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Security Features Available on The Best E-Wallet Applications in Malaysia

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Abstract

The rapid development of financial technology, especially in the aspect of cashless and contactless digital payments, increases the adoption of e-wallet applications among people from all walks of life. People are shifting from cash-based to cashless since it is convenient. This study explores and compares the characteristics and security features of current e-wallet applications available in the market to identify the three best e-wallet applications. The result is Boost, GrabPay, and Touch 'n Go eWallet. The purpose of this research is to in-depth analysis of the unique selling points and weaknesses of each e-wallet, enabling people to make informed decisions from the abundance of choices. The findings provide insight that all the three best e-wallets provide diverse features, including perceived ease of use, money transfer, loyalty program, pay later service, and so on. In terms of security, each e-wallet implements various security measures such as biometric authentication, data encryption, fraud monitoring, and secure transaction pins to reinforce safeguards against fraudulent transactions. Device binding also allows customers to link the account with a device to secure the account and prevent unauthorized account activities. The present study helps individuals to have a better understanding of the characteristics and security features of top contenders, assisting them to choose a secure and reliable e-wallet application.

Keywords: e-wallet application; security features; comparison

1. Introduction

In today's digital era, there is a noticeable increase in cashless and contactless transactions among people from all walks of life due to the rapid development of financial technology. The emergence of advanced payment apps such as e-wallet are gaining increasing global attention and the number of people that use e-wallet for their daily transactions continues to grow at a breakneck pace. E-wallet, also known as a digital wallet, is an electronic payment system that enables customers to store funds or make transactions for goods and services. People can save money in an e-wallet for future transactions (The Economic Times, 2021). Customers can conduct money transfers and payments at a lower cost, more conveniently, more securely, and on time. In addition, e-wallets enable customers to connect their bank cards to e-wallets and store information for payment transactions. All the transactions and customer information remain secure since strict online security measures will be implemented, and all the sensitive information will be encrypted to prevent fraudsters from stealing a customer’s money or identity. Therefore, it is undeniable that e-wallets are one of the best inventions of the twenty-first century.

E-wallets served as the cause of demonetization and were the first to facilitate payments in the country post-demonetization. As the adoption of e-wallets is becoming more prevalent in Malaysia, the choice of e-wallet providers keeps increasing to meet the demand. All the providers must apply for a licence from Bank Negara Malaysia (BNM). Currently, there are already a total of 53 authorized e-wallets in Malaysia and Bank Negara Malaysia’s latest data in 2022 recorded that there are 49 non-bank e-money issuer licences issued by the bank. For instance, Touch 'n Go eWallet, Boost, and GrabPay are the major and well-known e-wallet in Malaysia today. All e-wallets offer diverse benefits, security features and cater to different customer preferences.

These e-wallets can be broadly categorized into two common types which are open-loop e-wallets and closed-loop e-wallets. Open-loop e-wallets can be used to make purchases at multiple merchant locations that accept e-wallet payment methods. This means that the e-wallets are more versatile and not tied with a specific merchant or group of merchants. Customers have to be topped up first to pay for goods and services at select merchants. For example, Boost, GrabPay, and Touch 'n Go eWallet are open loops. On the other hand, closed-loop e-wallets are typically associated with a specific merchant or service provider. The payment method is linked to the system. Customers can load cash or store the money from returns or refunds in their wallets and also can track the balance. So, all the transactions are executed within that merchant’s ecosystem and customers also can enjoy some targeted benefits within the ecosystem.

For instance, Starbucks loyalty program is a closed-loop e-wallet, allowing customers to make payments and earn reward points exclusively within the Starbucks network.

Based on the PayNet Digital Payments Insights Study 2022 by PayNet, 78% of Malaysians have more than one e-wallet at their disposal (Peter Schiesser, 2022). It indicates that e-wallets have gained significant popularity in Malaysia. Consumers are satisfied with the benefits of using e-wallets. For example, purchasing will become as simple as clicking a button by using e-wallets (Tom Tucker, 2022). It is user-friendly because it is easy to install, set up, use, and top up. Besides, e-wallets are convenient because consumers can make payments without cash on hand. No more fumbling over cash and it also saves the hassle of typing out bank account numbers for transactions. It can act as a spending tracker because all transactions are recorded automatically in e-wallet apps once the payment is made. In addition, it is secure and safe since all the account information is encrypted. The availability of plenty of promotions such as discounts, cash rebates, reward points, prize redemption and so on have also attracted consumers to continue using e-wallets. Hence, all these benefits have made e-wallets take the lead in the digital payments industry.

