A survey on mobile payment applications and adopted theoretical models

Mohammed Ali Hadi[1*], Ibrahim Ahmed Al-Baltah[1,2], Ammar Thabit Zahary[1]

[1] Department of Information Technology, Faculty of Computer Science and IT, Sana'a University, Sana'a, Yemen
[2] Department of Information Technology, Faculty of Sciences and Engineering, Al-Hikma University, Sana'a, Yemen

*Corresponding author E-mail: jan.mohammed.hadi2@gmail.com

Abstract

Looking at the evolution of mobile phones, communication technology and the internet, a clear shift in their use can be seen in the past decade as mobile payment has become an important area of research in the field of information technology. However, many financial institutions have adopted mobile payments. Except that only a limited number of clients are used. Several information systems theories/models have been proposed to examine the factors that could influence user adoption. However, the literature on the field is still in its infancy. This paper, reviews and systematically analyzes the existing mobile payment acceptance and adoption literature that include Theory of Acceptance and Use of Technology (UTAUT) or Technology Acceptance Model (TAM) as a theoretical model to reveal mobile payment adoption research's current situation. The current study also provides a basis for future researchers in the mobile payment adoption study, as it provides a summary of related literature in the field, the models used, and the factors that have an impact on customer intent. Accordingly, the UTAUT, TAM models, with their extensions, are one of the models most used in examining and understanding the necessary factors that could influence mobile payment applications' adoption. The research revealed that 37 factors most commonly than a literature review on factors of adoption mobile payment applications since 2015. It was found that the factors of perceived trust and perceived risks are among the most critical factors in which the models are expanded, as they have an impact on the customer's acceptance of any new technology innovation. Therefore, emphasis must be placed on the factors of perceived trust and perceived risks to increase the applicability of UTAUT, TAM models to the mobile payment context.

1. Introduction

With advances in mobile phones, communications technology, and the internet, adaptation has become the key to survival for different industries as it has changed the ways in which partnerships meet customer needs. Like

other industries, the banking and financial industry has developed various electronic channels to meet the needs of different customers, such as mobile banking services, cashless payment, electronic financial transactions, and mobile money, in order to provide various services to consumers through information and communication technologies [1]. Many commercial and banking companies turn to mobile phone applications as they provide unlimited access at any time and in any place [2-4] because it enables the customers to manage commercial and financial transactions and to enjoy the many services that are provided through mobile applications. Where financial applications in the smartphone are widely adopted in developed countries and developing countries [5], such as the United States [6], the United Kingdom [7], India [8-10], China [11], Ghana [12], Malaysia [5, 13], Indonesia [1], and Oman [14]. Despite the many services of mobile banking applications, only a limited number of customers use mobile applications. However, this did not prevent service providers from looking for new ways to reach their customers in order to benefit from the development in mobile applications and the Internet, where the traditional patterns of buying and selling have undergone a transformation under the influence of the development of technology. The applications of mobile technology are widely applicable to all types of commercial transactions, banking, and financial services [15]. The rapid expansion and popularity of online purchases have spurred banks and financial sector companies to motivate their customers to use online and mobile banking methods to make payments and other related banking transactions. Besides, the non-acceptance of mobile banking services can be attributed to the many problems that customers face in accessing the financial services [16]. Whereas cashless payment is the essence of electronic and mobile commerce in the world, which can comprise loads of smartphone applications such as (mobile banking apps, mobile payment apps, digital or mobile wallet apps, mobile money apps, etc.) These smartphone applications have replaced services based on the traditional way of visiting banks and ATMs with electronic payments that facilitate the process of online transactions any-time and any-where [12, 17]. In addition, utilizing mobile payment apps is now convenient for the customer [18] because mobile payments are characterized by the availability, atomicity, integrity, the impossibility of non-repudiation, profitability, security, confidentiality, and usability for any financial services [19]. In spite of all that, only a limited number of customers use mobile payment applications. Therefore, several information systems theories/models have been proposed to examine the factors that could influence mobile payment app adoption. However, the literature on the field is still in its infancy [20]as there is no study that can provide a comprehensive view on this field.

Hence, this paper aims to review and systematically analyze the existing mobile payment apps adoption literature that includes TAM / UTAUT as a theoretical model, which enables us to get more information about the success factors of the adoption of mobile payment apps. Consequently, the comprehensive mobile payment apps adoption literature review approach that includes TAM / UTAUT as a theoretical model since 2015 has been used in this paper as a survey. The paper starts by providing an overview. Then, it presents the mobile payment applications, and related work, and after that, presents the theoretical models of adoption and the most common technical factors adopted in mobile payment applications. Finally, it provides the discussion, limitations, and future directions. The study attempts to examine and understand the necessary factors that could influence the adoption of mobile payment applications. In this respect, the study revealed that the UTAUT, TAM models, with their extensions, are one of the models which are most used in examining and understanding the necessary factors that could influence the mobile payment applications' adoption. In addition, this study found that 37 factors most commonly than a literature review on factors of adoption mobile payment applications. Also, it was found that the factors of the perceived trust and perceived risks are among the most critical factors in which the models are expanded as they have an effect on the customer's acceptance of any new technology innovation. Therefore, emphasis must be placed on the factors of perceived trust and perceived risks to increase the applicability of UTAUT, TAM models to the mobile payment context. All this is illustrated in Figure 1 Although research has been conducted to inspect the factors that influence mobile payment app adoption, there are a limited number of literature reviews that can provide a broad insight into this field. Consequently, this study provides a basis for future researchers on mobile payment adoption studies as it

