A SYSTEMATIC LITERATURE REVIEW OF THE TECHNIQUES AND ISSUES ON CASHLESS PAYMENT

Tinjauan Literatur Sistematik Tentang Teknik dan Isu Pembayaran Tanpa Tunai

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Abstract

Electronic payment is a revolutionary service that is driven by the world's fastest growing method of cashless technology. Same goes to any emerging technologies, there exist barriers in developing and maintaining electronic payment services. This systematic literature review (SLR) is conducted to identify electronic payment implementation trends and issues starting from 2015 until 2020. The researchers identified 10 relevant studies that are related to electronic payment based on specific selection parameters to justify the findings. The results reveal that there are four major domains of electronic payment that were reported. The domains are usability, security, maintainability and cost-effectiveness. In addition, 60 percent of the research papers emphasized on the effectiveness of electronic payment that are related to economic perspective while more than half of the papers that have been excluded are due to not matching the objective of this SLR.

Keywords: Electronic Payment, e-Wallet, e-Payment, Online Payment, Cashless.

Abstrak

Pembayaran elektronik ialah perkhidmatan revolusioner yang didorong oleh kaedah teknologi tanpa tunai yang paling pesat berkembang di dunia. Begitu juga dengan mana-mana teknologi baru muncul, terdapat halangan dalam membangunkan dan menyelenggara perkhidmatan pembayaran elektronik. Kajian literatur sistematik (SLR) ini dijalankan untuk mengenal pasti teknik dan isu pelaksanaan pembayaran elektronik bermula dari 2015 hingga 2020. Penyelidik mengenal pasti 10 kajian berkaitan yang berkaitan dengan pembayaran elektronik

berdasarkan parameter pemilihan khusus untuk mewajarkan penemuan. Hasilnya mendedahkan bahawa terdapat empat domain utama pembayaran elektronik yang dilaporkan. Domain tersebut adalah kebolehgunaan, keselamatan, kebolehselenggaraan dan keberkesanan kos. Selain itu, 60 peratus kertas penyelidikan memberi penekanan kepada keberkesanan pembayaran elektronik yang berkaitan dengan perspektif ekonomi manakala lebih separuh daripada kertas kerja yang telah dikecualikan adalah disebabkan tidak sepadan dengan objektif SLR ini.

Kata kunci: Pembayaran Elektronik, e-Dompet, e-Pembayaran, Pembayaran Dalam Talian, Tanpa Tunai.

1.0   INTRODUCTION

Cashless technology is growing rapidly due to the increasing spread of internet-based banking and shopping. Covid-19 has helped cashless activities to grow even faster than what the world expected. Cashless transfers are money transactions that take place electronically and between consumers and retailers. Millions of users around the world regularly make various payments whether via the Internet or other technology such as near-field communication (NFC) technology that has been widely used especially in tap-to-pay credit and debit cards. Electronic payment systems have gained tremendous interest over the last two decades because of the vital role they play in contemporary electronic commerce. According to the Statista Fintech report, in 2019, the total amount of transactions in the digital payment segment was estimated at 3,670,864 million euros, and by 2023, it is estimated to increase to 5,921,831 million euros (FinTech Report 2019).
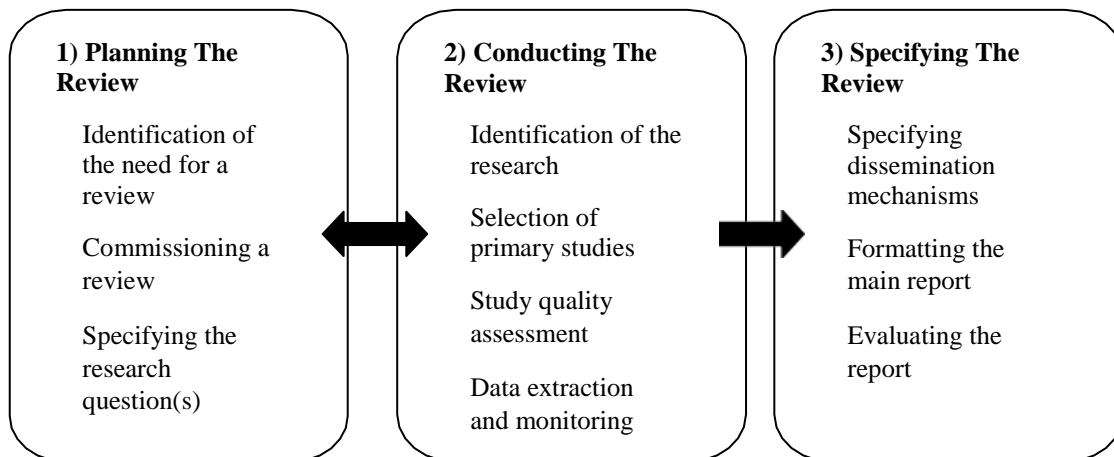
In South East Asia, Malaysia leads the highest of e-wallet users with 40% followed by Philippines (36%), Thailand (27%) and Singapore (26%) (Mastercard Survey, 2020) [30]. On average, Malaysian consumers register between 2 to 3 e-wallet accounts. Beside that, other cashless payments in Malaysia have also increased since the pandemic of Covid-19 when other contactless payment methods such as debit cards (26%) and contactless credit cards (22%) (Ebby Boon, 2020).