In this article, we will list the three best e-wallet applications authorized in Malaysia, explore the characteristics of each of the best e-wallet apps we have listed and compare their security features. The findings can be a guide for all people in Malaysia to make informed decisions when choosing the suitable e-wallet application for their needs.

2. Methodology

Step 1: Identifying the three best e-wallets applications.
The first step is in-depth analysis on e-wallet applications available in Malaysia and identifying the three best e-wallet applications. The decision to determine the three best e-wallets is affected by many determinants such as overall popularity, market acceptance, the services offered and their security level. Hence, we searched and consulted multiple resources on the Internet including journals, professional research papers and reputable technology websites. Then, we selected the three best e-wallets based on the market penetration and their ratings.

Step 2: Exploring and identifying the characteristics of the three e-wallets.
In this step, we explored and delved into the characteristics of the three best e-wallet applications in Malaysia. Through this exploration, we can capture the common and essential characteristics in every available e-wallet. Some e-wallet applications also have their unique features that can increase the reliability of e-wallet and gain attraction from customers to use them. All the information is collected through multiple sources including official documentation provided in the official website, relevant research papers, official news and so on. By gathering information from different resources, it increased the accuracy of data collected and we ensured a comprehensive and unbiased view of the e-wallet characteristics.

Step 3: Comparing the characteristics of the three best e-wallet applications.
After identifying the characteristics of the three best e-wallet applications, the next step is to compare and contrast their characteristics. The purpose is to explore the special features offered by each e-wallet and analyse how the unique selling points benefit the customers. E-wallet with more useful features is able to attract more potential customers to use them. By comparing these characteristics, people can gain a comprehensive understanding of the strength of each e-wallet application and assist them to select the e-wallet that aligns best with their requirements and preferences.

Step 4: Security Assessment of the three best e-wallet applications
Then, we thoroughly evaluated the security features of each e-wallet. We focus on the security measures implemented by each e-wallet provider to safeguard customer information and guarantee the confidentiality of every transaction. Through this evaluation, we can capture the common and essential security features in every available e-wallet. Some e-wallet applications have implemented extra security features that can make the e-wallet more secure. All the information is collected through multiple sources including official documentation provided on the official website, relevant research papers, official news and so on.

Step 5: Comparative analysis on security features of the three best e-wallet
After evaluating the security features of each e-wallet, we conducted a comparative analysis to compare the strengths and weaknesses of the three best e-wallets in terms of their security features. This comparison provides readers with a clear understanding of how the three best e-wallets prioritize and implement security. By comparing the security features, people can gain a better understanding of the security of each e-wallet application and assist them to select the e-wallet that aligns best with their security requirements.

3. Results and discussion

This study aims to explore and identify the three best e-wallet applications in Malaysia based on the ratings provided by reliable sources of reference listed in the reference list. The study also delves into the characteristics of each e-wallet application to do comparison and contrast. Besides, this study also assesses and compares the security features offered by each e-wallet, ensuring a comprehensive evaluation of their safety measures.

3.1 Three best E-Wallet applications in Malaysia

According to the comprehensive analysis of the e-wallet landscape in Malaysia, Boost, GrabPay, and Touch 'n Go e-wallet are the three best E-wallet applications in Malaysia. This result comes out after taking into account both the characteristics and security aspects of each e-wallet. These three e-wallet applications have widespread customer adoption. The result is also based on the ratings supported by reliable sources of reference listed in the reference list. Boost has gained widespread traction and recognition in the market for its unique and innovative features. It has a user-friendly interface, and it is perceived ease of use. Currently, it has over 500,000 merchant touchpoints available nationwide and counting. Boost offers a wide range of services including mobile top-ups, utility bills payment, making donations, merchant transactions, and so on. It also promotes a BoostUp Reward Programme which allows customers to earn boost stars and enjoy the shake rewards from every transaction. Besides, Boost executes advanced fraud detection and monitoring systems to track fraudulent activities. It will identify suspicious or unauthorized transactions and promptly notify customers to protect their funds.