provides a summary of related literature in the field, the models used, and the factors that have an effect on the customer's intent. However, this paper focuses on mobile payment applications from general perspective.
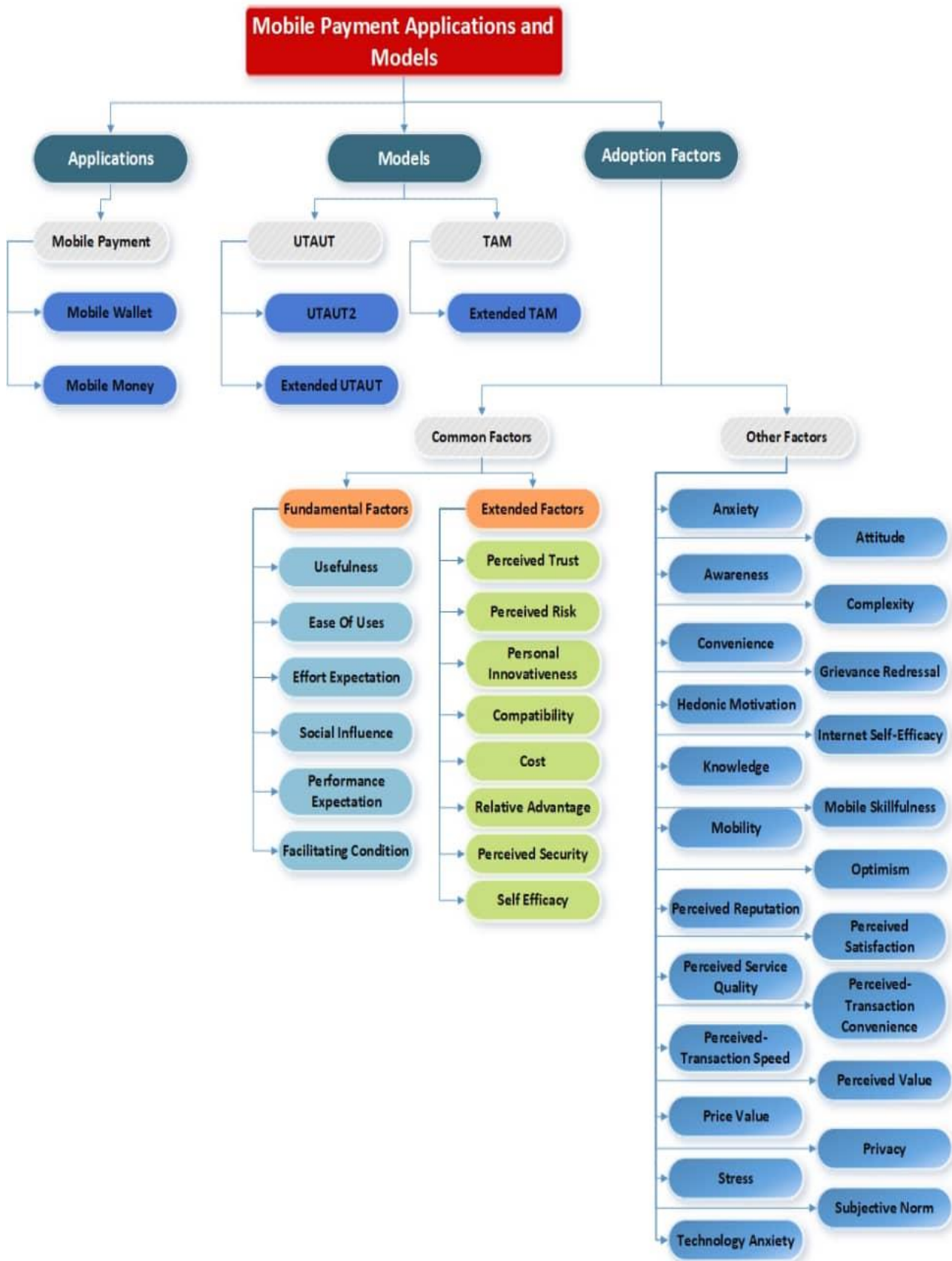
Figure 1. Mobile payment applications and models

2. Mobile payment applications

Recently, mobile payment and technology innovations have become increasingly popular in developed countries and developing countries [13], where mobile phone technologies play the primary role in allowing users to access an enormous amount of information and services through mobile applications at any time, anywhere for anyone [2-4], Mobile payment technology is considered one of the modern technologies used to conduct transactions over the Internet through mobile phone technologies [21]. Mobile payment has been defined as the service of financial activities that are ordinarily conducted utilize mobile phones [9] where the mobile payment system has been developed by combining the payment system with mobile phone technology [20] from what the users are enabled to access to conduct transactions through paying, selling and buying the products and services utilize smartphone applications as mobile payment facilitates commercial transactions and enables users to manage financial operations without physical cash [21]. Mobile payment applications are called mobile money or mobile wallet applications [20]. Mobile payment is the essence of mobile commerce [17] as it has changed traditional trading methods [15], and many companies and banks have transformed to work through mobile applications that increased the competitive advantage of these institutions [4]. According to the world trade report 2020 and the global payments for the same year, global non-cash transactions have achieved a growth of 14% during the previous two years to get 708.5$ billion as it is the highest growth recorded during the past decade [13]. This development has encouraged many financial companies to the trend towards using cashless payment and what the world is going through from the covid-19 epidemic. This encouraged many researchers to study the factors that could affect the adoption of mobile phone payment [8, 9, 15], whether such factors are social, individual, technological, or infrastructure. Since, if the payment is not approved by using the mobile phone by the users, it has no benefit [22]. Several information system theories/models have been developed to explore the factors that influence the adoption of new technologies, innovations, and information technology systems [20]. There have been several studies in the literature reporting important issues surrounding adoption and Mobile payment diffusion, where many factors have been identified, that can influence the behavioral intention of individuals to utilize different technology innovations. Mobile payment researchers have also indicated that, when customers are provided with an innovative payment system, their behavioral intent to utilize the system is affected by different factors [14]. According to the research conducted by [23], which reviewed some previous studies which focus on the acceptance of mobile payment for users through 57 studies up to the fall of 2018, it was found that TAM and UTAUT / UTAUT2 are the two primary models used in verifying the acceptance of mobile payment. The current research proposed a new framework that used a risk/trust valence with security and privacy antecedents. From another perspective, [22] used a qualitative method with a systematic literature review approach through 54 research articles until 2018, it was found that the most popular theoretical model for investigating the use of mobile payments is the extended TAM, TAM, and some have gone on to use a combination of TAM, Theory of Reasoned Work TRA, and Dissemination Innovations DOI, Planned Behavior Theory TPB, and UTAUT. It found 44 key factors that could influence the behavioral intention of individuals to utilize mobile payment, of which 17 were critical key technological factors for mobile payments. However, this paper surveys more recent work than [22] until 2021, and it provides a clear taxonomy for mobile payment applications, adapted models and adapted factors. Another study conducted by [20] in 2019 identified forty factors that influence the behavioral users' intent to adopt mobile payments. This summarizes the collection and analysis of twenty-five research papers that use UTAUT as a theoretical model. Most of the studies have adopted the questionnaire survey as the quintessential approach for data collection. However, it was noticed that the UTAUT model was not widely used because only 25 of the 377 studies in the adoption of mobile payments were observed as most of these studies concentrated on China with five studies, followed by India with three studies, USA, Malaysia, Taiwan with two studies each, Korea, Thailand, Qatar, UK, Brazil, Italy, France, Jordan, Indonesia, Saudi Arabia, and Portugal with one study each. Whereas TAM, UTAUT, and their extensions were the most commonly used in verifying consumers' intent to adopt mobile payment applications [22-24], and factors were perceived trust, perceived risk, perceived ease of use, perceived usefulness, social influence, perceived security, attitude, effort expectancy, performance expectancy, and

