PERSUASIVE SYSTEMS DESIGN FEATURES FOR PROMOTING INSURANCE THROUGH E-WALLET PENETRATION

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By

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ABSTRACT

PERSUASIVE SYSTEMS DESIGN FEATURES FOR PROMOTING INSURANCE THROUGH E-WALLET PENETRATION

Yeh Jia Yee

In Malaysia, a significant societal issue persists—the prevalence of a heavily underinsured population, specifically medical and health insurance. The primary contributors to that dissatisfying situation include the demand-supply gap, distribution network gap and security gap. Given these obstacles, insurtech offers an alternative option for the underinsured population to obtain systematic risk protection at a more affordable cost and flexible contract. Nevertheless, the advent of insurtech has not received welcoming responses from the prospects. The persisting issue of the low insurtech penetration rate paves an avenue to study the role of system design within the context of e-wallet mobile applications.

Thus, the present study investigates the persuasive system design (PSD) principles implemented in e-wallet mobile applications to convince users to purchase insurtech products through a Touch ‘n Go (TNG) eWallet case study. The research objectives are: (1) To evaluate the PSD features applied to TNG eWallet based on the design criteria of the PSD model (2) To study the influence of those PSD principles applied toward the perceived persuasiveness among the Malaysian population and (3) To examine the influence of the perceived

persuasiveness toward purchase intention of insurance products among the Malaysian population. Adopting TNG eWallet as the case study, the present study utilised purposive sampling to explain how persuasive system design features in e-wallets influence users to purchase insurance products. The study employed a survey questionnaire and recruited a total of 404 samples to participate in the study. The quantitative collected through survey questionnaires are analysed through PLS-SEM.

The research findings asserted that Primary Task Support and Dialogue Support do not necessarily contribute to perceived persuasiveness, while Social Support and System Credibility Support do contribute to persuading users to purchase insurtech offerings. The design principles are proven to have interrelated impacts among themselves. Along with that, it is suggested to pay particular attention to principles lying under the System Credibility Support and Social Support in the context of e-wallet mobile applications. Enhancing the trust-building features and social engagement functionalities fosters a greater motivation to translate the e-wallet active users into medical and health-protected consumers, thereby enhancing financial inclusivity.

Keywords: e-wallet, insurtech, persuasive system design, intention to buy, PLS-SEM

Subject Area: HF5410-5417.5 Marketing. Distribution of products

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SUBMISSION OF THESIS

It is hereby certified that ***Yeh Jia Yee*** (ID No: ***23UKM0605***) has completed this thesis* entitled "*PERSUASIVE SYSTEMS DESIGN FEATURES FOR PROMOTING INSURANCE THROUGH E-WALLET PENETRATION*" under the supervision of Dr Seah Choon Sen from the Department of International Business, Faculty of Accountancy and Management, and Ms Loh Yin Xia from the Department of Accountancy, Faculty of Accountancy and Management and Dr Low Mei Peng from the Department of International Business, Faculty of Accountancy and Management.

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Yours truly,

Yeh Jia Yee

(YEH JIA YEE)

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AIC_3	Modified Akaike's Information Criterion With Factor 3
AIC_4	Modified Akaike's Information Criterion With Factor 4
AM	Alternative Model
ANN	Artificial Neural Network
AVE	Average Variance Extracted
B2B	Business-to-business
B2C	Business-to-consumer
BCSS	Behaviour Change Support System
BIC	Bayesian Information Criterion
BNM	Bank Negara Malaysia
CAIC	Consistent Akaike's Information Criterion
CB-SEM	Covariance-based Structural Equation Modeling
CI	Critical Illness
CSV	Comma Separated Values
CTA	Confirmatory Tetrad Analysis
CVPAT	Cross-validated Predictive Ability
DITO	Digital Insurers and Takaful Operators
DOSM	Department of Statistics Malaysia
DS	Dialogues Support
EM	Established Model
EN	Normed Entropy Statistic
FIMIX-PLS	Finite Mixture Partial Least Square
HTMT	Heterotrait-Monotrait
IB	Intention to Buy
IMD	International Institute for Management Development
IMF	International Monetary Fund
LM	Linear Regression Model
MAE	Mean Absolute Error
MAPE	Mean Absolute Percentage Error
MDEC	Malaysia Digital Economy Corporation
MDL5	Minimum Description Length With Factor 5
MHI	Medical and Health Insurance
NCA	Necessary Condition Analysis
NFC	Near Field Communication
PDPA	Personal Data Protection Act
PLS-SEM	Partial Least Square Structural Equation Modeling
PP	Perceived Persuasiveness
PSD	Persuasive System Design
PTS	Primary Task Support
QR	Quick Response

RFID	Radio Frequency Identification
RMSE	Root Mean Square Error
SCS	System Credibility Support
SEM	Structural Equation Modeling
SS	Social Support
TAM	Theory of Acceptance Model
TNG	Touch' n Go
TPB	Theory of Planned Behaviour
TRA	Theory of Planned Behaviour
UTAR	Universiti Tunku Abdul Rahman
VIF	Variance Inflated Factor

CHAPTER 1

INTRODUCTION

1.1 Introduction

This research investigates the persuasive system design (PSD) principles in e-wallets to persuade users to purchase insurtech products. This chapter entails the research background of fintech, downscoping to insurtech. Subsequently, this chapter entails the research problem, research aim, research questions, research objectives, research scope, and research significance. The terms used in this research are explained along with the research scope.

1.2 Fintech

Over the last decade, technology development has sparked profound transformation in multiple sectors of industries, including reshaping the financial services industry (Anand & Mantrala, 2019; Arner et al., 2016). The marrying of financial services and technology innovation is commonly known as financial technology, or in short fintech (Belozyorov et al., 2020; Gomber et al., 2017; Imam et al., 2022; Milian et al., 2019; Taherdoost, 2023; Zavolokina et al., 2016).

Fintech has upended the manner of financial institutions offering innovative products and services to consumers (Anifa et al., 2022). The

technological transition introduces captivating innovations including peer-to-peer lending, equity crowdfunding, cryptocurrencies, remittance, digital banking and digital marketplace which enhances the competitiveness in global financial markets (Fintech News Malaysia, 2022c; Taherdoost, 2023). Not to mention the introduction of artificial intelligence to make more accurate decisions at a faster rate with the aid of algorithms and big data, the process of credit risk assessment, fraud detection, and personalised quotation based on consumers' preferences and behaviour are conducted in real-time (Harsono & Suprapti, 2024). The technology-aided process in the domain of finance does not only assist financial institutions in making informed decisions in response to consumers' individual needs (Gomber et al., 2017; Milian et al., 2019; Taherdoost, 2023), the consumers are proven with superior satisfaction due to the enjoyable experience when engaging with fintech (Chen et al., 2023; Harsono & Suprapti, 2024; Lian & Yoong, 2023; Mainardes et al., 2023). In essence, fintech reaps the benefits from the catalysed transformation of financial services towards more efficient operations with the aid of technologies.

Under the wide array of technology-based financial services available in the financial market to date, the present study sheds light on digital payment. The background of digital payment is covered in the following subchapter.

1.2.1 Digital Payment in Asia

Information technology is inevitable and has integrated into daily human life in the era of digitalisation. Digital payment simply means to replace the conventional payment of using notes and coins. The present study specifically

focuses on e-wallets, or an electronic channel used for financial transactions made online through computing devices, including computers, smartphones or tablets.

In today's world, the e-wallets that exist in the form of cashless transactions have welcomed popular demands worldwide. The subsequent discussion addresses China, Hong Kong and India for their remarkable achievement in fintech landscape from the global viewpoint. Across the entire Asia Pacific, China recorded leading statistics in e-wallet adoption attributable to the vast number of smartphone users (Fintech News Singapore, 2022). Reliable statistics highlighted that more than 60 per cent of the overall population is habituated to paying for their daily expenditures with an e-wallet (Daxue Consulting China, 2022). By far, Alipay and WeChat Pay, which are owned by Ant Financial and Tencent Holdings respectively, recorded substantial user bases, making China the largest for proximity mobile payment use (Statista Research Department, 2024). Low-cost internet access services that are widely accessible and made possible by swiftly developing world-class digital infrastructure are essential to China's development towards becoming a digital behemoth in e-commerce and internet-based services (Jiang & Murmann, 2022). Notwithstanding that, the development of fintech in China leaps into the front ranks of the world by integrating technological innovations as a whole. Big data, cloud computing, biometric security, and artificial intelligence maintained exceptionally smooth and stable growth, while blockchain technology did magnificently with rapid growth (Jiang & Murmann, 2022). Of these, big data analysis, interconnection technology, and cloud computing accounted for the largest part in the case of China (Yong, 2023).

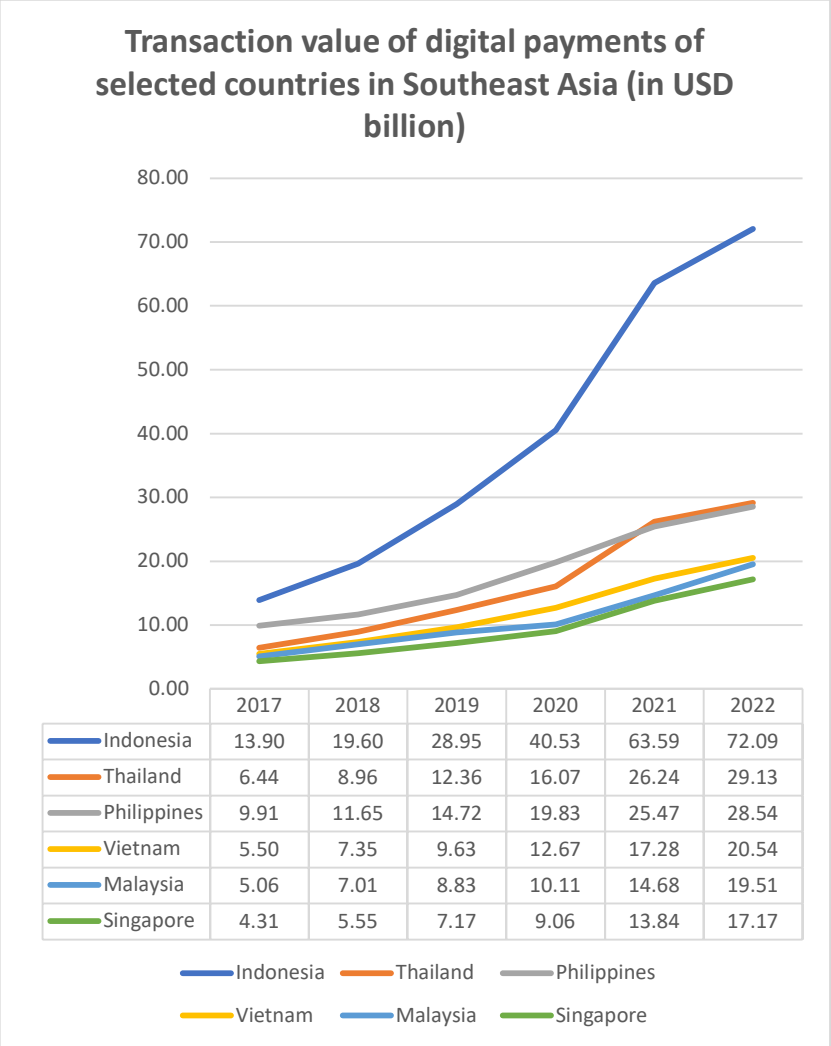
Similarly, it can be seen that the Hong Kong Monetary Authority is sparing no effort in preparing a conducive environment to motivate fintech, increasing the readiness in issuing Central Bank Digital Currencies, promoting the commercial banks to adopt fintech in their recent “All banks go fintech” strategy, enhancing the existing data infrastructure, increasing the supply of fintech talent and reinforcing the status of Hong Kong as a financial, commercial and innovation centre (Hong Kong Monetary Authority, 2022). The devotion of effort by the government authority in Hong Kong, which is responsible for maintaining monetary and banking stability, is incredible. Additionally, Hong Kong manages to capture advantages of the construction and development of the Guangdong-Hong Kong-Macao Greater Bay Area for the sake of fintech advances (Yong, 2023). With that, Hong Kong is staying abreast of technological advancements and leading Asia as a fintech hub.

Not to forget, the fintech industry in India is experiencing sizeable development. In recent years, India has been one of the most important operational nations for harbouring a booming fintech landscape among the South Asia countries (The Hindu, 2024). Scholarly articles underscore how the development of FinTech as a state-backed, tech-driven "Tech-Fin-State" ecosystem has been made possible and influenced by the export-oriented information and communication technology industry, the implementation of extensive, open digital infrastructures, and supporting regulatory frameworks (Gahlot & Ghosh, 2023; Migozzi et al., 2024; Morgan, 2022; Raj & Upadhyay, 2020). Together with geographic trends and investment networks that have made New Delhi and Bangalore global FinTech hubs before Mumbai, and regulatory focus on combining various laws into codes, the digital payment

industry has been identified as the main driver of India's growth in digital capacity and has greatly aided the nation in gaining a sizeable market in the fintech space (Gahlot & Ghosh, 2023; Haralayya, 2021; Migozzi et al., 2024).

1.2.2 Digital Payments in Southeast Asia

In 2021, the world witnessed the fastest development in the usage of financial services in Southeast Asia (Fintech News Singapore, 2021; Singapore Economic Development Board, 2021). With some of the fastest-growing economies in Asia, Southeast Asia is a particularly vibrant area for advances in digital payments. Traditional banks, fintech firms, and governments are working together to develop safe, effective, and inclusive payment options for a range of demographics. Notably, e-wallet payments have accumulated significant growth by one percentage point (Fintech News Singapore, 2021). Based on Figure 1.1, aside from Indonesia, a few countries in Southeast Asia are taking baby steps to popularize digital payments. The succeeding discussion covers Indonesia and Singapore for their outstanding performance in fintech industry across the Southeast Asia.



	2017	2018	2019	2020	2021	2022
Indonesia	13.90	19.60	28.95	40.53	63.59	72.09
Thailand	6.44	8.96	12.36	16.07	26.24	29.13
Philippines	9.91	11.65	14.72	19.83	25.47	28.54
Vietnam	5.50	7.35	9.63	12.67	17.28	20.54
Malaysia	5.06	7.01	8.83	10.11	14.68	19.51
Singapore	4.31	5.55	7.17	9.06	13.84	17.17

Figure 1.1: Transaction Value of Digital Payments of Selected Countries in Southeast Asia

Source: Statista Digital Market Insights. (2022).

The steep adoption of digital payment in Indonesia is deemed a rising star and has caught the attention of scholars in the ongoing progression of the body of academia. With 274 million populations, 84% of whom are under the age of 54, Indonesia is the fourth most populated country in the world and has the 16th biggest economy in the world (Fintech News Indonesia, 2021). According to Romero (2024), the number of registered fintech companies in

Indonesia experienced a skyrocketed growth in 2021 and achieved 336 units in 2023. Indonesia is expected to surpass all other fintech hubs in the area by 2025, with a projected market value of USD 130 billion (Yong, 2023). Scholarly articles suggested that the high Internet penetration rate in Indonesia contributed the most to the fintech adoption (Ariansyah et al., 2021; Nugraha et al., 2022; Setiawan et al., 2021; Sunarjo et al., 2021). Backed by solid facts and figures, According to the Indonesian Internet Service Providers Association, the nation's internet penetration rate increased from 78.1 per cent in 2023 to 79.5 per cent in 2024, indicating a surge in digital technology accessibility and use (Santoso, 2024). Moreover, the e-wallet penetration for financial inclusion in Indonesia is attributed to several underlying elements, including major motivators, infrastructure preparedness, and people's opinions on the security and safety of mobile transactions (Ciptarianto, 2022). A committed government that has enacted regulations in areas like peer-to-peer lending, digital payments, and most recently, open banking, in an effort to promote innovation and enhance financial inclusion, has been a major factor in Indonesia's rapidly expanding fintech industry (Kharisma, 2021; Muthukannan et al., 2021; Noor et al., 2023; Utami & Ekaputra, 2020). By bridging the gap between banks and non-banks, open banking has the potential to transform electronic transactions through open application programming interfaces, improving loans, payments, investments, and the distribution of funds (Gozman et al., 2018; Iman et al., 2023). These contributors altogether leverage the adoption of digital payments in Indonesia.

Acting as an international trade hub, an Asian financial centre, and a place of strategic importance for technological innovation, the fintech industry in Singapore sustained its swift development while solidifying the nation's

standing as a pioneer in digital payment innovation or “a regional financial capital” (Lin, 2019). Exemplary, with an emphasis on connecting its PayNow real-time payment system with those of its major Southeast Asian neighbours, Singapore carried on advancing payment connection in 2024 (Fintech News Singapore, 2024; Tan, 2022). Singapore also strives to redefine the digital banking experiences for the future by offering greater choice, more personalised financial solutions, and enhanced accessibility to its users. It is observed that five digital banks including GXS Bank, MariBank, ANEXT Bank, Green Link Digital Bank, and Trust Bank have joined the market since Singapore's first digital bank was introduced in 2022, upending established banking practices and reviving fintech innovation in the country's financial sector (Rowena, 2024). Attributable to the well-thought regulatory sandbox that facilitates trial-and-error in developing fintech products, it subsequently manifests a conducive fintech environment (Chen, 2019; Fan, 2018; Imam et al., 2022; Lin, 2019).

1.2.3 Digital Payment in Malaysia

This chapter refines the scope and spotlights the current development of digital payment in Malaysia. Based on the research by Google Temasek and Bain (2022), digital payments in Malaysia are projecting stable growth from 2019 to 2022 and are likely to continue their momentum in 2025. Meanwhile, e-wallet alone registered a sizeable growth rate of 74.4 per cent in 2021 (Bank Negara Malaysia, 2022a). Malaysia is solidifying its stance as a prominent participant in the fintech sector (Loh et al., 2021).

As e-wallet manages to meet the needs of current users seeking a cost-efficient and hassle-free solution, consumers worldwide opt to adopt e-wallet for their daily financial transactions like buying groceries, shopping online, and sending money abroad. Payment using e-wallet leverages more significant cost savings and efficiency by 1 per cent of the Gross Domestic Product annually and reduces the risk of leakage to the shadow economy via licit activities like tax evasion, money laundering, and corruption; it hypothetically enhances the competitiveness of Malaysia (Lee & Khaw, 2018).

By acknowledging the benefits of e-wallet payments, Bank Negara Malaysia [BNM] constantly reviews its policies and proposes several approaches to cultivating a conducive environment for digital payment. To capture the tech-savvy audience, BNM posted short videos and infographics on their social media account to publicise the financial education and awareness programme to avoid financial scams and frauds (Bank Negara Malaysia, 2022a). Not only that, but BNM also partnered with key stakeholders, the Ministry of Domestic Trade and Consumer Affairs and the Federal Agriculture Marketing Authority, to expand the adoption of e-wallets among young Malaysia students, and micro and small enterprises in selected areas (Bank Negara Malaysia, 2022a). This dynamic development has compelled conventional businesses to incorporate fintech into their business model to join the bandwagon of the modern financial industry.

In Malaysia, e-wallet dominates the application of fintech with 19% (International Monetary Fund, 2020). Recent statistics have clearly shown that the number of users of e-wallets in Malaysia has grown substantially from 2020 to 2021 across three main channels, namely GrabPay, Touch ‘n Go (TNG), and

Boost (Best, 2021). Even in the traditional wet market, e-wallet payments are viable; as a news article shows, 60 per cent of the merchants in Kuala Terengganu, Malaysia, are utilizing e-wallets (Ismail, 2021). In an effort to promote e-wallet payment, Touch 'n Go Group has collaborated with Shell Malaysia to officially introduce automatic cashless payment at Shell stations (Lye & Jayabalan, 2022). It is believed that the cooperation made digital payment more accessible in multiple places. The well-combined innovation of an RFID and e-wallet infrastructure enables consumers to avoid any form of contact by enabling zero interaction with the mobile application or engaging with the point-of-sale system (Lye & Jayabalan, 2022). Apparently, e-wallet has successfully immersed in the daily use of Malaysian consumers and embraced higher acceptance than other fintech innovations, attributable to the explosion of the COVID-19 pandemic and vigorous enforcement of cashless payment by the government during the Movement Control Order (The Star, 2020).

Back then, it was believed that cashless payment was effective in breaking the chain of spreading viruses as the mutated coronaviruses can survive nearly a month at room temperature or transferred between contaminated skin and a fomite surface (Kelleher, 2020; Riddell et al., 2020; The Times of India, 2020). Particularly on paper notes, related findings are remarkably important, given the frequency of circulation and the possibility for the transmission of viable viruses, including individuals and geographical areas (The Times of India, 2020). It is undeniable that the fear of physical touch, coupled with strategic initiatives, has reaped the leap to the introduction of digital payment to a broader audience in Malaysia.

1.3 Insurtech

As the fintech revolution continues to manifold, it permeates the insurance sector with endless opportunities. This transition denotes a paradigm shift in how insurance products are conceptualised, created, and offered to consumers, which is also referred to as 'insurtech'. The insurtech, describing an innovative solution, enables a disruptive phenomenon that has reshaped the way traditional insurance practices are conducted. This chapter discusses the backdrop of insurtech.

Insurtech, being one of the divisions across the fintech industry, shed light on the delivery of insurance solutions (Stoeckli et al., 2018; Yan et al., 2018). Modern technology innovations are combined with established insurance practices to establish insurtech, covering inherently complex procedures from risk assessment, underwriting, claims or other value-added services. Although insurtech has existed for an extended period of time, its influence has recently been more apparent due to how rapidly digital developments are changing the insurance industry (Chang, 2023).

Evidently, there are two schools of thought in relation to the insurtech industry. Some scholars perceive that the technology-based finance industry represents evolutionary changes leading to incremental developments of insurance products and services (Anand & Mantrala, 2019; Birnbaum et al., 2005; Hua et al., 2019; Thomond et al., 2003). On the other hand, scholars recognise the integration of technology and the financial industry as completely distinct products and services that are positioned with different values in the market (Birnbaum et al., 2005). The debates over the definition of insurtech are

persisting. Aligning with Stoeckli et al. (2018), the present study does not limit the insight on insurtech being either disruptive or incremental innovations to avoid any potential biases.

The core idea from fintech to insurtech is to enhance personalisation, simplicity and connectivity in order to accentuate seamless consumer experience (Yan et al., 2018). The core mechanism is similar for both traditional insurance and insurtech. By way of explanation, the underlying concept for both traditional insurance and insurtech is to evaluate the risk and transfer the risk to an insurance coverage provider, or insurer. The risk transferred to the insurer will be charged with a corresponding amount in exchange for the protected one, which is commonly regarded as the premium. In case any unfortunate occurs, the covered risk will be paid with a sum of money, which is known as a claim. Hale (2022) opined that insurance is an agreement between the insurance company and the consumers. Constant assessment of the core principles within insurtech is essential to deliver the essence of products in instances of loss and harm (Hale, 2022).

1.3.1 Insurtech in Post-Covid Era

Insurtech has been in the digital economy and has grown pronouncedly attributable to the onset of the COVID-19 pandemic (Jermer, 2021). The traditional manner of engaging the consumers in person contravenes the implementation of lockdowns and social distancing measures. Alternatively, the insurance agents were prompted to adjust their communication strategies to

align with the circumstances. Similarly, it applies to digitalising complex underwriting procedures.

The outbreak of the COVID-19 pandemic is undoubtedly leaving a permanent impact on humans in this era. Humans experienced the unprecedented pandemic. Fast forward to the current situation, humans are in the post-COVID-19 era. Volosovych et al. (2021) identified the possible development of insurtech in the post-covid era. To sum up, the literature reviewed shows that the present study is confident in its belief that the consumers' perception of insurance is changing after experiencing the dramatic crisis.

On the other hand, the world is welcoming Industrial Revolution 4.0 with the vigorous shift from the manufacturing paradigm to digital manufacturing (Fakhar Manesh et al., 2021). Similarly, insurers worldwide are shifting their respective thoughts from whether to cooperate to the model and scale of cooperation (Volosovych et al., 2021). It can be clearly seen that the change is imperative for insurers to capture the trend of digitalisation. Precisely, they have recognised the importance of integrating insurance with technologies. According to Levertov (2021), consumers' expectations in relation to financial services have shifted to the facilitation of rich access. This subsequently draws attention to the use of technology tools in all phases of the insurance process. To be precise, the focus of insurers sheds light on the integration of technology, varying from digital distribution, risk assessment, underwriting, claims processing, and value-added services.

Based on the aforementioned discussion on insurtech upon the impact of the post-COVID effect and Industrial Revolution 4.0 dynamic, the digital

economy is inevitably revamping the insurance value chain and presenting a forceful trajectory in cultivating the industry association. Therefore, the development and growth of the insurtech are worth attentive concern to increase the uptake of insurance protection. The following subchapter provides the landscape of current insurtech offerings available in the market.

1.3.2 Insurtech Industry in Malaysia

Getting oneself protection in case of any unfortunate event and paying a sum of compensation when an accident happens are examples of engaging with insurance. This is not new, but wholly integrating insurance via digital technologies or electronic means is.

Nonetheless, insurtech welcomes a notable increase in Malaysian registered companies in 2022. Based on Figure 1.2 below, insurtech registers 9% in the entire landscape of fintech after payment, lending, and e-wallet. This implies that the supply of digital insurance is occupying a remarkable share of the market. In other words, a wide array of insurance products is expected to be offered to the Malaysian population. To stand out from the competition, the insurtech providers introduced different specifications of insurance products to their targeted audience. As such, the Malaysian population should be able to get a suitable policy according to their respective needs and demands. Meanwhile, it also helps to address the needs of the unserved and underserved, which is in accordance with the continued work of the central bank to support better financial inclusion.

The enlightened situation is attributable to the great effort of the Central Bank Malaysia, or BNM in early 2022. The release of a discussion paper on the licensing framework for Digital Insurers and Takaful Operators (DITO) reflects strong encouragement to promote digital innovation in the insurance and takaful industry. According to Tan Sri Batuk Nor Shamsiah Mohd Yunus, the Governor of BNM, it is anticipated to attract novel digital players who aim to provide innovative solutions addressing crucial protection gaps within both unserved and underserved market segments (Fintech News Malaysia, 2022a). Meanwhile, it is also expected to enhance the overall customer experience and foster increased levels of trust (Fintech News Malaysia, 2022a), as insurtech offerings provide exclusive transparency and seamless payment methods rather than cash and cheques. The framework clearly focuses on advancing significant innovation, progressing financial inclusion and prompting consumer interest. Along with that, it is expected to welcome more affordable and accessible insurance products that are personalised for the niche. Associated with the heightened awareness of the need for insurance products accompanied by the occurrence of the COVID-19 pandemic, this is believed to aid the unserved and underserved segments.

