E-Wallet Transactional Framework for Digital Economy:
A Perspective from Islamic Financial Engineering

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Abstract: The development of electronic wallet (e-wallet) aims to encourage customers and small business owners to use digital payments for a safer, cashless, and efficient transaction. This study developed a procedure to discover the transactional framework for the e-wallet payment system in the digital economy. This study explained the procedure of the transaction process, starting from registration of user and service provider, payment composition and profit generation for the business model of e-wallet provider. This study provides a precise and reliable analysis to increase public awareness about the e-wallet transaction. At the same time, the framework in this study functions to help small and medium industries grow in the digital economy segments.

Keywords: Electronic Wallet, Digital Cash, Framework, E-Wallet, Islamic Financial Engineering

1. Introduction

Money is any item or verifiable record that is generally accepted as a payment for goods or services and repayment of debts. The main functions of money are as a medium of exchange, a unit of account, a store of value, and sometimes, a standard of deferred payment. The money should be fungible, durable, portable, recognizable and stable. Currently, people use digital currency as a medium of exchange. The development of fintech (financial technology) created digital currency. The Global Financial Crisis (GFC) of 2008 significantly decreased customer trust in financial services and helped spark the growth of Fintech ventures (Breidbach et al., 2019; Muzellec et al., 2015). Fintech refers to software and other modern technologies used by financial institutions that provide an automatic system and improve the services provided by financial institutions. Fintech is an excellent innovation because the system is fast and user-friendly friendly, using features such as Mobile Payments that give a unique benefit to businesses and customers in the payment transaction process.

FinTech began to flourish in the year 1990, when the Internet and e-commerce business models began to arise. This technology of cloud computing made it possible to invent new customized solutions and standard procedures such as providing an excellent platform for payment and transfer of money with automatically converted currencies. When the internet system was introduced in 1990, it made the concept of digital currency become a reality with the emergence of the World Wide Web and online payments. In the year 1999, European banks began to offer mobile banking services with smartphones. Then Paypal also used digital currency for transfers and payments as an alternative to traditional paper. The first digital currency, which is called DigiCash, was launched in the year 1992. Then, another digital currency was introduced, including CyberCash (1994), E-gold (1996) and Liberty Reserve (2006).

In 2009 Bitcoin was introduced by pseudonym Satoshi Nakamoto and became famous with the high demand from investors to invest in Bitcoin cryptocurrency. Bitcoin is a peer-to-peer electronic cash system in which encryption techniques are used to regulate the generation of units of currency (Nakamoto, 2009). This type of cryptocurrency is non-physical, of which no banknotes and coins exist, and which can only be transmitted electronically, typically allowing for instantaneous transactions and borderless transfer of ownership. The purpose of cryptocurrency is to enable anonymous

transactions users to trade virtual currency regardless of their geographic location, without revealing either the real-world source of their income or their own identity (Abu Bakar et al., 2019(b,c); Reynolds and Irwin, 2017).

In parallel with the development of digital currency worldwide, Malaysia has been using E-wallet since 2019. Three companies provide e-wallet platforms: Touch 'n Go e-wallet, Grab and Boost. The government of Malaysia encourages Malaysian people to use the e-wallet platform. As mentioned by the Minister of Finance, the Malaysian government gives initiative RM30 to all Malaysian people aged 18 or above to participate in the e-wallets system. The incentive was created to encourage Malaysian peoples to participate in the e-wallet system. During a10-month period from January to October 2019, statistics by Central Bank of Malaysia (BNM) showed that the transaction value for e-money surged RM13.9 bln with a transaction volume of 1.72 billion, surpassing the RM11 billion figure that was recorded for the whole of 2018 out of 1.92 billion transactions (Tan, 2020). Therefore, the demand for the e-wallet system is increasing to support the Malaysian government program in promoting digital currency.

2. Literature Review

E-commerce refers to the process of selling and buying products or services using the internet or other electronic systems. Electronic commerce has transformed trade as a routine activity by bringing the marketplace to your home or the office, thus saving you time and effort. The development of e-commerce has given birth to new terms such as electronic funds transfer, online transaction processing, electronic data interchange (EDI), internet marketing, automated data collection systems and others. Therefore, transactions over the internet rely almost exclusively on financial institutions serving as trusted third parties to process electronic payments. E‑commerce will continue to grow, and many organizations may find themselves either having to go online or go out of business (Fryad Henari and Mahboob, 2008).