facilitating condition are most of the factors used in mobile payments that play a vital role in consumer acceptance [20, 22]. Through previous studies, there are many factors that affect the adoption of mobile payments, also they differ from a country to another [2] and according to the type of the service provided [25].

3.   The theoretical models of mobile payment applications adoption

A research in the field of mobile payment adoption finds that several information technology theories or models have been used to explore the factors that influence the user's adoption, such as the Technology Acceptance Model (TAM) that was created from before [26] in 1986 and made some extensions to it, the model The Unified Theory of Acceptance and Use of Technology (UTAUT) created from before [27] in 2003. The original UTAUT model is the most used and validated one in the applied studies aimed at predicting the adoption or acceptance of innovation or new technology, as well as its expansion developed in 2012 by [28].

In summary, the UTAUT model has been used and expanded successfully to examine and understand the adoption of several technologies, innovations, and information technology systems [29] as it has proven to have great interpretation strength, compared to other models [30]. According to the study conducted by [14, 31], UTAUT provides a better comprehension of the variation in the behavioral intention to adopt a particular technology. Although research has been conducted to inspect the factors that influence mobile payment app adoption, there are a limited number of literature reviews that can provide a broad insight into this field. Among these research is a paper conducted by [20] in 2019, which focused on the UTAUT model, and at that time it obtained 25 studies, as well as a study conducted by [23] in 2019 on 57 studies, as it dealt with five models, including TAM and UTAUT. According to the current literature, there is no comprehensive study attempting to thoroughly examine the mobile payment app adoption studies that include the UTAUT model, TAM, with its extensions, as shown in Figure 2. Accordingly, this study will contribute to bridging this gap through the regular review and analysis of existing mobile payment app adoption studies that include UTAUT, TAM as a theoretical model.
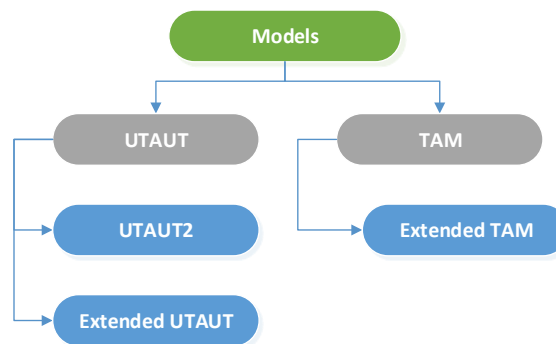

Figure 2. Theoretical models of mobile payment applications adoption

3.1. Unified theory of acceptance and use of technology

The UTAUT (Unified Theory of Acceptance and Use of Technology) theoretical model is developed by Venkatesh et al. [27]. In 2003 with four core determinants of intention and usage and up to four moderators of key relationships four constructs: (1) Performance Expectancy PE (2), Effort Expectancy EE, (3) Social Influence SI and (4) Facilitating Conditions FC has been theorized in formulating UTAUT with the purpose of examining and understanding the user's behavioral intention to accept the usage of technology as portrayed in Figure 3. The essential moderators in the model are gender, age, experience, and characteristics of information technology app related to their position in the firm (i.e., optional or compulsory) serve ace moderating effect did as the use of particular information system. Its predictor variables, meanwhile, include performance expectancy, effort expectancy, influence, and facilitating condition. The details of the UTAUT model are presented in Figure 4 [32]. This model depends on the theories of personal acceptance that are synthesized by [32, 33], which is inspired from TAM, TRA, IDT, the theory of planned behaviour, motivational model, a model

combining the technology acceptance model and theory of planned behaviour, model of PC utilization, and social cognitive theory, and this theory also focused on the motivations for the customers' behaviour, such as comparative advantage or perceived benefit [34].
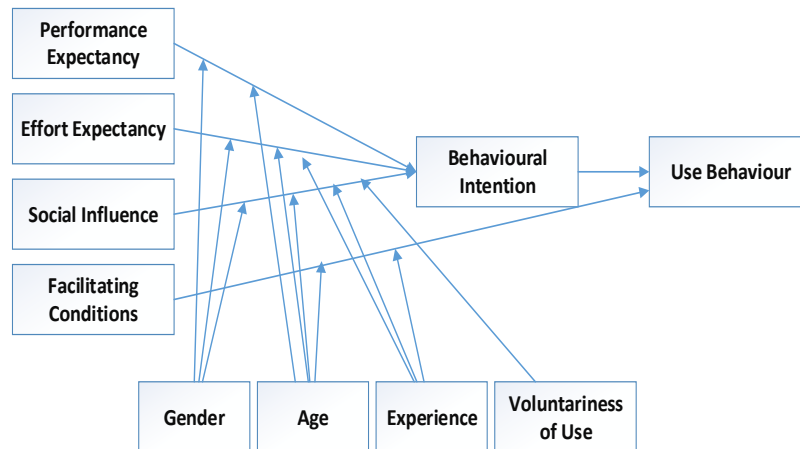

Figure 3. Unified theory of acceptance and use of technology (UTAUT) taken from [27]

