned that the industry of mobile payments within the UAE is expected to attain a compound annual growth rate (CAGR) of 12.7% and reach US$11.125 million by the end of 2025. The value terms linked to the mobile wallets segment increased by a CAGR of up to US$12.3 million between 2018 and 2025. The publisher has further noted that mobile payment services within the UAE have witnessed significant growth. This has been possible with support acquired through various reforms linked to policies and innovation from key players like Apple Pay, Samsung Pay, FAB payit, Mashreq, and Emirates NBD MePay (PAYNXT360 2019).

Similarly, in 2012, PayPal created a semi-closed e-wallet, partnered with Aramex, and launched its operations in the UAE (Curley 2012). Several other open e-wallets such as PayBy from Fintech, e-wallet from the UAE central bank, Samsung Pay, Apple Pay, and Google Pay, to mention a few, have started to create a movement to digitalize the economy to transform the business environment. Several locked e-wallets, such as Carrefour Pay, ADNOC Distribution Pay, etc., were also created. According to the world payments report, e-wallet transaction volumes in 2016 dominated other payments, and accounted for 36% of the value of total payments in 2018 (MeedInsight 2019). The increased adoption of mobile payment systems has led the central bank in the UAE to develop a regulatory framework for stored values and electronic payment systems. Such regulations introduce a mandatory license and provide additional detail concerning more specific payment services within their scope and those services to which they are not intended to apply (Jarvis 2017).

Zambonini and Zafar (2014) mentioned that the growth of the concept of contactless pay has led to positive stimulation among individuals to consider using the mechanism of mobile payments. The authors also included facts and statistics to support the claim that the industry has experienced significant expansion in this field. According to the authors, mobile payments account for roughly 10–13% of all payments made by significant firms in the UAE region.

According to Fintech Middle East (2019), payment using mobile proximity has shown significant growth within the region, and the trend is expected to show further growth in recent years. The significant factors that have been found to drive growth are enhanced penetration of smartphones, discounts in cash, and leveraged rates linked to innovation. Furthermore, the author also highlighted that continuous developments in the UAE region had led users to consider modes of contactless payments more.

While the shifts to mobile payments were happening, the onset of COVID-19 accelerated the need for action. As digital payments became more popular due to the required social distancing and the need to carry out transactions during the lockdown, economic agents' expectations continually changed. Despite the need for digitalization due to COVID-19, many researchers argue that mobile technology has not peaked, and the process is prone to various shortcomings (Teng and Khong 2021). Hence, the level of adoption is still unclear, because consumer demand and other key attributes are only starting to adjust and show the coronavirus's effects. As per the views of Revathy and Balaji (2020), throughout the COVID-19 lockdown phase, online transfers were quickly expanded to minimize physical visits to financial institutions in the region. Continuous intention towards mobile wallet usage due to the pandemic was the result of many studies (Daragmeh et al. 2021b; Puriwat and Tripopsakul 2021; Sreelakshmi and Prathap 2020). Daragmeh et al. (2021a) confirmed that perceived COVID-19 risk, usefulness, and subjective norms significantly influenced the Hungarian Generation X's behavioral intentions to use mobile payment ser-

vices. Factors such as perceived usefulness, perceived satisfaction, perceived health threats (Sreelakshmi and Prathap 2020), price value, hedonic motivation, facilitating conditions and social influence (Bommer et al. 2022), perceived usefulness, perceived susceptibility, perceived seriousness, and satisfaction significantly influenced continuance usage intention of contactless payment technologies (Puriwat and Tripopsakul 2021), to mention a few of those factors.

A report presented by Accenture (2020) included 10 impacts that the novel coronavirus had had on convenient payment methods. These impacts paid particular attention to tokenized payments, blockchain payments, and consumer spending. However, much of the report was oriented toward the issues that may arise due to digitalized or mobile payments.

