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A Systematic Review of E-wallet Usage Intention: Integrating UTAUT2 with Perceived Security

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ABSTRACT

The growth of cashless payment has grown exponentially, including that of e-wallet, in line with the government's plan to build a cashless society. The e-wallet phenomenon is fast becoming an important component for financial inclusion in emerging economies as studies found that the use of digital financial services like mobile money and other fintech applications could provide many potential development benefits. Countries like China have experienced the highest growth in cashless payments over the last five years and is said to be the most educated on mobile payment services. Despite the rapid development of this technology, organizations and consumers are still concerned about rising security issues. As the e-wallets markets are further expected to increase exponentially in Malaysia, it is crucial to study the consumers' behavioral intention to use e-wallets for the benefits of e-wallets service providers and users in Malaysia. Correspondingly, this paper presents a review of the literature aimed at advancing the body of knowledge by proposing a conceptual model on consumers' behavioral intention to use e-wallet (mobile payment) using UTAUT2 as a baseline model. This paper is built upon a systematic literature review method. This paper provides practical implications that would assist e-wallet service providers when devising appropriate strategies in planning and increasing consumers' intention to use the e-wallet.

Keywords: *Behavioral Intention to Use, Cashless Payment, E-Wallet, Mobile Payment, UTAUT2*

INTRODUCTION

E-wallet, a form of mobile payment, has been a topic of interest among academics and researchers over the past decade. E-wallet is a type of mobile payment system which is gaining traction in developing economies like Malaysia. It is a subject of great interest among researchers and academics along with its counterparts, i.e., m-commerce and mobile banking. The Central Bank of Malaysia, in particular, have been pushing consumers and merchants to adopt e-wallet as a convenient method of payment over cash. The push is part of the Central Bank's goal to speed up the process of migration from cash to electronic payments (including mobile payment). The impact of migration to mobile payment option would allow the country to save paper costs on the circulation of paper money and also to increase the efficiency of the country's payment systems. (Lee & Daniel, 2018).

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To date, there has been an increase in e-wallets services in Malaysia driven by rising smartphone penetration and increasing interest to provide a more innovative mobile payment solution. The current method of payment is expected to snowball in years to come as the e-wallet players develop more new and innovative applications to attract users to adopt the e-wallet, including the underdeveloped Malaysian market. Developing countries like China have gained high financial inclusion with increased financial access through the development of financial technology (fintech) services such as Alipay and WeChat pay. Achieving financial inclusion is seen as an important element in attaining economic growth and reducing poverty. Hence, having greater insight into the consumer's behavioural intention to use e-wallets would yield useful information for the benefits of the e-wallets service provider in Malaysia.

It has been reported in the Nielsen Payment Landscape Report (2018) that 67% of Malaysians have used some form of cashless payment (in the form of debit card and online banking being the primary method with 63% and 57% respectively). However, only 8% of the population uses e-wallet as a means of payment. The report suggested that despite its potential and benefits, the adoption of e-wallet is seemingly slow. The report also revealed that security and fraud were the most significant barriers to adoption in which security is the main reason why consumers do not use an e-wallet. In Malaysia, the research on e-wallet or mobile payment services is very much in its infancy stage (Moorthy et al., n.d.). Research in this area has mostly focused on consumer adoption and technology (Dahlberg et al., 2015). Although the size and scope of the literature explaining the adoption of mobile payments by consumers have increased, studies offering more profound insights into the adoption of e-wallets by consumers, in particular, are still limited.

Based on the findings from the systematic review by (Dahlberg et al., 2015), studies on mobile payment adoption had used models of information technologies like the Technology Acceptance Model (TAM), the Diffusion of Innovation (DOI) theory, and the Unified Theory of Acceptance and Use of Technology (UTAUT) as the theoretical base. The most recent and popular model for the adoption of technology is the UTAUT2 model, which is an expansion of the previous model in terms of theoretical scope and its functionality to adapt to new technologies (Venkatesh, 2012). The UTAUT2 model was explicitly designed to study the acceptance and use of mobile payment technology from the perspective of consumers with newly added constructs (i.e., price value, hedonic motivation, and habit). Unlike the TAM model, which has been used and extended in many technology acceptance/adoption studies, the UTAUT2 model is one of the least validated theories in the literature (Chhonker et al., 2018). Given that security is one of the main reasons for not using the e-wallet (Nizam et al., 2019), there were limited number of studies that have included perceived security as a construct in the UTAUT2 model (Oliveira et al., 2016). Therefore, this paper aims to systematically review the literature on e-wallet (mobile payment) to present a conceptual model specifically focusing on the factors influencing the consumers' behavioural intention by using UTAUT2 as a baseline model.