3.1.1. UTAUT2

UTAUT2 is an expansion of the original theoretical model UTAUT developed by Venkatesh et al. in 2012 [28]. Based on the literature review of the existing literature, UTAUT has been used in various studies to examine the impact on the acceptance of technology innovation, as UTAUT focused on explaining the acceptance of employee technology in an organizational context. This caused to suffer its limitation in terms of explaining the focal behaviour [5]. Therefore, [28] suggested extending UTAUT to UTAUT2 in order to adapt to the consumers' technology and the determinants affecting their intent to use technologies. UTAUT was expanded by adding three other constructs: hedonic motivation, price value, and habit in the use of technology as additional factors to become in the form of UTAUT2. Its effects are defined by a varied collection of three of the four primary moderators, age, gender, and experience, and removed the fourth moderating variable, the voluntariness of use, assuming the user's behaviors are facultative [7]. The model also complements the authentic UTAUT by the addition of direct relevancy between behavioural intention and facilitating conditions, which is extracted from the association of perceived behavioural control with intention and behaviour in the TPB. Thus, it is also assumed that the habit directly affects both the behavioral intention and the use of behaviour. It was also found that the effect of the behavioral intention on the use is modified through experience [28]. Compared to the original model, the UTAUT2 leads to a significant improvement in the explained variance of behavioural intent, from 56 % to 74 %, as well as a significant improvement in the interpretation of Use variance, from 40 % to 52 % [7].
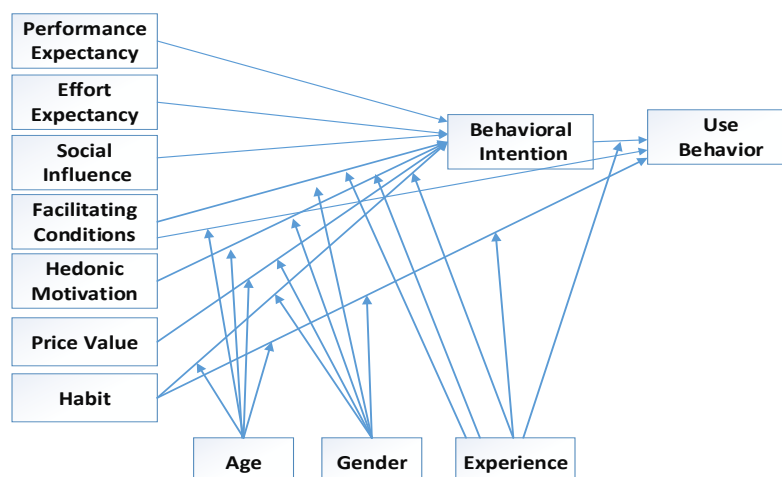

Figure 4. UTAUT2 taken from [28]

3.1.2. Extended UTAUT

Many theories and models of information systems are concerned with explaining the adoption of a variety of technological innovations in a variety of environments, where they have been used to help explain the adoption of new technologies based on different determinants. As is the case with many studies in the adoption of electronic payment, scientists have expanded UTAUT with different factors, as the original UTAUT model had limitations that limit its ability to interpret in different contexts, which led to a large number of factors and new combinations of the extended UTAUT models in acceptance studies of mobile payment [35]. It is evident from previous literature on the impact of mobile payment adoption, that additional factors and combinations varied from research to another according to context, participants, infrastructure, and environment [20, 22] as there was a need to expand the original UTAUT model for mobile payment adoption. For example, a study conducted by [14] expanded the UTAUT model by adding the most common factors that yielded significant results in mobile payment adoption studies where it was suggested to include perceived-trust, perceived-risk, perceived-cost, and self-efficacy. Some of the more common factors that expanded UTAUT are presented in the systematic review study conducted by [20].

3.2. Technology acceptance model TAM

In recent decades, the TAM model has been one of the most popular theoretical models used since the 1989's, and it was originally developed by Davis [26, 30], as shown in Figure 5. It is considered one of the first models that mentioned the psychological factors that could influence the adoption of technology [30], as the model has proven its ability to help in examining and understanding the user's behavioral intention to accept the use of information technology. In reality, the TAM model is inspired by the Theory of Reasoned Action (TRA). The TMA is used for clarification why customers accept or reject any newly emerged technologies, innovations, or information technology systems [33]. The TAM provides the foundation on which one can track how external variables affect belief, attitude, and intent to use [30]. The master factors that are included in TAM have perceived usefulness and perceived ease of use. One of the prime reasons for the widespread acceptance of TAM is its specific approach to remedy the factors that impact the usage of the technologies, while TRA is a general theory of human behavior. TAM has been validated by examining several types of technologies and innovations relevant to the adoption of individuals and organizations, such as E-Commerce, intranet, Mobile Banking, and others [33]. However, a number of studies have shown significant differences in TAM's ability to interpret the factors that may influence user adoption as there are some limitations that are apparent by the omission of some other important factors that may affect the user's acceptance. Therefore, as noted in the literature, the research did not use the TAM model in its original form. Instead, they expanded it by adding some other necessary factors to facilitate the examining and understanding adoption of the new technologies [30, 33].
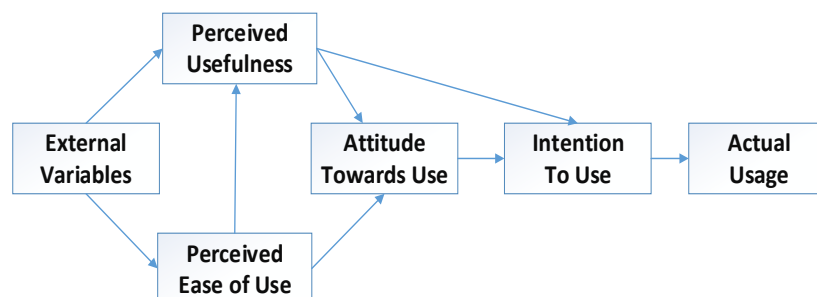
Figure 5 Technology acceptance model (TAM) taken from [26]

