A REVIEW UNDERLYING THEORIES IN TECHNOLOGY ADOPTION IN E-WALLET PERSPECTIVE

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ABSTRACT

In recent years, E-wallet as the alternative new payment system which is related to development on financial technology (Fintech) products. The increasing on E-wallet adoption enable Malaysia to achieve Malaysia's Vision as a cashless country and to shift to new norm as a cashless society. The customers and small business owners gain benefits by using digital payments which provide efficient and safer transaction and ease the user daily life dealing with transaction at anytime and anywhere. The implementation of the technology adoption in several models or theories show limitations and issues which are considered as research problems. This paper aims to discuss the underlying theories in the e-wallet transaction from the previous literature and to highlight issues that are related to its application. Specifically, it focuses on discussing the basic theories and concepts related to research in order to obtain theoretical construction foundation as a guide and benchmark of research. The underlying theories discussed in this study which are Diffusions of Innovations (DOI), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT), and Technology Acceptance Model (TAM). This study uses the inductive approach in finding relevant references and analytical approach in discussing the underlying theories. The findings show that TAM model is dominant model and the most influential theory which is proven to be highly successful in empirical studies related to adapting new technologies such as E-wallet. Researchers believe the discussion shows an added valuable evidence in the area information systems. The extended TAM will continue to grow and accommodate the adoption latest technology among users. There are plenty research opportunities for future researchers to expand this study using other theories or models related to online financial transactions. Finally, this study gives beneficial information to the merchants to understand the variety factors that have affected the customers’ preferences towards e-wallet adoption.

Keywords: E-wallet, technology adoption, underlying theories, financial technology

I. INTRODUCTION

With the rapid growth of the Internet and web technologies, the traditional technique in dealing with transactions in commercial activities has changed to new methods such as E-commerce.

Previously, the traditional business were using cash between customers and business entrepreneurs. However, there are several limitations such as safety concerns, valid for a one-time transaction, and no product advertisement for future purchasing (Bakar et al., 2020). Due to this restriction, most of the businesses have adopted E-commerce to compete with their rivals in the global market. In this regard, the level of online business transaction is rapidly increasing and customers have implemented E-commerce to entertain the global business. The payment system from manual has changed to the online transaction such as electronic money (e-wallet) in order to encourage small business owners and customers using digital payments which are safer, cashless, and they provide efficient transaction (Yang et al., 2021). In addition, e-wallet transaction is associated with digital currency, using internet banking which purchases and sells transactions through smartphone apps which are easier to be accessed at anytime and anywhere (Sohail et al., 2018).
The development of fintech began in 1990 which is parallel with the growth of Internet and E-commerce business. The digital currency becomes as alternative for all banks to offer mobile banking services with smartphones as the fastest online payments (Bakar et al., 2020). As the use of the e-wallet is getting wider in worldwide, Malaysia started using E-wallet since 2019 by providing various initiative to encourage Malaysian people participate in e-wallet system. According to Fintech Malaysian report (2021), Bank Negara Malaysia (BNM) website has listed 53 e-money issuers whose online and mobile banking penetration reached 112.5% and 61.8% respectively. The merchants were quick to embrace the domain e-wallet platforms such as Touch ‘n Go e-wallet, Grab and Boost due to Malaysian government program in promoting digital currency. In fact, 400,000 new business have registered QR code payment acceptance which showed 164% increasing compared to previous years. For instance, Bank Negara Malaysia (BNM) has introduced the Interoperable Credit Transfer Framework (ICTF) as payment infrastructure that connects any bank or non-bank accounts. Financial Sector Blueprint 2011-2020 also has launched by BNM in order to eradicate the issuance of cheques and increase e-payments usage among society (Teoh et al., 2020). Besides that, Real-time Retail Payment Platform (RPP) has been developed by Payments Network Malaysia Sdn Bhd (PayNet) which provides secure payments through simple identifiers from individuals such as business registration numbers, Identity Card (IC), Quick Response (QR) code by using mobile phone (The Star, 2019). Hence, e-wallet adoption in Malaysia is increasing because the government, banks and companies collaborate in promoting the e-wallet as platform for acceptable payment method for customers consumption.

This paper aims to discuss the underlying theories in the e-wallet transaction from the previous literature. Specifically, it focuses on discussing the basic theories and concepts related to research in order to obtain theoretical construction foundation as a guide and benchmark of research. The underlying theories of this study include Diffusions of Innovations (DOI), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT), and Technology Acceptance Model (TAM).

II. LITERATURE REVIEW

2.1 Underlying Theories in Technology Adoption

There are different types of studies on e-wallets with different underlying theories which have several characteristics. This section will discuss details the underlying theories in the area of technology adoption.