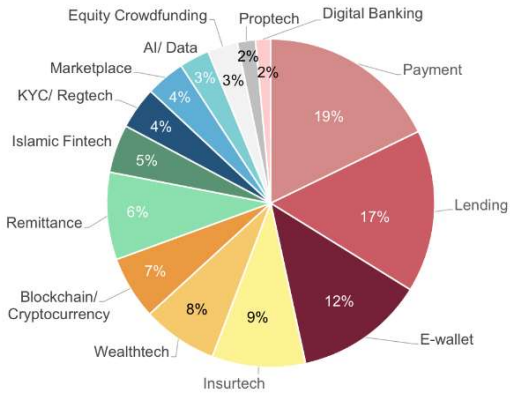


Figure 1.2: Malaysia's Fintech Landscape

Source: Fintech News Malaysia. (2022, July 18).

With the intense competition among e-wallets, financial institutions made wise decisions to keep up with the time by collaborating with fintech startups. According to IMF (2020), there are more than ten leading insurers, and Islamic companies have made successful collaborations with fintech startups. The succeeding subchapter illustrates one of the most successful integrations of digital payment and insurtech in the context of Malaysia.

1.3.3 Touch ‘n Go eWallet Entering Insurtech

Fintech platforms, especially those involved in payment processing, lending, or financial management, are observed marrying digital insurance services directly into their platforms. This provides enhanced ease for consumers to access insurance options while using the fintech services with which they are already familiar. In the context of Malaysia, TNG eWallet is one of the most successful cases of collaboration and partnership between fintech

and insurtech. Being the bellwether in the fintech industry in Malaysia, Touch ‘n Go eWallet is undoubtedly capturing the largest market share by owning more than 16 million registered users (Goh, 2021).

In order to integrate with the toll systems at North-South Expressway, the Touch ‘n Go eWallet has introduced its first merchandise, the Touch ‘n Go Near Field Communication (NFC) card, which allows users to manage the card via smartphone applications. The improvement is constructive for the people in Malaysia since Touch ‘n Go is made available for every toll payment on highways. Summing up, Touch ‘n Go is imposing a significant impact on society.

TNG eWallet, operated under TNG Digital Sdn Bhd, has confirmed its cooperation with AIA Malaysia, one of the industry leaders in the insurance field (AIA Bhd, 2021). In 2021, AIA Malaysia issued a press release. It delightfully announced the formation of a long-term strategic partnership with Touch ‘n Go to provide digital insurance solutions to the users of Touch ‘n Go eWallet (AIA Malaysia, 2021). The partnership is expected to deliver a convenient yet easy manner to protect users with a structured policy. The Group Chief Executive Officer of Touch ‘n Go Group, Effendy Shahul Hamid, commented upon the expansion of Touch ‘n Go eWallet into the more excellent prospect of financial services (AIA Malaysia, 2021). In doing so, Touch ‘n Go proudly proclaimed its development into financial services, along with the strategic participation of AIA Malaysia.

As increased health consciousness fires up the awareness of getting an insurance product, such strategic partnership comes in handy by allowing brilliant digitalisation and transformation of the insurance industry. At the same

time, it also enables the Malaysian population to secure themselves with the required coverage. With that, TNG eWallet launched several insurance products, including SafeTrip (Touch ’n Go, 2022). In conjunction with travelling borders open in many countries, they continue to impose some stringent rules and regulations pertaining to the COVID-19 issue. Plus, different requirements implemented across the globe are a headache for those who travel frequently. With that, SafeTrip, with its affordable pricing and convenient registration, of course, provides the traveller with hassle-free protection. Touch ‘n Go eWallet enables users to get instant quotations with a few important details related to the trip and make payments through the e-wallet, which differentiates them from traditional insurance signing. Apart from travel-based insurance, TNG Digital Sdn Bhd is proud to announce a novel personal insurance product for individuals named Critical Illness (CI) Insure. According to Touch ’n Go Sdn Bhd (2023), “CI Insure is a non-guaranteed yearly renewable critical illness insurance product which provides coverage for five main Advanced Stage Critical Illnesses, Lifestyle Assistance Allowance, and Personal Medical Case Management (PMCM) Service upon diagnosis of covered critical illnesses.” The protection amount can go up to RM100,000 for Advanced Stage Critical Illness Benefits and RM5,000 for Lifestyle Assistance Allowance Benefits per month, depending on the premium plan selected (Touch ’n Go Sdn Bhd, 2023). With its monthly quotation as low as RM10, CI Insure is much more affordable. After all, the low threshold to secure insurance protection allows more underinsured and uninsured individuals to get themselves a basic policy when unfortunate things happen.

To date, TNG has released six types of protection: CarInsure, MotoInsure, CI Insure, WalletSafe, SafeTrip, and SafeHome. Based on the insurtech product classification term provided by Bank Negara Malaysia (2024), the insurtech offerings provided are considered general insurance. Specifically, there are two branches under general insurance via a digital platform, namely general insurance with the exclusion of Medical and health insurance (MHI) and MHI (Bank Negara Malaysia, 2024). These insurance offerings vary based on the product nature or description, and disclosure requirements for the insurtech products at different stages including the pre-contractual stage, entering into the contract stage, during the term of the contract stage, as well as the cessation of contract stage. Besides CI Insure, the insurtech protections offered by Touch' n Go are considered general insurance with the exclusion of MHI. Otherwise, the CI Insure falls under the MHI.

1.4 Problem Statement

One of the significant social issues in Malaysia is the low penetration of insurance uptake in the MHI sector. A prior study analysed the National Health and Morbidity Survey 2015 and found that more than 55% of the Malaysian population was underinsured (Balqis-Ali et al., 2021). According to Redzuan et al. (2016), it is suggested that the average mortality protection gap for each family member, or the extent to which families are underinsured, is within the range from RM100,000 to RM150,000, holding the assumption of each household in Malaysia consists of 5 members (parents and three children). Notwithstanding, considering inflation over the years, the ideal sum assured per

capita has correspondingly increased. Simultaneously, in the latest annual report released by Bank Negara Malaysia (2023a), the institution specifically highlights the concern of MHI. Backed up with clear facts and figures of the rising medical cost inflation and escalating utilisation of medical services (Aon, 2024), the consumers are undoubtedly in greater need of MHI in exchange to ensure wider healthcare access and financial security while unfortunate happens.

PwC Malaysia (2023) pointed out that MHI is the most required insurance product among the uninsured population amidst the investigation of insurance inclusivity in Malaysia. Delving deeper into the problematic societal issue, PwC Malaysia (2023) found that more than 85% of the uninsured aged between 18 and 34 years old. The importance of having MHI is manifold. A classic study identified the beneficial effects of having MHI, by reducing the probability of inability to pay for medical bills that are deemed necessary, especially when one reports enduring poor health, chronic conditions or worse physical functioning (Ross & Mirowsky, 2000). Individuals who fall sick and are in need of financial assistance may resort to paying their medical bills with MHI. Worse to worst, provided that the breadwinner of a family is in impaired condition for work but cannot afford to miss work, MHI comes into place to protect the household budget from expensive medical bills (Ross & Mirowsky, 2000). Furthermore, a prior study asserted that uninsured populations often lose track of routine check-ups and preventative screening due to burdensome bills (Rahman et al., 2021). In short, the uptake of MHI is important to aid individuals in facing economic hardship when undesirable happens.

One of the main contributors to that dissatisfying situation is the distribution network gap. PwC Malaysia (2023) highlighted consumers'

difficulties in assessing insurance products as the primary obstacles to promoting financial inclusion in Malaysia. At the same time, the BNM proposed additional possible reasons for that, including low productivity, limited geographical reach of the agency network and the extensive focus of bancassurance channels on products targeted at wealthy consumers (Fintech News Malaysia, 2022). Given the clear-cut evidence associated with traditional distribution networks, the innovative insurtech solution appears as an intervention to enhance the accessibility of MHI via digital payment channels. By addressing the distribution network gap, it is possible to promote the MHI uptake among the underinsured population through digitalised solutions. As such, the user-friendly interface with interactive tools for product comparison and selection, while leveraging convincing messages to guide consumers through the purchase process would have a significant effect on consumers' intention to buy MHI through the digital payment channel. Therefore, the investigation of persuasive system design, specifically the Dialogue Support principles of e-wallet mobile application is deemed mandatory.

Furthermore, the researcher identified a mismatch between consumers' needs and traditional insurance offerings. Most of the underinsured consumers claimed that they were unable to afford expensive insurance premiums and fixed commitments (PwC Malaysia, 2023). In addition to that, as the underinsured consumers age, the insurance premium is increasingly burdening to them. The demand-supply gap is further widening as consumers nowadays have growing concerns about product relevance (Yao et al., 2023). Simply put, consumers have raised concerns about the structural value of getting protected systematically. As consumers evaluate insurance options, they are not only

focusing on the surface-level benefits but also delving into the underlying structures and mechanisms that dictate the scope and effectiveness of coverage. Consumers want to establish that their chosen insurance policies align with their individual needs and offer robust protection across diverse scenarios. This explains that the days of traditional MHI have passed. To elaborate on this, it is vital to understand that traditional MHI typically evaluates an individual's risk based on basic factors including age, gender and smoking habits factor and provides a quotation correspondingly. Under certain circumstances, a medical health report may be required, yet not compulsory for all cases. However, the traditional manner of evaluating risk does not represent a personalised solution to the consumers. This old-school method of evaluating risk for an individual is rather considered as a templated solution for a group of consumers who have alike characteristics. The underlying issue within the traditional MHI is its low flexibility in catering to individuals' needs and the overlook of an in-depth personal lifestyle. Subsequently, it provides the insurtech offerings with lucrative opportunities as a pioneering business model to improve the MHI penetration rate, aligning with the vision and mission of the central bank of Malaysia (Bank Negara Malaysia, 2019). Therefore, the insurtech solution integrated with a persuasive system design to highlight the relevance and benefits of MHI would increase the consumers' demand and narrow the supply gap. Along with that, it would potentially close the insurance protection gap. This further necessitates the present study to investigate the persuasive system design, specifically referring to Primary Task Support in relation to users' perceived persuasiveness on the insurtech solution.

Not only that, but the researcher also identified a security gap that existed in traditional insurance. With the brick-and-mortar mode of distribution, consumers used to receive information about insurance through the bancassurance channel or the insurance agency. In other words, the bancassurance personnel or insurance agents often have the best knowledge of the insurance products, while consumers may score low on financial literacy. This implies that there is potential information asymmetry bias as the bancassurance personnel or insurance agents might deliver information that is in favour of his or her interest. This caused appalling insurance scam cases to abound (Mat Arif, 2023; Olano, 2022). This makes the consumers' accessibility to the faithful agent even more difficult. As the insurtech industry moves into bits and bytes, the consumers now have greater bargaining power and authority to acquire information and knowledge about insurance. Simply put, the appearance of a digital platform as an intermediary increases transparency while conducting transactions. Along with that, it is worthwhile to explore the integration of persuasive system design, specifically Social Support and System Credibility Support in relation to the establishment of security and reliability.

However, stemming from the idea that the underinsured population is often characterised as less digitally savvy, it is not always accurate to make such an assumption. It is important to note that underinsured populations often remain less protected by systematic protection due to barriers in assessing traditional bancassurance or intermediaries like insurance agents (PwC Malaysia, 2023). Nonetheless, it does not necessarily imply that the underinsured population lacks digital competency. Consistently, it is observed that the Malaysian population is considered digitally savvy. According to

Malaysia Digital Economy Corporation [MDEC] (2022), citing the International Institute for Management Development [IMD] (2022), Malaysia stands strong in terms of digital readiness. Globally, Malaysia ranks 27th and 30th in 2021 and 2022, respectively, which in turn indicates exceptional digital savviness. The disparity in insurance coverage is less a result of digital incompetence and more a consequence of broader accessibility challenges that the underinsured population faces. As such, the assumption that digital proficiency is lacking among the underinsured warrants careful re-evaluation in light of the broader digital landscape in Malaysia.

Simultaneously, it is crucial to acknowledge the presence knowledge gap in the body of academia. The uncertainty in selling and marketing insurance offerings through digital platforms presents exciting opportunities and, at the same time challenges that are yet to be discussed. Previous research conducted on the traditional insurance industry in Malaysia has been centred around examining the influence of persuasion as a mediating variable in shaping the demand for insurance among policy buyers (Swee et al., 2021). Notably, insurance agents have emerged as key influencers in the persuasion process, effectively communicating the value and benefits of insurance to potential customers. Undoubtedly, these prior investigations have made valuable contributions to the body of academic knowledge. However, it is essential to acknowledge that the scope of these studies has predominantly revolved around the traditional insurance industry. This inherently presented the uncertainty in consumer behaviour and preferences when the research context emerged to purchase insurance through digital platforms. As the era of the digital economy has revamped the insurance industry, the present study shed light on the digital

distribution of insurance offerings to capture the evolving dynamic in the fintech landscape.

A recent study identified the driving factors of users' acceptance of fintech services in Malaysia on an explanatory basis (Hassan et al., 2023). The study confirmed that system quality significantly increases the potential of users' intention to use fintech services and contributes the most to behavioural intention to use fintech services. This study extends the findings from prior studies and delves deeper into the context of system design to determine the perceived persuasiveness among users as well as their behavioural intention to purchase insurance through an e-wallet mobile application.

On the other hand, research studies that implement the PSD on health-related websites and mobile applications are common and comprehensive. For instance, Meedya et al. (2019) evaluated the existing breastfeeding mobile applications, while Geirhos et al. (2022) delved into the field of mobile applications for diabetes management. Oyibo et al. (2022) established a study to compare the similarities and differences of contact tracing mobile applications in Canada and India in the field of public health; Asbjørnsen et al. (2020) identified the fundamental design principles that can effectively provide support for weight loss maintenance. Tons of similar studies have been conducted widely in health-related fields (Asbjørnsen et al., 2019; Halttu & Oinas-Kukkonen, 2017; Idrees et al., 2021; Jaffar et al., 2022; McCall et al., 2021; Meedya et al., 2019; Oyibo, 2021; Oyibo et al., 2022; Purpura et al., 2011; Radomski et al., 2019b, 2019a; Silva et al., 2023; Sittig et al., 2020; Wozney et al., 2017).

Given the dynamic and rapidly evolving fintech landscape in Malaysia, a pertinent knowledge gap arises concerning the potential implications of PSD within the context of emerging fintech platforms. As digital technologies reshape the financial services sector and redefine customer interactions, it becomes necessary to understand how insurance offerings are best presented to mobile application users. This necessitates the exploration of how system design features demonstrate in the context of fintech-driven insurance offerings. Extending the model to e-commerce websites like Amazon, eBay (Alhammad & Gulliver, 2014), and Zalora (Abdul Hamid et al., 2019), relevant findings show that the application of the model is thriving and has been validated. The present study seeks to address this specific gap and delve into the PSD in the escalating fintech insurance landscape, thus contributing to a more comprehensive understanding of consumer behaviour and decision-making within this transformative domain.

There is a scarce amount of research in relation to the model conducted in other fields of study. Notably, the PSD principles were investigated in the context of communication mobile applications, likewise WhatsApp Instant Messenger (Faisal et al., 2019). Similarly, Loh and Hamid (2021) investigated the e-commerce context in Malaysia by studying the case of Shopee and Lazada, which were the top-ranked e-commerce websites in Malaysia. Despite the wide application of the PSD model in various industries, research pertaining to the intersection of fintech and system design remains scarce in the literature body and implies a research gap in this context of the study. The daring extension of the PSD model into the social messaging and e-commerce field is inspiring, yet

reliable results and convincing discussion demonstrated the possibility and potential to conduct the present research.

1.5 Research Aim

With that, the general purpose of this study is to investigate the influence of PSD on e-wallets towards the promotion of insurance.

1.6 Research Questions

The issue of MHI coverage inadequacy among Malaysian populations forms an imperative urgency for the study because it highlights the critical need to enhance MHI adoption rates in Malaysia, primarily through innovative approaches like e-wallet mobile application. As more individuals utilise e-wallets for financial transactions, integrating insurance services within these platforms presents an opportunity to bridge the protection gap. Against the backdrop and problem discussed in previous chapters, this study proposed a main research question: how does the e-wallet mobile application system design persuade its user to sign up for an insurtech offerings?

i. What are the PSD principles applied to TNG eWallet?
ii. What is the influence of those persuasive system designs applied toward the perceived persuasiveness among the Malaysian population?
iii. What is the influence of the perceived persuasiveness toward purchase intention of insurtech offerings among the Malaysian population?

1.7 Research Objectives

Along with the research question proposed, the study aimed to look into the users' perceived persuasiveness leading toward purchase intention of insurtech offerings upon the influence of persuasive features in e-wallet applications, particularly the TNG eWallet. The investigation is expected to reveal the PSD principles implemented and identify the impact of the system design principles towards perceived persuasiveness and intention to buy the insurtech offerings. With that, the research helps explain how system design affects the users' attitudes and behavioural intentions in the insurtech industry in Malaysia. This study enlists the following research objectives:

i. To evaluate the PSD principles applied to TNG eWallet.
ii. To study the influence of those persuasive system designs applied toward the perceived persuasiveness among the Malaysian population.
iii. To examine the influence of the perceived persuasiveness toward purchase intention of insurtech offerings among the Malaysian population.

1.8 Research Scope and Definition of Terms

This research study examines the PSD principles applied to e-wallet and investigates the attitude and behavioural intention among e-wallet users. The research scope in the present study covers the context in terms of technology (Persuasive System Design), mobile application (e-wallet), insurance industry (medical and health insurance) and country (Malaysian). Therefore, the research

context encompassed the four main domains, as shown in Figure 1.3. The definition of terms and constructs engaged in the present study is described accordingly to facilitate the conduct of the present study.

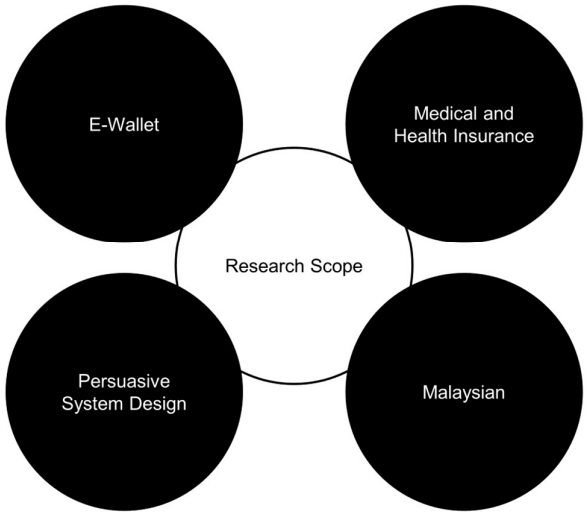


Figure 1.3: Research Scope of The Study

Source: Developed for the study

1.8.1 E-wallet

E-wallets, mobile wallets, and digital wallets are often used interchangeably. However, they differ from each other. The following discussion outlines the characteristics of each terminology used, coupled with examples for illustration purposes.

Based on a systematic literature review, e-wallet refers to mobile applications that are used to conduct online transactions (Ramli & Hamzah, 2021). The e-wallet service provider enables the digitalisation of financial services with a safe and reliable payment instrument that allows users to pay, receive and make monetary transfers to another party (Soegoto & Tampubolon,

2020). The difference that matters between traditional wallets is the conversion of physical wallets into digital features (Singh & Sinha, 2020). The popular e-wallet mobile applications in Malaysia include GrabPay, TNG, and Boost (Best, 2021). The users of these mobile applications are required to top up money in their wallets in order to perform digital transactions. It is also worthwhile to note that e-wallet embraces the DuitNow Quick Response (QR) feature (Boon et al., 2022; Rahim & Noor, 2024; Trianto et al., 2023). The DuitNow QR feature being used widely across different e-wallet mobile applications is proven with evidence enhancing the inclusivity of a fund transfer transaction or purchase transaction amid the proliferation of mobile technology (Bank Negara Malaysia, 2022b, 2023a).

Meanwhile, a digital wallet refers to a platform where users keep their card details for cashless transactions (Ramli & Hamzah, 2021). The most common digital wallets available in Malaysia are Apple Pay, Google Pay and Samsung Pay. These digital wallet service providers usually collaborate with banks to allow digital payment from a physical bank card (Liu et al., 2020). The most apparent distinction for digital wallets is needless for reload top-ups or upfront credits (Ramli & Hamzah, 2021). Interestingly, the digital wallet acts as if physical wallet, whereby users are allowed to store membership cards, discount coupons, event tickets, flight tickets and even personal documents (i.e. identification cards or driving licenses) in digital wallets (Gomber et al., 2017; Omarini, 2018; Sait et al., 2024; Shaw & Kesharwani, 2019).

On the same page of discussion, mobile wallets refer to payment methods that only support mobile devices like smartphones or tablets. Users may find it difficult to assess the mobile application via desktops or laptops.

Echoed with Rahman et al. (2024), the notable examples of mobile wallets available in Malaysia include Google Pay, Apple Pay, Samsung Pay, Alipay, WeChat Pay, Big Pay, and Wise. Notably, it is seen that some examples of mobile wallets are mentioned in previous discussions on e-wallets and digital wallets. This is because the mentioned technological innovations categorised under mobile wallets share a similar nature with e-wallets and digital wallets, which are subsets, wherein that are typically accessible on mobile devices only.

In this study, the focus is to shed light on e-wallet. To avoid confusion on the terminologies used, the present study defines e-wallets as mobile applications that enable electronic payment instruments, including the storage of funds and the means of making payments to third parties. The case adopted in this study is TNG eWallet. The practicability of promoting insurance adoption through e-wallets is proven by the Swiss Re Institute (2020), asserting that TNG eWallet is the most preferred mobile application for insurance purchases in Malaysia. The justification for selecting TNG eWallet as the case study is further discussed in Chapter 3.2.2.

1.8.2 Persuasive System Design (PSD) Model

The PSD model comprises two major branches, namely persuasion context and design of system features (Torning & Oinas-Kukkonen, 2009). This research wholly focuses on the design of system features. All four categories comprised in the PSD model include Primary Task Support, Dialogue Support, System Credibility Support, and Social Support. Primary task support provides ease for the users to carry out the main function of the system features, while

Dialogue Support facilitates instruction and communication between the system and users, ensuring that users can carry out the targeted behaviour. System Credibility Support ensures that mobile applications appear to be trustable and safe to use, while Social Support leverages the social influence of the system. Each pillar of the system design comprising seven design principles, proposed by Oinas-Kukkonen and Harjumaa (2009) is further discussed in Chapter 2.2.2.

1.8.3 Insurance

Insurance can be divided into two main categories, including general insurance and life insurance. In accordance with the Malaysian government's definition, general insurance is a basic insurance policy that covers losses and damages of assets, while life insurance protects the insured or the respective dependent upon critical events (My Government, 2021). Generally, life insurance covers a wide array of protection, including death, total disability, critical illness, and many more. In the recent publication of Bank Negara Malaysia (2024), the insurance offerings delivered through digital platforms, or the insurtech offerings are classified into four categories, namely ordinary life insurance, investment-linked insurance, general insurance other than medical and health insurance (MHI) and MHI. Concurrent with the earlier definition, both general insurance other than medical and health insurance (MHI) and MHI are considered general insurance. Specifically, to address the research problem proposed in the present research, this study wholly focuses on medical and health insurance to address the significant issue of being vulnerable to risks and inadequate protection in times of need.

1.8.4 Malaysia

Remaining at the infancy stage of fintech, Malaysia is a perfect research country to investigate how persuasive elements promote the sign-up of insurance on e-wallets. To date, the central bank has approved six banks and 49 non-bank e-money issuers (Bank Negara Malaysia, 2023).

1.8.5 Touch' n Go eWallet

Based on the research background and fintech development in Malaysia, the targeted unit of analysis is the users of TNG eWallet. It is essential to acknowledge the prominence of two major players, Google's Play Store and Apple Inc's App Store, to emphasise the significance of the mobile application distribution landscape. These digital distribution services serve as the official platforms for users to access and download mobile applications, catering to the diverse needs of Android and iOS users, respectively.

The Play Store, developed by Google, functions as the primary digital distribution channel for Android smartphones and tablets. Offering a vast array of mobile applications, the Play Store provides Android users with a seamless and centralized hub to explore, download, and update their desired apps. Its widespread availability across a multitude of Android devices grants users accessibility and convenience in accessing a diverse range of software offerings.

In parallel, the App Store, curated by Apple Inc., serves as the designated platform for iOS users to access approved mobile applications compatible with Apple's ecosystem. The Play Store and the App Store stand as

the foremost digital distribution services, providing Android and iOS users, respectively, with access to a diverse and ever-expanding library of mobile applications. Their cardinal roles in app discovery, distribution, and quality assurance have significantly influenced the mobile technology landscape and underscored the importance of robust and user-centric app distribution platforms in the digital age.

Table 1.1 illustrates the number of downloads recorded on the Play Store. Based on the tabulation of data retrieved, it is evident that Grab – Taxi & Food Delivery (Grab) is top-rated and records the highest number of downloads among all financial-related mobile applications inspected. However, Grab positioned itself in the travel category. Along with that, the insurance offerings by Grab focused on travelling, which represents a niche category and does not link to the research scope of this study. Therefore, Grab is eliminated from the selection. Similarly, Boost App Malaysia and Fave | Cashback & Savings (Fave) are not considered due to their brand positioning as lifestyle and food and drink categories, respectively. Hence, TNG eWallet and BigPay – financial services (BigPay) survived the preliminary screening session. Nevertheless, TNG eWallet outperforms BigPay and is selected as the case study in the present research. Owing to its popular responses and the outstanding number of downloads in both the Play Store and App Store.