GrabPay, powered by the widely used Grab platform, has gained substantial popularity for its diverse services and attractive rewards. Currently, it has more than 3000 merchant touchpoints available nationwide and counting. It offers a lot of trusted and convenient services such as online and in-store cashless transactions, e-hailing rides, food delivery, prepaid top-up, credit transfer, and so on. Besides, customers can earn GrabReward points from each transaction to redeem attractive deals such as discounted vouchers. It also offers PayLater service to customers with no interest or upfront costs as long as customers pay on time. Furthermore, it is PCI DSS level 1 compliant, which is the highest security standard for payment, and it will follow this strict standard when storing and processing customer data. Touch ʼn Go is the cornerstone of the digital transformation within Malaysia’s mobility ecosystem and its reputation has made it the top choice among Malaysians. Currently, it accepts payments at over 700,000 merchants nationwide. It offers diverse services such as making payments for tolls via RFID and PayDirect, paying for e-hailing apps, e-commerce shopping, and so on. Additionally, it offers GO+ feature that allows the balance in customers’ GO+ accounts to earn potential returns. Customers can freely cash out the balance into the e-wallet or bank account. Besides, their Money-Back Guarantee policy promises full compensation within five days if a customer's e-wallet is being charged with unauthorized purchases or reloading. In addition, to ensure the customer’s e-wallet is safe and secure, TapSecure Authentication must be executed when approving transactions. Customers can only link one device per account to authorize transactions.

Hence, determinants such as user adoption, diverse features, and market prominence make Boost, GrabPay, and Touch ’n Go top choices among Malaysians. Each e-wallet has its unique selling points to meet different customer needs and customers can determine which e-wallet is best based on their preferences. Besides, since specific details on the characteristics and security aspects of each e-wallet application may vary, all details will be discussed in sessions 3.2 and 3.3.

3.2 Characteristics of each of best E-Wallet apps

In this study, we explore the characteristics of the three best E-Wallet apps we listed in session 3.1. We summarise and compare their available characteristics by placing them head-to-head in the comparison table below so customers can compare at a glance to select their preferred e-wallet. Based on Table 1 below, there are similar characteristics among the three e-wallets including they are accessible on both Android and iOS, they hold an e-Money Issuers from Bank Negara Malaysia, they have a user-friendly interface, they are open-loop type, they emphasis on safety and so on. All these are the essential characteristics that can contribute to a reliable and secure e-wallet experience.

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Table 1: Characteristics of each of the best E-Wallet apps