The rest of the paper is structured as follows: Section 2 explains the methodology used in addressing the related literature. Section 3 provides a systematic review of the literature and synthesize the literature to identify relevant research on e-wallet (mobile payment) under specific research themes. Section 4 discusses the future research direction.

METHODOLOGY

This section provides a discussion on how the articles on e-wallet (mobile payments) are retrieved. A literature search relating to e-wallet (mobile payment) adoption was conducted via Scopus and Web of Science (WoS). The search process includes identifying only journal articles and conference papers focused on UTAUT2 as adoption models in understanding consumers' behavioral intention in using the e-wallet. The search process took place between January 26-30, 2020. The search string (keywords) is limited to only articles that have the following keywords, as shown in Table 1.

Table 1: Search process using keywords

Database	Search string
Scopus	TITLE-ABS-KEY(("e-wallet" OR "digital wallet" OR "mobile payment") AND ("UTAUT2") AND ("intention to use" OR "use intention" OR "usage intention" OR "behavioral intention to use"))
Web of Science	TS=(("e-wallet" OR "digital wallet" OR "mobile payment") AND ("UTAUT2") AND ("intention to use" OR "use intention" OR "usage intention" OR "behavioral intention to use"))

The keyword searches resulted in 363 articles (343 articles from WOS and 20 articles from SCOPUS), which were then added to Mendeley for further screening process through the abstract and full text. The selected articles are from the period of 2016-2020 because this was the period when the cashless payment phenomenon began, particularly in Malaysia. The articles are then screened for duplications of which, after removing duplicates, only 124 articles are left. The 124 articles are then filtered to ensure that the content was relevant to the aims of the study. The process is done by going through the title of the article, abstract, and full text. The articles considered for review should include peer-reviewed journals and conference papers, journals published in the English language, and those that are focused on e-wallet (mobile payment) adoption only.

RESULTS AND DISCUSSIONS

Publication Source and Number of Publications by Journal

This section presents the systematic review findings of the 124 e-wallets (mobile payment) adoption based empirical studies. Table 2 shows an outline of the selected articles by journals. The distribution of articles retrieved from journals amounted to 104 total articles, of which the majority with nine articles were published in the Journal of Bank Marketing, six articles in the Journal of Retailing and Consumer Services, four articles respectively in the International Journal of Information Management and Computers in Human Behavior and three articles in Electronic Commerce in Research and Applications. The most productive outlet of publication on e-wallet (mobile payment) research is the Journal of Bank Marketing and Journal of Retailing and Consumer Services, whereby both journals are in the high ranked management and marketing stream journals.

Table 2: Source and number of publication(s) by journal

Name of journal	No. of publications
Advanced Science Letters	1
Advances in Intelligent Systems and Computing	1
Asia Pacific Journal of Information Systems	1
Asia Pacific Journal of Marketing and Logistics	1
Asian Economic and Financial Review	1
Asian Journal of Business	1
Asia-Pacific Journal of Business Administration	1
Australasian Journal of Educational Technology	1
Challenges and Opportunities in the Digital Era	1
Computer Standards & Interfaces	1
Computers in Human Behaviour	4
Digital Policy, Regulation and Governance	1
Economic Modelling	1
Economic Research-Ekonomska Istrazivanja	1
Electronic Commerce Research	2
Electronic Commerce Research and Applications	3

Expert Systems with Applications	1
Global Business Review	1
IEEE Access	1
IET Intelligent Transport Systems	1
IFIP Advances in Information and Communication Technology	1
Industrial Management and Data Systems	1
Information Systems Frontiers	1
Information Systems Management	1
International E-journal of Information Management	1
International Journal of Bank Marketing	9
International Journal of Community Development & Management Studies	1
International Journal of Contemporary Hospitality Management	1
International Journal of Current Engineering and Scientific Research	1
International Journal of E-Adoption	2
International Journal of E-Business Research	1
International Journal of Finance & Economics	1
International Journal of Hospitality Management	2
International Journal of Human Computer Studies	1
International Journal of Human-Computer Interaction	2
International Journal of Information Management	4
International Journal of Mobile Human Computer Interaction	1
International Journal of Recent Technology and Engineering	1
International Journal of Retail and Distribution Management	1
International Review of Retail, Distribution and Consumer Research	1
Internet Research	3
Issues in Information Systems	1
Journal of Advances in Management Research	1
Journal of Applied Marketing and Management	1
Journal of Asia Business Studies	1
Journal of Database Management	1
Journal of Distribution Science	2
Journal of Electronic Commerce in Organizations	2
Journal of Enterprise Information Management	1
Journal of Hospitality and Tourism Technology	1
Journal of Indian Business Research	2
Journal of Islamic Accounting and Business Research	1
Journal of Management Development	1
Journal of Retailing and Consumer Services	6
Journal of Theoretical and Applied Electronic Commerce Research	1
Market-Tržište	1
Mobile Information Systems	1
Polish Journal of Management Studies	1
Procedia Computer Science	2
Psychology and Marketing	1
SAGE Open	1
South Asian Journal of Business Studies	1
Sustainability	1
Technological Forecasting and Social Change	5
Technology Analysis and Strategic Management	1
Technology in Society	2
The Bottom Line	1
Total Quality Management and Business Excellence	1
TOTAL	104