Andonova (2003) explained that two main features of e-commerce are particularly relevant for understanding the incumbent retailer's behavior. First, e-commerce is treated as a substitute for the traditional selling technology, and second, it is modeled as a low-cost alternative to conventional retailing. Many types of research are conducted to investigate the acceptance of customers towards e-commerce. Chiu and Cho (2019), who investigated the influence of perceived brand leadership of an e-commerce website on satisfaction and repurchase intention, found that the factors of perceived brand leadership (i.e., quality, value, innovativeness and popularity) have positive influences on satisfaction, and, in turn, satisfaction significantly affects repurchase intention. Sharma and Lijuan (2015), investigated service quality of e-commerce websites in the online platforms and their contribution to e-business promotion, suggested that information quality and online service quality were the critical determinants for user satisfaction and sustainability of e-commerce technology. Fryad Henari and Mahboob (2008) indicated that e-commerce includes consumers purchasing goods and services online, as well as businesses selling and communicating with other companies through the internet. Currently, currency transactions by using online or electronic platforms is known as a digital currency. Digital currency uses a system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party (Kristoufek, 2013). Transactions that are computationally impractical to reverse would protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers.

The development of internet-enabled the creation of many types of cryptocurrencies. Cryptocurrency is a digital currency designed to work as a medium of exchange using cryptography to secure the transactions, to control the creation of additional units, and to verify the transfer of assets (Abu Bakar and Rosbi, 2017(a)). The most famous cryptocurrency is Bitcoin, Etherium and others. Bitcoin has been used widely as a store of value that is non-physical of which no banknotes and coins exist (Abu Bakar and Rosbi, 2019(a); Ram, 2019; Abu Bakar and Rosbi, 2017(b); Antonopoulos, 2017; Narayanan et al., 2016; Ram et al., 2016;). There are many differences between cryptocurrency and fiat money. Fiat money is money in any form, which is in actual use or circulation as a medium of exchange, especially circulating banknotes and coins. This type of money is government-issued currencies. On the other hand, cryptocurrency is a digital currency in which encryption techniques are used to regulate the generation of units of currency (Abu Bakar and Rosbi, 2017(c); Abu Bakar et al., 2017(d)). Cryptocurrency uses a blockchain system. The security of the blockchain is highly reliable because of the implementation of the hash algorithm. The Hash algorithm is a mathematical algorithm that maps data of arbitrary size to a bit string of a fixed size (a hash). It is designed to be a one-way function, that is, a function which is infeasible to invert (Abu Bakar and Rosbi, 2018(a,b)). Abu Bakar and Rosbi (2018(c)) concluded that blockchain is the decentralized system that reduces the transaction fee by the central financial institutions, namely, bank institutions.

Therefore, the transaction fee of Bitcoin using blockchain is lower compared to an existing payment system. This method is supporting the digital community in e-commerce. Secondly, the security of the blockchain is highly reliable with hash algorithm implementation. Lastly, the account holder of bitcoin, including the receiver identity anonymously, exists in the system. Therefore, the account holders are undetected if any suspicious activities occur in the transaction.

3. Transactional Framework of E-Wallet

The development of electronic wallet (e-wallet) aims to encourage customers and small business owners using digital payments for a safer, cashless, and efficient transaction. This study shows the comparison of the traditional transaction process with contrast to the e-wallet transactional framework.