2.1.1 Diffusions of Innovations (DOI)

According to Kotler (2003), adoption is defined as the individual decision to use products or services. This is supported by Rogers (1983) who states that innovation diffusion process is an idea coming from creation to the ultimate users or adopters. Rogers (1983) categorises adopters to five groups of which are innovators, early adopters, early majority, late majority and laggards. Figures 2.1 shows the five categories of adopters, shown in a bell-shaped frequency curve (Rogers, 2003).

![Figure 2.1 Adopter Categorization on the Basis of Innovativeness](source: Adopted from Rogers (2003))

First stage in innovators refers to the group who introduces the new technology to public known as “global visionaries” and they are the first testers to the innovations, products or services (Rogers, 1983). Early adopters are not specialists in technology, but they are interested in the benefits of new technology. Usually, early adopters will get the information through broadcast channels and they will apply technology innovation to fulfil their
needs (Rogers, 1983). Early majority adopters usually wait and perceive how someone else adopts to innovation. They will not adopt technology program information unless they get good feedback from their reference, which is the previous early majority. Meanwhile, late majority group is less easy in action with technology goods and only purchase products from well-known companies. Finally, laggards refer to persons who move slowly in technology development and late accepters of technology and mobile devices. They have little attention to other people opinions and when they decide to adopt, it is already late because innovators have introduced new technology (Rogers, 1983).

2.1.2 Theory of Reasoned Action (TRA)

The Theory of Reasoned Action was developed by Fishbein and Ajzen (1975) in order to explain individual’s usage behaviour based on subjective norms, attitude and behavioural intention. According to Ajzen (1991), TRA is the backbone for some models in technology acceptance that has been used to explain the behavioural intention in various fields such as e-banking (Rouibah et al., 2009; Shih & Fang, 2004) and word processing (Davis, 1989). Moreover, Davis (1989) has employed TRA to explore the relationship between perception and technology usage as shown in Figure 2.2.

![Figure 2.2 Theory of Reasoned Action](source)

Source: Adopted from Fishbein and Ajzen (1975)

There are two main factors namely attitude towards behaviour and subjective norms which determine behavioural intention in TRA. The attitude towards behaviour is the individual belief, whether positive or negative, in order to perform his or her particular task (Fishbein & Ajzen, 1975). If an individual believes the results are negative, he or she will have negative attitudes and will not perform that behaviour. However, if an individual perceives the outcome is positive, he or she will perform that behaviour with positive attitude. Subjective norm captures the individual’s perceptions and influence others’ behaviours (Fishbein & Ajzen, 1975). Besides that, subjective norm is the determinant of behavioural intention in the theory of reasoned action and in that of planned behaviour theory (Ajzen, 1991; Venkatesh & Davis, 2000). The different influencers involved in the subjective norms may be of any groups such as family, friends and others. For instance, if the group members think positively about m-commerce application, then he or she will not have any objection and will make the same decision like others.

2.1.3 Theory of Planned Behavior (TPB)

Ajzen (1991) introduced the Theory of Planned Behaviour (TPB) which is an extension of the TRA (Ajzen, 1991; Fishbein & Ajzen, 1975). This new theory is to overcome the issues in TRA. One of the limitations of TRA is the concept of individual working under voluntary behaviour, but in reality, human behaviour is not voluntary all of the time. Thus, this theory uses new factor namely ‘perceived behavioural control’ which is relevant for non-voluntary users. In TPB, behavioural intention is determined by the attitude towards behaviour, subjective norm and perceived behavioural control. Several studies have applied this theory such as online consumer behaviour (Hansen et al., 2004) and online shopping behaviour (Hsu et al., 2006). These studies found that TPB provided better explanation to online consumers behaviour compared to TRA. It shows that perceived behavioural control in TPB influences non-voluntary users towards online shopping behaviour. Besides that, Ajzen (1991) stated that perceived behavioural control is an individual assumption to face the obstacles and to determine the individual
reaction in certain situation. Therefore, this theory explains that perceived behavioural control can influence individual decision as shown in Figure 2.3.

**Figure 2.3 The Theory of Planned Behaviour**

Source: Adopted from Ajzen, 1991

### 2.1.4 Innovation Diffusion Theory (IDT)

Rogers (1983) developed Diffusion of Innovations Theory to have a better understanding on individual reaction whether to accept or reject the innovation especially the innovation in technology. Moreover, Rogers stated that there are five (5) stages in diffusion process which are knowledge, persuasion, decision, implementation and confirmation. These stages are important to measure the potential adoption on innovation technology. At an early stage, individual should have knowledge on the innovation, and then he or she will form an attitude towards the value of innovation. After that, he or she has to decide whether to adopt or reject the innovation. If the individual chooses to accept, he or she will implement the innovation. Finally, the individual will make confirmation of his or her decision. A Model of Five Stages in The Innovation-Decision Process is shown in Figure 2.4.