Publication Source and Number of Publication by Proceedings

Table 3 presents the distribution of e-wallet (mobile payment) publications in conference proceedings. Two conference papers were published in the proceedings of the 2016 2nd International Conference on Science and Technology-Computer. The rest of the conference papers on e-wallet (mobile payment) were published once in every different conference.

Table 3: Source and number of publication(s) by proceedings

Name of conference/proceeding(s)	No. of publications
17th IFIP WG 6.11 Conference on e-Business, e-Services, and e-Society, I3FE 2018, Proceedings	1
2017 International Conference on Advanced Computer Science and Information Systems, ICACSIS 2017	1
2017 National Information Technology Conference, NITC 2017	1
2018 15th International Conference on Service Systems and Service Management, ICSSSM 2018	1
2018 IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC)	1
2018 IEEE 5th International Conference on Engineering Technology & Applied Sciences	1
2018 International Conference on Information Technology Systems and Innovation, ICITSI 2018 - Proceedings	1
2019 10th International Conference on E-Education, E-Business, E-Management and E-Learning (IC4E 2019)	1
2019 International Conference on Fourth Industrial Revolution, ICFIR	1
2019 International Conference on Information and Communications Technology, ICOIACT 2019	1
Nirma International Conference on Management (NICOM) 2016	1
Proceedings - 2016 2nd International Conference on Science and Technology-Computer, ICST 2016	2
Proceedings - 2017 17th IEEE International Conference on Environment and Electrical Engineering and 2017 1st IEEE Industrial and Commercial Power Systems Europe, EEEIC / I and CPS Europe 2017	1
Proceedings - 2019 Amity International Conference on Artificial Intelligence (AICAI)	1
Proceedings - 9th International Conference on Computational Intelligence and Communication Networks	1
Proceedings - International Computer Software and Applications Conference	1
Proceedings of 2018 International Conference on Information Management and Technology, ICIM Tech 2018	1
Proceedings of the 2018 10th International Conference on Information Management and Engineering	1
Proceedings-2018 5th International Conference on Information Science and Control Engineering	1
TOTAL	20

Theories/Frameworks Used in E-wallet (Mobile Payment) Adoption Studies

Table 4 provides an overview of the theories, frameworks, or models used as underpinning theory in the e-wallet (mobile payment) adoption studies. As seen in Table 3, the most popular framework widely used by researchers in the e-wallet (mobile payment) adoption studies is the Technology Acceptance Model (TAM) and the Extended TAM model with 24 articles. For the most part, the models were either a combination with other models or construct or just a single model on its own. The next most commonly used adoption model is the UTAUT2 and Extended UTAUT2 with 15 articles, UTAUT with three articles, and the Value-Based Adoption Model and Diffusion of Innovation with two articles, respectively. There was one article each of every other model like the Trust Transfer

Theory, Theory of Perceived Value, Information Security, Extended Post-Acceptance Model, Expectations-Confirmation Model, Valence Theory, Theory of Reasoned Action, Social Cognitive Theory, Regret Theory, and the TPE Framework.