Characteristics	**E-Wallets**		
	Boost	**GrabPay**	**Touch 'n Go**
Platform Compatibility	Accessible on both Android and iOS (Apple)		
Regulatory Compliance	Hold an e-Money Issuers License from Bank Negara Malaysia (BNM)		
User Experience	User-friendly interface with a straightforward and intuitive design, it is easier for customers to navigate and perform transactions.		
Ownership	Backed by Axiata Group	Backed by Grab	Backed by Alipay and Touch 'n Go
Type	Open loop		
Number of merchants acceptance	over 500,000 merchants	over 3000 merchants	over 700,000 merchants (1.2 millions with DuitNow QR function)
Example of notable merchants	JD Sports, Watsons, KK SuperMart and TGV Cinemas	Family Mart, KFC Jaya Grocer and Legoland	Converse, Lazo Diamond, Mydin and Tealive
Supported Services	Peer-to-Peer (P2P) Transfer, Bill Payment, Prepaid Top-up, In-store and online purchase, Movie Booking, Transport, Parking Payment, Parcel Delivery	Peer-to-Peer (P2P) Transfer, Bill Payment, Prepaid Top-up, Food and Beverage Delivery, In-store and online purchase, Transport, Hotel Booking, On- demand Delivery	Peer-to-Peer (P2P) Transfer, Bill Payment, Prepaid Top-up, Parking Payment, In-store and online purchase, Toll Payment, Flight Booking, Hotel Booking, Movie Booking, Transport
PayLater service	Boost PayLater - service allows users to transact today and make repayment in 30 days with zero interest rate.	Grab PayLater - service provides two options for users to select, which are pay in four monthly instalments and pay the next month.	Not Applicable
Oversea Transaction	Not Applicable	Applicable. Customers will be charged a non- refundable processing fee of 1% for cross-border transactions.	Applicable. Customers can conduct overseas transactions in select locations through TNG's link up with Alipay
Insurance Feature	Applicable. Users can enjoy Boost Protect microinsurance plans with low insurance premiums.	Applicable. GrabInsure offers flexible solutions to users' daily insurance needs. For example, Travel Coverage	Applicable. GOprotect provides a suite of products such as CarInsure and Cl Insure that can meet users' insurance
Charitable Contributions	Applicable. Users can select an organization and contribute any amount users are comfortable with.		
Money Transfer	Money can be transferred free of charge to other e-wallet users.		
DuitNow QR Payment	Applicable		
Top-up Option	Online Banking Transfer, credit/debit cards and cash-in at partner locations		
Minimum Top-up Amount	RM20	RM20 via credit/debit card or RM50 via online banking (FPX)	RM20
Unique Selling Point	Multiple reward systems	Emphasis on safety and security	Easily pay tolls via RFID and PayDirect
Check-in Rewards	Not Applicable	Not Applicable	Applicable. Users can click 'Check-in Now' within the 'My Rewards' page to collect the rewards. Users can collect up to a maximum of five rewards per month.
Size of E-Wallet	Basic Wallet: RM1,000 Premium Wallet: RM4,999	Basic Wallet: RM500 Premium Wallet: RM1,500 Business Wallet: RM15,000	Lite Tier: RM200 Pro Tier: RM5,000 Premium Tier: Up to RM20,000

Monthly Transaction Limit	Basic Wallet: RM2,000 Premium Wallet: RM4,999	Basic Wallet: RM4,999 Premium Wallet: RM10,000	Lite Tier: RM2,000 Pro Tier: RM5,000 Premium Tier: RM25,000
Annual Transaction Limit	Basic Wallet: RM24,000 Premium Wallet: RM59,999	Basic Wallet: RM50,000 Premium Wallet: RM120,000	Lite Tier: RM24,000 Pro Tier: RM60,000 Premium Tier: RM300,000
Money Withdrawal	Not Applicable	Applicable. Users can cash out the transferable balance to another GrabPay Wallet, a local bank account or another third-party e-wallet	Applicable. Users can withdraw money from GO+ investment account into an e-wallet or bank account.
Cashback Service	Applicable		
Security Feature	Biometric Authentication such as facial or fingerprint recognition		
Type of Rewards	Boost Coins/Boost Stars and Shake Rewards (1 month validity)	GrabRewards points (3 months validity)	Cashback e-Vouchers and Check-in Rewards (A+ Rewards)
Loyalty Programme	BoostUp Rewards Program (to accumulate Boost Stars and redeem rewards)	GrabRewards Program	Not Applicable
Physical Card Availability	Not Applicable	Available. The GrabPay Card is a prepaid MasterCard that can be used anywhere, same as normal MasterCard.	Available. The enhanced Touch'nGo card with NFC tech. allows users to reload via Touch 'n Go e-wallet and use it for cashless payment. Besides, Touch 'n Go Visa card can be used worldwide and online payment.
Additional Features	Offer UnionPay QR Payment service	Offer GrabFood, GrabMart, GrabExpress, and Grab rides service	Offer GO+ investment for users to enjoy daily low-risk returns credited to the balance. Money-back Guarantee policy promises full compensation within 5 days if the user's e-wallet is being charged with unauthorized purchases or reloading.

3.3 Security features found in each of E-Wallet Application

In this study, we delve into the security features found in the three best E-Wallet apps we listed in session 3.1. We summarize and compare their available security measures by placing them head-to-head in the comparison table below so customers can compare at a glance to select their preferred e-wallet. Based on Table 2 below, there are similar security features among the three e-wallets including biometric authentication, secure login, data encryption, fraud monitoring and so on. All these are the essential security features that can contribute to a reliable and secure e-wallet experience.