**Figure 2.4 A Model of Five Stages in The Innovation-Decision Process**

Source: Adopted from Rogers, 2003

At the knowledge stage, there are three (3) characteristics for decision making which are socio economic, personality variables and communication behaviour. At the persuasion stage, there are five (5) factors of technology that could determine its adoption and individual can decide to reject or adopt the innovation (Rogers, 2003). The first factor which is relative advantage refers to the benefits of the innovations. Meanwhile, compatibility refers to consistency of the innovation during the past values, past experience and demands by the potential adopters. The third stage is complexity to measure the level of difficulties of the innovation. Trialability is to measure whether the innovation can be used for the limited basis experiment. Finally, observability is the degree to whether results of innovations can be seen by others.
2.1.5 Technology Acceptance Model (TAM)

According to Davis (1989), TAM is constructed based on Theory of Reasoned Action (TRA). TRA explores the relationship between perception and technology usage (Fishbein & Ajzen, 1975). However, Davis et al., (1989) developed TAM to predict individual adoption and the use of new technology. The model claims that an innovative information system is dependent on two determinants, which are, perceived ease of use and perceived usefulness. The following diagram in Figure 2.5 below depicts the Technology Acceptance Model (TAM).

![Diagram of TAM model](image)

**Figure 2.5 Model of Technology Acceptance Model (TAM)**

Source: Adopted from Davis, 1989

In TRA, behavioural intention comprises two constructs, namely, attitude towards behaviour and subjective norm. While in TAM, there are two additional constructs, namely, perceived usefulness and perceived ease of use, apart from other constructs, including attitude toward using and behavioural intention to use. Perceived usefulness is the degree to which individual believes the system or technology is useful, therefore he or she will be more positive towards using the technology or system. On the other hand, perceived ease of use refers to the individual perception whether this technology can enhance their performance and is easy to use (Davis, 1989). The other construct that composites the model is, attitude, which refers to the individual attitude towards a new technology that is influenced by perceived usefulness and perceived ease of use. Meanwhile, another construct, i.e, behavioural intention to use, is a construct that depends on the user’s attitude that influences his or her use of a new technology (Davis, 1989).

### III. DISCUSSION

This section discusses the issues and limitations for several theories. Firstly, the diffusion of innovation has several weaknesses. In this theory, the category of a set of adopters is omitted in the adopter categorization on the basis of innovativeness. In the context of changes in technology, there are several adopters who are innovators or early adopters, but they are not quickly adopting the innovation (Downs & Mohr, 1976). Rogers (2003) found four criticisms of diffusion research which are pro-innovation bias, individual-blame bias, recall problem, and issues of equality. Besides that, another weakness of this theory is the one-way information flow which is from sender to receiver. When the sender wants to persuade the receiver, there is little or no reverse flow between them. Thus, one-way model is inconsistent and needs other multiple communication flows when the adopter receives information from many sources (Robert et al., 1996).

Secondly, Theory of Reasoned Action (TRA) also comes with several weaknesses. The behaviour in TRA must be voluntary whereby attitude and subjective norm depends on the individual’s decision. However, this theory is not suitable in an organizational context. TRA does not explain other behaviours such as those that are spontaneous, impulsive and habitual. This behaviour is excluded because their performance might not be voluntary (Bentler & Speckart, 1979). For instance, spontaneous behaviour needs special skills, unique opportunities and the cooperation in the organization. An individual may not perform a behaviour, probably because he or she lacks of certain skills, opportunity and cooperation from others, not because he or she voluntarily decides not to engage in the behaviour (Liska, 1984). Moreover, previous studies showed that only 40% of the variance of behaviour could be explained using TRA (Ajzen, 1991). Intention factors are not limited for attitude and subjective norm only, because other factors will also influence attitude. Additionally, TRA is a more general model compared to other technology acceptance theories, which are more complex such as
technology acceptance model, the theory of planned behaviour and others. TRA is a “predictive” model that predicts individual behaviour based on certain aspects (Ho et al., 2009). Unfortunately, person action is not the same as the prediction in TRA.

Thirdly, the limitations of Theory of Planned Behaviour (TPB) still exists although Ajzen (1991) has introduced new variable which is perceived behavioural control in TPB. There are several studies that have used TPB such as Marcoux and Shope (1997) which predicts the potential of TPB in regard to use, frequency of use and misuse of alcohol among eighth-graders, while Hanson (2005) used TPB to compare the predictors of cigarette smoking among African-American, Puerto Rican and non-Hispanic white teenagers. From the findings, TPB has been criticized because it cannot explain behaviour change and this theory also did not provide detailed information (Hanson, 2005). Another limitation in TPB is that it does not consider other external factors such as personality-related factors, cultural factors, and demographic variables which are important for shaping the individual behaviour. In addition, based on literature review findings, Ogden (2003) criticized that the variables in TPB such as subjective norm, attitude and perceived behavioural control were not adequately operationalized and showed low variance among the variables. Taylor and Todd (1995a) support this by criticizing that perceived behavioural control was not identified as the specific belief and may not consistently occur as predicted.