3.2.1. Extended TAM

The TAM model is considered one of the most popular models as it has been used extensively in the information system adoption studies, which helps to understand the customers' intention to adopt the new technology. However, studies in this field have indicated that there are many limitations for the ability of the original TAM model [33]. One of the limitations is the omission of other important factors that could influence the user's

acceptance, such as factors of individual differences [30]. TAM has been expanded and adding some factors to help understand the customers' intention to adopt the new technology in different contexts where the behaviour of the individual to make decisions may change. At the same time, it extends the TAM model to be applicable to different systems and contexts [36]. Among the most critical factors that have expanded the TAM model to understanding the customers' intentions to adopt mobile payments are Perceived Risk, Perceived Trust, Relative Advantage, Perceived Cost, Perceived Security, etc. [22, 24].
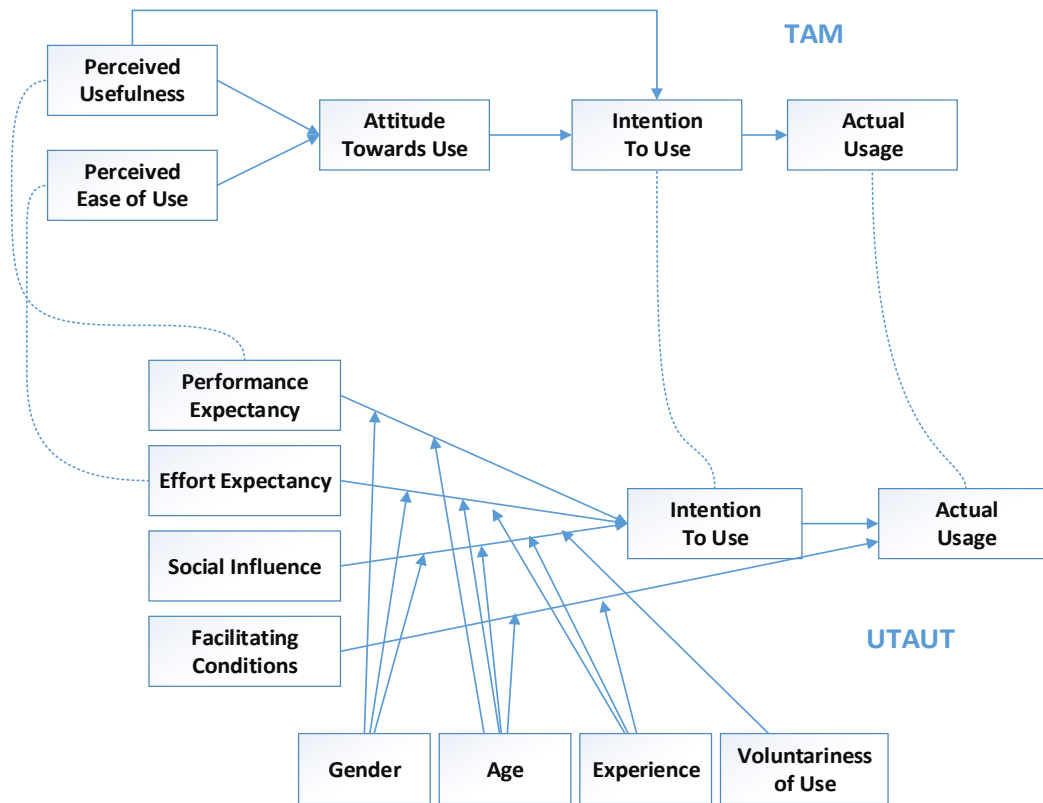

Figure 6. Comparison of TAM and UTAUT theoretical models, taken from [37]

The UTAUT model was developed by deriving three factors that affect the behavioral intentions of use, one factor that influences action, and four control factors that mediate the effects of the process. Some of the factors had a similar concept to factors to structure the TAM model [37], as shown in Figure 6.

Table 1. Comparison of the theoretical models for technology adoption, taken from [30]

No	The base model(s)	Adoption Factors	Moderators	Variance
1	Technology Acceptance Model (TAM)	Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Subjective Norm.	Experience, Voluntariness	0.53
2	Unified Theory of Acceptance and Use of Technology (UTAUT)	Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions(FC).	Gender, Age, Experience, Voluntariness.	0.69

According to [37], the UTAUT model has the ability to explain the factors affecting the users' adoption of new technologies 20 to 30% greater than the TAM model, which, on average, exhibits 40 to 50% explanatory power regarding the users' behaviors or intentions to utilizing the new technologies. And among the fourteen theoretical models reviewed by [30], UTAUT has been shown to be an improved model that could provide a valuable tool to assess the likelihood of success for technology acceptance and adoption studies. The following facts can be drawn from the comparison of theoretical models for technology adoption in Table 1. The explanatory power

of technology usage intention in terms of variance has (0.53,0.69) (TAM, UTAUT) in the order, UTAUT is the highest [30].

4. Technical factors adopted in mobile payment applications

There are 37 factors most frequent from 14 research on factors adopted in mobile payment applications. They are extracted from theories/models that have been very widely used by researchers and theoretical models innovated by the current literature on this field. The most popular theoretical models commonly utilized to investigate the use of the mobile payment applications adoption are the UTAUT model, TAM with its extensions [22, 23]. The data included in this study was collected through extensive research in the following digital databases: IEEE Xplore, ACM Digital Library (DL), Google Scholar, Springer, Science Direct, SAGE, Taylor & Francis, Wiley, and Emerald. The approach for the related literature search differs from one database to another, depending on the utilized search tools. In this research, the search terms include the keywords "Mobile Payment", "Mobile Wallet", "Mobile Money", "Unified Theory of Acceptance and Use of Technology", "UTAUT", "Technology Acceptance Model", "TAM" The research was carried out during the period 2015 to 2021, due to the fact that period it was active in mobile payment research [20, 23]. Table 2 adds another important contribution in which, it associates the technical factors adapted in mobile payment applications with their relevant models. Furthermore, it maps the technical factors with the work that adapted them.