The continued momentum and exciting payment development were the focus of a proprietary shopping outlook survey that tracked evolving consumer sentiment during the pandemic. The survey found a greater consumer demand for mobile and contactless payments. Applications such as mobile wallets have experienced increased usage by the tech-savvy population and the older generation, and mobile wallets have and will continue to experience increased usage (Gilbert 2020).

Considering the views of Park et al. (2019), it can be argued that the drop in the number of desktop consumers is emerging as a significant factor corresponding to the growth of mobile payments. In recent years, significant growth in mobile payments has taken place within the region of the UAE. Even in the present scenario, the upcoming forecast has been quite significant. The growth of the e-commerce industry, along with the social commerce aspect, is driving further growth and stimulating individuals to avail themselves of digital modes of payments and money transactions in the form of mobile payments using their tablets or cell phones. Advanced digital transformation has been the major factor leading to the rise linked to the intention of using mobile payments in the UAE (Al-Qudah et al. 2022).

3. Research Framework

Various recent studies have identified the outbreak of the worldwide phenomenon of COVID-19 to be a significant reason for the growth of the use of technologies, including cashless payment (Accenture 2020; Brem et al. 2021; De' et al. 2020; Ren and Tang 2020; Revathy and Balaji 2020). Restrictions imposed by the government to apply social distancing and avoid physical touch made mobile payment a viable option (Liébana-Cabanillas et al. 2018). In this context, COVID-19 was a blessing in disguise for the mobile payment industry. It has drawn customers' attention to the availability of mobile payment services (MPS) when paying for their desired products and goods. This has further benefited customers, who can avail themselves of desired products and goods while adequately maintaining social distancing regulations. Since COVID-19 cannot be quantified, vendors' methods had to be considered to highlight an increase or decrease in MPS usage due to COVID-19. Supply and demand were used as a proxy, and any change in them was quantified as the effects of COVID-19 (Table 1) as follows:

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + e$$

where

- Y = e-commerce;
- X_1 = consumer demand (before COVID-19);
- X_2 = producer supply (before COVID-19);
- X_3 = consumer demand (after COVID-19);
- X_4 = producer supply (after COVID-19).

Table 1. Dependent and independent variables.

Dependent Variable	Mobile Payments Services (MPS)
Independent Variables	Consumer demand and producer supply before corona. Consumer demand and producer supply after a corona.

The supply side or mobile payment services require platform setups of infrastructure, technology, and applications. The growth of mobile payment is based on making it available and reachable by consumers, who comprise the demand side of mobile payment services.

The supply side is driven by broadband services, developed payment application infrastructure, and cooperation between banks and the mobile payment service provider. In contrast, the demand side is driven by consumer characteristics, lifestyle, and attitudes toward service and knowledge (Kongaut and Lis 2017). According to Mas and Radcliffe (2010), adopting mobile payments requires simultaneously promoting both supply and demand. Accordingly, the following two hypotheses were posited:

Hypothesis 1 (H1). *There was a significant relationship between supply and demand on the one hand, and MPS on the other, before the onset of the COVID-19 pandemic.*

Hypothesis 2 (H2). *There is a significant relationship between supply and demand on the one hand, and MPS on the other, after the onset of the COVID-19 pandemic.*

4. Methodology

A survey with a closed-ended questionnaire was oriented on mobile payments, which was made available online to gain first-hand detailed primary data. The first part of the survey was designed to determine the mobile payment market position before the onset of the pandemic. Consequently, the latter part of the survey was more valuable to our multiple regression analysis. It enabled us to develop a relationship to assess the impact COVID-19 had on MPS in the UAE. Many vendors could provide mobile payment services soon after the social distancing rules were enforced, although many already had these services. The goal of this study was to compare demand patterns before and after the onset of the pandemic to gauge the degree to which the market climate in the UAE may have changed.