3.1 Business Model of Traditional Transaction
Traditional business involves customer and business entrepreneurs using cash, as shown in Figure 1.
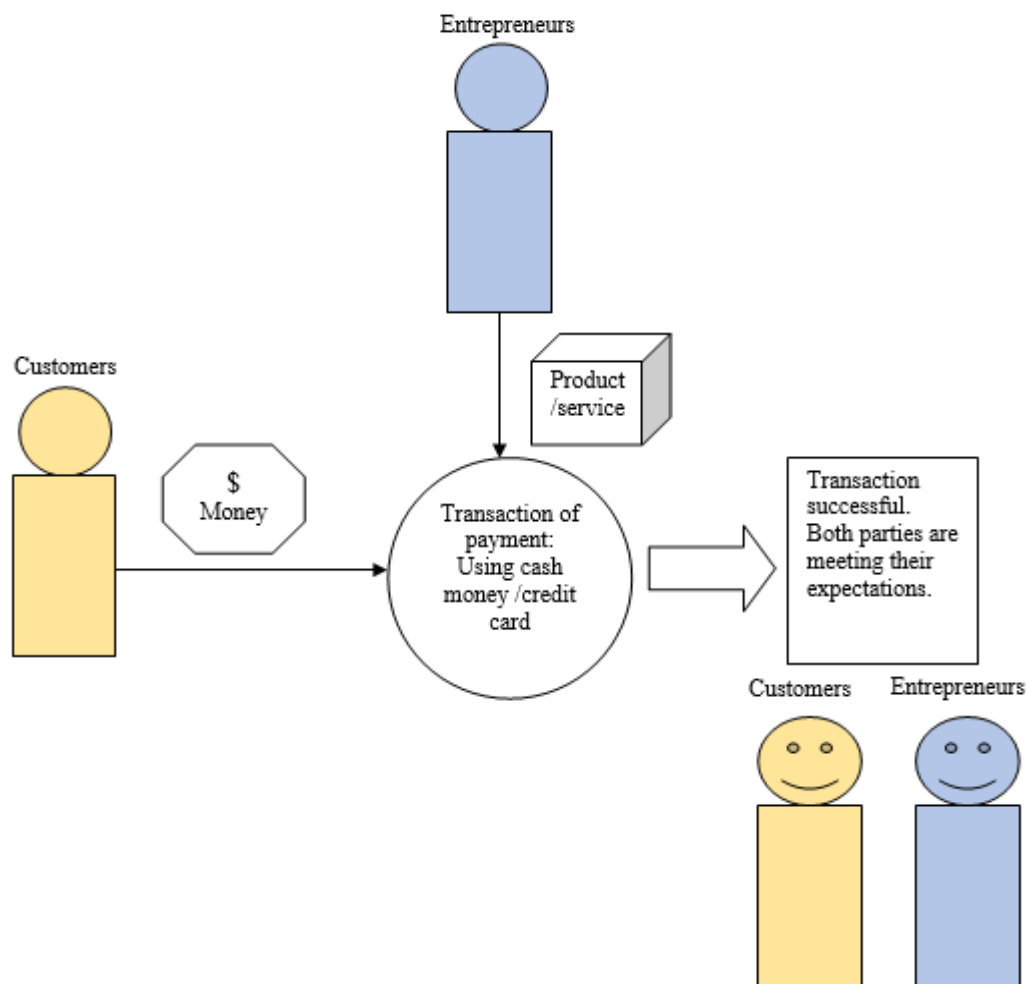

Figure 1: Transactional framework for conventional purchasing and payment procedure

This study evaluated the conventional purchasing transactional framework according to advantages and disadvantages as below:

Advantages:

- Simple transaction process involving a transfer method of cash money.
- Both parties are satisfied with the transaction.
- The credit card provides a reliable payment method for products or services provided by a business entity.

Disadvantages:

- This transaction is valid for a one-time transaction with no tracking for future marketing.
- There is no product advertisement for future purchasing.
- The transaction using cash creates difficulty and safety concerns.
- The utilization of credit is limited to specific customers with good financial status. This creates a limitation of usage of credit cards among customers that have lower annual income.