Solely focusing on TNG eWallet may exhibit several potential risks. One of them is limited representation. The findings derived from the present study solely emphasise a single e-wallet, namely the TNG eWallet. Thus, it may not apply to other e-wallet mobile applications as every e-wallet may employ distinct persuasive features to persuade respective target users. Subsequently, it

may overlook diverse insights from the massive e-wallet user base. The user of TNG eWallet may not be characterized similarly to the user of GrabPay or Boost Pay. Thus, the research may capture the complete domain of insurtech adoption on e-wallets. Despite TNG eWallet being bound with unfavourable issues, including its NFC card being sold at an exorbitant price until it requires the official governmental organisation to conduct an inspection (The Star, 2022b), added to the aforementioned potential risks, it does not present as an obstacle to adopting TNG eWallet as the case study.

According to the statistics provided by the Swiss Re Institute (2020), one of the largest reinsurers based in Switzerland, TNG eWallet is regarded as the most preferred mobile application for the purchase of digital insurance. It outperformed its competitors in the e-commerce and digital payment sector by leaving Shopee, Boost, Lazada, and GrabPay behind and establishing itself as a frontrunner in the industry. Along with the recommendations, it is believed that TNG eWallet possesses tremendous potential as an online distributor to grow medical and health insurance penetration in the digital economy (Swiss Re Institute, 2020). This further validates the rationale of opting for TNG eWallet as the case study in the present research.

Table 1.1: Number of Downloads Recorded on Play Store and App Store

E-wallet	Developer	Category	No. of downloads (millions)	No. of reviews		Ratings	
				Play Store	App Store	Play Store	App Store
Grab – Taxi & Food Delivery	Grab Holdings	Travel	100	11,000,000	517,509	4.8	4.7
Touch 'n Go eWallet	TNG Digital Sdn Bhd	Finance	10	439,000	352,044	4.6	4.7
Boost App Malaysia	Boost @ Axiata Digital eCode Sdn Bhd	Lifestyle	5	164,000	43,558	4.0	4.5
Fave | Cashback & Savings	Fave Group Pte Ltd	Food and Drink	1	43,000	31,484	4.1	4.7
BigPay – financial services	Big Pay	Finance	1	27,000	7,091	3.9	4.1

Note(s): The data was documented as of 13 February 2023 through an organised inspection of the Play Store and App Store.

Source: Developed for the study

1.9 Research Significance

The present research supports previous studies in numerous approaches. Previous scholarly studies on PSD mainly focus on healthcare and lifestyle-related mobile applications. Oinas-Kukkonen and Harjumaa (2009) outlined the criteria of a credible website. Nevertheless, it might not be universally applicable to all websites and mobile applications. In reality, the potency of implementing the persuasive system design principle varies according to the field of application. While the implementation of PSD principles like Primary Task Support, Dialogue Support, System Credibility Support and Social Support has been thoroughly explored and proven effective in influencing user behaviours in healthcare, there is a dearth of studies on PSD linked to the fintech field, particularly the insurtech sector. Thus, this study contributes to expanding

the scope of prior research and attempts to investigate the significance of persuasive system design principles in the fintech domain.

Subsequently, the present study makes a contribution to transitioning the focus from the mere adoption of e-wallets to the consumers' behavioural intention in purchasing insurtech offerings via e-wallets with the concern of persuasive system design. E-wallets have been introduced in Malaysia for years and bloomed with their frequent usage among the Malaysian population while moving towards a cashless society. The marrying of e-wallet mobile applications and insurtech offerings is seen as an appealing solution to enhance the MHI penetration. While plentiful of the study was conducted to investigate the adoption of wallets (Abdulla & Al-Alawi, 2023; Bohari et al., 2022; Chua et al., 2020; Jameel et al., 2022; Lim et al., 2023; Malhan & Kumar, 2022; Malik & Annuar, 2021; Ming & Jais, 2022; Ramli & Hamzah, 2021; Teo et al., 2020; Yeh et al., 2024; Yin & Chen, 2022), research on the uptake of insurtech via e-wallets has not been identified. Thereafter, the unmapped intersection of e-wallets necessitates present research to investigate the significant motivation to persuade users to buy insurtech offerings through e-wallet mobile applications from the lens of system design.

Meanwhile, this research also adds value by closing the gap between theory and practice on PSD in consumers' attitudes and behavioural intentions in the fintech context, especially motivating the adoption of insurtech offerings. Prior studies often focus on generic PSD principles without contextualising to specific domains (Drozd et al., 2012; Lehto et al., 2012; Oduor et al., 2014, 2017; Oinas-Kukkonen, 2010, 2013; Oinas-Kukkonen & Harjumaa, 2008, 2009; Torning & Oinas-Kukkonen, 2009). Theoretically, it is known that the

Primary Task Support underscores providing clear instructions for users to carry out the desired tasks through a well-thought implementation of PSD. By investigating PSD principles through a case study, the present study validates the relevance of PSD frameworks beyond the traditional application. The present study identifies the implementation of PSD principles within the TNG eWallet mobile application and investigates their influence based on the theoretical framework. Subsequently, the study outlines actionable insights with sound reasoning as a guideline and conveys meaningful messages to the insurers, TNG Digital Sdn Bhd, fintech players venturing into digital insurance offerings and system solution engineers to enhance consumers' confidence in engaging with digital insurance offerings via e-wallet mobile applications. Exemplary, the present study highlights the shortcomings of Primary Task Support implementation in the study and suggests providing a user-friendly demonstration of claim submission as part of the system design. The actionable insights drawn from the present research study allow practitioners to translate abstract PSD theories into practical design strategies, thus enhancing user experiences that promote digital insurance uptake.

The present study also delves deeper into the interrelationship between system design principles and discusses the respective impact in promoting the uptake of insurtech. By acknowledging that users are concerned with the Expertise principle, which is categorised under System Credibility Support, the present study confirmed that collaboration between digital payment services and pioneers within the insurance industry is paramount. With the establishment of empirical data, the present study bridges the gap between PSD theories and the tangible architecture of system design to fit the insurtech sector.

Conclusively, these research findings not only proliferate academic understanding of PSD in fintech but also allow the practitioners to analyse how different system design principles play respective roles in the fintech context and revisit their current implementation of system design for improved users' experience. With improved user experience, it administers greater conviction to engage with digital payment services, promotes the adoption of digital insurance offerings and successively uplifts Malaysia's MHI penetration.

1.10 Organisation of The Research

This research is organised into five chapters. This chapter provides the background of the research and the current problems faced in the real world. It continued with elaborating the research aim, raising the research question, and proposing research objectives accordingly. The scope and significance of the research are outlined.

Chapter 2 elaborates on the underpinning theories of research and reviews the related variables in this study. Chapter 2 maps the relationship between the theory of reasoned action, persuasive system design and behaviour change support system. Research hypotheses are developed based on the literature reviewed.

Chapter 3 discusses the research methodology adopted to conduct the research. The PSD principles are posited as formative constructs, while the attitude and behavioural intention constructs are posited as reflective constructs. In Chapter 3, the benchmark and data collection procedures are justified in detail.

Chapter 4 reports the empirical results derived from the research. It includes the conduct and results of the pilot study. The researchers reported the descriptive statistics of the research. Then, the confirmatory tetrad analysis is conducted to confirm the setting of the measurement model. The results from confirmatory tetrad analysis suggest that PSD principles are most suitable to measure in a reflective measurement model. Then, a structural model assessment is conducted with the examination of collinearity, path coefficients, coefficients of determination, and predictive power. Chapter 4 is closed with a chapter summary.

Lastly, Chapter 5 presents discussions of the research findings. Each hypothesis developed is presented with in-depth interpretation. Then, the chapter addresses the research contributions and research limitations, along with the recommendations for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The foundation of academic research pursuit is about building the research study and relating it to existing knowledge (Snyder, 2019). It shall also be the prime concern for all researchers. According to Linnenluecke et al. (2019), the literature review is the key to gathering information and reorganising the existing knowledge in a scientific fashion.

This chapter entails the underpinning theory and conceptual background of the research. The proposed research model alongside exogenous and endogenous, is presented in the following subsection. With that, the subsequent subsection exhibits the research hypotheses formulated based on the literature review. The final subsection concludes this chapter with a summary.

2.2 Underlying Theory

This subsection discusses the underpinning theories that serve as a guidance for the present study. The established theories provide a solid foundation for exploring complex real-life phenomena and understanding the mechanism, thus explaining and predicting the users' attitudes and behavioural intentions. Fitting into the context of the present study, it introduces the

Behaviour Change Support System, accompanied by the Persuasive System Design model and the Theory of Reasoned Action. The underpinned theories render a holistic approach from behavioural and technological disciplines to understand the influence of PSD on e-wallets towards the promotion of insurance.

2.2.1 Behaviour Change Support System Model

Initially, the BCSS framework was proposed to conceptualise the idea of it (Oinas-Kukkonen, 2010). In the prior study, the BCSS framework is defined as "an information system designed to form, alter or reinforce attitudes, behaviours or an act of complying without using deception, coercion or inducements" (Oinas-Kukkonen, 2010, 2013). In other words, the BCSS framework ideally suggests that users are motivated to perform a targeted behaviour voluntarily, without any forceful impact. Essentially, the model highlights the persuasion element, either by technology-mediated persuasion or technology-human persuasion (Drozd et al., 2012). Lehto et al. (2012) gave a clear explanation of technology-mediated persuasion, which refers to those cases where humans persuade humans through technology or computers in an earlier study. This happens on discussion forums or social media systems where users interact with each other via the technology as a vehicle. It emphasised full automation (Drozd et al., 2012). Lehto et al. (2012) especially highlighted that the users, in the case of the BCSS framework, must have the intention to influence others' attitudes or behaviour. Aside from that, the BCSS framework honours that each user has their respective goal or motivation, thus accentuating

the autogenous approaches where users utilise the information technology and adapt it according to their personal context (Lehto et al., 2012). On top of that, the author highlighted that the position of behaviourist and any mechanistic psychological view is inapplicable in the case of the BCSS framework (Oinas-Kukkonen, 2013). The general end user should be aware of the design principles applied and their possible corresponding intention.

Technically, the BCSS framework is applicable across various socio-technical systems, applications, or software features that are intended for persuasion (Oinas-Kukkonen, 2010). Apart from that, Oinas-Kukkonen (2010), in his later study, investigated more profound behavioural changes and divided them into three categories, including the act of complying, the behaviour change, and the attitude change. These three behavioural changes differ in their difficulty to build. The behavioural changes are named C-change, B-change, and A-change accordingly, as presented in Table 2.1. The C-change is the easiest among the three as it simply requires the users to comply with the system's request (Oinas-Kukkonen, 2010). Citing an example by Chiu et al. (2009), the system is designed to motivate the users to keep up with sufficient water intake; thus, the users are required to record their daily water intake via the mobile application. Having a solid C-change will ease the achievement of the B-change. The goal of B-change is to trigger more remarkable persistence in the behavioural change than a superficial observance of the system’s request (Oinas-Kukkonen, 2010). It is worthwhile to note that B-change does not always translate into lifelong behavioural change. Proceeding A-change aims to influence the attitudinal change among users. The authors asserted that full persuasion occurs only when attitude change takes place (Oinas-Kukkonen,

2010). This means that when users change their perception of some issues, they will subsequently behave accordingly. The statement is relevant to date, as earlier social psychologists maintained that individuals' attitude is strongly associated with their behaviour when the focus of the study is relevant (Ajzen & Fishbein, 1977).

Table 2.1: Change Design Matrix

	C-Change	B-Change	A-Change
F-Outcome	Forming an act of complying	Forming a behaviour	Forming an attitude
A-Outcome	Altering an act of complying	Altering a behaviour	Altering an attitude
R-Outcome	Reinforcing an act of complying	Reinforcing a behaviour	Reinforcing an attitude

Source: Oinas-Kukkonen, H. (2010).

In the context of insurtech, behavioural change is arduous. However, there are insurance companies doing wonders by changing the consumers' behaviour and attitude while promoting insurance products. Exemplary, Tokio Marine & Nichido Anshin Life Insurance introduced a health insurance product that promotes an active lifestyle by providing premium cashback to the insurers in return when they achieve a certain number of paces (Okada, 2018). The incentive is paid after two years, according to six-monthly achievements (Okada, 2018). Predominantly, the consumers comply with a simple act required by ensuring a certain number of paces per day. In that sense, they are undergoing C-change. As the users can monitor their daily steps through a wearable device that is being approved by the company, users who are motivated to earn the

premium cashback will slowly undergo the B-change over time. It is believed that users will ultimately undergo an A-change when they are fully persuaded by the entire system.

Given that the research seeks to explore "Persuasive Systems Design Features in Promoting Insurance Through E-Wallet Penetration" with a focus on behavioural changes concerning insurance adoption, the BCSS framework is particularly well suited for the entire study as the BCSS framework was created with the explicit goal of promoting behaviour change through the use of technology. The BCSS framework could theoretically be successfully used to create persuasive interventions within the e-wallet platform since the study aims to improve insurance adoption through e-wallet penetration. The BCSS framework can encourage users to adopt insurance products and make sound choices about their coverage by utilising behaviour modification approaches.

Furthermore, the study's spotlight on the end-user perspective and the BCSS framework's emphasis on user-centred design are interrelated. The BCSS framework may customise persuading elements within the e-wallet application to fulfil particular expectations and promote favourable behavioural objectives towards insurance acceptance by recognising users' attitudes, motives, and preferences. In this regard, the suitability of the BCSS framework is highly compatible with the research objectives of the present study, attributable to the solid foundation provided by the BCSS framework in developing persuading features and interventions that may improve insurance acceptance among e-wallet users.

2.2.2 Persuasive System Design Model

The power of influencing thoughts and behaviour through technology innovations is increasingly feasible as it has evolved into a strong and solid phenomenon. Interactive design criteria have been found to motivate positive users' attitudes and perceptions and stimulate transformative action. This is called persuasive technology. Persuasive technology may involve human-computer persuasion or computer-mediated persuasion (Cassell et al., 1998). Before delving deeper into the PSD model, it is necessary to understand that a computer does not act like a human. Computers do not have the ability to communicate and persuade. It is the human that utilises the computer as a vehicle to deliver a message. Computers play the role of a tool, medium, and social actor that increases interactive and persuasive capabilities (Oduor & Oinas-Kukkonen, 2018). Thus, it can motivate positive behaviour change in users (Oduor & Oinas-Kukkonen, 2018). If the message delivered by the web developed to the users is successful and makes transformative behaviour changes among the users, then the persuasion is considered successful.

Attributable to the rising competition in technological development, mobile application developers are compelled to acquire substantial knowledge about effective persuasion strategies to stay competitive. In this context, the PSD model proved invaluable as it outlines a structured framework for evaluating and enhancing system design to influence user behaviour. Oinas-Kukkonen and Harjumaa (2009) introduced the Persuasive System Design (PSD) model by outlining technology-related persuasion. Precisely, the model aims to dictate persuasive designs and software requirements as well as to

underpin categorising and mapping the persuasive elements which enable literature analysis (Torning & Oinas-Kukkonen, 2009). By integrating the knowledge of social psychological theories and information systems development, the PSD model is established to solve real-world problems in the design and development of a persuasive system (Oduor & Oinas-Kukkonen, 2019).

In contemplation to reinforce, change or shape attitudes and behaviours, it is crucial to recognise the doctrine of developing a persuasive system. Firstly, the author defined seven postulates that need to be considered in relation to the perception towards users in general, persuasion strategies and actual system features (Oinas-Kukkonen & Harjumaa, 2009). Moving on, with the supposition of the persuasive system in mind, the author highlighted the purpose of analysing the persuasion context, in which to acquire a thorough understanding of the information-processing event (Oinas-Kukkonen & Harjumaa, 2009). This persuasion context underscores the significance of attention and understanding during the persuasion process. Last but foremost, the author presented the most important notion of system development and design, referring to the design principles (Oinas-Kukkonen & Harjumaa, 2009). The design principles dictate functional requirements and nonfunctional requirements and limitations of the development and design of system qualities (Robertson & Robertson, 2012). The following subsections discussed the persuasion context and design principles concerning the fintech field.

2.2.2.1 Persuasion Context

Under the persuasion context, the model outlines the postulates behind the design of a persuasive system. Generally, it describes the neutrality of technology, its accessibility and reach, ease of use, how people make and enforce commitments, users' attitudes and persuasion strategies, the sequential nature of persuasion, the ideal moments for initiating persuasive features, and openness in the development of persuasive systems (Oinas-Kukkonen & Harjumaa, 2009). The persuasion context comprises three essential elements in order to allow persuasion to occur, namely the intent, the event and the strategy.

However, it is beyond the scope of the current study to analyse the context of persuasion. The present research acknowledges the significance of considering the context of persuasion, which entails looking at many factors that might affect user behaviour and decision-making. However, due to practical limitations and difficulties, a thorough consideration of the context of persuasion is not feasible in this study.

Evaluating the persuasive context can be challenging since it frequently necessitates clear disclosures from mobile application developers or access to confidential information. Furthermore, components of the persuasion context may alter over time as a result of cultural changes, data volume, diversity, real-time dynamics and technology improvements, rendering it difficult to describe precisely.

Furthermore, the primary focus of this research is to explore the persuasive system design features specifically within the context of promoting insurance adoption through e-wallet penetration. By adopting the TNG e-wallet

as a case study, the study can delve deeply into the e-wallet's impact on insurance adoption without diverting resources to investigate broader aspects of persuasion.

It is vital to note that prior studies have shown that studies may be carried out without explicitly analysing the persuasion context, to name a few: Abdul Hamid et al. (2019), Loh & Hamid (2021), and Oyibo (2021). Moreover, a notable drawback arose from the frequent use of prototype cases in previous studies that examined the persuasion context. This particular aspect implied that the developer, who also served as the researcher, possessed complete control and comprehensive information about the case (Tikka et al., 2016; Tikka & Oinas-Kukkonen, 2016). As a result, the persuasion context analysis could be conducted with a high level of precision. Conversely, the present study adopted a real-life instance as the case study. Conducting an inaccurate analysis of the persuasion context due to incomplete or misinterpreted information could lead to potential misinterpretations of the context. Therefore, the present study sheds light on the impact of system design principles and the subsequent effect on insurance adoption through e-wallet penetration by focusing on persuasive system design principles. The succeeding subchapter describes the focus of the present study and explains the design principles outlined by Oinas-Kukkonen and Harjumaa (2009).

2.2.2.2 The Intent

The intent includes the persuader and the change type (Torning & Oinas-Kukkonen, 2009). It is simple to understand as persuader usually refers to the

mobile application developers who generate the intention to create such persuasion. The change type refers to the targeted behavioural change, be it reinforcing the outcome, changing the outcome, or shaping the outcome (Oinas-Kukkonen & Harjumaa, 2009). Reinforcing outcome means consolidating the current attitude or behaviour that one has already equipped. Putting this into the context of the current study, the persuasive system design aimed for reinforcement shall capture the users sticking to the e-wallet they are currently using and continue to register themselves as at least an insurance product via e-wallet. Changing outcome intends to transform the current attitude or behaviour that one has. For instance, the mobile application developers of e-wallets should utilize persuasive technologies to attract users who often make payments using e-wallets to register for insurance products. A shaping outcome is to influence the non-users of e-wallets to download the mobile e-wallet application and sign up for the insurance product. Agreeing with Oinas-Kukkonen and Harjumaa (2009), different outcomes may require different persuasive techniques.

2.2.2.3 The Event

Moving on to the event comprises use context, user context, and technology context. To highlight, the technology context may result in a significant impact on the persuasion, depending on the features of the technological platform (Torning & Oinas-Kukkonen, 2009). Even if it is similar content and messages delivered on the web, the persuasion through mobile phones and desktops may vary in a different way. A study investigating the relationship between the technology platforms and the effectiveness of

persuasive technology has been done in the context of physical activity and sedentary behaviour, unambiguously shows that mobile and handheld devices exhibit leading cases of the entirely successful result of persuasion (Aldenaini et al., 2020).

2.2.2.4 The Strategy

The strategy includes message and route as essential components to creating successful persuasion among the users (Torning & Oinas-Kukkonen, 2009). The definition provided by the previous authors is that the message refers to the selected content delivered to the users to achieve the goal of persuasion (Torning & Oinas-Kukkonen, 2009). For instance, to educate people about the importance of critical illness protection, it may be presented in raw text, infographic, motion graphic, pushed as a notification in a dialogue system, or organised in the form of a mini-game. Meanwhile, the route of persuasion can be represented directly, indirectly, or by combining both (Torning & Oinas-Kukkonen, 2009). All these elements mentioned call for an understanding of what is happening in the event of the information process.

2.2.2.5 Design Principles

Oinas-Kukkonen and Harjumaa (2009) extended the study of Fogg (2003) by overcoming the weakness of the previous model, which omitted a clear explanation of how a persuasive system should behave. The design of system features described by Oinas-Kukkonen and Harjumaa (2009) clearly

explains how the suggested design principles should translate into software requirements and be implemented as system features. In simpler terms, it explicitly explains how a system should behave, be designed, and developed. By understanding what is required for software qualities, mobile application developers can better implement persuasive technologies in the system design, thus resulting in attitude or behaviour change. The design of system features is supported by four pillars, namely Primary Task Support, Dialogue Support, System Credibility Support, and Social Support (Oinas-Kukkonen & Harjumaa, 2009). The researcher conducted a thorough investigation on the implementation of the design principles in the case of TNG eWallet as fulfilment of research objective 1.

2.2.2.6 Primary Task Support

Primary Task Support principles include reduction, tunnelling, tailoring, self-monitoring, personalisation, simulation and rehearsal (Oinas-Kukkonen & Harjumaa, 2009). The design principle aims to help users in performing targeted behaviour (Drozd et al., 2012; Oinas-Kukkonen & Harjumaa, 2009). It is found that Primary Task Support is the most important and most commonly implemented persuasive feature in the case of fitness applications (Oyibo, 2021). Regardless of culture, users strongly suggest that Primary Task Support should be implemented. As users recognise there are features to support them in conducting primary tasks (e.g., making payments or transferring funds in the case of e-wallet), they also perceive the system as effective. The results of the evaluation on TNG eWallet are tabulated in Table 2.2.

Table 2.2: Primary Task Support Principles Implementation

Primary Task Support	
Design Principles	Application in TNG eWallet
Reduction A system that reduces complex behaviour into simple tasks helps users perform the target behaviour, and it may increase the benefit/cost ratio of a behaviour.	The 'shield' icon next to the total balance is linked to WalletSafe insurance to protect the e-wallet from unauthorised transactions. The users can assess the insurance section within three clicks.
Tunnelling Using the system to guide users through a process or experience provides opportunities to persuade along the way.	The interface guides users to enable auto-payment and the latest promotions when purchasing insurance. The users are provided with a brief description alongside every button.
Tailoring Information provided by the system will be more persuasive if it is tailored to the potential needs, interests, personality, usage context, or other factors relevant to a user group.	The system enables quotations based on the data entry immediately. The SafeTrip quotation is subject to the travelling date, destination, and the total number of travellers. The quotation of Critical Illness Insure is subjected to the gender and smoking behaviour of users as well as the preferred coverage of the plan.
Personalization A system that offers personalized content or services has a more excellent capability for persuasion.	Users are allowed to move their preferred mini-program (referring to the financial services) to the main page by rearranging the icons. Users can select to set up personalised insurance based on personal settings.
Self-monitoring A system that keeps track of one's own performance or status supports the user in achieving goals.	Users can view the details of the policies purchased in GOprotect > My Policies. If the users subscribe to insurance (e.g., WalletSafe to protect from unauthorised transactions), the 'shield' icon beside the total balance is turned green. If the users invest in GO+, they can monitor daily earnings in the transaction history.
Simulation Systems that provide simulations can persuade by enabling users to observe the link between cause and effect immediately.	Most Goprotect mini-programs compare protected situations and non-protected situations.
Rehearsal A system providing means with which to rehearse a behaviour can enable people to change their attitudes or behaviour in the real world.	Not Implemented

Source: Developed for the study.

2.2.2.7 Dialogue Support

In this category, design principles are set to build an interactive system that provides a certain degree of system feedback to the users in any form to enable users to keep up with their targeted behaviour (Oinas-Kukkonen & Harjumaa, 2009). It includes praise, rewards, reminders, suggestions, similarity, liking, and social roles (Oinas-Kukkonen & Harjumaa, 2009).

A systematic literature review of the persuasive system design of a web-based health intervention found that extensive employment of Dialogue Support principles can significantly predict better adherence in the investigated model and promote the effectiveness of web-based health interventions (Kelders et al., 2012). Oduor et al. (2017) looked into the Dialogue Support in the PSD model and identified the technical software design patterns. The scholars managed to identify three general patterns, namely reward pattern, instant feedback pattern, and reminder pattern. The instant feedback pattern should provide users with immediate feedback when completing any task. By praising users upon completing expected behaviour, it enhances persuasion (Toscos et al., 2006). By providing suggestions, it increases users' viscosity in performance, linking them to their desired outcome (Purpura et al., 2011). This pattern includes Praise and Suggestion principles from the PSD model. Similarly, the reminder pattern suggested automating general messages or notifications to all users or disseminating personalised messages or notifications based on predetermined algorithms (Ritterband et al., 2009). The reminder pattern should play a role in strengthening users' habit of regularly visiting the system (Oduor et al., 2017). The reminder pattern is reflected in the Reminder principle only. Subsequently,

the reward pattern indicated that rewards and virtual achievements are incredible in motivating users to perform their targeted behaviour (Oduor et al., 2017). Ritterband et al. (2009) claimed that users tend to enjoy and gain more pleasure when performing the targeted task. The rewards principle meets the criteria mentioned in the reward pattern. Although Oduor et al. (2017) managed to represent the abovementioned principles from the PSD model with exact examples, the study includes limited coverage of the Dialogue Support.

Table 2.3 explains the Dialogue Support principles outlined by Oinas-Kukkonen and Harjumaa (2009) and evaluates the respective features applied to TNG eWallet.

Table 2.3: Dialogue Support Principles Implementation

Dialogue Support	
Design Principles	Application in TNG eWallet
Praise	Not Implemented
By offering praise, a system can make users more open to persuasion.	
Rewards	Not Implemented
Systems that reward target behaviours may have great persuasive powers.	
Reminders	The latest news in relation to insurance is sent to users via mobile application notifications.
If a system reminds users of their target behaviour, the users will be more likely to achieve their goals.	
Suggestion	The system provides suggestions with the most suitable plan for the users by indicating a 'recommended' label in bright red colour with yellow star points.
Systems offering fitting suggestions will have greater persuasive powers.	
Similarity	Not Implemented
People are more readily persuaded through systems that remind them of themselves in some meaningful way.	
Liking	The mobile application developers leave appropriate white space between the buttons and consistently engage the iconic blue and yellow in system design.
A system that is visually attractive for its users is likely to be more persuasive.	
Social role	Not Implemented
If a system adopts a social role, users will more likely use it for persuasive purposes.	