Table 4: Theories/Frameworks

Theories/ Frameworks used in E-wallet (Mobile Payment) Adoption Studies	No. of publications	Reference
Technology Acceptance Model (TAM) and Extended TAM	24	E. Matemba, G. Li (2018), P. Su, L. Wang & J. Yan (2018), J. Li et al. (2019), J. Nie, W. Amarayoun (2019), M. Lau et al. (2019), S. Lisa et al. (2018), C. Phonthanukitithaworn et al. (2016), Z. Jing et al. (2020), Y. Pooi et al. (2018), O. Alaeddin et al. (2018), Y. Zhang et al. (2018), W. Aslam (2017), J. Lee et al. (2019), T. Chi (2018), S. Sinna Lebb et al. (2019), Z Zhang et al. (2018), J. Trivedi (2016), A. Bailey et al. (2017), D Chatterjee et al. (2019), P. Teng et al. (2018), A. Shankar et al. (2018), F. Liébana-Cabanillas et al. (2018), M. Trojanowski et al. (2019), K. Hunafa et al. (2018)
UTAUT	3	K. Gupta et al. (2019), K. Madan et al. (2018), V. Patel (2016)
UTAUT2/ Extended UTAUT2	14	M. Hussain et al. (2019), V.Soodan et al. (2020), R. Palau-Saumell et al. (2019), K. Gupta et al. (2019), N. Limantara et al. (2018), S. Megadewandanu et al. (2017), R. Wu et al. (2017), N. Sobti (2019), N. Singh et al. (2017), A. Alalwan et al. (2017), C. Morosan et al. (2016), K. Moorthy et al. (2019), C. Chen et al. (2019), R. Bhimasta et al. (2018)
Value-Based Adoption Model	2	J. Jun et al. (2018), G. de Kerviler et al. (2016)
Trust Transfer Theory	1	L.Yu et al. (2018)
Theory of Perceived Value	1	G. De Kerviler et al. (2016)
Information Security	1	F. Gao et al. (2017)
Extended Post-Acceptance Model (EPAM)	1	S. Lim et al. (2019)
Expectations-Confirmation Model	1	S. Kujala et al. (2017)
Theory of Planned Behaviour (TPB)	1	S. Sun et al. (2020)
Valence Theory	1`	A. Ozturk et al. (2017)
Diffusion of Innovation	2	V. Johnson et al. (2018)
Theory of Reasoned Action (TRA)	1	P. Teng et al. (2018)
Social Cognitive Theory & Regret Theory	1	S. Verkijika (2020)
Technological-Personal-Environmental Framework (TPE)	1	K. Hunafa et al. (2018)
TOTAL	**58**	

Model Extension to UTAUT2

Based on the analysis of the selected papers, 14 articles have used UTAUT2 as a baseline model to understand the factors that influence consumers' behavioural intention to use the e-wallet (mobile payment) system. All the 14 articles have extended the UTAUT2 model to include several different constructs such as perceived security; perceived privacy; trust; lifestyle compatibility; perceived savings; trust; performance risk; social risk; perceived cost; perceived risk; demonetization effect; perceived satisfaction; innovativeness; attitude; stress to use technology; experience; and personal innovativeness.

In the article by (Hussain et al., 2019), lifestyle compatibility was added as a new extension to the UTAUT2 model, which is then used to examine the adoption of those in the lower-income segment in the developing country setting. The result from this study showed a good fit of adding lifestyle compatibility into the model, specifically in the context it was examined. The author suggested that future studies should look into extending the model to include security or trust factors to have a clearer understanding of adoption (Hussain et al., 2019). Additionally, a new relationship was formed in the extended UTAUT2 model with new variables, namely; perceived cost, perceived risk and demonetization effect in the study by (Sobti, 2019). The result suggested that the antecedents of behavioural intention and adoption were explained better when the three variables were included in the model. The findings from both this study are just a few examples of how the UTAUT2 model could provide high explanatory power relative to a focal phenomenon should a new construct is added into the model (Dwivedi et al., 2020). However, it is difficult to conclude just by relying on the overall findings from the 14 articles. The context or the study setting is a factor for consideration in strengthening the choice to extend the appropriate construct into the model.

The prevalence of IT/IS related studies that extend new construct to the established UTAUT2 was highlighted by (Venkatesh, 2012). They claim that contextual theories could describe a phenomenon better and could provide a significant theory extension. (Slade et al., 2013) supported the claim for UTAUT2 extension because relying on an individual model may not be enough to explain the effects on adoption due to the varying pattern of consumers technology adoption. It can be construed that the emphasis of each of the studies from the 14 articles was meant to highlight other factors that could be relevant in the consumer adoption of IT/IS study. For example, the research by (Soodan & Rana, 2020) have highlighted a new construct, i.e., general privacy, perceived security and perceived savings. The analysis of the UTAUT2 as a baseline model has revealed the effect of general privacy towards perceived security and facilitating condition. In the study, the result showed consumers‘ concern for security has a more substantial impact on the development of intention to use the e-wallet.