3.2 E-Wallet Transactional Framework

The transaction of e-wallet is illustrated in Figure 2. The process of the transaction starts with the registration of business retailers and customers to an online platform that is managed by the e-wallet provider. The business retailer promotes its products with specific product selling prices. The buyer will pay the product price using e-wallet service in an online e-commerce platform. The product selling price includes the cost for business retailers, e-wallet providers, and online e-commerce providers, including cashback amounts.
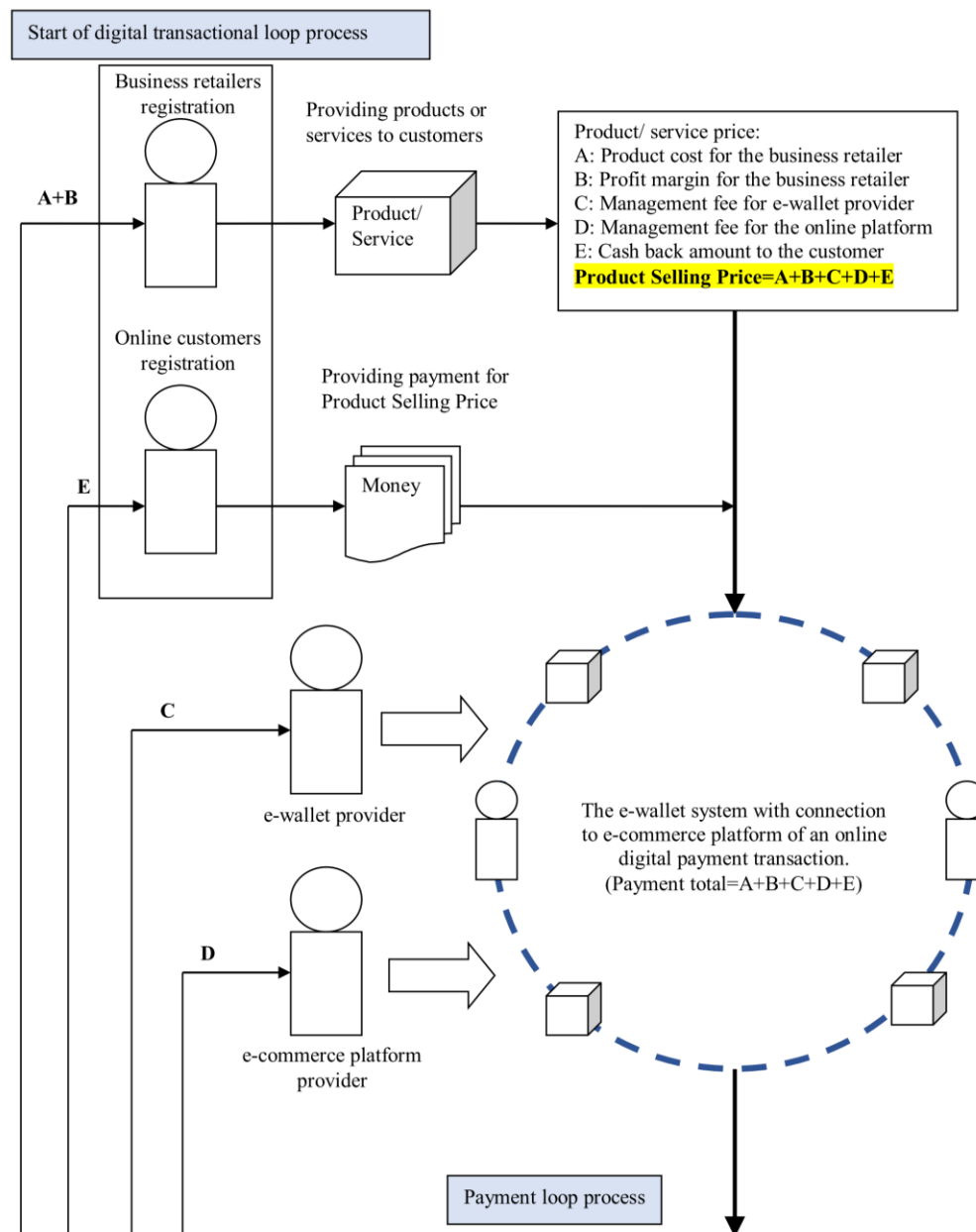

Figure 2: Framework for transaction loop of e-wallet ecosystem

The advantages of e-wallet transactions for customers are described in Table 1.

Table 1: Advantages of the e-wallet system

Main advantages of e-wallet for customers:
1. E-wallet is digital payments for a safer, cashless, and efficient transaction.
2. Ease of transaction tracking to monitor user expenses because e-wallet provides a record for every transaction.
3. E-wallet provides user-friendly cash reload system. The cash reload can be performed using cash, debit/credit card and bank transfer
4. E-wallet is backed by a money-back guarantee system by a provider. Therefore, users can perform a payment process confidently with enhanced security features.
5. E-wallet provides a money transfer process that covers a broad range of products and services. The vast network of e-wallet payments makes a better user experience for payment transactions.
6. E-wallet payment method also supports peer fund transfers that enable smooth cash movement among users of the e-wallet system.