In this study, we compile all research that has been done about cashless payment to review all the related issues and trends. It is very important for us to understand the advantages and disadvantages and to look further in this area in order to improve the benefit of the cashless technology. In this paper we describe the method that we used to review and filter the research paper. After that, followed by some description about research questions, discussion of our analysis and findings and conclusions.

2.0   REVIEW METHOD

The review techniques applied in this study follow the technique in (Ahmad, J., & Baharom, S. 2017). The process of review is divided into three phases as shown in Figure. 1. The first phase begins by planning the process of review that consists of identifying the points of review, clarify the research questions and plan the steps of review. The second phase is conducting a review. In this phase there are three steps of action: identify the research area, define the source and selection criteria, and extract the data. The last phase is reporting the finding which includes the data synthesis, review, writing and evaluating the report.

Figure 1: Systematic Literature Review (SLR) phases

1) Planning The Review

Identification of the need for a review

Commissioning a review

Specifying the research question(s)

2) Conducting The Review

Identification of the research

Selection of primary studies

Study quality assessment

Data extraction and monitoring

3) Specifying The Review

Specifying dissemination mechanisms

Formatting the main report

Evaluating the report

2.1   Research questions

Research questions for this SLR are definitely focusing on trends and issues of electronic payment. The aim of this SLR is to understand and identify the existing structure of electronic payment and what are the challenges. Therefore, they must be defined properly and precisely as they are an important part of SLR (B. Kitchenham and S. Charters, 2007). The research questions for this SLR consist of 4 components. These components called PICO were proposed by Richardson et al., (1995). Table I shows the criteria and scope of research questions.

Table 1: Criteria and Scope of Research Questions

Criteria	Scope
Population	Security, Reliability, Others
Intervention	Cashless Payment system technique
Comparison	NA
Outcomes	Structure of E-Payment technique and the challenges

In order to achieve the of the SLR, three primary questions and four secondary questions have been defined as follows:

RQ1: How has the cashless payment technique been applied in facilitating the acceptance of electronic payment for online transactions?

RQ1.1: What techniques are used in cashless payment?

RQ2: How are those techniques gaining trust from users?

RQ3: What are the concerns of cashless payment implementations?

RQ4: Is there any latest cashless technology that works efficiently?

2.2   Data sources

Research papers that were related to the subject were selected to help answer the research questions. Irrelevant research papers that could not answer or even support the research questions have been removed. The following online libraries have been decided as our primary resources:

   •Institute of Electrical and Electronics Engineers (IEEE) Xplore Digital Library (ieeexplore.ieee.org)
   • Association for Computing Machinery (ACM) Digital Library (dl.acm.org)
   • Semantic Scholar (www.semanticscholar.org)
   • Google scholar (www.scholar.google.com)
   • Springer (link.springer.com)
   • Science Direct (www.sciencedirect.com)

2.3   Search process

According to the research method, to find any queries that are focused on digital payment, cashless, electronic payment and online payment systems, we searched using a keyword pattern. Boolean operators were used to clarify the data on keywords and they were also a priority in searching the database for each research publication. Symbols and Boolean operators have been used such as "OR", "AND" to check for the following keywords:

(("Cashless" AND "Digital") OR "Electronic Payment") OR ("Cashless Payment" AND "Education") OR ("Digital Payment" AND "School") OR ("Electronic Payment" AND "Society") OR ("Contactless Payment" AND "University")

Some of the process of searching was done manually by selecting advanced settings such as IEEExplore and ACM Digital Library. The alternative words have been used and added to the search string.

2.4   Data selection

Data selection process is the most crucial part of systematic review in order to filter any existing research papers based on our research questions and domains. In this SLR, data selection involves selection of online libraries and search strings and also executes inclusion and exclusion as decided in the early phase. The focus at this phase is to ensure the selection of papers can be done thoroughly for this research.