Table 5 presents the 13 studies that used UTAUT2 constructs with a combination of additional constructs. From the analysis, perceived security was the most commonly used external construct with five articles, followed by the trust with four articles and privacy and risk with three articles each and innovativeness with two articles. Other constructs were used in one instance each namely perceived privacy, lifestyle compatibility, perceived savings, perceived credibility, social norm, perceived cost, demonetization effect, perceived satisfaction, attitude, stress to use technology, and experience.

Table 5: Model extension to UTAUT2

Independent Variable	Dependent Variable	Reference
Perceived Security, Perceived Privacy, Trust	Behavioural Intention to Use	M., Merhi et al. (2019)
Lifestyle Compatibility	Behavioural Intention to Use	M. Hussain et al. (2019)
Perceived Security, Privacy, Perceived Savings	Behavioural Intention to Use	V, Soodan & A. Rana (2020)

Perceived Credibility, Social Norm	Behavioural Intention to Use	R. Palau-Saumell et al. (2019)
Trust, Performance Risk, Social Risk	Behavioural Intention to Use	N. Limantara et al. (2018)
Perceived Security	Behavioural Intention to Use	R. Wu and J. Lee (2017)
Perceived Cost, Perceived Risk, Demonetization Effect	Behavioural Intention to Use	N. Sobti (2019)
Perceived Satisfaction, Innovativeness, Attitude, Stress to use a technology	Behavioural Intention to Use	N. Singh et al. (2017)
Trust	Behavioural Intention to Use	A. Alalwan et al. (2017)
Privacy, Security	Behavioural Intention to Use	C. Morosan and A. DeFranco (2016)
Perceived Security	Behavioural Intention to Use	K. Moorthy et al. (2019)
Experience, Perceived Risk	Behavioural Intention to Use	C. Chen and S. Tsang (2019)
Trust, Personal Innovativeness	Behavioural Intention to Use	R. Bhimsata and B. Suprapto

Given the aim of this systematic review is to propose a conceptual model with UTAUT2; therefore, the ensuing discussion will focus on the perceived security construct. Perceived security is an antecedent that affects the behavioural intention to adopt mobile payment (Moorthy et al., 2019). Findings from the study by (Merhi et al., 2019; Moorthy et al., 2019; Morosan & DeFranco, 2016; Soodan & Rana, 2020; Wu & Lee, 2017) supported the construct of perceived security to have a significant impact on behavioural intention to use e-wallet system. The findings from these studies have revealed the importance of perceived security in influencing consumers' behavioural intention to adopt an e-wallet system. Therefore, based on the current findings and limited evidence of the effect of the interaction of the constructs in the context of the e-wallet system, perceived security is deemed an appropriate construct to be extended in the UTAUT2 model in e-wallet (mobile payment) studies. The inclusion of perceived security into the UTAUT2 model fit the context of the study, in Malaysia because security remains a significant concern for the users, especially those who expressed their willingness to use the e-wallet system (Wong, 2017). Although the remaining factors may appear to be less commonly extended with the UTAUT2 model in e-wallet (mobile payment) studies, it does not mean that the factors are less significant. These factors may potentially be included in future e-wallet (mobile payment) adoption studies.

CONCLUSION

The systematic literature review provides a critical assessment of e-wallet (mobile payment) adoption studies between the year 2016-2020 with a specific focus on UTAUT2 as the baseline model. The literature was obtained from an established online database, Scopus, and Web of Science (WOS). The systematic literature review of the e-wallet (mobile payment) adoption literature revealed only 13 articles of empirical nature which used additional construct to the existing UTAUT2 model. It was deemed that UTAUT2 is an appropriate model to study the consumers' behavioural intention towards using the e-wallet (mobile payment) system in Malaysia. Further, construct analysis has chosen perceived security as appropriate extensions of UTAUT2 in the context of e-wallet (mobile payment) usage intention.

This study has only focused on current empirical e-wallet (mobile payment) adoption studies, which were published from the year 2016-2020 and retrieved from two established online databases, Scopus and WOS. The general idea to emphasize on current studies is to provide an overview of the constructs and models used in the mobile payment studies that have been conducted so far. As the field of mobile payment is likely to expand further in the near future, new services and offerings may be introduced due to the ubiquitous nature of the system. Thus, future research could include the application of the proposed model in an empirical study to examine e-wallet adoption in the Malaysia context.

Additionally, future research could develop and validate the model and apply it to the other related field of technology services like mobile commerce. The finding from this study is hoped to provide industry practitioners with useful insight into the e-wallet (mobile payment) system to devise appropriate strategies for the development and promotion of e-wallet (mobile payment).

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