Table 2. Technical Factors Adopted in Mobile Payment Applications "+ Means Extended, # Means Quantity

No.	Factors	Theory /Model					Qty(#)	Reference
		UTAUT	UTAUT2	UTAUT+	TAM	TAM+		
1	Perceived Risk	√		√	√	√	8	[38] , [15], [39], [40], [6], [41], [14], [10]
2	Perceived Trust	√		√	√	√	8	[38] , [11], [15], [6, 40], [9] , [14], [10]
3	Usefulness				√	√	8	[38] , [11], [15], [42], [39], [40], [10], [43]
4	Ease Of Uses				√	√	7	[38] , [11], [15], [42], [40], [10], [43]
5	Effort Expectation	√	√	√		√	7	[39], [6], [41], [5], [44], [9],[14]
6	Social Influence	√	√	√		√	7	[11], [6], [41], [5], [44], [9], [14]
7	Performance Expectation	√	√	√			5	[41], [5], [44], [9], [14]
8	Personal Innovativeness			√		√	5	[42], [39], [9], [10], [43]
9	Facilitating Condition	√	√	√			4	[6], [5], [44], [9]
10	Compatibility	√			√	√	4	[38] , [11], [40], [6]
11	Cost	√		√	√	√	4	[38] , [40], [41], [14]
12	Relative Advantage	√			√	√	3	[11], [6],[38]
13	Perceived Security		√				2	[5], [44]
14	Self-Efficacy			√		√	2	[42],[14]
15	Anxiety			√			1	[9]
16	Attitude				√		1	[38]
17	Awareness		√				1	[44]
18	Complexity					√	1	[11]
19	Convenience					√	1	[39]
20	Grievance Redressal			√			1	[9]

No.	Factors	Theory /Model					Qty(#)	Reference
		UTAUT	UTAUT2	UTAUT+	TAM	TAM+		
21	Hedonic Motivation		√				1	[5]
22	Internet Self-Efficacy					√	1	[11]
23	Knowledge	√					1	[6]
24	Mobile Skillfulness					√	1	[39]
25	Mobility				√		1	[15]
26	Optimism					√	1	[43]
27	Perceived Reputation				√		1	[15]
28	Perceived Satisfaction					√	1	[10]
29	Perceived Service Quality					√	1	[11]
30	Perceived-Transaction Convenience					√	1	[43]
31	Perceived-Transaction Speed					√	1	[43]
32	Perceived Value					√	1	[39]
33	Price Value		√				1	[44]
34	Privacy		√				1	[44]
35	Stress					√	1	[10]
36	Subjective Norm					√	1	[40]
37	Technology Anxiety					√	1	[42]

5. Discussion

The current research has been conducted up to January 2021. It retrieved 251 articles, of which 14 articles matched the selection criteria for this study. From the previous studies, research conducted by [20] reviewed and analyzed mobile payment acceptance with respect to studies that adopt the UTAUT model. This research was limited to identifying the studies that were adopted to examine the accreditation of mobile payment studies that adopt the UTAUT model only. It does not adopt any other model. In addition, another study conducted by [23] the adoption of mobile payment for consumers highlighted the models used in these investigations. It was revealed that TAM and UTAUT / UTAUT2 models are the most used ones. Furthermore, the research agreed with the opinion of [22] which found that TAM and UTAUT and its extensions are the most commonly used models in mobile payment adoption studies, as it has been shown to have excellent interpretation power, compared to other models, and it provides a better understanding of the difference in the behavioral intent to adopt a particular technology or innovation [45].

Regarding the most common external factors for TAM and UTAUT models, through Table 2, the results of the current study revealed that Perceived Trust & Perceived Risk were considered to be the most common factors used to examine mobile payment adoption, as 8 of the 14 studies were used. As for the fundamental factors, the results of the present study revealed that most studies focused on the usefulness with eight studies, followed by ease of uses with seven studies in the TAM model and in the UTAUT2 / UTAUT model, most studies focused on effort expectation, social influence, performance expectation, facilitating condition, which indicates its importance. The fundamental factors in the models, in some studies, are dispensed with and replaced with other factors in order to increase clarity as there are many differences between the countries that differ in culture, infrastructure, economic development, technology, innovation, and others that can affect the adoption of

technology [24]. It is also evident that TAM and UTAUT / UTAUT2 have been expanded and added other factors, such as compatibility, cost, relative advantage, perceived security, self-efficacy, and others, as the use of these factors can be helpful and become a basis for the development and adoption of mobile payment products [23]. Regarding the data collection methods, it was found that the studies mainly relied on questionnaire surveys to collect them. This indicates that the surveys are the most appropriate way to collect data in this field of studies [20].

6. Limitations and future directions

Like all other studies, the current study is also subject to reasonable limitations and shortcomings. Accordingly, the study identified the following limitations and guidelines for future studies.

Firstly, the studies used in this paper were collected from different countries as the adoption of mobile payments has become a global phenomenon [46]. However, it limits the ability to generalize the results to developed countries and developing countries, as the distinction between countries is enormous, where they differ in culture, infrastructure, economic development, technology, innovation, and others that can influence technology adoption. This, in turn, encourages future researchers to conduct studies focusing on specific societies to compare the differences between the factors that affect the adoption of technology between developed countries and developing countries.

Second, since most of the studies reviewed are on mobile payments only, the literature review of this study is limited. It was impossible to scrutinize all categories as the studies that do not explicitly include mobile payments such as phone banking were overlooked. Thus, studies that did not explicitly include mobile payments are considered outside the scope of this study. Unlike most of the studies reviewed, some studies did not distinguish between mobile banking and mobile payments. However, it would be helpful for future studies to differentiate between mobile banking and mobile payment. Still, other studies would focus on a specific approach to mobile banking, given that the users may have an intention to adopt services differently, depending on the provider's approach [9].

Third, the literature review search has focused on the acceptance or adoption of mobile payment, which might have led to the exclusion of some essential related literature.

Fourth, although the search for studies related to the literature on the acceptance or adoption of mobile payment apps and TAM / UTAUT models comprise most of the scientific electronic databases, the "Scopus" databases were missing. This may lead to the exclusion of some of the essential related literatures. Consequently, this, in turn, encourages future studies to examine further to cover these databases.