2.5   Inclusion and exclusion criteria

Inclusion and exclusion criteria for this SLR is determined based on our research questions and our focus to identify the trends and issues of cashless payment. It is clear that in order to select and filter relevant papers, it is compulsory to clarify inclusion and exclusion criteria. The inclusion criteria stated as follows:

   ●   All papers published in English or Malay.
   ●   All papers must be published from 2015 and above.
   ●   All papers must be focused on cashless payment specifically on trends and issues.
   ●   All papers must be four pages and above.

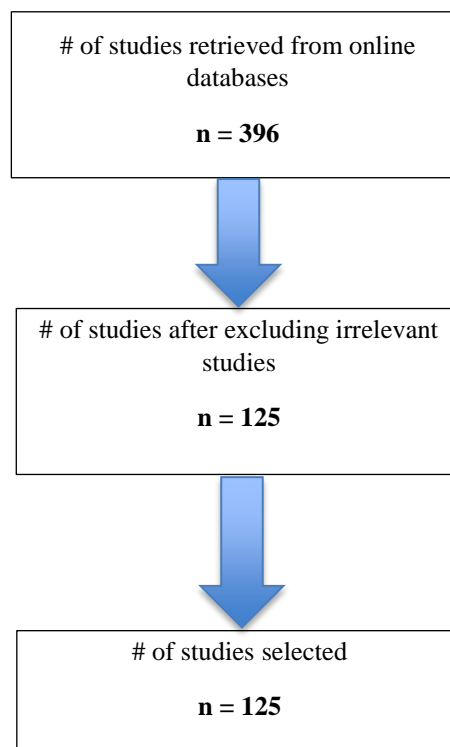The process of dividing and filtering the unrelated papers was done based on the exclusion criteria below:

   ●   Papers published not in English or Malay.
   ●   Paper published not related to domain areas such as economy and finance.

- Papers that only contain ideas with no details and results.
- Papers with less than 4 pages.

2.6 Data Extraction and Findings

Each initial study has been analyzed to identify the Cashless Payment System including e-wallet and all research papers related to cashless transaction trends and issues. All identified papers were documented based on their title, description, abstract and result. The search process performed in April to June 2021, at which time we identified 396 publications including 328 proceeding papers and 41 journals. By following the selection and refusal criterion, relevant research articles were carefully extracted as per the search process shown in Figure 1. Finally, 125 studies were identified as initial studies. Figure 1 below displays the data extraction and synthesis of the chosen study articles to find the answers to the research questions and the 125 studies' classification. Insignificant research articles were removed which did not address the research questions. The articles also were removed because the main topics did not concern cashless payment systems and were only focusing on economy and finance. The rejection of papers was also based on stated keywords which did not relate to our study.

Figure 1: Search and Selection Papers Stage

# of studies retrieved from online databases

n = 396

# of studies after excluding irrelevant studies

n = 125

# of studies selected

n = 125

3.0   DISCUSSIONS

This part shows and discusses the results related to the research questions. A clarification of the findings will be presented in-depth in this part with the questions and its sub-questions.

RQ1: How has the cashless payment technique been applied in facilitating the acceptance of electronic payment for online transactions?

The main focus of this RQ is to identify and understand cashless payment implementation in terms of technology that has been chosen. Other than that, the software and the hardware involved for each technology were also investigated. Researchers have shown the eagerness to study about the cashless technology since it is very significant and important towards digital society. However, researchers have found only a few research papers that focused on technology used for cashless payment. Therefore, a sub-question RQ1.1 has been created to discuss about the cashless techniques.

RQ1.1: What techniques are used in cashless payment?

50% of the papers use RFID and fingerprint technology for cashless payment. 30% of the papers use QR code, barcode, bluetooth and the rest of the papers used a combination of the technology such as microcontroller and RFID and integrated biometric technology. Table II presents 10 papers that focus on the implementation method for cashless payment from 2015 until 2020.

Table 2: List of Research Papers and Techniques Used for Cashless

No.	Paper Title	Year of Publish	Method/Technique	Ref.
1	Automatic Cashless Campus Store Using Fingerprint Technology	2017	Fingerprint	Ya'acob, Norsuzila et al. (2019)
2	E-Payment and Transactions Using QR Codes	2019	QR Codes	Anbalagan, Surekha et al. (2015)
3	School Debit Transaction Using Fingerprint Recognition System	2019	Fingerprint Recognition System	Wong, W.K., & Chong, T.S. (2019)
4	Implementation of The Enhanced Fingerprint Authentication in The ATM System Using Atmega128 With GSM Feedback Mechanism	2016	Enhanced Fingerprint Authentication	Okokpujie, K., Olajide, F., John, S., & Kennedy, C. (2016)
5	A Cashless Payment Transaction (CPat) Using RFID Technology	2019	RFID Technology	Ya'acob, Norsuzila et al. (2019)
6	Integrated Biometric Authentication Technology to Support Cashless Society	2020	Integrated Biometric Authentication Technology	Abe, N., Nada, H., Matsunami, T., & Uchida, H. (2020)