Biometric Authentication

Biometric authentication refers to a process that authenticates a user's identity using their unique biological traits such as fingerprints, retinas, voices, and facial features when accessing the account. It supports the facet of non-repudiation in information security. E-wallet applications nowadays only support facial and fingerprint recognition. A facial recognition technique is an application of a computer for automatically verifying a person's unique facial features to identify them. Fingerprint recognition refers to the automated method of identifying the identity of a user and works by examining a finger pressed against a smooth surface. Hence, this high level of security makes the e-wallet account become secure.

Fraud monitoring

Fraud monitoring is the process of continuously monitoring and scanning all account activity and financial transactions such as payments and funds transfers to detect any suspicious behaviour. If the system detects any anomalies in user behaviour or transaction pattern, it will stop the action and send email alerts to users. If that action or transaction does not belong to the account's owner, then the system will help to resolve the fraud attack. All e-wallet applications

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nowadays support fraud detection. In GrabPay e-wallet, it has executed 24/7 fraud detection that will keep monitoring users' accounts and may contact them if the system detects unusual activity.

Data Encryption

Data encryption is a security method where information is encoded from readable format and remains hidden from or inaccessible to unauthorized users. It can only be accessed or decrypted by a user with the correct decryption key. For example, it will scramble the password from 'cheng1234@' to '25sfhsr63x'. The purpose is to protect sensitive information confidentiality from hacking, identity theft and fraud. All e-wallet applications nowadays support data encryption, the personal and transaction information will be encrypted. Currently, the strongest and most robust encryption is AES 256-bit encryption.

Table 2: Security Features found in each of the E-Wallet Applications

Security Features	**E-wallet**		
	Boost	**GrabPay**	**Touch 'n Go**
Biometric Authentication	Applicable such as facial or fingerprint recognition	Applicable such as fingerprint scanning authentication or face ID authentication	Applicable such as facial verification or fingerprint recognition
Secure Login	Applicable. Users need to set up a strong and secure password when creating an account.		
Two-factor Authentication (2FA)	Applicable. Users will receive an SMS one-time password (OTP) or through other verification methods such as face recognition to authorize certain account activities.	Applicable. Users are required to key in their GrabPIN set before accessing sensitive information or if an unauthorized activity is detected.	Applicable. Users will receive an SMS one-time password (OTP) or through other verification methods such as face verification to authorize transactions or reloads to e-wallet.
Data encryption	Applicable. All personal information and payment transactions are encrypted.		
Fraud monitoring	Applicable. This e-wallet will monitor the account activities of every user, analyse the transaction pattern and track unauthorized transactions.	Applicable. All personal information and payment transactions are protected with a 24/7 fraud detection engine.	Applicable. Strict fraud rules will be implemented and unauthorized behaviour observed on users' accounts will be blocked.
Purchase Alert and Notification	Applicable. System sends real-time notifications to users for every transaction made using their e-wallet account to enable users to identify unauthorized transactions.		
Security Email Alert	Not Applicable	Applicable. When a new device tries to sign into an account and this activity is detected, alerts will be sent to the email address of that account's owner to get the confirmation.	Applicable. If transactions go over the set limit or any abnormal activity observed on a user's account, the transactions will be blocked, and email alerts will be sent to the users.
Cooling-off Period	Not Applicable	Not Applicable	Applicable. Users will be limited to a certain amount for top-ups or payments up to 48 hours if users log in to account from a new device with a less secure authentication method. Any top-up or payments above the limit will be rejected automatically.
Secure Transaction PIN	Applicable. Users are required to set a secure 6-digit transaction pin and need to key in a valid 6-digit pin number to make every transaction.		
Payment Tokenization	Applicable. Payment tokenization will be implemented to protect users' credit/debit card information. The identification symbols called tokens are used to represent the card details and the card information will not be stored by merchants or within the e-wallet.		
Device Binding	Applicable. Users only can link an account to one unique device such as mobile phone. Users with more than one device are required to create an account for each device.	Applicable. For example, users who are accessing their accounts with modified devices are banned and unable to login to their Grab driver account.	Applicable. TapSecure is introduced to ensure that only linked devices can be used for the authentication of e-transactions within every user's e-wallet account.