Source: Developed for the study.

2.2.2.8 System Credibility Support

As cyber risks emerged, users gained a greater awareness of digital services. ReMark Global (2023) reported that more than 75% of respondents stressed the importance of the protection of their digital assets and personal data to secure trust in the system. In doing so, the System Credibility Support plays an essential role in designing a credible and, thereafter, developing a more persuasive system. System Credibility Support comprises trustworthiness, expertise, system credibility, real-world feel, authority, third-party endorsement, and verifiability. The design principles applied in TNG eWallet in relation to System Credibility Support are evaluated and tabulated in Table 2.4.

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Table 2.4: System Credibility Support Principles Implementation

System Credibility Support	
Design Principles	Application in TNG eWallet
Trustworthiness A system that is viewed as trustworthy will have increased powers of persuasion.	The logo of Touch n Go eWallet and Alipay Partner is displayed at the bottom of the main page. It provides a careline and email to contact aside from Frequently Asked Questions. It always requires the users to consent to their permission before entering the insurance-related mini-program. It requires users to enter their PIN to approve the transactions.
Expertise A system that is viewed as incorporating expertise will have increased powers of persuasion.	Associated with Alipay Partner (a third-party mobile and online payment platform founded by Jack Ma) A brief description of the insurer companies (including AIA Malaysia, Allianz, Etiqa, MSIG, Takaful Ikhlas, Takaful Malaysia and Zurich Takaful) is provided at the bottom of the page.
Surface credibility People make initial assessments of the system credibility based on a firsthand inspection.	There is no irrelevant advertisement pops up.
Real-world feel A system that highlights people or organizations behind its content or services will have more credibility.	Users can seek help through frequently asked questions according to the well-organised topics. The users can also reach out to TNG Digital's customer service for assistance.
Authority A system that leverages roles of authority will have enhanced powers of persuasion.	Not Implemented
Third-party endorsements Third-party endorsements, especially from well-known and respected sources, boost perceptions of system credibility.	The e-wallet is recognised by Bank Negara Malaysia.
Verifiability Credibility perceptions will be enhanced if a system makes it easy to verify the accuracy of site content via outside sources.	The product disclosure sheet about insurance products offered by respective insurer companies is hyperlinked to the respective companies' websites.

Source: Developed for the study.

2.2.2.9 Social Support

Generally, Social Support aims to increase the social influence of the system and thus motivate the users to perform targeted behaviour. This category

comprises social learning, social comparison, normative influence, social facilitation, cooperation, competition, and recognition. Citing the example given by Oinas-Kukkonen & Harjumaa (2009), team challenges shared by several members that formed into a team are predicted to be helpful in leveraging users' motivation to cooperate through the desire to achieve goals together.

From the perspective of sociopsychology, persuasion is often predictable (Weiksner et al., 2008). It happens via social influence. As user may shift their attitudes privately according to the analysis of their public statements, social influence arises (Wiafe et al., 2014). Simply put, social influence is present when users try to influence others or users are being influenced by others, while social influence occurs during social interaction (Smith et al., 2011). As such, it forms a support community of users that can guide others to perform the targeted behaviour to a certain extent (Martire & Franks, 2014).

The computer interferes with the process of social influence and is regarded as the medium to conduct. As soon as social media becomes popular, it allows an easier way to make ideas available online for anyone to see (Gruzd & Wellman, 2014). Agree that, to a certain extent, it is undeniable that massive data creation is overflowing users' eyesight and possibly makes high-quality information overlap (Armstrong, 2019). Nonetheless, users who actively engage with online communities long for Social Support and a sense of belonging (Seraj, 2012; Wang et al., 2012).

In a similar sense, Oduor et al. (2014) looked into PSD and social psychological principles derived from the suggested patterns. Thus, they developed a framework that is useful to serve as guidelines for persuasive

system design, specifically for social influence. Likewise, Konishi et al. (2019) interestingly found that users might feel isolated when social interaction happens between users and the system bot. In the case of TNG, the system design allows limited social interaction with the users. The users interact with each other on third-party social networks in lieu. The design principles applied in TNG eWallet in relation to Social Support are evaluated and tabulated in Table 2.5.

Table 2.5: Social Support Principles Implementation

Social Support	
Design Principles	Application in TNG eWallet
Social learning	Users can check reviews of TNG eWallet on the Play Store or App Store. Users can also observe reviews of TNG NFC Cards on the Touch 'n Go eWallet official store established on Lazada, the popular e-commerce platform. The store has sold 1.1 million TNG NFC Cards with a high rating of 4.9 out of 5.
A person will be more motivated to perform a target behaviour if (s)he can use a system to observe others performing the behaviour.	
Social comparison	Not Implemented
System users will have a greater motivation to perform the target behaviour if they can compare their performance with the performance of others.	
Normative influence	When 'Touch 'n Go eWallet' is searched on social media, tons of users share information and personal experiences about insurance products on e-wallet.
A system can leverage normative influence or peer pressure to increase the likelihood that a person will adopt a target behaviour.	
Social facilitation	Not Implemented
System users are more likely to perform target behaviour if they discern via the system that others are performing the behaviour along with them.	
Cooperation	Not Implemented
A system can motivate users to adopt a target attitude or behaviour by leveraging human beings' natural drive to cooperate.	
Competition	Not Implemented
A system can motivate users to adopt a target attitude or behaviour by leveraging human beings' natural drive to compete.	
Recognition	The e-wallet is accepted at over one million merchant touchpoints.
By offering public recognition for an individual or group, a system can increase the likelihood that a person/group will adopt a target behaviour.	

Source: Developed for the study.

2.2.3 Theory of Reasoned Action and Theory of Planned Behaviour

The BCSS framework is developed based on the theory of reasoned action (TRA). The TRA is developed to understand relationships between attitudes, intentions, and behaviours (Jahoda & Fishbein, 1968). The TRA theorises that a user's overt behaviour is their performance in doing specific

actions (Ajzen & Fishbein, 1980). Technically, the theory asserted that behaviour is a function of salient information or beliefs in relation to the behaviour (Ajzen & Madden, 1986). The preceding determinant of the behaviour is the intention of doing so. If the user showcases greater intention to perform a behaviour, it implies a greater likelihood of performing the behaviour. The TRA suggests two factors that influence the intention: attitude and subjective norm (Ajzen & Fishbein, 1980). It can be understood that attitude is the outcome of personal behavioural belief, whereas the subjective norm is the normative belief influenced by the big environment. As both behavioural belief and normative belief mutually exist, it is essential to note that external variables that are not included in the model are assumed to influence intention through either attitudes or subjective norms (Madden et al., 1992). The underlying assumption of TRA is that human behaviour is sensible and rational.

2.2.3.1 Comparison Between The Theory Of Reasoned Action And Theory of Planned Behaviour

Across previous studies, many scholars tend to argue between the utility and practicability of TRA and the extended model of TRA, referring to the Theory of Planned Behaviour (TPB). Founding on the basis of TRA, TPB added 'perceived behavioural control' as a primary construct (Ajzen, 1985). Perceived behavioural control considers that the users may not have a complete willingness to control behaviour. When the perceived behavioural control is high, the users are likely to manipulate what they intend to do; thus, the likelihood of performing the targeted behaviour is high, holding other factors

equal (Ajzen, 1985). Unlike the other two factors, perceived behavioural control can influence behaviour independently and be mediated via intention. The direct influence of perceived behavioural control on behaviour makes sense under two specific situations: when the users are not under volitional control to a certain extent, and the users have an accurate perception of control over the behaviour (Madden et al., 1992). Citing a famous example in the earliest study by Ajzen and Madden (1986), the perceived behavioural control in the case of students' class attendance is significant to predict the targeted behaviour as the scholars argue that the extent of perceived behavioural control is excellent. The students can quickly determine whether they want to attend the class; thus, the inclusion of perceived behavioural control in the case of investigating students' class attendance confirmed that the performance of behaviour is very likely to undergo the mediator of behavioural intention. The second experiment was conducted to measure the students' results in achieving an A in the investigated course. The result of the second experiment found that perceived behavioural control has primarily contributed to the prediction of behaviour. As the students gained a greater understanding of their perception of behavioural control, it increased the tendency to fulfil the exact control over their respective behaviour. With that, perceived behavioural control is significant in predicting the targeted behaviour independently. Aligning to a prior study by Madden et al. (1992), the TPB confirms that the inclusion of perceived behavioural control as a primary determinant is warranted.

Many studies adopted TRA and TPB do not explicitly differentiate the reason and circumstances to adopt the respective theory to explain the underpinning mechanism, especially when both theories are popularly adopted

to explain consumer behaviour. Citing Madden et al. (1992), the authors assumed that the TRA is applicable when the targeted behaviour is under volitional control. Otherwise, the TPB is much more comprehensive when the targeted behaviour violates the aforementioned assumption. In other words, the TRA assumes perfect volitional control when users conduct the behaviour. Supported by Nomi and Sabbir (2020), a past study reported that perceived behavioural control does not play a significant role in determining the purchase intention of insurance. Additionally, Nomi and Sabbir (2020) mentioned that the application of TRA in investigating consumers' purchase intention towards life intention is deemed reasonable. With that, the present study did not see the necessity to include perceived behavioural control as a construct in investigating the influence of persuasive technology on e-wallets towards the promotion of insurance. Hence, the TRA is preferred. Figure 2.1 illustrates the framework of TRA.

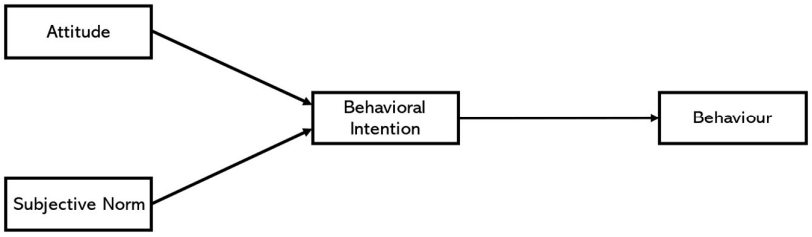


Figure 2.1: The Theory of Reasoned Action

Source: Hill, R. J., Fishbein, M., & Ajzen, I. (1977).

The aforementioned subchapters explain the theory of reasoned action and the persuasive system design model. To better explain the relationships between the models and theory, Figure 2.2 illustrates a Venn diagram to present the generic concept of BCSS. The establishment of the relationship between BCSS, TRA and the PSD model is required to understand how BCSS incorporates the principles of PSD to create effective and engaging persuasive technologies, subsequently changing the user's perception, attitude or behaviour. Overall, the three models and theories are interconnected in their pursuit of behaviour change facilitation through the application of technology and psychological insights. By combining the theoretical underpinnings of TRA with the system design principles of the PSD model, researchers and designers can develop sophisticated and impactful behaviour change support systems that address individual needs and drive positive behavioural outcomes.

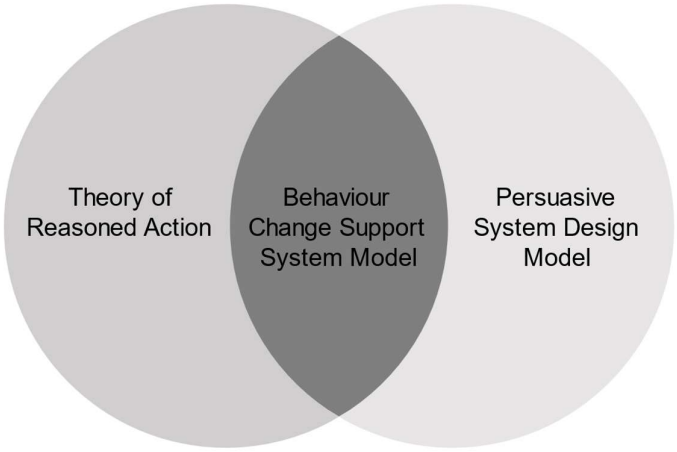


Figure 2.2: The Generic Concept of Behaviour Change Support System (BCSS)

Source: Developed for the study.

2.3 Perceived Persuasiveness

Perceived persuasiveness is defined as "a socio-technical information system with psychological and behavioural outcomes designed to form, alter or reinforce attitudes, behaviours or an act of complying without using coercion or deception" (Lehto et al., 2012). The term was initiated in conjunction with the introduction of the Behaviour Change Support System. The focus of the study was spotlighted on the keyword 'perceived.' The word 'perception' had undergone an evolution before it was defined correctly, attributable to its vague classification of percept. A comprehensive study in the older era reviewed works by past researchers and managed to outline 'percept' or the 'perceptual response' as an active process of exploration and discovery in which the organisms experience multiple associations of awareness, discrimination between stimuli, of a belief of the natural environmental presence of the perceived matter (Hochberg, 1956). On the other hand, persuasion often links up with terms like influence, inducement, or motivation. With that, it can be understood that persuasiveness is the extent of being influenced and motivated. Successively, the operational definition of perceived persuasiveness in this study refers to the extent to which users are motivated to conduct a targeted behaviour after the exhaustive cognition experience in relation to the subject matter. Similarly, Oyibo and Vassileva (2020) defined perceived persuasiveness in their study as "the capacity of a persuasive system to influence or motivate users to change their behaviour in a positive way." It is worthwhile to note that the authors mentioned that perceived persuasiveness often leads to a positive pattern of behaviour.

Agreeing with Crano & Prislin (2006), there is a primary consideration when reflecting on persuasion involving the fundamental construct of attitude. The authors provided their opinion on the definition of attitude, in which attitudes should be considered as "the evaluative judgments that integrate and summarize these cognitive/affective reactions" (Crano & Prislin, 2006). With that, this study strongly asserts perceived persuasiveness as the attitude construct that predominantly influences behavioural intention, according to the TRA.

2.4 Intention to Buy

The intention to buy has been a lifelong question to ponder by market researchers as they are keen to understand the intention, thus producing a more accurate prediction of consumers' buying behaviour (Hill et al., 1977). Interestingly, the buying behaviour of insurance products differs from other conventional consumer products, as consumers who purchase insurance are in the hope never to use it, while those who do claim see benefits long after (ReMark Global, 2023). Thus, the present study looks into the purchase intention in relation to insurance products only.

The intention to buy, or the purchase intention, often refers to the chance or probability that consumers will select a particular brand over others after experiencing an intensive decision-making process (Crosno et al., 2009). It reflects the extent to which an individual is motivated to make the purchase. Theoretically, the intention to buy is often taken as the primary predictor of purchase.

Adapting the intention to buy into the context of insurance products, a study by Omar and Owusu-Frimpong (2007) investigated the factors of people in Nigeria do not intend to buy insurance products attributable to the lack of confidence and trust in the insurance field associated with their personal past experience. Another underlying factor behind the greater proportion of people not buying insurance is the power of word-of-mouth (Omar & Owusu-Frimpong, 2007). As such, it is clear that the intention to buy insurance products is highly correlated with the normative influence. Citing a similar viewpoint by ReMark Global (2023), the purchase of insurance always starts from the home. Most times, the trigger of an individual to take one step further for further advice and extra information about insurance is recommendations from friends and family. The power of word-of-mouth is significant in the case of insurance. The lack of trust among consumers is linked to the absence of systematic legal regulation in relation to the agent responsibilities, structure condition, and rates of contracts within the country, yet it can be effectively lifted with the presence of a sound legal system (Gaganis et al., 2020). Otherwise, if the upsetting situation persists, it will subsequently shrink the insurance uptakes and extend the effect to economic penetration (Hafiz et al., 2021).

2.5 Research Framework

The present study developed based on the Persuasive System Design (PSD) model and extended the model by modifying the relationship based on the context of the study. Figure 2.3 illustrates the proposed research framework for the study.

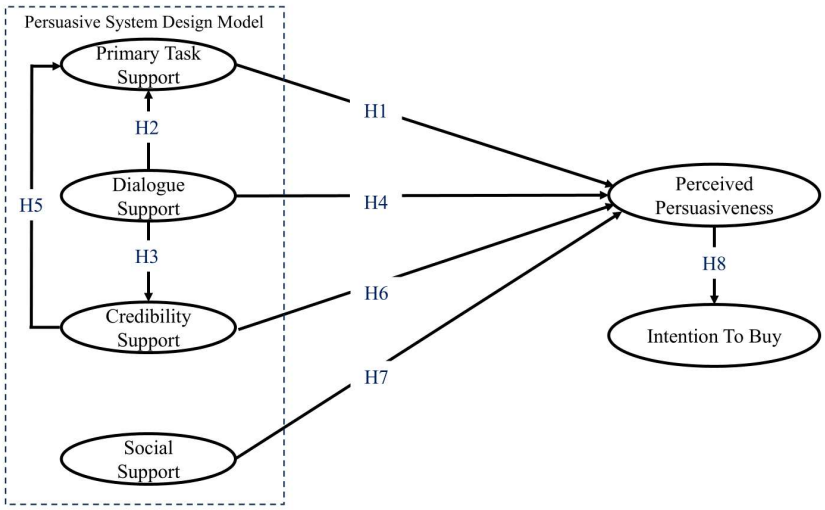


Figure 2.3: Research Framework

Source: Developed for the study

2.6 Hypotheses Development

This section reviewed empirical studies and formulated hypotheses between variables in accordance with prior studies.

2.6.1 Primary Task Support

The design principle of Primary Task Support helps users conduct the main task (Oinas-Kukkonen & Harjumaa, 2009). A previous review study concluded that Primary Task Support is the most frequently applied among the four main design principles in digital health intervention (Matthews et al., 2016; Sittig et al., 2020). In the body of literature, Primary Task Support is often argued to be effective in intervening in users' behaviour (Chiu et al., 2009; Koranteng et al., 2022). Indirectly, the mobile application developers will lead

the users to fall into the carefully planned trap. The overall aim of Primary Task Support is to promote users' self-efficacy and reduce the cognitive burden associated with using information systems (Lehto et al., 2012; Lehto & Oinas-Kukkonen, 2015; Oduor & Oinas-Kukkonen, 2019). In the health-related field, the Tailoring feature is mainly adopted as physical activity advice is sent according to the users' age, gender, and usage context (Win et al., 2019).

The Reduction feature, on the other hand, suggests low complexity in manipulating the system. This is attributable to the fact that users have limited capability in processing a large amount of information (Mathiassen & Stage, 1990). Thus, this requires intensive work by mobile application developers to organise the complex set of information and focus on those relevant ones. As such, users are more likely to attach to the e-wallet when making payments through the mobile application is more effortless. Suppose the mobile e-wallet application eases the operation of making financial transactions and financial matters. In that case, users are more likely to rely on the e-wallet than other conventional payment methods. This study proposes the following:

H1: Primary Task Support positively influences Perceived Persuasiveness

2.6.2 Dialogue Support

The succeeding pillar that supports a persuasive system design is Dialogue Support, which delivers system feedback to the users verbally or in any other potential way (Oinas-Kukkonen & Harjumaa, 2009). It aims to facilitate and improve communication between a system and the respective users (Torning & Oinas-Kukkonen, 2009). Sending reminders and personalised

notifications helps in task completion. A study by Chiu et al. (2009) affirmed the effect of sending automated computer reminders and computer-mediated social reminders in motivating users to drink adequate amounts of water daily. Thus, this study posits that Dialogue Support is positively associated with Primary Task Support.

H2: Dialogue Support positively influences Primary Task Support.

Drozd et al. (2012) conducted a study to investigate whether users are confident about following the health-related programme when the system sends system-to-user prompts, praises, and reminders. The study confirmed that Dialogue Support significantly influenced users' perceived credibility (Drozd et al., 2012). Recent studies on health information systems also indicate similar results whereby Dialogue Support will translate into credibility over a prolonged time of use (Halttu & Oinas-Kukkonen, 2021). Similarly seen in the case of web-based systems promoting weight loss, Dialogue Support is empirically proven to have a positive association with credibility support (Lehto & Oinas-Kukkonen, 2015). In doing so, this study posits that Dialogue Support has a positive association with System Credibility Support.

*H3: Dialogue Support positively influences System Credibility Supp*ort.

The up-to-date suggestions are critical in affecting perceived persuasiveness. Segerståhl et al. (2010) surveyed 435 actual users of web-based services that promote weight loss and found that suggestions that do not fit the season and real-life context reduce the overall persuasiveness. In view of Similarity principles, a study investigating the perspectives of educated elderly seniors who are motivated to engage in an active fitness lifestyle found that the users are easily persuaded when competition or comparison is initiated with

people who share similar characteristics with them (Mohadis et al., 2016). The participants also claimed higher motivation to stay active when they engage with virtual coaches who age similarly to them (Mohadis et al., 2016). These findings from prior studies suggested that poor implementation of Dialogue Support will reduce perceived persuasiveness. In doing so, this study hypothesized that Dialogue Support has a positive influence on perceived persuasiveness.

H4: Dialogue Support positively influences Perceived Persuasiveness.

2.6.3 System Credibility Support

The System Credibility Support validates certain information on the web and makes it more reliable (Oinas-Kukkonen & Harjumaa, 2009). Therefore, the users are more likely to rely on the system, especially when it comes to financial-related matters.

A prior study examined Cialdini's six principles of influence in relation to the persuasive system design model features for the case of commercial mobile fitness applications (Halttu & Oinas-Kukkonen, 2021). The study hypothesised that System Credibility Support has a positive relation to Primary Task Support. If the users trust the system, they are more likely to follow the guidance prompted by the system. Subsequently, the users are more likely to perform the targeted behaviour. The study empirically confirmed that System Credibility Support significantly influences Primary Task Support in a positive manner when it comes to neutral moderators. This study prefers to extend the generalisability of the statement by hypothesising that System Credibility

Support has a positive correlation to Primary Task Support in the case of purchasing an insurance product.

H5: System Credibility Support positively influences Primary Task Support.

In the context of social commerce, prior studies affirmed that positive surface credibility could significantly influence the users' trust (Attar et al., 2021). Considering trust as one of the factors under perceived persuasiveness, this study predicts a positive association between System Credibility Support and perceived persuasiveness. However, Oyibo and Vassileva (2021), in their study to investigate the relationship between user-experience design attributes and users' perception of persuasive features, found that perceived credibility is insignificant in influencing perceived persuasiveness. Nevertheless, it is arguable since the authors did not include sufficient measurement items for the relevant construct. Exemplary, the authors only provide one measurement item in which they require the respondents to rate on 'The app is credible.' This may lead to an insignificant relationship between System Credibility Support and perceived persuasiveness. After all, this study hypothesises a positive relationship between System Credibility Support and perceived persuasiveness.

H6: System Credibility Support positively influences Perceived Persuasiveness.

2.6.4 Social Support

Lastly, the system design should adhere to Social Support to motivate the usage of the web by increasing social influence (Oinas-Kukkonen & Harjumaa, 2009). As users gain motivation from others, it encourages them to perform the targeted behaviour. For example, a prior study conducted a group

randomised trial to assess a health-based Internet intervention (Winett et al., 2007). The outcome of the study suggested that internet-based intervention may result in better effectiveness in motivating users to manage their health when Social Support is present. Interestingly, the study was conducted at churches in the United States, where a large group of users share similar values and social networks. This implies that the social bonds between the users are strong. However, it is unfair to assume that the users of e-wallets will behave as such since this study does not include any social interaction offline. However, social interaction through the Internet is plausible.

In this case, when a user knows someone from his or her social circle is purchasing insurance products via the e-wallet, they will do so. It is possibly happening through electronic word-of-mouth. Therefore, this study posits that Social Support has a positive association with perceived persuasiveness.

H7: Social Support positively influences Perceived Persuasiveness.

2.6.5 Perceived Persuasiveness

To date, there is scarce study that examines the effect of perceived persuasiveness towards the intention to buy. This is attributable to the fact that persuasive system design is often applied to investigate the effectiveness of system design in interfering with individuals' habits, mainly in relation to health. Thus, this study refers to a relevant research study that suggests similar results.

A recent study investigated the influence of the perceived persuasiveness of a mobile application to promote the adoption of COVID-19 countermeasures (Mulchandani & Orji, 2021). The system was designed by

implementing persuasive strategies like competition or social comparison, simulation, and self-monitoring. The research study found that the mobile application was perceived as persuasive. It further changed the attitude of participants to be highly aware of COVID-19 and, thus, will prepare themselves against the pandemic. Thereby, it is clear that users change their behavioural intention once they perceive the mobile application is motivating them in a similar direction.

Similarly, perceived persuasiveness was used as the antecedent to predict the intention to use a system (Lehto et al., 2012). The system investigated aimed to assist the users in changing their eating habits, boosting their emotions and temporary state of mind, and ultimately losing weight. As the research study was conducted over a certain period of time, it is observed that perceived persuasiveness significantly influenced the intention to use the system. In this connection, this study posits that perceived persuasiveness has a positive impact on the intention to buy.

H8: Perceived Persuasiveness positively influences the Intention To Buy.

2.7 Summary

This chapter has elaborated on the theories and literature in insurtech, behaviour change support system, the theory of reasoned action, and the persuasive system design model. The literature reviewed acts as the foundation of a research framework for this study. This chapter has conceptualised the constructs that are incorporated into the research study. The hypotheses are

developed accordingly. The succeeding chapter explains how the research study is being conducted to examine the hypotheses developed.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides details on how the current study was conducted. It outlines the research design, sampling method, questionnaire development, and pilot test before the study is conducted. Subsequently, the chapter discusses data collection during the study and the data analysis technique, along with essential indicators to consider.

3.2 Research Philosophy

Saunders and Tosey (2012) present a comprehensive overview of designing research to address research questions or problems. They conceptualize the research process using the "Research Onion" metaphor. With that, this study adheres to the study by Saunders and Tosey (2012), in which it progressively explores research philosophies and unveils subsequent layers through justification and explanation.