7. Conclusion

Due to the importance of mobile payment systems, several research have been conducted to study the adoption of mobile payment in both developed countries and developing countries, and most of the research has dealt with TAM and UTAUT models to examine and understand the necessary factors that could influence the adoption of mobile payment applications. Furthermore, by looking through the previous studies, it has been shown that factors perceived trust and perceived risk are among the most critical ones in which the models are expanded as they have an impact on the customer's acceptance of any innovation of new technology. Therefore, mobile payment service providers should focus on the factors of perceived trust and perceived risks. Through the current study, it was found that the personal and the technical factors play an essential role in influencing the customer's intention to accepting and adopting mobile payments as it was found that the top ten factors are usefulness, ease of uses, effort expectation, social influence, performance expectation, personal innovativeness, facilitating condition, compatibility, cost and relative advantage. Therefore, these ten factors are beneficial for the technological development and research should focus on them when developing mobile payments applications because they will increase their prevalence, and the users.

Declaration of competing interest

Funding information

References

[1] H. M. Sitorus, R. Govindaraju, I. Wiratmadja, and I. Sudirman, "Examining the Role of Usability, Compatibility and Social Influence in Mobile Banking Adoption in Indonesia," (in en), International Journal of Technology, vol. 10, no. 2, p. 351, 2019-04-25 2019.

[2] H. Ashbi, "Mobile Banking adoption in Yemen by applying the Unified Theory of Acceptance and Use of Technology (UTAUT)," Masters, Maastricht School of Management (MSM), 118, 2018.

[3] I. R. de Luna, F. Liébana-Cabanillas, J. Sánchez-Fernández, and F. Muñoz-Leiva, "Mobile Payment is not all the Same: The Adoption of Mobile Payment Systems Depending on the Technology Applied," (in en), Technological Forecasting and Social Change, vol. 146, pp. 931-944, 09/2019 2019.

[4] N. Sidek, "Determinants of Electronic Payment Adoption in Malaysia: the Stakeholders' Perspectives," Doctor PhD Thesis, The University of Queensland, 2015.

[5] K. Moorthy et al., "What Drives the Adoption of Mobile Payment? A Malaysian Perspective," (in en), International Journal of Finance & Economics, vol. 25, no. 3, pp. 349-364, 07/2020 2020.

[6] J.-H. Jung, E. Kwon, and D. H. Kim, "Mobile Payment Service Usage: U.S. Consumers' Motivations and Intentions," (in en), Computers in Human Behavior Reports, vol. 1, p. 100008, 01/2020 2020.

[7] E. L. Slade, M. D. Williams, and Y. Dwivedi, "Extending UTAUT2 To Explore Consumer Adoption Of Mobile Payments," UKAIS, vol. 36, 2013.

[8] S. Khanra, A. Dhir, P. Kaur, and R. P. Joseph, "Factors Influencing the Adoption Postponement of Mobile Payment Services in the Hospitality Sector During a Pandemic," (in en), Journal of Hospitality and Tourism Management, vol. 46, pp. 26-39, 03/2021 2021.

[9] P. Patil, K. Tamilmani, N. P. Rana, and V. Raghavan, "Understanding Consumer Adoption of Mobile Payment in India: Extending Meta-UTAUT Model with Personal Innovativeness, Anxiety, Trust, and Grievance Redressal," (in en), International Journal of Information Management, vol. 54, p. 102144, 10/2020 2020.

[10] F. Liébana-Cabanillas, A. Japutra, S. Molinillo, N. Singh, and N. Sinha, "Assessment of Mobile Technology Use in the Emerging Market: Analyzing Intention to Use M-Payment Services in India," (in en), Telecommunications Policy, vol. 44, no. 9, p. 102009, 10/2020 2020.

[11] I. K. Mensah, "Predictors of the Continued Adoption of WECHAT Mobile Payment:," (in en), International Journal of E-Business Research, vol. 15, no. 4, pp. 1-23, 10/2019 2019.

[12] F. Jiang, C. Sakyi-Nyarko, A. H. Ahmad, and C. Green, "Mobile Money, Financial Inclusion and Poverty: Full Results from Two New Surveys in Ghana," (in en), Loughborough's Research Repository, p. 62, 2020.

[13] M. Rahman, I. Ismail, and S. Bahri, "Analysing Consumer Adoption of Cashless Payment in Malaysia," (in en), Digital Business, p. 100004, 1/2021 2021.

[14] K. Al-Saedi, M. Al-Emran, T. Ramayah, and E. Abusham, "Developing a General Extended UTAUT Model for M-Payment Adoption," (in en), Technology in Society, vol. 62, p. 101293, 08/2020 2020.

[15] K. A. Welat Kavak, "Technological Innovation in Mobile Payment Solutions A study on Factors Affecting the Adoption Rate of Mobile Payment Solutions," Master, KTH Royal Institute Of Technology School Of Engineering Sciences, 2019.

[16] A. Kumar, S. Dhingra, V. Batra, and H. Purohit, "A Framework of Mobile Banking Adoption in India," (in en), Journal of Open Innovation: Technology, Market, and Complexity, vol. 6, no. 2, p. 40, 2020-05-22 2020.

[17] C. Kim, M. Mirusmonov, and I. Lee, "An Empirical Examination of Factors Influencing the Intention to Use Mobile Payment," (in en), Computers in Human Behavior, vol. 26, no. 3, pp. 310-322, 5/2010 2010.

[18] A. Chircu, "Digital Payments have Evolved Over the Years from Simple Automated Payments and Credit and Debit Card Processing to Providing Support " 2014.

[19] Y. U. Chandra, "Bank vs Telecommunication E-Wallet: System Analysis, Purchase, and Payment Method of GO-Mobile CIMB Niaga and T-Cash Telkomsel," in 2017 International Conference on Information Management and Technology (ICIMTech), 2017, pp. 165-170: IEEE.

[20] K. Al-Saedi, M. Al-Emran, E. Abusham, and S. A. El Rahman, "Mobile Payment Adoption: A Systematic Review of the UTAUT Model," in 2019 International Conference on Fourth Industrial Revolution (ICFIR), 2019, pp. 1-5, Manama, Bahrain: IEEE.

[21] K. Owusu Kwateng, K. A. Osei Atiemo, and C. Appiah, "Acceptance and Use of Mobile Banking: An Application of UTAUT2," (in en), Journal of Enterprise Information Management, vol. 32, no. 1, pp. 118-151, 2019-02-11 2019.