7	Cashless Campus: Fund Management Using Micropayment Technique	2017	Barcode Technology	Sawant, U., Katkar, Y., Gandhi, I., (2017)
8	A Microcontroller Based Electronic Payment System for Cashless Transportation System	2019	Microcontroller And RFID	K. G. Akintola , O. S. Eluyode , O. O. Oyedele (2019)
9	Application of NFC Technology for Cashless Payment System in Canteen	2015	NFC Technology	Abdul Kadir, Evizal et al. (2015)
10	Paytooth - A Cashless Mobile Payment System Based on Bluetooth	2015	Bluetooth Technology	Patel, Rushabh et al. (2015)

RQ2: How are those techniques gaining trust from users?

Trust can be earned if the technology used for cashless payment is easy to use and the transaction is done smoothly. Assuming there are no major issues encountered during the transaction, end users will definitely use contactless payment again. That means that particular electronic payment technology has won trust from end users to continue using their payment method. However, it is difficult to implement a cashless system due to some particular limitations such as the difficulties in building trust to use cashless or to get rid of using cash. Like for example in Malaysia when all 94 toll plazas fully operated electronically (Veena Babulal, 2017), it took some time for Malaysians especially for senior citizens to trust with the contactless payment. Poverty is also one of the concerns that could prevent a cashless system to be implemented at education institutions. In India, poor students from rural areas still don't have bank accounts and have trust issues with the security of the cashless payment system (Jain, P. 2017).

RQ3: What are the concerns of cashless payment implementations?

There are numerous techniques for cashless payment introduced to facilitate people in order to purchase necessary things without money in their hand. However, there are certain concerns that prevent people from continuing with contactless payment. Table III depicts concerns of cashless implementations.

Table 3: Concerns of Cashless Implementations

Concerns	Authors/Techniques
Security	Anbalagan, Surekha et al., (2015),
	Abdul Kadir, Evizal et al., (2015),
	Salloum, S. et al., (2019),
	Jain, P. (2017),
	Rochanachamrat, Napat & Ruangroek, Natnaree. (2020)

Reliability	Ya'acob, Norsuzila et al., (2019),
	Wong, W.K., & Chong, T.S. (2019),
	Ya'acob, Norsuzila et al., (2019),
	Abe, N. et al., (2020),
	D I Cendana & T D Palaoag (2020),
	Goh, S.W. (2017),
	Kustono, A. et al., (2020),
	YONG, Ing-Ing et al., (2021)
Infrastructure	Rana, Shailendra. (2017),
	Shaji, Jisa & Mathias, Calida. (2021)
Others	Julia Juremi, Mohamad Firduas Che Abdul Rani, & Cheng Ma. (2020),
	Jain, P. (2017)

RQ4: Is there any latest cashless technology that works efficiently?

Just Out Technology is basically detecting when products are taken or returned to the shelves and keeps track of them in a virtual cart. On June 17 this year, this awesome technology was already available in a newest Amazon Fresh grocery store in Seattle, U.S. Shoppers at the store can opt to use the Just Walk Out cashierless checkout or go through a normal employee-staffed checkout line. Shoppers who decide to go cashierless can enter the store in three ways.

1. Scanning the QR code in their Amazon app
2. Using Amazon One to scan the palm
3. Inserting a credit or debit card linked to their Amazon account.

All these three ways will open the Just Walk Out gates. This Just Out Technology is also being used in self-driving cars by using an app called Amazon Go (Likhitha, C, et al., 2018). This technology is developed by a combination of computer vision, sensor fusion and deep learning (Jennifer Strailey, 2021). However, there are some reliability challenges of this Just Walk Out Technology such as if the customer wears a mask or if the customer returns an item on the wrong shelf (K. Wankhede, B et al., 2018).

4.0   CONCLUSIONS

The use of cashless technology will become a new paradigm that can change our future into a digital technology. Sure it is more flexible, but still has many issues and challenges to be encountered. it will be a part of our future life. The cashless facility is just the beginning of a digital world that demands researchers and industrial players to explore in depth the needs and the challenges to be faced. Especially to be concerned about aspects of security, reliability, and functionality of the system.

In order to extend this study, the researchers can work on the development of a proper model or prototype and test its functionality. The researchers also can focus on the security, usability and effectiveness of the cashless technology.

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