The areas of e-wallet implementation for digital cash payment is shown in Figure 3. The area of e-wallet implementation needs to cover large area consumption to make sure e-wallet becomes an acceptable payment method for customers.
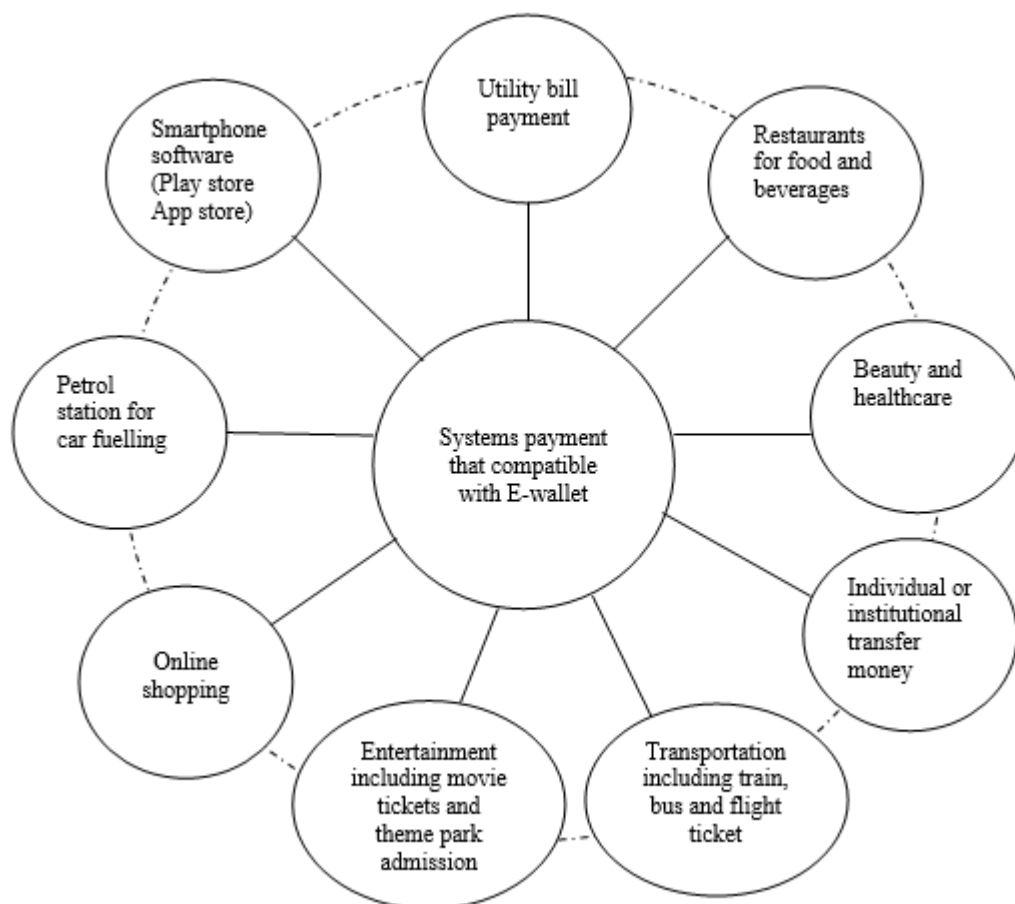

Figure 3: Applicable area of e-wallet for payment transaction

Payment procedure

The e-wallet is a secure payment system with a money-back guarantee system. Customers can perform payment confidently with enhanced security features. The e-wallet implements easy reload methods using cash, debit or credit

card and bank transfer. The e-wallet system eases the money transfer between peers and a broad range of merchant business.

The steps of the payment procedure for e-wallet is shown in Figure 4. The system starts with users downloading and launching e-wallet software with personal registration, including account linkage to bank accounts. The users need to reload some amount of digital cash using cash, credit card, or debit card. Then users get involved in purchasing activities using online platforms. The payment process starts with a customer scanning the merchant code of payment. Then, the customer enters the amount of payment or transfer amount. Next, the transaction authorization code is needed to fill in for confirmation of the purchasing of transferring money. Then, the transaction is complete with a record saved in the database with the reference identification number for each transaction. Next, the purchasing loop continues with reloading cash or checking cash balance in e-wallet software.