The initial step is determining the research philosophy. It concerns how the researchers view the world. There are four research philosophies included in the first layer of the research onion: positivism, realism, interpretivism, and pragmatism. The philosophy of positivism reflects that researchers are keen to

observe and predict the possible outcome or cause and effect of a phenomenon. The assumption for positivism is that the research is neutral and not influenced by the researchers' values (Saunders & Tosey, 2012). Positivism posits the linking with scientific inquiry. The researchers may have observed reality and then conducted the research to validate their hypothesis. Meanwhile, interpretivism believes that each individual has their own point of view. Therefore, this philosophy studies the social phenomena in their natural setting and understands the social world from the perspective of the targeted audience. This philosophy often binds with a particular value, in which the study only applies to a particular group of people at a certain period. Researchers who rely on pragmatism often believe that no single viewpoint can explain the entire picture of phenomena. There should be multiple faces to understand reality.

This study proposes to investigate how the persuasive system design elements influence users' perceived persuasiveness and its consequences reflecting on the intention to purchase insurance products. This study concerns law-like generalisation; thus, a positive philosophy is adopted.

3.2.1 Methodological Choice

The subsequent basic but essential decision for research design is to choose between qualitative, quantitative, or mixed methods to conduct the research study (Saunders & Tosey, 2012). Quantitative research often involves large samples drawn from a broad population. It involves numerical data to obtain and represent information about the world. Meanwhile, qualitative research is often conducted in a natural setting, involving the researcher as a

participant, communicating mainly about the subject or topics, subjective in nature and pragmatic (Chesebro & Borisoff, 2007).

The research onion listed varied methodological choices that can be further divided into the mono method, the multimethod and the mixed method under the significant branch of qualitative and quantitative approaches. Past researchers often adopt qualitative studies to investigate persuasive technologies (Fuentes et al., 2014; Mohadis et al., 2016; Segerståhl et al., 2010). This study adopts the quantitative research approach to provide fresh insights and validate the topic with statistical results. Aside from the formal and objective results obtained from the systematic process, the adoption of a quantitative approach allows the researcher to reach a greater number of prospects. The methodological choice of quantitative approach has taken into account the large number of downloads recorded on Play Store (refer to Table 1.1).

3.2.2 Research Strategies

The next decision falls on research strategies. Saunders and Tosey (2012) listed various research strategies ranging from experiment, survey, archival research, case study, ethnography, action research, and grounded theory to narrative inquiry. A detailed description of the choice of strategies is discussed by Saunders and Tosey (2012). The present study adopted a survey to collect data in a structured manner. The survey will be constructed according to the guidelines of PSD elements outlined by Torning and Oinas-Kukkonen (2009).

A case study is a research method that involves substantial knowledge of a particular matter (Range, 2023). Seawright and Gerring (2008) supported the definition proposed by Gerring (2004), in which a case study is "an extensive study of a single unit for the purpose of understanding a larger class of (similar) units." The nature of case study research requires the researchers to gather multiple sources of information concerning the subject matter, thus enhancing the richness of data and enabling a holistic examination of the complex situation. Since the case is drawn from a realistic example, a case study's greater degree of fitness to the real world is undoubtful. With that, the learning of human behaviour that is impossible to express or describe theoretically is eased. Plus, a case study is most beneficial to accommodate the complex cause-and-effect relationship, as it is supported by the diverse sources of observation in the physical and social world (Bennett, 2004). As suggested by Saunders and Tosey (2012), in addition to investigating the cause-and-effect of reality, this research took Touch n' Go eWallet as a case study.

The adoption of single-case designs allows a deeper examination of the case itself. Research studies conducted in persuasive technologies often adopted case studies in research. Likewise, to name a few, Carros et al. (2020) investigated the potential enablers and barriers of using robot-based assistance with the humanoid robot named Pepper; the adoption of COVID Pacman-C to investigate the perception of users towards the persuasive strategies implemented in promoting COVID-19 precautionary measures (Mulchandani & Orji, 2021). In order to ease the delivery of centralised information for nurses, the Nurse Antibiotic Information App (NAIA) was developed and adopted as the case to investigate (Jong et al., 2014), while Faisal et al. (2019) investigated

the study on PSD principles on WhatsApp Instant Messenger. All in all, regardless of the context of the study, the adoption of the case is deemed necessary in the present research study. Hence, it justified the selection of a case study as a research strategy. The rationale for selecting TNG eWallet as the case study in the present research is discussed in Chapter 1.8.

3.2.3 Time Horizon

The time horizon defines the period required for the researchers to conduct the study. It can be longitudinal, where the study is conducted over an extended period or cross-sectional, in which the study is conducted at a particular time.

The longitudinal study conducts an examination of the variables of interest in the subject matter over a prolonged period of time (Hua & David, 2009; Venkatesh & Davis, 2000). In light of this, the employment of longitudinal study is undoubtedly characterised by a greater extent of complexity and higher involvement of financial cost (Jha, 2023). Despite that, the body of academia often advocates the longitudinal study for its capability to better estimation of relationships, especially to establish the causal relationship between variables of interest (Hua & David, 2009; Maier et al., 2023; Savitz & Wellenius, 2023; Spector, 2019; Wang & Cheng, 2020). Spector (2019) outlined several decisive factors for adopting a longitudinal study, including the researchers' intention to test the effects of a particular intervention or the effects of a particular event that happens between waves. Most importantly, the time frame is known to conduct a longitudinal study.

A cross-sectional study, on the other hand, is characterised by its prevalence using a snapshot of the variables of interest in the subject matter at a specific point in time (Hua & David, 2009; Maier et al., 2023; Spector, 2019). The typical use cases to employ cross-sectional study include the stipulation of baseline information to validate the need for further research on the particular topic (Setia, 2016). In other words, the cross-sectional study provides initial evidence in forming the foundation for a more sophisticated study (Maier et al., 2023). Scholars asserted the importance of such insights in informing the trend of evolving issues, especially in technology-related fields (Bonner et al., 2018; Dwivedi et al., 2022; Edo et al., 2023). Spector (2019) added that the cross-sectional study is sensible to suggest, whether or not to start new areas of research. Additionally, the employment of a cross-sectional study is exceptionally useful to investigate the prevalence of perceptions and behaviours (Kesmodel, 2018; Maier et al., 2023). By way of explanation, cross-sectional studies disclose the prevalence of traits (Kesmodel, 2018), such as their spending habits, attitudes towards insurance or general understanding of fintech. Alternatively, the researchers may develop insights from the associations between different variables of interest (Kesmodel, 2018). Attributable to its manner of collecting data at a certain point in time, the cross-sectional study allows the research study to be conducted financially effectively and inexpensively (Spector, 2019). Given the rapid technological evolution and taking into consideration that the present study lies within a novel intersection, this study employs a cross-sectional approach to capture the current state of e-wallet mobile application system design.

3.3 Research Design

The first part of the research design is deciding between deductive and inductive reasoning. Researchers who adopt deductive reasoning aim to explain the observations or findings from a validated theory, while inductive reasoning develops theory from the observed reality (Saunders et al., 2019). Interestingly, most studies that adopt deductive reasoning are prone to quantitative research, while studies to build models and theories are more suitable for qualitative approaches (Park et al., 2020). As reminded by Saunders et al. (2019), several essential criteria should be considered when choosing the research approach; one is the nature of the research topic. When abundant literature about the research topic is available, and the existing theoretical framework can be explained, it is more suitable to conduct deductive reasoning. The previous section highlights that this study follows the positivism philosophy. Hence, it is natural to follow with deductive reasoning. Positivism is aligned with the hypothetico-deductive model of science that builds on verifying a priori hypotheses and experimentation by operationalizing variables and measures; results from hypothesis testing are used to inform and advance science. Crowther and Lancaster (2008) argued that positivist studies generally adopt a deductive approach. Therefore, it falls under deductive reasoning.

In accordance with this research's final objectives, to investigate the influence of PSD of mobile e-wallet applications on users' perceived persuasiveness leading to respective intention to purchase insurance products, the present research adopts the explanatory approach. Unlike the exploratory and descriptive approaches, the explanatory approach studies a phenomenon or

problem and explains the relationships between variables (Saunders et al., 2019). As such, this study adopts deductive reasoning and proceeds with a quantitative research design.

3.4 Sampling Procedure

Farmer and Farmer (2021) defined sampling as a strategy of selecting individuals or items from a population. Sampling is essential to select representative individuals or items from a population, as it is impossible to include every single population unit in the study. The researchers must obtain a sample that is representative of the targeted population. Otherwise, it might affect the accuracy of the research results and their generalisability. Knapp (2017) added that sampling is necessary to overcome scarce resources while gathering quality data.

3.4.1 Population

According to Zikmund et al. (2010), the population can be "any complete group or constitution of people or any collection of items." Another technical definition provided by Knapp (2017) is that the population is "the entire realm of people that consists of the whole domain of interest." The population of this study is defined as all users of e-wallet. There are no official data and statistics available from the government portal. As such, a rough computation of data is done for the study.

According to Demirgüç-Kunt et al. (2022), as cited in BNM (2023b), 79% of Malaysian adults are using digital payment services. Department of Statistics Malaysia [DOSM] (2022) reported that the estimation of the Malaysian population accounts for 32.7 million people. After rough computation, it is estimated that there are 25.83 million users in Malaysia who are using digital payment. They are deemed as the population of this study.

3.4.2 Sampling Method

There are two categories of sampling methods in broad, namely probability and non-probability sampling. Probability sampling ensures that all units have a defined determination of the chance of being selected as a sample. Non-probability sampling does not denote a predetermined chance of units being selected as a sample. This research employs the non-probability sampling method.

Specifically, non-probability sampling includes convenience, purposive, quota, and snowball sampling. Interestingly, purposive sampling has been proven to have many practical advantages, even though it is often debated. Likewise, the respondents who participated in the research may provide abundant helpful information about the research project yet may not be representative of the entire population (Acharya et al., 2013). Nevertheless, it is the best sampling method by far when the researchers manage to identify confined numbers of individuals in an all-inclusive community that fulfil the characteristics of targeted respondents (Rahman, 2023). After thoughtful consideration of time and cost, this study adopted the purposive sampling

method to realise the data collection on broader units. With that, the present study identifies the users of TNG eWallet as the respondents of the study.

3.4.3 Sample Size

Determining sample size plays a vital role in ensuring that the sample is representative of the population. Generally, the more data collected, the more comprehensive the research is (Saunders et al., 2019). This is supported by Dawkins et al. (1994), as statistical power increases while sample size increases. The scholars later added that indefinite collection of data must be taken into consideration against time since additional data collected may not be productive to the study when it may add little to no effect to the results.

To date, most researchers rely on a table for determining the sample size proposed by Krejcie and Morgan (1970). The table for determining sample size was constructed using a statistical formula that includes the table value of chi-square for 1 degree of freedom at the desired confidence level, the population size, the population proportion, and the degree of accuracy expressed in proportion (Krejcie & Morgan, 1970). The table was then simplified by illustrating the relationship between sample size and total population. It is vital to note that the sample size for a population of more than 1000000 remains at 384, with a margin error of 5% and a confidence level of 95% (Krejcie & Morgan, 1970). A snapshot of the table is attached in Table 3.1. There is another method to compute sample size (Cochran, 1977). In general, the determination of sample size measures the population variance, margin error, and confidence intervals.

Worthily, the formula for determining sample size remains a few unknowns that rely on the decision of researchers to choose a particular level of confidence and margin of error. Mandeville and Roscoe (1971) listed six rules of thumb to obey. The scholars also agreed that the general rule of 30 to 500 units is recommended. They added that this is because the abovementioned sample size is about 10% of the population. Similarly, Omair (2014) stated that the sample size should include 50 to 100 units, depending on available resources.

Out of various methods or rules of thumb, this study determines 384 as the sample size according to the table proposed by Krejcie and Morgan (1970). As such, the number of respondents needed for TNG eWallet is 384. The researchers rounded up the figure and concluded that 400 respondents were needed.

Table 3.1: Extract of Sample Size Table

Population	Sample	Population	Sample	Population	Sample
4000	351	8000	367	30000	379
4500	354	9000	368	40000	380
5000	357	10000	370	50000	381
6000	361	15000	375	75000	382
7000	364	20000	377	1000000	384

Source: Krejcie, R. V., & Morgan, D. W. (1970).

3.4.4 Unit of Analysis

The unit of analysis is defined as 'the theoretical population for which a study can make externally valid inferences based on a representative sample' (Wülferth, 2013). As this research investigates users' intention to purchase insurance products through e-wallets, the unit of analysis is set at an individual level.

To determine the individual to include in the present study, specific inclusion and exclusion criteria are indicated to fulfil the non-probabilistic and purposive nature of the sampling method. In setting the inclusion and exclusion criteria, decisions are made carefully to ensure comprehensive voices from the prospective participants are embraced. The inclusion criteria for the study sample consisted of Malaysians who are actively using digital payment services. This implies that the vast majority of Malaysian digital payment users who are identified as non-TNG users and aged below 18 years old are excluded from the study.

The rationale for setting up the exclusion criteria is further explained as such. Since the present study adopts TNG eWallet as the case study, those users who do not own an active account on the TNG eWallet mobile application are not viable as the study sample. On top of that, individuals aged 18 years old and below are determined as minors. Under the Insurance Act 1996, Laws of Malaysia Section 153, Subsection 1 (2005), those aged below 16 are required to provide the consent in writing of their parent or guardian. Taking the TNG eWallet policy into account, it is mentioned that users eligible for the insurance protection should be between 18 years old to 50 years old, renewable up to 70 years old. Thereby, this solidifies the set-up of exclusion criteria for minors aged 18 years old and below.

3.4.5 Data Collection

In social science research, a survey questionnaire has often been used as the research instrument in recent years (Zina, 2021). Data in this study is

collected through primary sources. This allows greater flexibility among the researchers to fulfil the research objectives. On the other hand, the researchers are responsible for ensuring the quality of the data collected (Mazzocchi, 2011).

Data in this study is collected through an online self-administered questionnaire. This is suitable for the research study as the targeted respondents are e-wallet users relying heavily on the Internet to conduct transactions. A filter question of 'Do you use Touch 'n Go eWallet?" to determine whether the respondents are qualified to answer the subsequent question. There are two possible answers to the filter question: either 'Yes' or 'No'. If the respondents answer a 'Yes', they are qualified as the targeted group of respondents and eligible to answer the subsequent question. Otherwise, the respondents will be directed to the last page of the questionnaire and thanked for the effort. As they are not considered to be the target group of respondents, the responses will consequently be removed.

The structured questionnaire survey is developed and sent to the users of the e-wallet. With that, respondents indicate the extent of their attitude towards PSD elements, perceived persuasiveness, and intention to buy an insurance product. Interestingly, the respondents are in favour of five points, ten points, and seven points for easier use, shorter scales for quicker use, and more options to adequately express their feelings (Preston & Colman, 2000). According to Colman et al. (1997), scales with odd numbers are preferred over even numbers as they allow a middle ground for the respondents to express a neutral point of view and prevent them from picking a side. This is especially applicable in this study as not all respondents are tech-savvy and sensitive to each system design element. Therefore, the given option to the respondents with

a neutral position is desirable. On top of that, considering the reliability and validity of the result, Preston & Colman (2000), as cited in Taherdoost (2019), found that a seven-point Likert scale would increase the internal consistency reliability while a seven to ten-point Likert scale would yield greater convergent validity. Although Simms et al. (2019) suggested that a scale with response options beyond six or seven may be pointless, this study adopted a seven-point Likert scale, considering a more accurate expression of agreement and/or disagreement among the respondents. The respondents are required to rate their extent of agreement or disagreement from one to seven on a Likert scale, with one being strongly disagreed and seven being strongly agree.

3.5 Questionnaire Development

The construction of a questionnaire is imperative when researchers seek to obtain organized information from respondents. Researchers gather accurate data and further validate the research by asking the right questions (Peterson, 2013). In this study, the researcher diligently followed the framework proposed by Churchill and Illinois (1976) for constructing effective questionnaires. This study adopts close-end questions, which allow the respondents to answer within a fixed range of options.

The layout of the questionnaire is mainly divided into four parts. The respondents are introduced to the background of the researcher and the purpose of the research study and are required to provide consent for personal data in accordance with the Personal Data Protection Act 2010. The second section of the questionnaire includes only one screening question that acts as a filter to

confirm whether the respondents are TNG eWallet users. The screening question is posed as a preventive measure to avoid suspicious survey responses to ensure the respondents fit the inclusion criteria of the study (Chandler & Paolacci, 2017; Jones et al., 2015). As mentioned in Chapter 3.5, the respondents who do not use the TNG eWallet are directed to the end of the questionnaire. Otherwise, they are required to proceed to the subsequent section of the questionnaire.

The third part of the questionnaire gathers demographic information about the respondents and relevant information about insurance. Table 3.2 illustrates the research instrument for Section 3 of the questionnaire. To highlight, the distribution of age refers to the cohort analysis conducted by Colby and Ortman (2014). Based on the cohort identification, the present study acknowledged that respondents aged between 11-26 are Generation Z, 27-42 are Millennials, 43-58 are Generation X, 59-77 are Baby Boomers, and 78-95 are Silent Generation. It is worthwhile to note that the definition of Generation Z does not align with the identification of cohorts by Colby and Ortman (2014). This is mainly due to the Insurance Act 1996, Laws of Malaysia, Section 153, Subsection 1, which highlighted that a minor who is below 16 should sign the insurance contract with the consent of the parent or guardian. On top of that, the TNG eWallet enlisted the minimum age of eligibility at 18 years old. Hence, the present study assigned the minimum age for Generation Z to be 18, while those who have not attained the age of minor shall fall in the category of below 18.

Table 3.2: Research Instrument for Demography Profile

Question	Option
What is your gender?	Male Female
What is your age?	Below 18 18-26 27-42 43-58 59-77 78-95
What is your highest education level?	Primary school Secondary school Pre-university Undergraduate Postgraduate
What is your current employment status?	Employed Self-employed Unemployed Student Retired
What is your average household income level?	Below RM4,850 Between RM4,850 to RM10,960 Above RM10,960
Which type of insurance(s) do you own currently?	Life and health insurance Non-life insurance Both None of the above
Do you think insurance is important?	Yes No Maybe
Do you consider Touch 'n Go eWallet as your mainstream payment method?	Yes No Maybe
What is your tier in Touch 'n Go eWallet?	LITE PRO PREMIUM
Do you secure yourself with insurance product(s) on Touch 'n Go eWallet?	Yes No
Which insurance product(s) have you purchased on Touch 'n Go eWallet?	CarInsure MotoInsure CI Insure WalletSafe SafeTrip SafeHome
Are you aware of Insurance Technology (Insurtech)?	Yes No

Source: Developed for the study

The last section of the questionnaire captures the respondents' perceptions of the research domain. The questionnaire items are developed from the literature reviewed in relation to the PSD model, perceived persuasiveness,

and purchase intention. The questionnaire items derived from previous studies are adapted to fit the context of the e-wallet mobile application. Table 3.3 illustrates the item measurements adopted for each construct and their corresponding sources.

Table 3.3: Items Measurement with its Adopted Sources

Construct	Variable	Items Measurement	Adapted Sources
Primary Task Support (PTS)	PTS1 Reduction	I can manage my insurance policies easily with fewer clicks on Touch ‘n Go eWallet.	(Loh & Hamid, 2021; Oinas-Kukkonen & Harjumaa, 2009; Oyibo & Vassileva, 2021)
	PTS2 Tunnelling	Touch ‘n Go eWallet provides clear guidance through the management of insurance policies.	
	PTS3 Tailoring	Touch ‘n Go eWallet can support immediate quotations based on my needs.	
	PTS4 Personalisation	I can rearrange the recently used features easily on Touch ‘n Go eWallet.	
	PTS5 Self-monitoring	I can track and monitor the insurance policies purchased on Touch ‘n Go eWallet.	
	PTS6 Simulation	I can compare and contrast the difference between protected situations and non-protected situations on Touch ‘n Go eWallet.	
Dialogue Support (DS)	DS1 Reminders	Touch ‘n Go eWallet prompts reminders for ongoing promotions or new products.	(Loh & Hamid, 2021; Oduor & Oinas-Kukkonen, 2019; Oinas-Kukkonen & Harjumaa, 2009; Shevchuk & Oinas-Kukkonen, 2019)
	DS2 Suggestion	Touch ‘n Go eWallet suggests the most suitable insurance plan for me.	
	DS3 Liking	The system design of Touch ‘n Go eWallet is visually appealing.	

Source: Developed for the study

Table 3.3: Items Measurement with its Adopted Sources (cont.)

Construct	Variable	Items Measurement	Adapted Sources
System Credibility Support (SCS)	SCS1 Trustworthiness	Touch 'n Go eWallet provides enhanced security to authorise transactions.	(Loh & Hamid, 2021; Oinas-Kukkonen & Harjumaa, 2009)
	SCS2 Expertise	I can assess the brief description of the insurer companies.	
	SCS3 Surface credibility	I can see a limited number and a logical reason for ads on Touch 'n Go eWallet to be professional.	
	SCS4 Real-world feel	I can contact customer service of Touch 'n Go Digital for assistance or seek help through frequently asked questions according to the well-organised topics.	
	SCS5 Third-party endorsements	Touch 'n Go eWallet provides endorsements from Bank Negara Malaysia.	
	SCS6 Verifiability	Touch 'n Go eWallet provides links to verify the accuracy of insurance products.	
Social Support (SS)	SS1 Social learning	I can check reviews of Touch 'n Go eWallet on the external platform.	Self-developed based on (Oinas-Kukkonen & Harjumaa, 2009)
	SS2 Normative influence	There are many users who share information and personal experiences about the insurance products of Touch 'n Go eWallet.	
	SS3 Recognition	Touch 'n Go eWallet is accessible at most merchant touch points.	

Source: Developed for the study

Table 3.3: Items Measurement with its Adopted Sources (cont.)

Construct	Variable	Items Measurement	Adapted Sources
Perceived Persuasiveness (PP)	PP1	The system design of Touch ‘n Go influences me to purchase insurance products via the app.	(Drozd et al., 2012; Lehto et al., 2012; Oyibo & Morita, 2022; Oyibo & Vassileva, 2020, 2021)
	PP2	Touch ‘n Go eWallet is personally relevant to me.	
	PP3	Touch ‘n Go eWallet makes me reconsider the way to get myself insurance products.	
	PP4	The features of Touch ‘n Go eWallet are convincing.	
Intention to Buy (IB)	IB1	I am positive towards purchasing insurance products on Touch ‘n Go eWallet.	(Hajli, 2015; Kharde & Madan, 2018)
	IB2	I am likely to purchase insurance products on Touch ‘n Go eWallet in the near future.	
	IB3	I have the intention to purchase insurance products through Touch ‘n Go eWallet.	
	IB4	It is possible for me to purchase insurance products on Touch ‘n Go eWallet.	

Source: Developed for the study

3.6 Pre-test

The conduct of a pre-test is imperative, serving its purposes to assess face validity, avoid unwanted analytical errors, provide an opportunity to reflect and improve on the research study design, and ensure the survey questions are understandable, aiming to collect the right information and produce valid results effectively (Abdulameer et al., 2020; Hashim et al., 2022; Memon et al., 2023).

The researcher in the present study conducted the pretest using the expert review approach by seeking advice from experts. The expert review approach is also known as the focus group method (Aithal & Aithal, 2020). The rationale for opting expert review approach to conduct the pre-test is to adhere to the research findings by Presser & Blair (1994), wherein expert review is by far the most productive approach accompanied by its outstanding robustness to identify the nontrivial number of analysis problems and consistency across trials. The expert review approach typically engages the subject matter expert and survey expert with in-depth experience in the survey methodology (Bhalla et al., 2023; Czaja, 1998). Aligned with the protocol of conduct (Bhalla et al., 2023), the subject matter expert is identified as practitioners who have experience in the area of focus, whereas the survey professionals can be academicians with publication records in relevant research domains.

The present study engaged one information system practitioner who has a prominent understanding of persuasive system design and mobile application development as well as one academic researcher with in-depth experience in survey process research. Coherent to Hunt et al. (1982), the expert panel are required to assess the survey questionnaire and the individual questionnaire

items. The assessment of the pretest specifically includes the length or format of the survey questionnaire and the ambiguity of the questionnaire items. This step aims to identify plausible complexity in wording, accuracy in terms used, ambiguity in language and redundancy in questionnaire items. Simultaneously, the expert panel are solicited to inspect if all domains are covered in the survey questionnaire. The experts were approached with a cover letter, the survey questionnaire and a pretest form. The cover letter generally introduces the researcher and the research project. Then, the survey questionnaire consisting of the items of each variable is attached. Finally, the expert panel are provided with a pre-test form to jot down their feedback or suggestions on the questionnaire design and scales used. The experts were well-informed about the purpose and procedure of the pre-test.

The undertaking of the pre-test using expert review returns that no major issue was identified from the survey question. As per the expert panel, the survey questionnaire has deliberately covered satisfactory domains of research interest. Therefore, the survey questionnaire is approved for further consideration.

3.7 Data Analysis Technique

3.7.1 Descriptive Data Analysis

The present study employed Microsoft Excel for descriptive data analysis. The adoption of Microsoft Excel is to identify missing data, suspicious and inconsistent response patterns, and outliers by statistical means. On top of

that, the user-friendly interface allows the researchers to conduct analysis and interpretation of the descriptive data easily.

Missing data is often perceived as a problematic issue. The present study agrees with Schafer & Graham (2002) in that the missing values on a dependent variable should not be simply omitted. Instead, the missing value should be fairly treated. This study applies the general method, which is commonly used by researchers, in which entering -99 indicates a missing value. For instance, given that the particular respondent failed to provide his/her expression of agreement or disagreement for PTS1, the corresponding item will be labelled -99. However, when the missing value for a particular case has exceeded 15%, the particular case should be removed (Hair et al., 2022).

3.7.2 Structural Equation Modeling Using Partial Least Square

Structural Equation Modeling (SEM) is employed to analyse the data collected. Generally, SEM can be categorized into covariance-based approach (CB-SEM) and partial least squares (PLS-SEM). As this study fulfils the characteristics of multiple regression, PLS-SEM is more appropriate (Hair et al., 2011). Added to the increasing popularity of PLS-SEM in research of various fields, its credible ability to manage complicated models and novel issues is preferred by researchers to perform statistical analysis. In simpler terms, it helps to test the hypotheses developed. Past studies have proven that PLS-SEM is helpful in understanding and assessing the conceptual framework (Hair et al., 2011; Sarstedt et al., 2016).