The survey was adapted from Ghandour and Woodford (2020), in which vendors were asked to compare supply and demand in the two periods (before and after the onset of COVID-19). This allowed us to assess better the disruption they faced in their services. Data analysis, including the results obtained from the regression analysis, is detailed in the results and findings section below.

The survey included 10 questions reworded to fit the current study. The first five questions gave us insight into market conditions before the COVID-19 pandemic had begun. We used supply and demand as a proxy for COVID-19. The reason behind this is that the virus caused significant changes in the demand for and supply of MPS. The vendors' responses were based on their companies' performance before COVID-19. The market situation since the pandemic began is explored in the last five questions. The survey's first and second sections looked at the retailers' perspectives on MPS. The first regression was performed using the first five questions. The second regression was performed using the last five questions of the survey. In summary:

- First five questions = first regression analysis (benchmark);
- Last five questions = second regression analysis (comparison).

A purposive sampling was chosen for this study as the purpose was to home in on particular phenomena (Robinson 2014). More than 200 retailers from the UAE marketplace were contacted by telephone. To make our research more specific and give an accurate analysis, only vendors using MPS were asked to participate. In total, 125 responses were recorded.

5. Results and Findings

The research model comprises three variables, of which MPS is the dependent variable. At the same time, supply and demand were used as proxies for COVID-19, which acted as independent variables. For the two different periods, regression analysis was performed. The first regression recorded vendors' views before the pandemic had begun, while the second recorded their views after it had begun. This enabled us to develop a benchmark to compare the pandemic's effect on supply and demand. The changes in supply and demand constructs of the two periods determine the impact of COVID-19. The result, however, demonstrates that the relationship between the independent and dependent variables is significant.

The data fit the model quite well in the benchmark regression before the beginning of the pandemic, with a goodness of fit of 87%. Furthermore, a high F value suggests that our dependent and independent variables have a meaningful association. The results are shown in Tables 2 and 3.

Table 2. Statistical analysis before COVID-19 pandemic.

Measure	Value
The number of obs.	125
$F_{(2, 122)}$	3.56
Prob > F	0.0450
R-squared	0.8699
Adj R-squared	0.7364
Root MSE	0.69293

Table 3. Regression analysis before COVID-19 pandemic.

MPS	Coef.	Std. Err.	t	P > |t|	[95% Conf.	Interval]
supplybc	0.3026952	0.188649	1.60	0.122	−0.087555	0.6929455
demandbc	0.2902557	0.1766119	1.64	0.114	−0.0750938	0.6556052
_cons	−0.032481	0.5772672	-0.06	0.956	−1.226649	1.161687

In the comparison regression following the beginning of the pandemic, the information supplied by respondents for the MPS condition matches our model fairly well. The goodness of fit is calculated to be 90%, allowing us to conclude that our results are accurate and precise. Table 4 shows the statistical analysis of the situation after the emergence of the new coronavirus. Table 5 shows the regression analysis from which we can assert that supply and demand drive the attractiveness of MPS. An increase in MPS by 1 unit equates to a 0.5 and 0.2 unit increase in supply and demand, respectively. The high F value indicates a significant relationship between the dependent variable (MPS) and the independent variables (supply and demand). The positive relationship, however, is due to various demand factors.

Table 4. Statistical analysis after onset of COVID-19 pandemic.

Measure	Value
The number of obs.	125
$F_{(2, 122)}$	4.21
Prob > F	0.0276
R-squared	0.9045
Adj R-squared	0.8681
Root MSE	0.76726

Table 5. Regression analysis after onset of COVID-19 pandemic.

MPS	Coef.	Std. Err.	t	P > |t|	[95% Conf.	Interval]
supplybc	0.5786452	0.2167348	2.67	0.014	0.1302952	1.026995
demandbc	0.2598546	0.1922195	1.35	0.190	−0.1377818	0.657491
_cons	1.006506	0.5585994	1.80	0.085	−0.149045	2.162057

Overall, the results show significant relationships between the dependent and independent variables. The MPS industry expanded before and after the pandemic and more interestingly, it was growing before the onset of the pandemic.