The benefits of this transaction using e-wallet are:

- Secure payment system with all the transaction kept in record using the reference identification number
- The secure payment system also is backed up with a money-back guaranteed if any problem occurs in a transaction.
- The loop of purchasing provides marketing data for e-wallet provider to analyze purchasing behavior of customer that uses e-wallet payment system.
- The set-up of the transaction process is user-friendly, where a customer only needs to download smartphone apps and link with their banking accounts.
- The payment process at a merchant site is straightforward with only three steps involving scanning the payment code, entering the amount and password, and then the transaction process is complete.
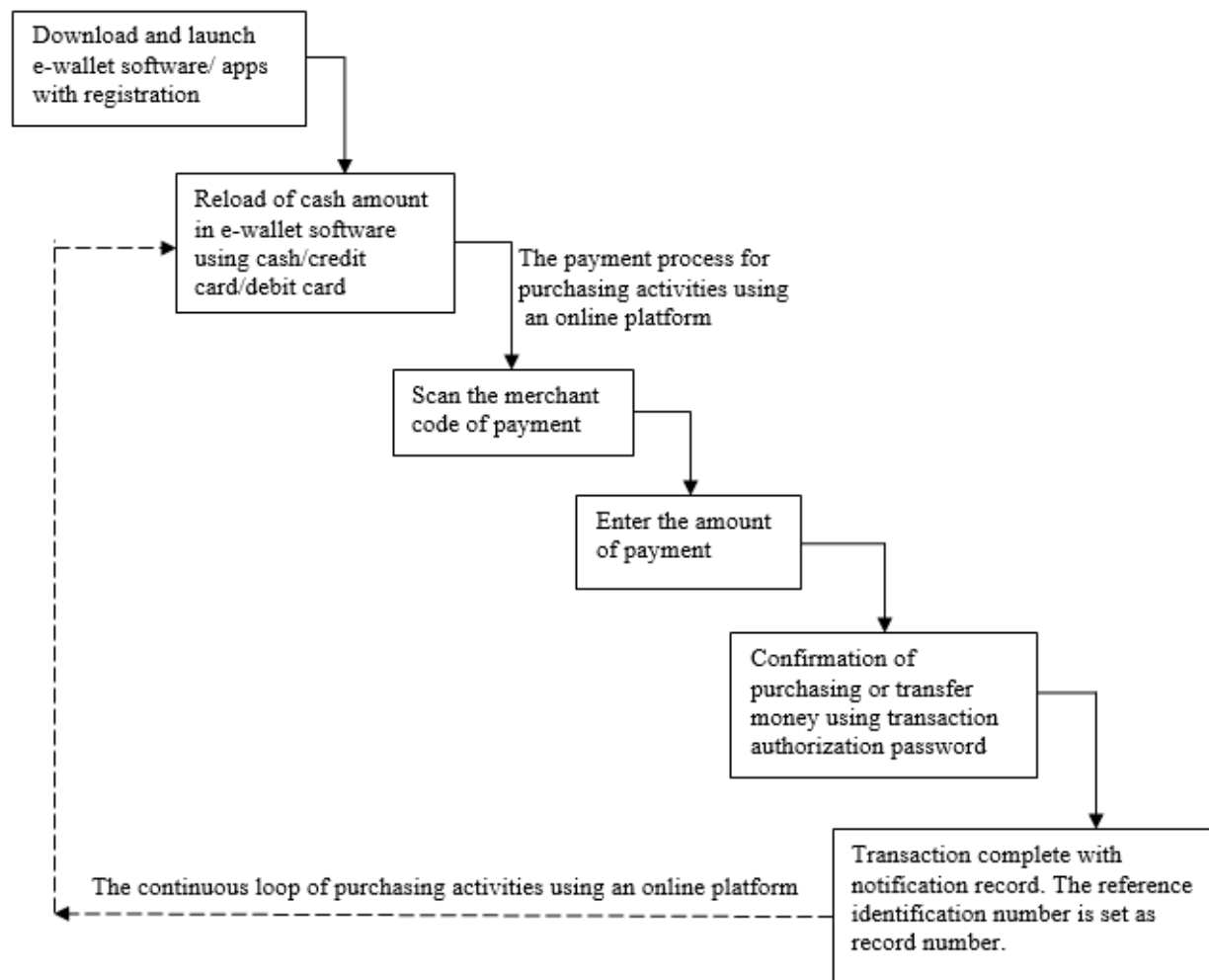