Putting the technical terms into this study, the perceived persuasiveness of PSD elements on e-wallet mobile applications (indicator) contributes to the intention to purchase insurance products (latent variable). Specifically, the indicator can be categorised into two broad categories: exogenous variables (commonly known as independent variables) and endogenous variables (commonly known as dependent variables).

Before proceeding to the assessment of the measurement model, it is vital to distinguish between reflective and formative constructs in the application of SEM. A sound measurement theory can be helpful in deriving valid results from PLS-SEM. This is attributable to the fact that it puts the statistical conclusion of a study's findings in jeopardy (MacKenzie et al., 2005). Likewise, it would suggest Type I errors, Type II errors, or both of inference in hypothesis testing (MacKenzie et al., 2005).

The first criterion to distinguish between reflective and formative models is the nature of indicators. Items that demonstrate the constructs in a manner that they are each determined by it is a reflective model (MacKenzie et al., 2005). Items that collectively explain the meaning of a construct that should be considered as a formative model.

The second criterion is the interchangeability of indicators. The fundamental characteristic of a formative model is non-interchangeable. Oftentimes, removing an indicator can mean removing the construct partially (Bollen & Lennox, 1991). Meanwhile, the reflective indicators should strongly share a common theme and collectively capture the essence of the domain of the construct (MacKenzie et al., 2005).

On the same note, the third criterion to differ between the reflective and formative models is the correlation among indicators. Following the aforementioned characteristic where reflective indicators of a construct share cover similar provinces, they should be expected to covary with each other (MacKenzie et al., 2005). Technically, if an indicator is being removed, the correlation between the remaining indicators does not change as per the interchangeability of the effects indicators, provided that sufficient indicators are present (Simonetto, 2012). Contrary to the formative model, the indicators are not expected to be highly correlated as they all may not reflect the same underlying latent construct (MacKenzie et al., 2005). The conceptual difference between the reflective and formative measurement models pertaining to the construct of the domain of interest is illustrated in Figure 3.1. Based on the illustration, it is clearly understood that the indicators in the reflective measurement model tend to shed light on domains with higher relevancy by having more grey-shaded circles overlapping each other. Meanwhile, the formative measurement model owns a bigger black circle as the domain of interest is wider than the reflective measurement.

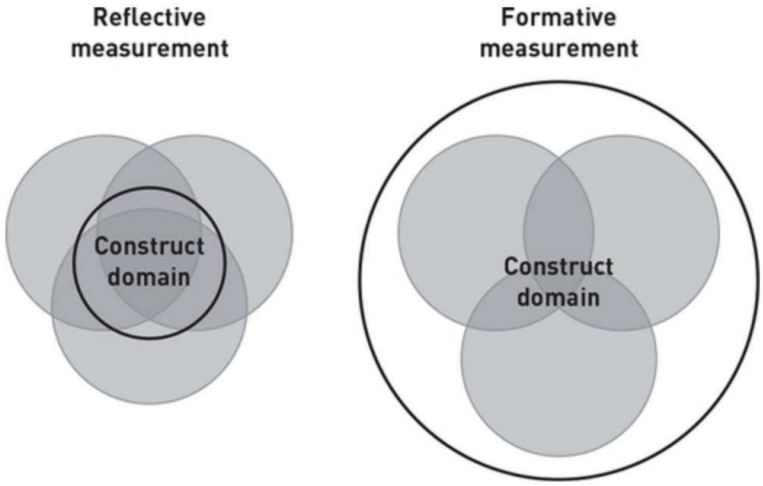


Figure 3.1: Conceptual Difference Between Reflective And Formative Measurement Models

Source: Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022).

Lastly, it depends on whether all indicators reflect the same antecedents. Reflective indicators should propose the same direction or the same consequences for the underlying construct. Nevertheless, the formative indicators do not necessarily have similar antecedents since they might exploit diverse aspects of the construct. The fundamental concept of the reflective model is that the direction of the relationship initiates from the construct to the indicators (Diamantopoulos et al., 2008). Contrasting to the direction of the relationship concerning the formative model happens from the indicators to the construct (Diamantopoulos et al., 2008). Figure 3.2 illustrates the relationship between construct and indicators for reflective and formative measurement models.

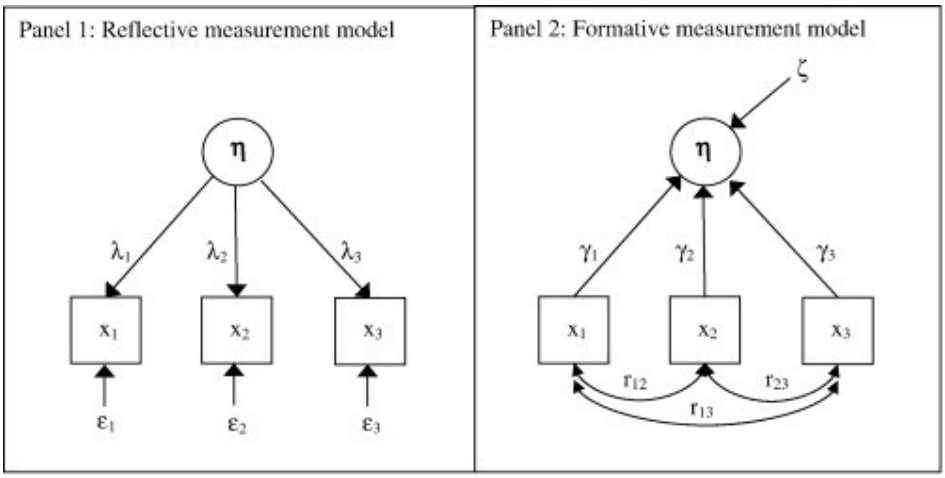


Figure 3.2: Relationship Between Construct And Indicators

Source: Diamantopoulos, A., Riefler, P., & Roth, K. P. (2008).

With the understanding of the differences between reflective and formative measurement models, the persuasive system design constructs are considered formative measurement models as they fulfil the most crucial characteristic of non-interchangeability. This implies that each indicator for the persuasive system design constructs captures a specific aspect of the construct's domain. Exemplary, the seven principles under Primary Task Support possess different requirements and do not duplicate among themselves.

Contrarily, both perceived persuasiveness and intention to buy constructs represent the reflective measurement model. The domain of interest for both constructs is considered more concentrated. In this case, the overlapping between interchangeable indicators is maximised.

Both reflective and formative measurement models are susceptible to a different set of model assessment techniques. The assessment of the measurement model follows a general guideline illustrated by Hair et al. (2022).

3.8 Evaluation of Reflective Measurement Model

For the reflective measurement model, the examination includes indicator reliability, indicator consistency reliability, convergent validity and discriminant validity. The formative measurement model is to assess convergent validity, collinearity between indicators, significance and relevance of outer weights. The subsections below further discuss the rule of thumb or threshold value for each evaluation.

3.8.1 Indicator Reliability

The foremost step in assessing the reflective measurement model is to examine the outer loading of the indicators. The weightage of outer loadings reflects its reliability. According to Hair et al. (2022), the outer loadings of all indicators should be at least 0.708 or higher. Generally, 0.70 is also considered acceptable since it is close enough to 0.708. The logic of having 0.708 is that the latent variable should explain at least half of each indicator's variance, subsequently implying that the variance shared between the construct and its indicator's standardised outer loading is larger than the measurement error (Hair et al., 2022). The remaining part shall represent the unexplained variance of an indicator, known as the measurement error.

Outer loadings that are less than 0.708 are considered weak. As such, the rules of thumb of indicator reliability suggest that it should be removed. Interestingly, researchers in social science often obtain weaker outer loadings when the field is newly developed (Hulland, 1999). Nevertheless, outer loadings

of indicators should not be solely taken as the only measurement of whether to remain the respective indicators in the study. In general, outer loadings between 0.40 and 0.70 should be carefully considered, whether to remain or remove, in reference to the internal consistency reliability or convergent validity (Hair et al., 2022). Alternatively, it should also consider the extent of the effect on content validity (Hair et al., 2022). However, outer loadings of indicators below 0.40 should be removed anyhow (Bagozzi et al., 1991). Figure 3.3 shows the recommendations on decisions on whether to remove or keep the indicators based on outer loadings.

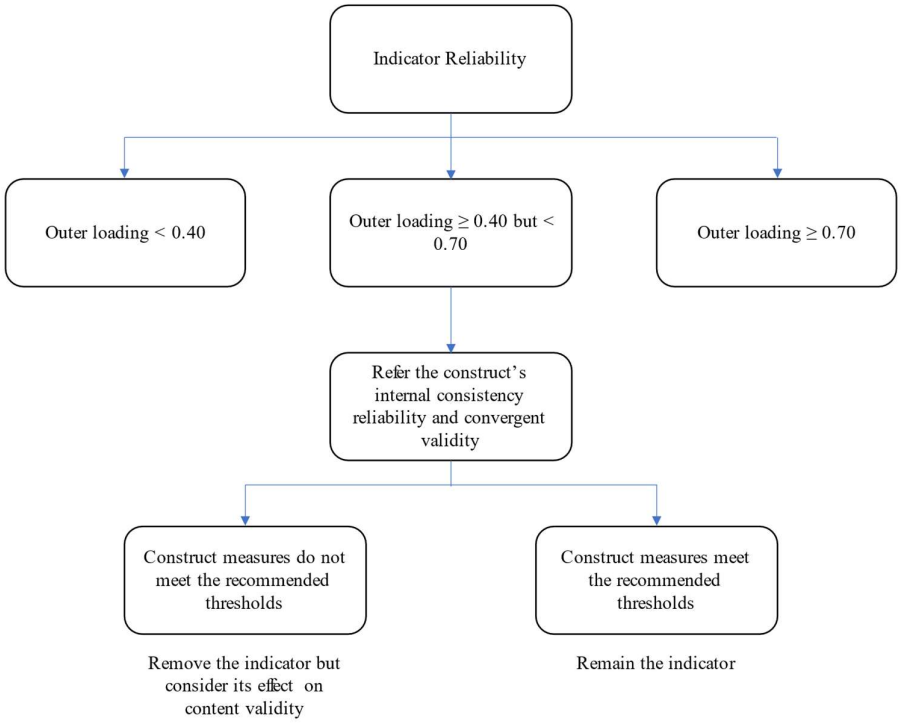


Figure 3.3: Indicator Reliability

Source: Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022).

3.8.2 Internal Consistency Reliability

The second step to assess the reflective measurement model is to examine the internal consistency reliability. There are three methods to evaluate internal consistency reliability.

Cronbach's alpha, being the traditional criterion for internal consistency reliability assessment, estimates the reliability based on internal correlations of the indicator variables. It holds the assumption that all indicators have equal weightage on reliability (Cronbach, 1951). Also, it is sensitive to the number of items in the scale and tends to underestimate the internal consistency reliability. Scholars consider it a conservative measure of internal consistency reliability (Hair et al., 2022).

Subsequently, composite reliability (ρ_C) overcomes the drawback of Cronbach's alpha by considering the different outer loadings of indicator variables. Peterson and Kim (2013) discussed the manipulation of correlations between items on composite reliability. With that, it stems from the criticises of composite reliability for being too liberal.

Considering the two opposite extremes between Cronbach's alpha and composite reliability, scholars suggested the use of the reliability coefficient (ρ_A) (Dijkstra & Henseler, 2015). The reliability coefficient usually lies between Cronbach's alpha and composite reliability; thus, it can better compromise the weaknesses of both (Hair et al., 2019). All three methods of measuring internal consistency reliability follow the same rules of thumb—the greater the metric, the greater the reliability, varying from 0 to 1. Table 3.4 illustrates the rule of thumb for internal consistency. To highlight, Hair et al. (2022) explained that

internal consistency valued above 0.95 reflects the result of semantically redundant items and may boost error term correlations. Thus, it requires actions to remove the redundant items. The reliability coefficient valued at 0.6 and below illustrates a lack of internal consistency reliability.

Table 3.4: Rule of Thumb For Internal Consistency

Composite reliability	Label
0.95 and above	Definitely undesirable
0.90-0.95	Undesirable
0.7-0.90	Satisfactory
0.6-0.7	Acceptable (Specifically for exploratory research)
0.6 and below	Totally unacceptable

Source: Hair, J. F. J., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017).

3.8.3 Convergent Validity

In evaluating the convergent validity of a measure, the degree to which it correlates with other measures of the same construct is often considered (Hair et al., 2022). This is typically achieved by ensuring that the indicators of specific reflective constructs account for a high proportion of variance, as reflected in the average variance extracted (AVE). Technically, it is defined as "the grand mean value of the sum squared loadings of the indicators associated with the construct" (Hair et al., 2022). In short, the AVE equals the commonality of a construct (Hair et al., 2022).

Regarding AVE, a commonly accepted rule of thumb is that it should be at least 0.50 (Hair et al., 2022; Hair et al., 2011). This is based on the idea that at least half of the variance among the indicators should be accounted for. A low AVE indicates that more variance remains in the error of the indicators, which suggests low convergent validity.

3.8.4 Discriminant Validity

The term 'discriminant validity' refers to the degree of difference between constructs by empirical standard (Hair et al., 2022). Traditionally, the Fornell-Larcker criterion is used to evaluate discriminant validity, but scholars have found that they do not reliably detect issues based on both empirical and conceptual grounding (Hair et al., 2022). Exemplary, when all indicator loadings vary differently in the minimal range, it shows misleading results of analysis. When indicator loadings vary strongly, the Fornell-Larcker criterion improves insignificantly, resulting in upsetting performance overall (Radomir & Moisescu, 2020). A similar issue is posed on cross-loadings; the indicators' outer loadings are not able to support the detection of severe violations of discriminant validity, portraying a useless method for assessing discriminant validity.

Henseler et al. (2015) introduced the heterotrait-monotrait ratio (HTMT) to assess the ratio of between-trait correlations to within-trait correlations, which measures the true correlation between constructs when they are perfectly reliable. The lower the HTMT value, the greater the discriminant validity. The HTMT threshold value remains debatable, but a value below 0.85 may be considered conservative, and a value ranging from 0.85 to 0.90 may be acceptable. Any value above 0.90 implies a lack of discriminant validity (Henseler et al., 2015).

Additionally, bootstrapping can be used to derive a bootstrap confidence interval and provide a range of values where the HTMT proportion value will fall, holding a particular assumption of confidence level (Hair et al., 2022). The

rationale for inferential testing using bootstrap confidence intervals is to avoid suppressing discriminant validity issues in the application of the HTMT statistics (Franke & Sarstedt, 2019). This study follows the recommendation by Chin (1998) and examines the confidence value of HTMT using complete bootstrapping with 10000 samples.

3.9 Evaluation of Formative Measurement Model

Unlike the reflective measurement model, the formative measurement model encompasses substantially different characteristics in the sense that indicators plausibly represent independent causes of the construct and are not widely correlated to each other. Therefore, the evaluation criteria mentioned in Subchapter 3.8 are not applicable to the assessment of the persuasive system design construct. In lieu of that, the evaluation criteria of the formative measurement model concern the convergent validity, collinearity, significance and relevance of the formative indicators.

3.9.1 Convergent Validity

The assessment of convergent validity in the formative measurement model aims to examine the content validity before testing the formative construct empirically (Hair et al., 2022). The content validity issues are examined to ensure that the formatively measured constructs address the domain of content comprehensively. Failure to do so results in the exclusion of vital parts within the construct, subsequently contributing to a potential risk of

construct misrepresentation. Specifically, the assessment of convergent validity is to examine the extent of correlation between measures of the same construct using different indicators (Hair et al., 2022). The assessment is done by conducting a separate redundancy analysis, which aims to ensure there is no repetition of information being measured in the formative constructs.

The assessment of convergent validity should refer to the path coefficient as the path coefficient linking formative constructs to another reflective construct, revealing the validity of a formative construct exploiting the exact domain of interest. The general threshold value recommended by scholars is 0.7, or ideally 0.8, for the coefficient of path linking formative construct to reflective construct. Alternatively, the R^2 value should be higher than 0.50. Otherwise, it reflects a lack of convergent validity.

As the global single-item measure defining the persuasive system design is inattentive based on the literature review, it is necessary to generate and validate global single items to be used as criterion variables for the sake of redundancy analysis. In the present study, the theoretical definition of persuasive system design outlined by Oinas-Kukkonen and Harjumaa (2009) is implemented as a scale item. Subsequently, the reliability assessment is conducted to measure the correlation between the single-item measure and the multi-item measure of the formative construct, respectively (Hair et al., 2022). The statements developed to assess the convergent validity and to be treated as the reflective single-item construct in response to the PSD constructs are tabulated in Table 3.5).

Table 3.5: Single-item Measurements For PSD Constructs

Persuasive System Design Construct	Single-item Measurement	Source
Primary Task Support	The system design of Touch ‘n Go eWallet supports me to purchase insurance products.	(Oinas-Kukkonen & Harjumaa, 2009)
Dialogue Support	The system design of Touch 'n Go eWallet allows me to interact with the system.	
System Credibility Support	The system design of Touch 'n Go eWallet appears credible and thus more credible.	
Social Support	The system design of Touch 'n Go eWallet leverages social influence.	

Source: Developed for the study.

3.9.2 Collinearity Issues

Since formative constructs are expected to capture a more comprehensive picture of the specific domain, collinearity issues should be avoided. Otherwise, it leads to controversy in methodology and interpretation. The assessment of the level of collinearity should refer to the tolerance value. The tolerance value implies the extent of one formative indicator that is not being explained by the other indicator within the same construct. In this case, the variance inflation factor (VIF) is a valuable indicator to measure the tolerance value. A VIF value ranges from 1, which indicates no correlation with any other indicators, to infinity, where a perfect correlation appears (Stadler et al., 2021). The threshold value for VIF, which is ideally accepted by scholars, is three or lower (Hair et al., 2022). Indeed, a VIF value lower than five is desired.

Provided that the VIF value is greater than 5, the researcher should consider removing the corresponding indicator or combining the collinear indicators into a single composite indicator as a treatment for collinearity issues. If the collinearity issues persist, the formative measurement shall be dismissed.

On the contrary, if the collinearity issues are treated, the significance of outer weights should be analysed, and the absolute or relative contribution of the formative indicator should be interpreted accordingly.

3.9.3 Significance And Relevance of The Formative Indicators

The outer weight of a formative indicator reflects its contribution of it and its relevance. By comparing the outer weight of formative indicators, it suggests the relative contribution of each indicator to the underlying construct. The greater the outer weight, the more the relative contribution made by a formative indicator to the underlying construct.

Alternatively, the absolute contribution of a formative indicator should also be assessed simultaneously. This is attributable to the fact that the absolute contribution of the formative indicator implies information without considering other indicators that are associated with the underlying construct (Hair et al., 2022). In this case, the outer loadings should be taken into account.

Scholars also suggested conducting a bootstrapping procedure to measure whether the outer weights are significantly different. Along with the bootstrapping procedure, the bootstrap confidence intervals can be derived to provide additional information on the extent of certainty of a value. The clear and concise concept of adopting a relatively large number of bootstrap samples is acknowledged. Nevertheless, the number of bootstrap samples is often debated among researchers since there is no guideline determining which number of samples is considered significant (Streukens & Leroi-Werelds, 2016). Earlier studies recommended that 5,000 samples are sufficient for the bootstrap

procedure (Hair et al., 2017; Preacher & Hayes, 2008)). In practice, many studies conducted earlier also adopted 5,000 bootstrap samples.

Generally recommended, the number of bootstrap samples should be greater than the number of samples adopted; the commonly used is 10,000 bootstrap samples (Hair et al., 2022). Echoed by Streukens and Leroi-Werelds (2016), this study adheres to 10,000 bootstrap samples, prioritizing the construction of bias-corrected percentile bootstrap confidence intervals. Therefore, the bootstrap procedure is sufficient to determine the empirical *t*-value and its corresponding *p*-value by referring to the standard error of outer weight (Hair et al., 2022).

3.10 Evaluation of Structural Model

After confirming the reliability and validity of construct measures, the next step is to assess the structural model. The structural model assessment procedure starts with assessing for collinearity issues, followed by an examination of the significance of structural model relationships, the explanatory power and predictive power.

3.10.1 Collinearity

The assessment of collinearity refers to the variance inflator factor (VIF), which is defined as the reciprocal of the tolerance (Hair et al., 2022). The threshold value applied for VIF is 5. The preferred value for VIF is below 3 to ensure zero substantial effect on structural model estimates. A VIF valued of 5

and above reflects collinearity issues and, thus, requires immediate action to either eliminate a particular construct, merge the predictors into one single construct or create a higher-order construct as a treatment for collinearity issues (Hair et al., 2022).

3.10.2 Path Coefficient

The path coefficients show the hypothesised relationships among the constructs. It should be a value between -1 and +1, with path coefficients approaching +1 explaining a strong positive relationship while path coefficients approaching -1 explain a strong negative relationship. A path coefficient very near to 0 reflects an extremely weak relationship in the structural model.

In order to ensure the coefficient is significant, bootstrapping is needed to acquire the standard error. It is a technical procedure to investigate the extent to which formative indicator significantly contributes to the corresponding construct (Hair et al., 2022). The most commonly used indicator to assess the significance level is the *p*-value. The rationale for referring to the *p*-value is that it reflects the chances of mistakenly rejecting a true null hypothesis (Hair et al., 2022). Applying this to the current study, assuming the significance level is 5%, the *p*-value must be smaller than 0.05 to ensure that the hypothesised relationship is significant (Hair et al., 2022).

The assessment of the significance of the structural model relationship should also refer to *t* values or bootstrapping confidence intervals that provide additional information about the significance of testing results. Corresponding

to *p*-values, the critical level of *t*-values for the one-tailed test at a 5% significance level should account for 1.65 (Hair et al., 2022).

3.10.3 Coefficient Of Determination

After confirming the significance of the hypothesis, the next step of examination is to assess the explanatory power of the model. According to Hair et al. (2011) and Shmueli et al. (2015), the explanatory power of a model describes the ability of a model to fit the data by examining the strength of association in metrics. The most useful indicator is the coefficient of determination (R^2). It explains the variance in the independent variables in correlation to their underlying dependent variables. The R^2 value should range between 0 and 1, with the greater numeric value indicating a greater ability to explain. The general rule of thumb for R^2 is that 0.25 is weak, 0.50 is moderate, and 0.70 is substantial (Hair et al., 2019). However, there is no standardised benchmark to determine the best R^2 value since it may vary over several disciplines. Some cases accept 0.10 as a satisfactory value, while some cases require 0.65 and above (Hair et al., 2022). Inasmuch as the greater the R^2 value, the better the model is explained.

Additionally, the R^2 value can also measure the strength of the structural model relationship by referring to the f^2 effect size (Hair et al., 2022). For example, if the f^2 effect size of a construct is large, it can be reflected in the changes in the R^2 value. Therefore, it serves as a useful indicator for the researcher to understand the extent of the impact of the corresponding construct. In short, the f^2 effect size specifically measures the weightage of a construct in

the structural model. A general rule of thumb to evaluate the f^2 effect size is 0.02, 0.15 and 0.35, which represent small, moderate and large effects, respectively (Cohen, 1988; Hair et al., 2022). Any value below the minimum threshold value of 0.02 can be interpreted as no measurable effect (Cohen, 1988; Hair et al., 2022).

3.10.4 Predictive Power

Similar to many other marketing research studies, the present study aims to test whether it is capable of explaining the interest of the greater population from the existing sample. Therefore, the "causal-predictive model" of PLS-SEM comes in handy to assess the predictability of the phenomena (Shmueli et al., 2015).

The predictive power of a model determines its ability to extend the findings of the study beyond the present unit of analysis (Hair & Sarstedt, 2021). High predictive power can be seen from a slight divergence between the actual and predicted value and vice versa (Hair et al., 2022). The key indicator to refer to is $PLS_{predict}$. The $PLS_{predict}$ compensates for the crucial drawbacks of Q^2 in assessing the predictive quality of a model. With respect to that, Q^2 is evidently problematic for omitting single data points, imputing the omitted data points, and estimating the PLS path model (Shmueli et al., 2019). This can result in misleading results and interpretation of data when the optimal predictive model is potentially different from the explanatory model (Shmueli, 2010).

In light of this, researchers should concentrate on the interpretation of $Q^2_{predict}$ value to ensure the predictions primarily fulfil the most naive benchmark.

Notably, a positive $Q^2_{predict}$ value is favourable as it suggests a smaller prediction error by the model as compared to the prediction error set by the benchmark (Hair et al., 2022). Conversely, a $Q^2_{predict}$ value of zero or less reflects that the model does not even outperform the most basic benchmark. A general guideline outlined by Hair et al. (2019) suggests that 0 is equivalent to small, followed by 0.25 and 0.50 for moderate and large predictive relevance of the PLS-path model. Shmueli et al. (2015) then suggested a linear regression model (LM) benchmark for more clear-cut predictions. This improves the accuracy in assessing the out-of-sample predictive power of each model (Shmueli et al., 2019).

Following that, the interpretation of predictive power should subsequently refer to other relevant statistics, provided that it fulfils the fundamental benchmark. The comparison can be done on root mean square error (RMSE) or mean absolute error (MAE). In the prior study, the mean absolute percentage error (MAPE) is excluded for comparison as it fails to define the manifest variables with a zero value, potentially resulting in a composite score of zero (Shmueli et al., 2019). For this reason, using MAPE as a naïve benchmark seems to be meaningless. Contrary to MAPE, RMSE and MAE are proven to be reliable in balancing the model fit and the predictive power (Shmueli et al., 2019). However, both of these indicators are not being used simultaneously but depend on the distribution of error. By looking at the distribution of prediction error from the plot graph, it reveals the preferred indicator. If the prediction errors are highly symmetrically distributed, then apply RMSE. Otherwise, MAE is preferred. Coincidentally, both RMSE and

MAE rely on the manifest variables' scaling (Shmueli et al., 2019). The possible outcomes of comparison are cited below (Hair et al., 2022).

1. PLS-SEM < LM for all indicators: A PLS-SEM model exhibits a robust predictive ability if all the indicators demonstrate lower RMSE (or MAE) values than the naïve LM benchmark.
2. PLS-SEM < LM for a majority of the indicators: An average predictive ability of a PLS-SEM model can be inferred if the majority (or an equal number) of its indicators yield smaller prediction errors than the naïve LM benchmark.
3. PLS-SEM < LM for a minority of the indicators: A PLS-SEM model has poor predictive power if only a minority of its indicators, pertaining to the dependent construct, produce lower prediction errors than the naïve LM benchmark.
4. PLS-SEM < LM for none of the indicators: The lack of predictive power is evident in a PLS-SEM model when none of the indicators shows lower prediction errors in terms of RMSE (or MAE) than the LM benchmark.