6. Discussion

This research has successfully established the relationship between MPS growth and COVID-19. The impact of COVID-19 was measured by the difference in MPS demand and supply before and after the epidemic. The pandemic played a role in encouraging consumers to adopt mobile payments as a health-protective behavior. Consumers have started to search more for information about mobile payment as they think it is safer, since it requires less contact and physical approach by others. Businesses' response to these market dynamics was quick, since mobile payment systems were available before the pandemic. However, respondents and consumers had issues using mobile payment systems, according to the open-ended questions. They viewed it as a complicated method of payment, not supported by all shops, which made people hesitate to use it. Many said they did not consider mobile payment special until the current circumstances emerged, and people needed to change their lifestyles and perceptions.

Although MPS existed with less use before the pandemic, businesses were pushed to develop campaigns to increase consumer awareness of using it and its potential benefits. Other stakeholders, such as banks and internet service providers, were also active.

The study has practical implications because mobile payments have become integral to consumer life owing to the pandemic. The industry in the UAE should thus maintain the momentum towards fulfilling the growing needs and demands of this new normal. Further, among its players, the industry should collaborate in formulating operational and marketing strategies to maintain the appetite for the trust that has been induced in mobile payment services among consumers. Moreover, the study has social implications, with mobile payments offering more accessible and faster payments, and access to a broader range of products and services, complementing the pervasiveness of e-commerce in the UAE.

The research has its limitations. Firstly, the pandemic itself was the most significant constraint that had to be quantified to reveal the impact on mobile payment systems. Secondly, our survey was distributed to only 125 retailers (purposeful sampling) due to lockdowns and standard operating procedures issued by the government, which might have decreased the degree of representativeness of the study sample. Thirdly, our study focused on the supply of and demand for mobile payment systems from the merchant perspective. Future studies could identify the constituents of demand and supply and consider the impact of the pandemic on each of these factors. Further studies could also measure consumers' perspectives, with moderating and control factors, to test their influence.

This study has contributed to understanding the supply and demand that influenced the adoption of mobile payments during the COVID-19 pandemic. Our research has confirmed that both factors played a role in the growth of mobile payments and contributed to the journey of developing a cashless society in the UAE.

7. Conclusions

Since COVID-19 spread across the world, online industries have significantly expanded, and similarly, digital and especially mobile payment transactions have increased to a high extent. The demand for mobile wallets was linked to protective measures while

continuing to make transactions for the necessities of life. The current study examines the impact of COVID-19 on MPS from the supply and demand perspective. While some previous studies focused on adoption, others have investigated continuous intention to use contactless payments. Different frameworks and factors have been identified in different contexts, and evidence of the importance of the continued adoption of mobile payments before and during the COVID-19 pandemic has been provided.

This research, however, reaffirms that COVID-19 has changed the behavior of individuals. The pandemic changed the concepts of what is wanted and what is needed. People now view mobile payments as a necessary tool that they need to use because it requires less physical communication. It is safer than other payment methods such as cash, debit cards, or credit cards. The intention of people to use mobile payment has increased after COVID-19. COVID-19 has accelerated the need for action and caused the use of mobile payments to flourish, unlike its effect on other business sectors and applications. The pandemic has positively affected the sector and made it easier for people to accept such methods as mobile payments and anything requiring zero contact and therefore carrying no risk of infection. The mantra "cash is king" is no longer valid. On the contrary, cash is considered a hazardous payment method as it is constantly exchanged between one person and another. It cannot be disinfected like cards, mobile phones, or other intelligent devices. Therefore, people are shifting towards mobile payments and debit or credit cards as they are less risky than cash.

On the basis of the study's result, business strategies need to be responsive to the market demands of mobile payments to ensure continuance of usage. This study is a pioneer in researching the demand for and supply of mobile payment systems in the UAE market in the time of COVID-19.

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