Dedicated Customer Service Channel	Applicable. Users can contact the customer hotline to make a report or find a solution to a current encountered problem.	Applicable. Users can report any fraudulent activities through a platform called Grab FairPlay Programme.	Applicable. Users can contact the customer hotline to make a report or find a solution to a current encountered problem.
Implementation of PCI DSS level 1 compliant	Not Applicable	Applicable. It has followed and executed the highest industry-acclaimed standard for payment gateway when storing, transmitting and processing data.	Not Applicable
Protection through audio recordings	Not Applicable	Applicable. Both driver-partners and passengers have enabled audio recordings during rides to enhance safety and prevent incidents.	Not Applicable

4. Conclusions

In conclusion, after the exploration and comparison of the characteristics and security features of each e-wallet application, this study concluded that Boost, GrabPay, and Touch 'n Go eWallet are the three best e-wallet applications in Malaysia. It is evident that each e-wallet has its unique characteristics and security measures implemented to further reinforce safeguards against fraudulent transactions or other unauthorized activities. In terms of characteristics, all the three best e-wallet applications are accessible on both Android and iOS (Apple) and hold an e-Money Issuers Licence from Bank Negara Malaysia (BNM). They are open-loop type and have a user-friendly interface with a straightforward and intuitive design. Cashless payment and wide acceptance across many payment merchants also attract users to continue using these e-wallet applications. Besides, each e-wallet application has its own unique selling points that can cater to customers' preferences and become the top choice of customers. Boost has multiple reward systems such as BoostUp Rewards and Shake Rewards that enable customers to redeem rewards when fulfilling the criteria. GrabPay offers diverse services such as GrabFood, GrabMart, GrabExpress, and Grab Rides. Touch 'n Go eWallet enables customers to pay tolls via RFID and PayDirect.

In addition, in terms of security features, all three e-wallets implement security measures to guarantee the confidentiality of personal data and transaction details to prevent any fraudulent activities. They have security features like biometric authentication, data encryption, fraud monitoring, and payment tokenization. However, Touch 'n Go eWallet and GrabPay has extra security features. In Touch 'n Go eWallet, when customers login to eWallet from a new device with a less secure authentication method, customers will undergo a cooling period. The system will set a limit and customers will be limited to a certain amount for top-ups or payments up to 48 hours. In GrabPay, for the sake of women's safety, AudioProtect feature was introduced. The driver-partners and passengers have enabled audio recordings during rides to prevent incidents.

Security is considered an important risk attribute that affects the customer decision making process when purchasing a product or consuming multiple services (Kahar, 2018). Hence, the implementation of security measures is very important to protect the details of transactions and customers from internal and external criminal usage. Not only do the e-wallet providers need to keep updating and enhancing the security measures, but users also must increase awareness and implement best practices to prevent others from gaining access to their e-wallets. For example, users can connect the device to a trusted and secure network when accessing the e-wallet apps. Try to avoid using public or unsecured Wi-Fi connection. Besides, users have to be vigilant and not click on unknown links because the links have a probability of being malware and will be hacked by hackers. Furthermore, users can install extra security apps on devices so that the firewall can block unauthorized access. In addition, users need to create a unique and hard-to-guess password and transaction pin to prevent the risk of unauthorized access.

Last but not least, it is undeniable that the adoption of e-wallet applications is increasing continuously especially after the government announced incentives to use e-Tunai Rakyat during the pandemic. The emergence of different e-wallet applications allows users to select the best e-wallet based on their individual preferences and risk tolerance. To select a reliable and secure e-wallet application, users are recommended to assess their requirements, do research on currently available e-wallet features, and stay informed about the characteristics and security updates. Furthermore, all e-wallet applications are necessary to continue implementing further advancements to meet users' changing requirements. For instance, the rising popularity of e-wallets is driven by rewards, convenience, and security. Hence, e-wallet applications could introduce more reward systems or keep updating the security measures to entice users to use them. They also can collaborate with more merchants to increase the number of merchant touchpoints. Future studies can use this research as a reference point for conducting their own research.

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