Despite that, the debate between the scholars' discontent over the lack of prediction in management and social science research pertains. The debate stemmed from the lack of a statistical test to measure the predictive power between the proposed research model and the established model (Liengaard et al., 2021).

Along with that, social science researchers faced incredible obstacles to deriving reliable predictions based on non-sample assessments (Silver, 2012).

Hence, Liengaard et al. (2021) introduced the cross-validated predictive ability test (CVPAT) in PLS as a remedy by allowing pairwise comparison between the proposed model (hereinafter the alternative model, AM) and the established model (hereinafter the established model, EM) on the general basis of a prespecified statistical significance level (i.e. α=0.05). The strength of adopting CVPAT over PLSpredict is the reduced generalisation error as well as strengthened feasibility of predictive modelling in the context of management and social science disciplines (Chin et al., 2020; Liengaard et al., 2021; Shmueli et al., 2015). The present study follows the stepwise prediction-oriented model selection procedure outlined by Liengaard et al. (2021).

The CVPAT recruits a random process to divide the dataset into a predetermined number of groups or folds, namely ten folds, and then repeatedly processes each fold. During the initial iteration, the first fold is designated as a separate holdout set, while the model is trained on the remaining observations, which serve as the training set. The input variables are used to forecast the output variables of the first fold based on the estimated training parameter values. The out-of-sample prediction error refers to the divergence between the predicted values of the output variables and their corresponding actual values (Liengaard et al., 2021). The process is iterated for each fold to provide the out-of-sample prediction errors for every observation in the dataset. According to the result of the robustness check conducted by Liengaard et al. (2021), along with the advancing frontier of prediction capability, the present study preferred the application of CVPAT to assess the predictive relevance of out-sample.

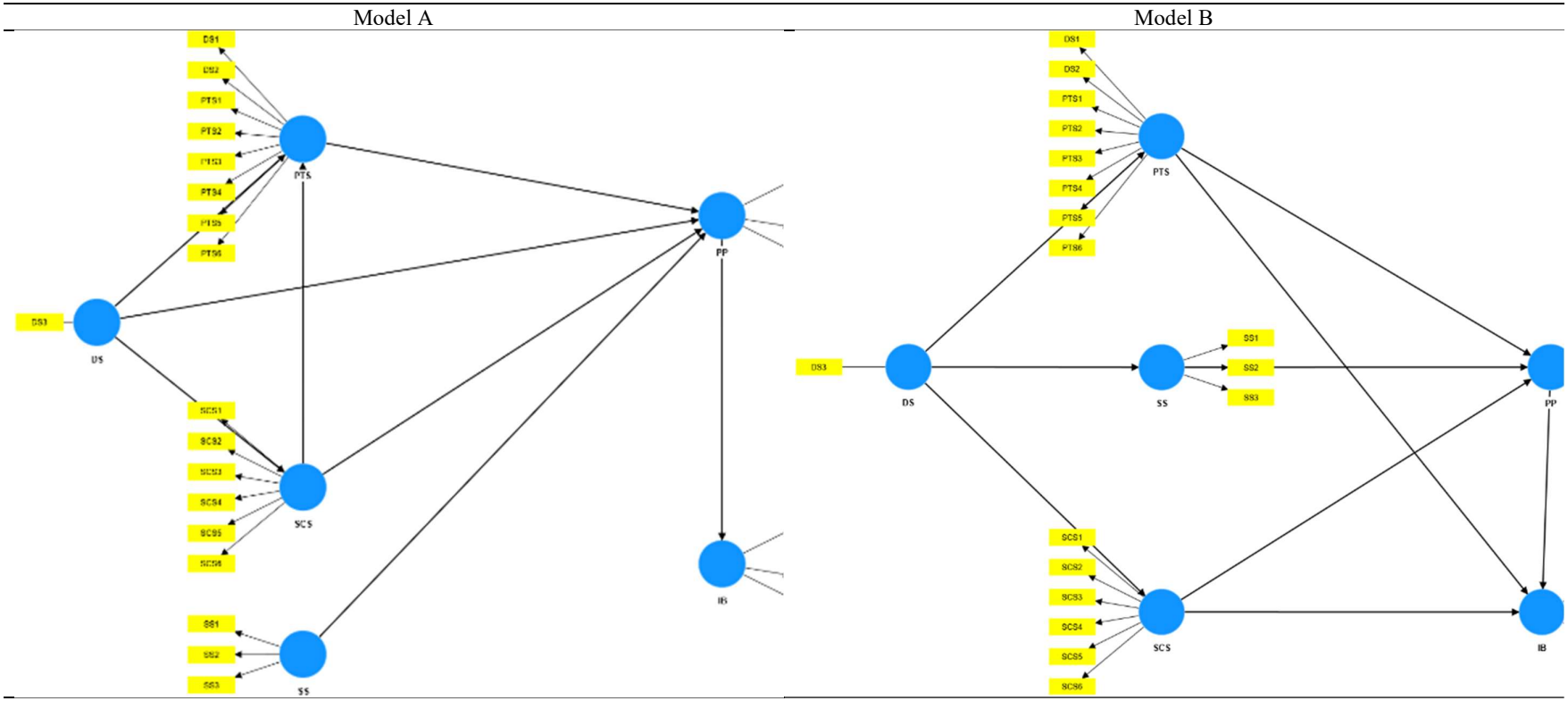
In prior research, the scholars asserted that Dialogue Support limited the influence of Dialogue Support towards Primary Task Support, Social Support

and System Credibility Support (Oduor & Oinas-Kukkonen, 2019). Additionally, the prior research excluded the influence of Dialogue Support towards attitudinal factors (Oduor & Oinas-Kukkonen, 2019). The researcher argued that Dialogue Support carries a significant impact towards the attitudinal factor as it conveys call-to-action messages that prompt users into subsequent effort. Besides that, the present study defended the direct influence of system features towards behavioural intention. This is because the persuasive system design features refer to the system qualities that require complex psychological processes, motivating behavioural intention (T. E. Becker et al., 1995). Based on the aforementioned line of reasoning, the present study proposed an alternative model (henceforth AM) and illustrated as Model A. Model B is the established model (henceforth EM) in prior research studies (Oduor & Oinas-Kukkonen, 2019). Figure 3.4 illustrates the comparison between EM and AM.

Following that, the researcher is required to ensure fair assessment, in terms of data and measurement quality, for the model comparison (Liengaard et al., 2021). This includes rigorous conditions like sufficient data collection to fulfil the sample representativeness and minimum sample size requirements, same datasets, measurement model, mode of model estimation, as well as the established measurement model evaluation criteria. The present study duplicated the proposed research model and modified the path modelling accordingly. This allows unbiased observed differences in predictive abilities. Thereafter, the research compared the EM and AM to identify the model with higher predictive power.

The general guideline to select a preferred model is based on the lower value of the CVPAT result. By way of example, if the EM model derives a lower

loss difference as compared to the AM model, then the EM model should be retained, and vice versa. It is worth noting that CVPAT provides evidence with *p*-value. The scholars highlighted that a small *p*-value provides suggestions on relative support for the preferred model based on the comparison of the CVPAT value (Liengaard et al., 2021). Hence, it does not provide extra information on the size of the loss difference or the corresponding practical significance (Wasserstein & Lazar, 2016).



Note(s): (1) Model A is the proposed research model in the present study (henceforth, the alternative model, AM). (2) Model B is the research model tested in the prior study (henceforth, the established model, EM) in the assessment of CVPAT.

Figure 3.4: The Alternative Model for Predictive Relevance Assessment

Source: Developed for the study.

3.11 Confirmatory Tetrad Analysis

As discussed in Sections 3.8 and 3.9, the evaluation of reflective and formative measurement models requires a different set of examinations. This is attributable to the PLS-SEM that allows examinations for complex cause-and-effect relationship models in business research (Venturini & Mehmetoglu, 2019).

Opposed to previous studies that investigated the Persuasive System Design (PSD) using reflective measurement (Halttu & Oinas-Kukkonen, 2017; Loh & Hamid, 2021; Shevchuk & Oinas-Kukkonen, 2016), the present study suggests the measurement of PSD constructs in a formative manner. The present study boldly posits that design principles, although categorized under the same branch, pertain to different domains. For instance, the Liking principle, emphasizing aesthetic appearance, pertains to visual considerations, while the Praise and Reminders principles are concerned with verbal information. However, this introduces the risk of measurement model misspecification, which can lead to severe issues such as bias in inner model parameter estimation and incorrect assessments of relationships in Partial Least Squares (PLS) path modelling (Gudergan et al., 2008). Therefore, this necessitates confirmatory tetrad analysis (CTA) to test the appropriateness of measurement model specification before proceeding to the measurement model evaluation. Ringle et al. (2011) added that indicators in a measurement model are determined by CTA-PLS by computing the difference between the product of two covariances and the product of another covariance (tetrad). This calculation is done

successively for any likely combination of two pairs of indicators in a measurement model.

It is worthwhile to note that the Dialogue Support and Social Support constructs in the present study accounted for three measurement items only. Since CTA-PLS does not run the analysis for variables less than four items, it is insufficient to run a confirmatory tetrad analysis on the two constructs. Therefore, the confirmatory tetrad analysis is conducted on Primary Task Support and System Credibility Support constructs, which consist of 4 or more indicators.

Table 3.6 presents the results from the CTA-PLS results. The results showcased that the model implied non-redundant tetrads vanish. This successively induced that the presumed hypothesis, wherein PSD constructs are formative operationalization, is rejected. With that, the present study inverted the measurement model of PSD and operationalised them in a reflective measurement model in the forthcoming discussion.

Table 3.6: CTA-PLS Results

Variable	Model-implied non-redundant vanishing tetrad	Residual value	*p*-value	Confidence interval
Primary Task Support	1: PTS1,PTS2,PTS3,PTS4	0.260	0.041	[-0.061 , 0.586]
	2: PTS1,PTS2,PTS4,PTS3	0.182	0.162	[-0.148 , 0.513]
	4: PTS1,PTS2,PTS3,PTS5	0.269	0.027	[-0.037 , 0.582]
	6: PTS1,PTS3,PTS5,PTS2	-0.151	0.046	[-0.345 , 0.040]
	7: PTS1,PTS2,PTS3,PTS6	0.039	0.761	[-0.282 , 0.360]
	10: PTS1,PTS2,PTS4,PTS5	0.115	0.342	[-0.190 , 0.423]
	16: PTS1,PTS2,PTS5,PTS6	0.482	0.004	[0.061 , 0.914]
	22: PTS1,PTS3,PTS4,PTS6	-0.029	0.779	[-0.291 , 0.231]
	26: PTS1,PTS3,PTS6,PTS5	0.142	0.379	[-0.266 , 0.552]
System Credibility Support	1: SCS1,SCS2,SCS3,SCS4	0.101	0.595	[-0.143 , 0.680]
	2: SCS1,SCS2,SCS4,SCS3	0.016	0.093	[-0.014 , 0.757]
	4: SCS1,SCS2,SCS3,SCS5	0.367	0.556	[-0.232 , 0.495]
	6: SCS1,SCS3,SCS5,SCS2	0.180	0.247	[-0.111 , 0.364]
	7: SCS1,SCS2,SCS3,SCS6	0.110	0.224	[-0.177 , 0.795]
	10: SCS1,SCS2,SCS4,SCS5	0.002	0.25	[0.128 , 1.106]
	16: SCS1,SCS2,SCS5,SCS6	0.000	0.144	[0.538 , 1.539]
	22: SCS1,SCS3,SCS4,SCS6	0.212	0.098	[-0.214 , 0.640]
	26: SCS1,SCS3,SCS6,SCS5	0.000	0.714	[0.278 , 1.068]

Notes: Adjustment of the 5% bias-corrected bootstrap (two-tailed) confidence interval limits use the Bonferroni method to account for multiple testing issues

Source: Developed for the study

3.12 Pilot Study

A pilot study is conducted before the actual survey, aiming to affirm the feasibility of the survey questionnaire from various perspectives, but not limited to the adequacy of questions, comprehensiveness of contents and clarity of instructions given (Regmi et al., 2017; Zikmund et al., 2010). The pilot study is a trial run of the entire study to manifest from the start to the end of the study. As recommended by Brent and Leedy (1990), the pilot study is a small yet valuable investment, especially when the researcher is uncertain about the validity and reliability of the survey instrument. The motive of doing so is to

ensure the entire research study is feasible and rational to be conducted smoothly without failure from a methodological standpoint (Zikmund et al., 2010). By conducting a pilot study before the actual survey, the researchers can test potential flaws that may act as obstacles for the respondents to participate in the study.

By way of illustration, the present study spotlighted the persuasive system design, which is not popularised among all users of TNG eWallet. If the respondents find difficulty in answering the survey questionnaire, rephrasing the terms used in the questionnaire for the sake of welcoming higher accuracy in the investigation should be taken into account. Otherwise, the probability of non-response bias will rise due to limited literacy about the topic of the research study. With all that said, the pilot study serves its purpose to ensure that the instruction of each question is clear and concise to all respondents (Zikmund et al., 2010).

The present study adheres to the general rule of thumb in which the pilot study is conducted on 30 participants. The determination of 30 participants is aligned with the Central Limit Theorem, which suggests that the sample size tends to be generally distributed at a minimal number of 30 (Kim, 2015). The selected respondents for the pilot study were active users of TNG eWallet and industrial experts who have in-depth experience (≥ three years) in developing system solutions. The purpose of doing so is to warrant the comprehensiveness of the survey instrument in covering the necessary domain.

During the pilot study stage, the selected respondents were approached beforehand and were briefed individually on the purpose of the research. They were requested to respond to the online survey questionnaire. Then, the

feedback given by the selected respondents was integrated into the design of the questionnaire. Overall, the questionnaire was revised with minor amendments before conducting an actual survey.

After collecting responses from the participants, the researcher employed a PLS-SEM assessment to evaluate the reliability and validity of the construct measurement. The key indicators referred to measure the reliability of construct measurement include indicator reliability and composite reliability. In terms of validity, the key criteria used are convergent validity (referring to average variance extracted (AVE)) for construct validity and discriminant validity for distinction between constructs.

In terms of indicator reliability, the outer loadings for all indicators fulfilled the threshold value of 0.708, except item PP2. Subsequently, the pilot test results returned the composite reliability (ρa) fulfilled the rule of thumb by exceeding 0.60 at the minimum.

The AVE, which measures the construct validity, is above 0.50. Meanwhile, the discriminant validity, wherein it measures the construct distinction, shows that most of the cross-loadings of the construct range below 0.90. Upon the data collected from 30 pilot test respondents, these key criteria reflected the green light for the researcher to proceed with the actual survey.

3.13 Summary

This chapter has discussed the methodology used for research in the present study. This study applies positivism to investigate the case of TNG

eWallet quantitatively. By adopting deductive reasoning, this study explains how persuasive system design features in e-wallets influence users to purchase insurance products. This chapter also justifies the sampling design and displays the development of a survey questionnaire that will be distributed to the respondents. The responses collected through questionnaires are to be analysed through PLS-SEM based on the aforementioned justification. The procedures to perform PLS-SEM and key metrics to assess are discussed in detail in this chapter. This chapter ends with a pilot study. The succeeding chapter is to present the analysis of the data collected for the actual study.

CHAPTER 4

RESULTS

4.1 Introduction

The preceding chapter describes the research methodology adopted for the present study. This chapter reports the result of the pilot study conducted prior to the actual survey. It includes the preparation process before data analysis is conducted.

4.2 Research Ethics

It is vital for a researcher to adhere to research ethics, especially when the study heavily involves human factors. In general, there are several reasons for a researcher to adhere to ethical norms, including the aims of research in constructing knowledge, being truthful and avoiding any potential error (Morris, 2015).

The present study was conducted in accordance with all research ethics outlined by the Research Ethics Committee of the Institute of Postgraduate Studies and Research (IPSR) of Universiti Tunku Abdul Rahman (UTAR). As raised by Regmi et al. (2017), the present study fulfilled the key ethical components in a few perspectives. In relation to the informed consent and right to withdrawal, the researcher's contact details were provided on the cover page.

Beyond that, a Personal Data Protection Statement in accordance with the Personal Data Protection Act (PDPA) 2010 was attached after the introductory statement of the survey. The respondents were informed that, by participating in the survey, they agreed to the collection, recording, storage, usage, and retention of personal information, whichever applies. Additionally, the respondents were required to provide their consent on their personal data. Else, the respondents had the right to withdraw from the study. Privacy and confidentiality-wise, the respondents were ensured anonymity, and their personal data were kept in accordance with the retention policy of UTAR and shall not be utilized for political and commercial purposes. Since the present study was conducted fully over the Internet, the respondents were required to tick the boxes provided to present their willingness to provide consent.

4.3 Response Rate

A respectable response rate is often deemed important in determining the quality of a survey conducted in terms of its effectiveness and efficiency (Hox & De Leeuw, 1994). In the past decades, the researchers thrived to obtain 80% survey response rates at the expense of pricey budgets (Davern, 2013). The rationale for pursuing high response rates is correlated with the fear of introducing nonresponse bias (Eckman et al., 2023; Groves & Peytcheva, 2008; Sax et al., 2003; Wright, 2015).

The present study employed the purposive sampling method as mentioned in Section 3.4. The required sample size is 400 respondents. With a envision of receiving an 80% response rate, 500 units of the survey were

distributed through online mediums. The researcher identified the targeted respondents from the TNG eWallet official Facebook page that has been meta-verified with a blue-tick badge. Then, the researchers slid into Facebook Messenger to contact the respondents. The respondents were provided with a cover letter that informed the purpose of the research study as well as the instructions, followed by the questionnaire. The participants of the present study were recruited between August and November 2024. A reminder prompt was then sent out to the targeted respondents after two weeks for not receiving feedback from them, as reminders are found to yield a positive impact on the response rates (Wu et al., 2022).

From the distributed surveys, 443 responses were successfully obtained, yielding a response rate of 88.60%. However, after a thorough screening process for data verification, only 404 responses were deemed valid and retained for data analysis. The detailed screening process is described in Section 4.5. This inherently represents the response rate of 80.80%, considering the legitimate responses that meet the study's criteria.

According to Hendra and Hill (2019), the nonresponse bias occurs when the survey response rate falls below 100%. As far as the researcher acknowledges that the nonresponse bias resulted from the response propensity and the study variable, the expectation of having an absolute zero for the nonresponse rate is de facto nearly impossible (Hendra & Hill, 2019). Owing to that, it is crucial to assess whether the acquired sample size meets the minimum requirement for statistical power in the context of SEM. Alongside, scholars also recommended minimum sample size estimation conducted post-data collection (hereinafter known as retrospective estimation) purported for

additional data collection, adjustments in the analysis and the hypothesis testing assumptions, wherever applicable (Gerard et al., 1998; Kock & Hadaya, 2018; Nakagawa & Foster, 2004).

Kock and Hadaya (2018) presented solid work by comparing the existing formulas in the minimum sample size estimation to the Monte Carlo simulation based on the power values, sample size and path coefficient magnitude. The scholars found that the inverse square root method tends to provide a minimal underestimation of the minimum sample size required for small samples and a minimal overestimation for larger samples (Kock, 2023; Kock & Hadaya, 2018). On the other hand, the gamma-exponential method possessed a heavy reliance on the complex numerical equation (Kock, 2023; Kock & Hadaya, 2018). Despite that, Kock & Hadaya (2018) defended the standard error estimates yielded by the inverse square root method as relatively small and harmless, while the gamma-exponential method provides a more precise estimation of the standard error. Therefore, both methods are considered robust in ensuring adequate statistical power.

Based on the power analysis conducted in Figure 4.1, the minimum sample size required for the present study at a minimum absolute significant path coefficient of 0.243, significance level of 0.05 and power level of 0.80 is 105 and 92, respectively, for the inverse square root method and the Gamma-exponential method. This suggests that the sample size required for the present study should range between 92 and 105 to provide a reliable and valid explanation of the research findings. As such, it is confirmed that the 404 valid responses qualified for data analysis far exceed the minimum sample size required as per both power analysis methods. Despite scholars arguably

discussing that large samples may affect the sensitivity of statistical significance, which subsequently leads to Type I error (Akobeng, 2016; Wilson Van Voorhis & Morgan, 2007), recent studies declared that the manner of data collection carries greater weight for the robustness of sample, instead of the sample size (Abt et al., 2020; Memon et al., 2020; Mooi et al., 2018). In short, this further addresses the concerns regarding the adequacy of sample size, thereby alleviating potential biases arising due to the sample size insufficiency.

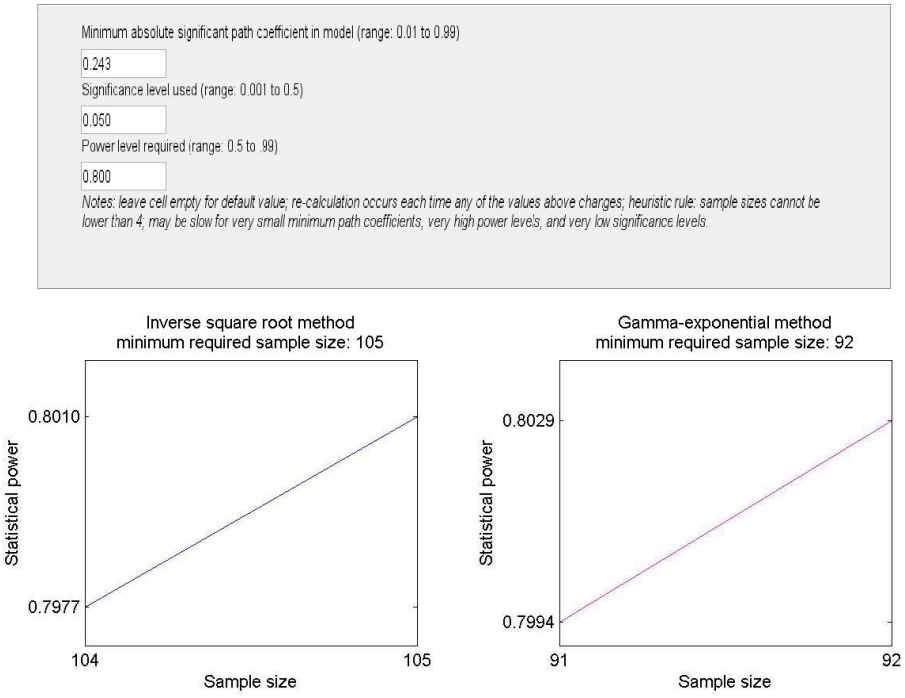


Figure 4.1: Sample Size Estimation using Inverse Square Root Method and Gamma-Exponential Method

Source: Developed for the study.

4.4 Data Preparation

Data preparation is the crucial stage for specifying the raw data into readable labels. This provides ease to the researchers for further analysis.

The primary data collection method used in this study is the online survey. Using Google Forms, raw data were methodically collected, arranged, and exported in the Comma Separated Values (CSV) format. Following the scholarly advice (Leslie et al., 2002; McCarthy et al., 2022), a thorough review of the raw data was conducted prior to beginning the data analysis stage, guaranteeing the detection and correction of any possible inconsistencies that might affect the outcome.

The researcher's process of entering data was made easier using CSV files. Later, in the data preparation phase, Microsoft Excel was used to carefully edit raw data. This required converting headers into clear, understandable labels that matched the sample items. Furthermore, the information was converted into numerical values in order to make it compatible with data analysis programs.

After the data preparation was finished, the researcher moved on to the data verification stage. This required a careful examination to guarantee the integrity, accuracy, and consistency of the dataset, which strengthened the validity of the ensuing analytical processes.

4.5 Data Verification

It is the duty of the researcher to ensure the accuracy and completeness of the data gathered during the data verification phase. This entails closely examining outliers, missing data and suspicious responses.

A preventive measure is set forth to address potential problems with data in the present study. In order to ensure the respondents answer the demographic information when filling out the survey on their mobile devices, all measurement items about demographic profiles are made mandatory. Otherwise, the measurement items for the exogenous and endogenous constructs are left optional. This is to avoid the potential risk of respondents' leaving false due to the obligation.

4.5.1 Outliers

Extreme values, frequently identified as outliers, are observations that drastically differ from the overall composition of the dataset. These anomalies are usually evidence of peculiar qualities in the data generation process and have the ability to distort overall results (Wang et al., 2019). Given that the present study provided a diverse range of options for the closed-ended questions, participants were constrained to selecting options that aligned with and reflected their perspectives. Consequently, the study did not identify any outliers within the datasets, as the response options accommodated a broad spectrum of participant viewpoints.

4.5.2 Missing Data

Missing data is an acute issue, particularly concerning social science research, because participants may purposefully or unintentionally decline to reply to certain questions. Nevertheless, some incomplete responses were found in spite of these precautions. The main root causes of these invalid responses were the refusal to provide personal data (6), disqualification as non-TNG eWallet users (4), and the inclusion of minors below the age of 18 (6). Consequently, these responses were removed from the datasets to preserve data integrity.

4.5.3 Suspicious Response

Unlike missing data and outliers, the identification of suspicious responses for online surveys is tricky. By far, there is neither a straightforward rule of thumb nor a threshold value outlined to identify suspicious or fraudulent response patterns for online surveys. Instead, Lawlor et al. (2021) have proposed a REAL framework for researchers to identify suspicious responses to online surveys. The REAL framework consists of Reflect, Expect, Analyse and Label, which allows the researchers to recognise suspicious responses, case by case. This is coherent with the statistical techniques recommended by Newman et al. (2021) by examining response consistency. According to scholars (Cheung et al., 2017; Curran, 2016), the examination of respondents' patterns in answering the survey can potentially yield findings with fewer false

positives and/or false negatives, thereby enhancing the reliability and validity of the datasets. The researcher in the present study followed the suggested manner of strict recruitment by approaching the participants through direct contact online.

Alternatively, the researcher conducted a manual review to identify potential suspicious responses. In the present study, suspicious responses were defined as those demonstrating a straight-line pattern, where respondents consistently expressed the same level of agreement or disagreement across the entire survey. The researcher successfully identified and removed 23 responses exhibiting such straight-line patterns, as they could introduce unnecessary biases to the dataset.