[22] M. Karsen, Y. U. Chandra, and H. Juwitasary, "Technological Factors of Mobile Payment: A Systematic Literature Review," (in en), Procedia Computer Science, vol. 157, pp. 489-498, 2019.

[23] M. Harris, A. Chin, and J. Beasley, "Mobile Payment Adoption: An Empirical Review and Opportunities for Future Research," (in en), Association for Information Systems Electronic Library (AISeL), p. 7, 2019 2019.

[24] W. A. Alkhowaiter, "Digital Payment and Banking Adoption Research in Gulf Countries: A Systematic Literature Review," (in en), International Journal of Information Management, vol. 53, p. 102102, 08/2020 2020.

[25] L. Perlman, "Technology Inequality: Opportunities and Challenges for Mobile Financial Services," Columbia Business School Research Paper, no. 7-49, 2017.

[26] F. D. Davis, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," MIS quarterly, pp. 319-340, 1989.

[27] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User Acceptance of Information Technology: Toward a Unified View," MIS quarterly, pp. 425-478, 2003.

[28] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," MIS Quarterly, vol. 36, no. 1, pp. 157-178, 2012.

[29] N. Al-Qaysi, N. Mohamad-Nordin, and M. Al-Emran, "A Systematic Review of Social Media Acceptance from the Perspective of Educational and Information Systems Theories and Models," Journal of Educational Computing Research, vol. 57, no. 8, pp. 2085-2109, 2020.

[30] C. G. Gunawardena, "Comparison of Existing Technology Acceptance Theories and Models to Suggest A Well Improved Theory/Model," (in en), International Technical Sciences Journal (ITSJ), vol. 1, no. 1, p. 16, 2014 2014.

[31] N. Koenig-Lewis, M. Marquet, A. Palmer, and A. L. J. T. S. I. J. Zhao, "Enjoyment and social influence: predicting mobile payment adoption," vol. 35, no. 10, pp. 537-554, 2015.

[32] A. Indrati, E. Minaji, S. Binastuti, and P. Dwi Raharjo, "Comparation of Model Unified Theory of Acceptance and Use Technology (UTAUT) And Technology Acceptance Model (TAM) for Internet Adoption of Credit Union Staff," The First International Credit Union Conference on Social Micro nance and Community Development, BKCU Kalimantan Gunadarma University, 2011.

[33] I. A. Al-Baltah , S. As-Sultan, and F. a. H. Abdulrazzak, "A Survey on Mobile Banking Applications and the Adopted Models," (in en), International Journal of Advanced Research in Computer Scienceand Software Engineering, vol. 7, no. 2, pp. 6-11, 2017-02-28 2017.

[34] N. Nayak, V. Nath, and N. Goel, "A Study of Adoption Behaviour of Mobile Banking Services by Indian Consumers," International Journal of Research in Engineering Technology, vol. 2, no. 3, pp. 2347-4599, 2014.

[35] H. Qasim and E. Abu-Shanab, "Drivers of Mobile Payment Acceptance: The Impact of Network Externalities," Information Systems Frontiers, vol. 18, no. 5, pp. 1021-1034, 2016.

[36] A. A. Bailey, I. Pentina, A. S. Mishra, and M. S. B. Mimoun, "Mobile Payments Adoption by US Consumers: An Extended TAM," International Journal of Retail Distribution Management, vol. 45, no. 6, 2017.

[37] S. Kim, K.-H. Lee, H. Hwang, and S. Yoo, "Analysis of the Factors Influencing Healthcare Professionals' Adoption of Mobile Electronic Medical Record (EMR) Using the Unified Theory of Acceptance and Use of Technology (UTAUT) in A Tertiary Hospital," BMC medical informatics decision making, vol. 16, no. 1, pp. 1-12, 2015.

[38] F. Abebe and L. Lessa, "Factors Affecting Mobile Payment Adoption by Merchants in Ethiopia," presented at the The 6th African Conference on Information Systems and Technology (ACIST2020), Ethiopia, 2020.

[39] F. Li and I. Ramos-de-Luna, "Mobile Payment Adoption in the Age of Digital Transformation: The Case of Apple Pay," (in en), Sustainability, vol. 12, no. 13, p. 15, 2020 2020.

[40] C. Phonthanukitithaworn, C. Sellitto, and M. Fong, "User Intentions to Adopt Mobile Payment Services: A Study of Early Adopters in Thailand," (in en), Journal of Internet Banking and Commerce, vol. 1204, p. 14, 2015.

[41] R. d. S. Abrahão, S. N. Moriguchi, and D. F. Andrade, "Intention of Adoption of Mobile Payment: An Analysis in the Light of the Unified Theory of Acceptance and Use of Technology (UTAUT)," (in en), RAI Revista de Administração e Inovação, vol. 13, no. 3, pp. 221-230, 07/2016 2016.

[42] K. Gbongli, Y. Xu, and K. M. Amedjonekou, "Extended Technology Acceptance Model to Predict Mobile-Based Money Acceptance and Sustainability: A Multi-Analytical Structural Equation Modeling and Neural Network Approach," (in en), Sustainability, vol. 11, no. 13, p. 3639, 2019-07-02 2019.

[43] L.-Y. Yan, G. W.-H. Tan, X.-M. Loh, J.-J. Hew, and K.-B. Ooi, "QR Code and Mobile Payment: The Disruptive Forces in Retail," (in en), Journal of Retailing and Consumer Services, vol. 58, p. 102300, 01/2021 2021.

[44] M. Al-Okaily, A. Lutfi, A. Alsaad, A. Taamneh, and A. Alsyouf, "The Determinants of Digital Payment Systems' Acceptance under Cultural Orientation Differences: The Case of Uncertainty Avoidance," (in en), Technology in Society, vol. 63, p. 101367, 11/2020 2020.

[45] K. Al-Saedi and M. Al-Emran, "A Systematic Review of Mobile Payment Studies from the Lens of the UTAUT Model," Recent Advances in Technology Acceptance Models Theories, pp. 79-106, 2021.

[46] A. A. Shaikh and H. Karjaluoto, "Mobile banking adoption: A literature review," Telematics Informatics, vol. 32, no. 1, pp. 129-142, 2015.