Finally, empirical research found innovation decision process has several limitations. This theory does not consider the possibilities that individual behaviour whether adopt or reject the innovation technology and indicates insufficient consideration for innovative characteristics and how these change over time (Wolfe, 1994). In addition, Charters and Pellegrin (1972) argued that nature of the utilisation of knowledge in diffusion of innovations is complicated by opposing direct adoption (replication) versus reinvention (adaptation). Based on the discussion above, there are several limitations arise in four models or theories especially in adopting the new technology. This study found throughout the decades, due to the robustness of the model, TAM has become well-established and has been adopted in numerous studies and documented in extensive literature especially in e-wallet context as shown in Table 2.1 below.

<table>
<thead>
<tr>
<th>Title</th>
<th>Studies</th>
<th>Subjects</th>
<th>Theory/Model</th>
<th>Proposed Antecedents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigating E-Wallet Adoption in India: Extending the TAM Model</td>
<td>Singh &amp; Ghatak (2021)</td>
<td>North Indian customers</td>
<td>Extended TAM</td>
<td>Risk, cost, compatibility, usefulness, ease of use, behavioral intention to use, actual usage</td>
</tr>
<tr>
<td>Investigating e-wallet Adoption of COVID19 Intra-period among Malaysian Youths: Integrated Task-technology Fit and Technology Acceptance Model Framework</td>
<td>Yaakop et al., (2021)</td>
<td>Malaysian youths</td>
<td>Extended TAM</td>
<td>Individual-technology fit, task-technology fit, perceived usefulness, perceived ease of use, perceived credibility</td>
</tr>
<tr>
<td>Factors Influencing the Use of E-wallet as a Payment Method among Malaysian Young Adults</td>
<td>Karim et al., (2020)</td>
<td>Young adults in Klang Valley of Malaysia</td>
<td>Extended TAM</td>
<td>Perceived usefulness, perceived ease of use, privacy and security, behavioural intention, actual usage</td>
</tr>
<tr>
<td>Factor Affecting Adoption of E-Wallet in Sarawak</td>
<td>Ming et al., (2020).</td>
<td>Respondents in Sarawak, Malaysia</td>
<td>Perceived usefulness, perceived ease of use, perceived risk, rewards, actual usage</td>
<td></td>
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<tr>
<td>Analysis of Factors That Affect Intention to Use e-Wallet through the Technology Acceptance Model Approach (Case Study: GOPAY)</td>
<td>Taufan &amp; Yuwono (2019)</td>
<td>GOPAY users in Indonesia</td>
<td>Extended TAM</td>
<td>Perceived security, perceived trust, intention to use, social influence, attractiveness of alternatives, perceived ease of use, perceived usefulness, perceived value, intention to use</td>
</tr>
<tr>
<td>E-Wallets: Diffusion and Adoption in Indian Economy</td>
<td>Lonare et al., (2018)</td>
<td>User proportion in metro and tier-2 cities in</td>
<td>Extended TAM</td>
<td>Perceived usefulness, perceived ease of use, attitude, behavioural intention to use,</td>
</tr>
</tbody>
</table>
The table above shows that numerous studies on e-wallet from five recent years are from 2017 to 2021. The findings show that TAM model is a dominant model and the most influential theory which is proven highly successful in empirical studies related to adapting new technologies such as e-wallet. This model is not outdated and most researchers extend TAM model with other theories (Singh & Ghatak, 2021; Yaakop et al., 2021; Karim et al., 2020; Ming et al., 2020; Taufan & Yuwono, 2019; Lonare et al., 2018; Seetharaman et al., 2017)

IV. CONCLUSION

The study discusses the basic five theories and concepts in technology adoption such as Diffusions of Innovations (DOI), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT), and Technology Acceptance Model (TAM). The findings show that there are several limitations on the four theories and the dominant theory which TAM is recently used by various researchers in examining the new technology adoption especially e-wallet among users. Researchers believe the discussion shows added valuable evidence in the area information systems and the extended TAM will continue to grow and accommodate the adoption of latest technology among users. There are abundantly research opportunities for future researchers to expand this study by other theory or model related to online financial transactions. Last but not least, this study also gives beneficial information to the merchant on the variety factors that have affected the customers’ preferences towards e-wallet adoption.

REFERENCES