Figure 4: Transactional framework for the e-wallet payment process

3.3 Evaluation of the E-Wallet Transactional Process from Islamic Financial Engineering

This section evaluates the e-wallet characteristics from the perspective of Islamic financial engineering. Table 2 shows e-wallet characteristics with an analysis from Islamic financial engineering.

Table 2: E-wallet transaction system from Islamic financial engineering perspective

E-wallet characteristics	Analysis of Islamic financial engineering
1. The users of the e-wallet payment system need to register using a bank account.	User registration creates a transaction record that can be traced and, at the same time, shows the trustworthiness of transactions.
2. The e-wallet transaction underlies with money back guaranteed by the e-wallet system provider.	This element provides a guaranteed claim by e-wallet system provider if any mistake occurs. Therefore, the e-wallet system offers a transparent and reliable service.
3. The transaction of e-wallet payment is secured with an authorization code.	This process prevents any suspicious transactions by unauthorized parties.
4. Data from the e-wallet payment system can be developed for analysis of customer purchasing behavior.	The online marketing based on customer purchasing behavior will help a business entity to propose products or services that match customer preferences.
5. The transaction of payment requires a few steps that link the e-wallet system with a credit card and debit card.	The smooth flow of payment gives a good user experience for performing payment during purchasing activities.

From the analysis in Table 2, all the transaction process provides a clear, traceable, and reliable transaction method. Therefore, from Islamic financial engineering, the transaction using an e-wallet is a secure system without a doubt.

4. Conclusion

The objective of this paper is to develop an e-wallet framework and evaluate it according to Islamic financial engineering perspective. From the analysis, this research concludes the research findings as below:

1. The transaction of e-wallet is a secured payment system with money-back guaranteed by e-wallet providers.
2. The transaction of payment using the e-wallet system is reliable as all the users need to register themselves before any account can be activated for transaction. This process prevents any suspicious transaction that can be tracked if it occurs. At the same time, any mistake or programming error can be debugged in a safer way.
3. All the transaction process will be recorded with an authorization code of payment. Therefore, this process creates a system for e-wallet payment that can be monitored to increase safety for purchasing activities.
4. This study shows a framework for an e-wallet payment system is useful for the merchant side because the online promotional activities can be tailored according to customer preferences. At the same time, a business entity can increase their sales with promotional activities using the e-wallet system.
5. The characteristics of e-wallet payment shows no ambiguity and no unclear operational activities. Therefore, the e-wallet payment system is reliable, robust and user-friendly from the Islamic financial engineering perspective.

References

- Abu Bakar, N., and Rosbi, S. (2017a). High Volatility Detection Method Using Statistical Process Control for Cryptocurrency Exchange Rate: A Case Study of Bitcoin. *The International Journal of Engineering and Science, 6* (11), 39-48.
- Abu Bakar, N. and Rosbi, S. (2017b). Identification of Non-Equilibrium Growth for Bitcoin Exchange rate: Mathematical Derivation Method in Islamic Financial Engineering. *International Journal of Scientific Research and Management, 5* (12), 7772-7781. Crossref
- Abu Bakar, N. and Rosbi, S. (2017c). Robust Statistical Pearson Correlation Diagnostics for Bitcoin Exchange Rate with Trading Volume: An Analysis of High Frequency Data in High Volatility Environment. *International Journal of Advanced Engineering, Management and Science, 3* (12), 1135-1142. Crossref

- Abu Bakar, N. and Rosbi, S. (2018a). Robust Framework Diagnostics of Blockchain for Bitcoin Transaction System: A Technical Analysis from Islamic Financial Technology (i-FinTech) Perspective. *International Journal of Business and Management,* 2 (3), 22-29.
- Abu Bakar, N. and Rosbi, S. (2018b). Robust Outliers Detection Method for Ethereum Exchange Rate: A Statistical Approach Using High Frequency Data. *The International Journal of Engineering and Science, 7* (4), 01-08.
- Abu Bakar, N. and Rosbi, S. (2018c). Weighted Moving Average of Forecasting Method for Predicting Bitcoin Share Price using High Frequency Data: A Statistical Method in Financial Cryptocurrency Technology. *International Journal of Advanced Engineering Research and Science, 5* (1), 64-69. Crossref
- Abu Bakar, N. and Rosbi, S. (2019a). Forecasting Method for Ethereum Cryptocurrency with Autoregressive Integrated MovingAaverage (ARIMA) Model using High-frequency Data. *Revista Religacion, 4* (17), 9-20.
- Abu Bakar, N., Rosbi, S. and Uzaki, K. (2017d). Cryptocurrency Framework Diagnostics from Islamic Finance Perspective: A New Insight of Bitcoin System Transaction. *International Journal of Management Science and Business Administration, 4* (1), pp. 19-28. Crossref
- Abu Bakar, N., Rosbi, S. and Uzaki, K. (2019b). Forecasting Cryptocurrency Price Movement using Moving Average Method: A Case Study of Bitcoin Cash. *International Journal of Advanced Research, 7* (12), 609-614. Crossref
- Abu Bakar, N., Rosbi, S. and Uzaki, K. (2019c). Forecasting Cryptocurrency Price Movement using Moving Average Method: A Case Study of Bitcoin Cash. *International Journal of Advanced Research, 7* (12), 609-614. Crossref
- Andonova, V. (2003). Online Disintermediation: Differences in the Behavior of Traditional Retailers in Adopting E-Commerce. *Management Research*, 1(3), 279-290. Crossref
- Antonopoulos, A.M. (2017), Mastering Bitcoin, O'Reilly Media, Sebastopol, CA
- Breidbach, C., Keating, B. and Lim, C. (2019). Fintech: Research Directions to Explore the Digital Transformation of Financial Service Systems. *Journal of Service Theory and Practice*, Vol. ahead-of-print No. ahead-of-print. Crossref
- Chiu, W. and Cho, H. (2019). E-commerce Brand: The effect of Perceived Brand Leadership on Consumers' Satisfaction and Repurchase Intention on E-commerce Websites. *Asia Pacific Journal of Marketing and Logistics*, Vol. ahead-of-print No. ahead-of-print. Crossref
- Fryad Henari, T. and Mahboob, R. (2008). E-commerce in Bahrain: The Non-Technical Limitations. *Education, Business and Society: Contemporary Middle Eastern Issues*, 1(3), 213-220. Crossref
- Kristoufek, L. (2013). BitCoin Meets Google Trends and Wikipedia: Quantifying the Relationship Between Phenomena of the Internet Era. *Scientific reports, 3,* 3415 Crossref
- Muzellec, L., Ronteau, S. and Lambkin, M. (2015). Two-sided Internet Platforms: A Business Model Lifecycle Perspective. *Industrial Marketing Management, 45*(4), 139-150. Crossref
- Nakamoto, S. (2009) Bitcoin: A Peer-to-Peer Electronic Cash System", Retrieved from http://www.bitcoin.org /bitcoin.pdf
- Narayanan, A., Bonneu, J., Felten, E., Miller, A. and Goldfeder, S. (2016). Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, Princeton.
- Ram, A. (2019). Bitcoin as a New Asset Class. *Meditari Accountancy Research, 27*(1), 147-168. Crossref
- Ram, A., Maroun, W. and Garnett, R. (2016). Accounting for the Bitcoin: Accountability, Neoliberalism and a Correspondence Analysis. *Meditari Accountancy Research, 24*(1), 2-35. Crossref
- Reynolds, P. and Irwin, A.S.M. (2017). Tracking Digital Footprints: Anonymity Within the Bitcoin System. *Journal of Money Laundering Control, 20*(2), 2017, 172-189. Crossref
- Sharma, G. and Lijuan, W. (2015). The effects of Online Service Quality of E-commerce Websites on User Satisfaction. *The Electronic Library*, 33(3), 468-485. Crossref
- Tan, R. (2020) The Star, E-wallets to Carve Up More Market, available at: https://www.thestar.com.my/news/nation/2020/01/02/e-wallets-to-carve-up-more-market