4.5.4 Common Method Bias

The prevailing examination of common method bias has raised concerns among the body of academia as it might jeopardise research rigour, ultimately leading to backlash on theory development and practical contributions (Memon et al., 2023). An earlier study conducted by Kock (2015) illustrated how common method bias threatens the path coefficients, thus inducing type I error (false positives) or type II error (false negatives). After identifying outliers, missing data and suspicious responses, the data collected are being examined for the plausible detrimental impact of systematic measurement error on the validity of research findings. In this case, the present study seeks to identify the common method bias.

Before the assessment of common method bias, per recommendation by Memon et al. (2023), the present study adopted procedural approaches to rule out the potential common method bias. The scholars asserted that concise surveys with negligible redundancy increase response precision and decrease common method bias (Memon et al., 2023). Henceforth, the present study placed equal emphasis on pre-data collection procedural remedies including clarifying the research purpose and instructions in the coversheets and ensuring measurement item clarity through the conduct of pre-test.

On the other hand, the statistical approach in a post hoc fashion to identify potential common method bias was taken by conducting the full collinearity test. Despite prior researchers finding that Harman's single factor test is widely employed due to its outstanding ease of implementation, its substantial drawbacks in confounding substantive variance and common method variance, low statistical power and inability to identify the specific sources of method variance affecting the focal relationships is non-negligible (Aguirre-Urreta & Hu, 2019; Kock et al., 2021; Kock, 2015; Memon et al., 2023; Podsakoff et al., 2024). Scholars altogether reached a consensus with prior scholars to caution against the employment of using Harman single-factor test (Aguirre-Urreta & Hu, 2019; Baumgartner et al., 2021; Baumgartner & Weijters, 2021; Kock, 2015; Podsakoff et al., 2003, 2012, 2024; Steenkamp & Maydeu-Olivares, 2021).

Holding that in mind, Kock and Lynn (2012) proposed and illustrated a relatively new approach to assessing common method bias, namely the full collinearity test to compensate for the drawback of Harman's single factor. The scholar then comprehensively elaborated on the conduct of a full collinearity

assessment at a later date (Kock, 2015). The full collinearity test is considered a more holistic approach to assess both vertical and lateral collinearity simultaneously (Kock & Lynn, 2012). The scholars defined lateral collinearity as "a predictor-criterion phenomenon", meanwhile vertical collinearity is referred to as a "predictor-predictor phenomenon" (Kock, 2015). The present study is convinced by the result of the Monte Carlo experiment and the outstanding benefits of the full collinearity assessment method (Kock, 2015).

To determine the existence of common method bias, it is to refer to the variance inflated factor (VIF). The general rule of thumb proposed by Kock (2015) is that VIF shall remain below 3.3 to be considered free from common method bias. Otherwise, a VIF greater than 3.3 suggests pathological collinearity and contamination of common method bias (Kock, 2015). Per the assessment procedure suggested, to conduct the full collinearity assessment for common method bias, the researcher created a new column "Random" in Excel using the "RAND" function and treated it as a dummy variable. Subsequently, a new model was created by letting all latent variables point towards the newly created dummy variable. The VIF value was then assessed to confirm the identification of common method bias. Table 4.1 revealed that the VIF values set from latent variables to the dummy variable created for the assessment remain in ranges from 1.104 and 2.297, wherein the rule of thumb is satisfied. Hence, the present study was confirmed to be free from common method bias.

Table 4.1: Common Method Bias Assessment

Variable	VIF Values for Random-number Dummy Variable
Primary Task Support	2.080
Dialogue Support	1.533
System Credibility Support	1.852

Social Support	1.104
Perceived Persuasiveness	2.297
Intention to Buy	2.085

Source: Developed for the study.

4.5.5 Normality

The present research study assessed descriptive statistics of constructs in partial fulfilment of the robustness check. This is of particular interest to academic research, despite PLS-SEM not requiring normally distributed data, extreme cases may deviate from the meaningfulness of the research findings (Hair et al., 2022).

Despite PLS-SEM possessing the ability to analyse nonnormal distributed datasets, extreme cases are generally not preferred (Guenther et al., 2023; Hair et al., 2022; Hair et al., 2019). With that, the present study employed an assessment of the normality of the data. Aligned with Vaithilingam et al. (2024), this is purported to ensure that the study does not generate misleading results and to establish the capability of PLS-SEM in examining non-normal data.

Among various methods available to statistically assess the univariate normality of datasets, the graphical methods of normality assessment employing the Q-Q plot and P-P plot are often debated on their subjectivity of interpretation (Loy et al., 2016). Similarly, Shapiro-Wilk and Kolmogorov-Smirnov tests are recommended for datasets with small samples attributable to their high power (Razali & Wah, 2011). This implies that the examination of skewness and kurtosis is most preferred and commonly adopted. Generally, skewness and kurtosis showcased the descriptive summary of statistics that measure the extent

of departure from normality (Vaithilingam et al., 2024). A similar finding in the earlier study conducted by Miller et al. (2002) asserted that kurtosis and skewness are critical indicators in which nonnormality would affect the inferences drawn in the analysis of variance. Along with the extensive review conducted on skewness and kurtosis for measuring nonnormality, Cain et al. (2017) strongly recommended reporting the skewness and kurtosis.

Particularly, skewness and kurtosis are applied simultaneously for varied purposes. The assessment of skewness focuses on the symmetry of the distribution (Hair et al., 2022). The skewness of a normally distributed dataset is expected to be zero (Cain et al., 2017). A positive figure of skewness explains a dataset with a longer right tail in the positive direction and vice versa (Cain et al., 2017). Meanwhile, the kurtosis test examines the extent of the peakedness of the distribution (Hair et al., 2022). The assessment of kurtosis relies on the tail, shoulder and peakedness of the distribution (DeCarlo, 1997). Similar to skewness, a zero kurtosis is theoretically expected. Provided that a dataset reflected a positive kurtosis or a leptokurtic distribution, the distribution tends to demonstrate a fatter tail than the normal distribution with the same variance (Browne et al., 2023; Cain et al., 2017). Otherwise, a platykurtic distribution or a distribution with relatively flat shoulders and shorter tails is associated with a negative kurtosis. The general rule of thumb for skewness and kurtosis is best to keep within the range of -1 to 1 to indicate significant deviation from normality (Hair et al., 2022). A distribution with both skewness and kurtosis values close to zero is deemed normal and statistically acceptable.

Table 4.2 presents the result of the normality test using skewness and kurtosis tests. It is observed that the skewness ranges between -0.768 and -0.138,

while the kurtosis ranges between -0.761 and 0.280, while. After all, it falls within the recommended rule of thumb. Hence, the normality is attained.

Table 4.2: Skewness and Kurtosis Test

Indicator	Mean	Median	Standard deviation	Skewness	Excess kurtosis	Cramér-von Mises p-value
PTS1	4.641	5	1.396	-0.377	-0.072	0
PTS2	4.604	5	1.415	-0.407	-0.154	0
PTS3	4.676	5	1.37	-0.322	-0.075	0
PTS4	4.795	5	1.438	-0.548	-0.027	0
PTS5	4.455	4	1.478	-0.280	-0.281	0
PTS6	4.498	5	1.462	-0.370	-0.317	0
DS1	4.557	5	1.482	-0.459	-0.168	0
DS2	4.968	5	1.416	-0.630	0.133	0
DS3	4.307	4	1.58	-0.193	-0.666	0
SCS1	4.696	5	1.494	-0.516	-0.233	0
SCS2	4.802	5	1.44	-0.443	-0.266	0
SCS3	4.901	5	1.444	-0.579	-0.051	0
SCS4	4.597	5	1.47	-0.383	-0.194	0
SCS5	4.834	5	1.35	-0.508	0.135	0
SCS6	4.812	5	1.454	-0.611	0.101	0
SS1	4.899	5	1.354	-0.343	-0.155	0
SS2	4.824	5	1.298	-0.373	0.041	0
SS3	4.864	5	1.306	-0.509	0.126	0
PP1	4.72	5	1.426	-0.321	-0.390	0
PP2	4.168	4	1.599	-0.138	-0.761	0
PP3	5.386	6	1.38	-0.768	0.280	0
PP4	5.042	5	1.343	-0.613	0.156	0
IB1	4.351	5	1.672	-0.344	-0.748	0
IB2	5.243	5	1.395	-0.708	0.264	0
IB3	4.304	4	1.638	-0.320	-0.613	0
IB4	5.084	5	1.342	-0.630	0.175	0

Source: Developed for the study.

4.6 Descriptive Statistics of Respondents

The present research study collected data from the active users of TNG eWallet. The descriptive statistics of respondents consist of the examination of demography profile, insurance-related perception, and TNG eWallet usage behaviour.

4.6.1 Demography Profile

Table 4.3 illustrates the respondents' profile according to gender. The options provided in the survey questionnaire include male, female and preferred not to say. The results returned that the respondents are open to declaring their gender. It is clearly seen that the majority of the respondents are female (56.44%), followed by males with 43.56%.

Table 4.3: Respondents' Profile according to Gender

Gender	Frequency	Percentage
Female	228	56.44%
Male	176	43.56%
Total	404	100.00%

Source: Developed for the study

Following that, the researcher examined the respondents' profiles according to age and generation. Table 4.4 illustrates the distribution of age from youngest to eldest. It is clearly seen that Generation Z is dominating the penetration of TNG eWallet with 59%. A huge disparity is observed when Millennials only occupy 35.15% of the total respondents, Generation X with 5.20% and Baby Boomers with 0.50%

Table 4.4: Respondents' Profile according to Age and Generation

Generation	Age	Frequency	Percentage
Generation Z	18-26	239	59.16%
Millennials	27-42	142	35.15%
Generation X	43-58	21	5.20%
Baby Boomers	59-77	2	0.50%
	Total	404	100.00%

Source: Developed for the study

Next, the researcher examined the respondents' profiles according to the highest education attained. Table 4.5 demonstrates that the majority of respondents attained undergraduate level (278), followed by postgraduate (70), pre-university (35), secondary school (19) and primary school (2). Ift reflected that the respondents received tertiary education by large.

Table 4.5: Respondents' Profile according to Highest Education Attained

Highest Education Attained	Frequency	Percentage
Primary school	2	0.50%
Secondary school	19	4.70%
Pre-university	35	8.66%
Undergraduate	278	68.81%
Postgraduate	70	17.33%
Grand Total	404	100.00%

Source: Developed for the study

Table 4.6 illustrates the respondents' current employment status. It is observed that employed respondents occupied about 50% of the entire respondents' profile according to their current employment status. Then, there are about 13.37% of self-employed respondents and 5.45% of unemployed respondents within the workforce. Another large group of respondents are students (30.20%) who are not considered in the workforce. Meanwhile, the lowest number of respondents are retired people, making up about 1.49% of the respondents.

Table 4.6: Respondents' Profile according to Current Employment Status

Current Employment Status	Frequency	Percentage
Employed	200	49.50%
Self-employed	54	13.37%
Unemployed	22	5.45%
Retired	6	1.49%
Student	122	30.20%
Grand Total	404	100.00%

Source: Developed for the study

Table 4.7 shows the respondents' household income level. The categorisation of household income level refers to the definition given by the Malaysian government. The bottom 40%, widely known as B40, are recognised as having household incomes less than RM4,850. About 39.60% of respondents reported that they belong to the B40 group. Then, the middle-tier households who have an income between RM4,850 and RM10,960 are known as Middle 40% (M40). Of the respondents, 42.57% belong to the M40 group. The top-tier households with incomes of more than RM10,960 are considered the top 20% (T20). 17.82% of respondents are included in the T20 group.

Table 4.7: Respondents' Profile according to Household Income Level

Household Income Level	Frequency	Percentage
Below RM4,850	160	39.60%
Between RM4,850 to RM10,960	172	42.57%
Above RM10,960	72	17.82%
Grand Total	404	100.00%

Source: Developed for the study

4.6.2 Insurance-related Perception

The present subsection reported the descriptive statistics in relation to the respondents' perception of insurance.

Table 4.8 shows the insurance owned by the respondents. The majority of the respondents owned life and health insurance only (52.48%), and 11.39% of the respondents owned non-life insurance only. More than one-fifth of the respondents declared that they owned both life and non-life insurance. However, 13.37% of the respondents do not own any insurance.

Table 4.8: Respondents' Profile according to Insurance Owned

Insurance Owned	Frequency	Percentage
Life and health insurance	212	52.48%
Non-life insurance	46	11.39%
Both	92	22.77%
None of the above	54	13.37%
Grand Total	404	100.00%

Source: Developed for the study

Upon that, the researcher looked into the respondents' perception of the importance of insurance. Table 4.9 illustrates that the majority of the respondents agree with the importance of insurance (87.87%), while 11.39% of the respondents have a reserved attitude towards insurance. A small niche was observed wherein not more than 1% of the respondents perceived that insurance is not important.

Table 4.9: Respondents' Perception of The Importance of Insurance

Perceived Importance of Insurance	Frequency	Percentage
Yes	355	87.87%
Maybe	46	11.39%
No	3	0.74%
Grand Total	404	100.00%

Source: Developed for the study

Table 4.10 shows the cross-tabulation between the perceived importance of insurance and insurance owned. It is observed that, among 355 respondents who agreed with the importance of insurance, 42 of them owned non-life insurance only, while 27 of them did not own any insurance. Of those with a reserved attitude to the importance of insurance, the majority of them do not own any insurance. Surprisingly, among three respondents who disagreed with the importance of insurance, one of them actually owned life and health insurance.

Table 4.10: Respondents' Perceived Importance of Insurance and Insurance Owned

Importance of Insurance	Insurance Owned				
	Life and health insurance	Non-life insurance	Both	None of the above	Grand Total
Yes	199	42	87	27	355
Maybe	12	4	5	25	46
No	1			2	3
Grand Total	212	46	92	54	404

Source: Developed for the study

Table 4.11 reported the respondents' awareness of insurtech according to gender. In general, more than half of the respondents self-reported that they

were unaware of the insurtech. Most of those who indicated a lack of awareness regarding the existence of insurtech are female.

Table 4.11: Respondents' Awareness according to Gender

Awareness	Yes		No		Grand Total	
Gender	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Female	84	20.79%	144	35.64%	228	56.44%
Male	87	21.53%	89	22.03%	176	43.56%
Grand Total	171	42.33%	233	57.67%	404	100.00%

Source: Developed for the study

4.6.3 TNG eWallet Usage Behaviour

The descriptive statistics of the respondents' TNG eWallet usage behaviour is presented in this subsection. The respondents were requested to answer whether they consider TNG eWallet as a mainstream payment method in the survey questionnaire. The results are tabulated in Table 4.12. About a third-fifth of the respondents claimed that TNG is a mainstream payment method for them. 25.50% of respondents are uncertain about the question. At the same time, 17.08% of respondents denied that TNG eWallet is the mainstream payment method for them.

Table 4.12: Respondents' Perception of TNG eWallet as a Mainstream Payment Method

TNG as a Mainstream Payment Method	Frequency	Percentage
Yes	232	57.43%
No	69	17.08%
Maybe	103	25.50%
Grand Total	404	100.00%

Source: Developed for the study

The respondents were also required to check their tier on the TNG eWallet mobile application. The terms Premium, Pro and Lite reflect a descended order of the tier. Table 4.13 illustrates the differences between the tiers. Users at the premium tier are entitled to a larger eWallet size, larger transaction limit and more features available. Thus, users who heavily rely on TNG eWallet as their payment method usually fall under the Premium tier.

Table 4.13: Differences between TNG eWallet Tier

	PREMIUM	PRO	LITE
eWallet size	Up to RM20,000	RM5,000	RM200
Monthly Transaction Limit	Up to RM25,000	RM5,000	RM2,000
Annual Transaction Limit	RM30,000	RM60,000	RM24,000
Make payments	Available	Available	Available
Reload	Available	Available	Available
Receive Money	Available	Available	Available
Transfer money	Available	Available	-
Money-back Guarantee protection	Available	Available	-
Earn daily returns via GO+	Available	-	-
Balance cash out	Available	-	
RFID	-	Available	Available

Source: Touch 'n Go Sdn Bhd (2022)

Referring to Table 4.14, the present study recorded more than 50% of the respondents falling under the Premium tier. This means that the respondents are heavily relying on TNG eWallet as their mainstream payment method. Meanwhile, it was found that 97 out of 404 respondents are Pro-tier users who moderately use TNG eWallet. Not more than 20% of the respondents fall under the Lite tier.

Table 4.14: Respondents' Actual Usage on TNG eWallet

TNG eWallet Tier	Frequency	Percentage
PREMIUM	228	56.44%
PRO	97	24.01%
LITE	79	19.55%
Grand Total	404	100.00%

Source: Developed for the study

Table 4.15 shows that the majority of the respondents do not own insurance policies on TNG eWallet, constituting 70% of the respondents. Only 29.46% of the respondents purchased at least one insurtech policy through the mobile application.

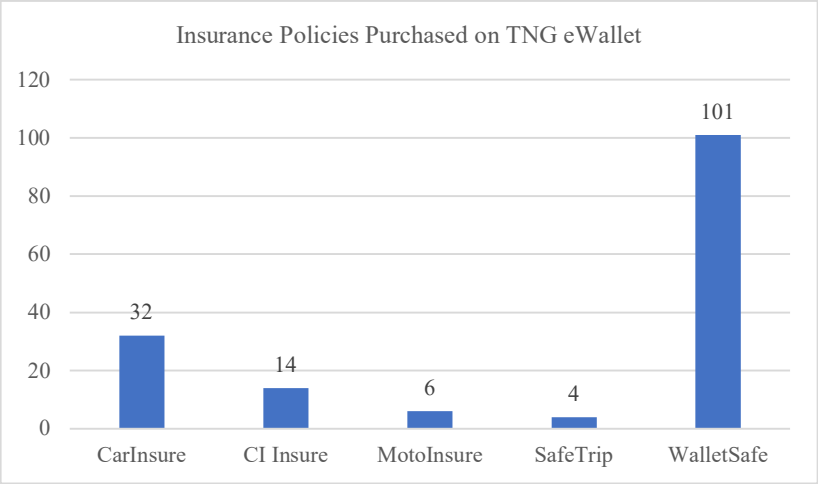
Table 4.15: Respondents' Ownership of Insurance on TNG eWallet

Ownership of Insurance in TNG eWallet	Frequency	Percentage
Yes	119	29.46%
No	285	70.54%
Grand Total	404	100.00%

Source: Developed for the study

Figure 4.2 illustrates the insurance policies purchased by the respondents on TNG eWallet. TNG eWallet offers insurtech solutions, covering car, motor, critical illness, e-wallet, home, and travel trips. Among these offerings provided, WalletSafe, which covers insurance for eWallet balance, is the most purchased policy (101). This is followed by CarInsure (32), CI Insure (14), MotoInsure (6) and SafeTrip (4). It is worthwhile to note that SafeHome, the fire insurance to protect homes from disastrous events, recorded zero purchases in the present study.

Figure 4.2: Insurance Policies Purchased on TNG eWallet



Source: Developed for the study

4.7 Reflective Measurement Model Evaluation

In the forthcoming section, the researcher conducted a critical examination of the reflective measurement model employed in the present study. The reflective measurement model evaluation is concerned with the assessment of relationships between the indicators and the constructs (Hair et al., 2022). It explains the quality of the measurement construct and indicators based on statistical rule of thumb.

4.7.1 Indicator Reliability

The first focal point of reflective measurement model evaluation is indicator reliability. It is crucial to examine the indicator reliability as it ensures the consistency of each indicator in capturing the construct.

The outer loadings of each indicator were tabulated in Table 4.16. With the exception of items IB2, PP3 and SCS6, the indicator reliability as determined by outer loadings typically satisfies the suggested value (>0.708) put forth by Hair et al. (2011, 2019, 2022). In particular, IB2 is at 0.678, PP3 is at 0.679 and SCS6 is at 0.663. Although these values fall between 0.40 and 0.70, suggesting that they should consider being removed, the choice must be based on the possible effects on content validity, convergent validity, and internal consistency reliability.

When construct reliability and validity are examined more closely, it is found that the removal of these crucial items has no negative effects on the average variance extracted and composite reliability. However, content validity becomes the main area of concern. In spite of this, the items were decided to be kept after careful consideration. The reasoning behind this retention stems from the knowledge that these items help evaluate the system quality of the e-wallet under investigation. As such, eliminating these items would jeopardise the construct's content validity (Bagozzi & Yi, 1988; Bollen & Lennox, 1991; Hair et al., 2011).

In summary, while certain items fall slightly below the recommended outer loading threshold, their retention is justified by their substantive contribution to the overall evaluation of system quality within the e-wallet. The decision to prioritize content validity aligns with the specific context and objectives of the study, ensuring a comprehensive and accurate representation of the construct under investigation.

Table 4.16: Indicator Reliability

Construct	Indicator	Indicator Reliability
Primary Task Support (PTS)	PTS1	0.866
	PTS2	0.867
	PTS3	0.840
	PTS4	0.785
	PTS5	0.834
	PTS6	0.775
Dialogue Support (DS)	DS1	0.865
	DS2	0.784
	DS3	0.827
System Credibility Support (SCS)	SCS1	0.807
	SCS2	0.859
	SCS3	0.752
	SCS4	0.822
	SCS5	0.702
	SCS6	0.663
Social Support (SS)	SS1	0.812
	SS2	0.869
	SS3	0.874
Perceived Persuasiveness (PP)	PP1	0.781
	PP2	0.706
	PP3	0.679
	PP4	0.819
Intention to Buy (IB)	IB1	0.812
	IB2	0.678
	IB3	0.8008
	IB4	0.807

Source: Developed for the study

4.7.2 Construct Reliability

The next step of evaluation lies in the construct reliability. The rationale for doing so is to ensure the coherence and consistency of the measures employed. The analysis results showcased that all constructs follow the general composite reliability rule, ρ_a>0.60 in exploratory research, as suggested by scholars (Hair et al., 2022; Hair et al., 2011).

Primary Task Support shows the highest reliability at 0.910, followed by System Credibility Support (0.868), Social Support (0.812), Intention to Buy (0.781), Dialogue Support (0.774) and Perceived Persuasiveness (PP) showing the lowest reliability at 0.750, these values demonstrate a satisfactory level of composite reliability for each construct. The values of Cronbach's alpha and composite reliability (ρc) were attached in Table 4.17 to support the robustness of composite reliability in the present study.

Table 4.17: Construct Reliability

Construct	Cronbach's alpha	Composite reliability (ρa)	Composite reliability (ρc)
PTS	0.767	0.774	0.865
DS	0.778	0.781	0.858
SCS	0.737	0.750	0.835
SS	0.908	0.910	0.929
PP	0.861	0.868	0.897
IB	0.811	0.812	0.888

Source: Developed for the study

4.7.3 Convergent Validity

The degree to which various measurements of the same construct are related is known as convergent validity, and it is a crucial component of construct validity. The significance of this validity is emphasised in the context of cognitive assessment and programme evaluation, respectively (Chamberlain & Haaga, 1999).

In examining the construct validity, the Average Variance Extracted (AVE) is utilized as a key indicator. Table 4.18 reports the AVE values for all constructs. The AVE values for all constructs surpass 0.5, aligning with the recommendation by Hair et al. The highest AVE is observed in Social Support

(0.726), succeeded by Primary Task Support (0.687), Dialogue Support (0.682), Intention to Buy (0.603), System Credibility Support (0.594), and Perceived Persuasiveness (0.560). This indicates that each construct possesses a substantial amount of variance captured by its respective indicators, reinforcing the internal consistency and convergent validity of the measurement model.

Table 4.18: Convergent Validity

Construct and indicator	Loadings	Average variance extracted (AVE)
PTS		0.682
PTS1	0.866	
PTS2	0.867	
PTS3	0.84	
PTS4	0.785	
PTS5	0.834	
PTS6	0.775	
DS		0.603
DS1	0.865	
DS2	0.784	
DS3	0.827	
SCS		0.560
SCS1	0.807	
SCS2	0.859	
SCS3	0.752	
SCS4	0.822	
SCS5	0.702	
SCS6	0.663	
SS		0.687
SS1	0.812	
SS2	0.869	
SS3	0.874	
PP		0.594
PP1	0.781	
PP2	0.706	
PP3	0.679	
PP4	0.819	
IB		0.726
IB1	0.812	
IB2	0.678	
IB3	0.800	
IB4	0.807	

Source: Developed for the study

4.7.4 Discriminant Validity

As an indicator of measurement validity, discriminant validity becomes the primary focal point of attention, highlighting the requirement that each construct show true distinctions without unnecessary overlap. By examining the HTMT ratio, the researcher attempts to confirm that the selected indicators accurately capture different facets while preventing confusion or duplication in the research models.

The result of the discriminant validity analysis is tabulated in Table 4.19. However, the HTMT ratio reflected discriminant validity issues, wherein the constructs captured highly overlapping indicators when holding 0.90 as the threshold value. For example, the HTMT ratio of Perceived Persuasiveness to Intention to Buy is 0.940. Similarly seen between Primary Task Support to Dialogue Support and System Credibility to Dialogue Support, the HTMT value is 0.991 and 0.914, respectively. These values indicated a lack of discriminant validity. Therefore, it necessitates remedies to treat the discriminant validity problem.

Table 4.19: Discriminant Validity

	DS	IB	PP	PTS	SCS	SS
DS						
IB	0.761 CI.95(0.673, 0.841)					
PP	0.765 CI.95(0.671, 0.853)	0.940 CI.95(0.876, 1.005)				
PTS	0.991 CI.95(0.958, 1.025)	0.690 CI.95(0.601, 0.773)	0.695 CI.95(0.605, 0.777)			
SCS	0.914 CI.95(0.832, 0.987)	0.831 CI.95(0.758, 0.898)	0.847 CI.95(0.777, 0.914)	0.816 CI.95(0.735, 0.885)		
SS	0.746 CI.95(0.652, 0.833)	0.798 CI.95(0.724, 0.869)	0.871 CI.95(0.798, 0.942)	0.710 CI.95(0.623, 0.789)	0.873 CI.95(0.820, 0.922)	

Source: Developed for the study

Farrell (2010) suggested inspecting the cross-loadings of items and removing the offending ones to improve discriminant validity. Similarly, Voorhees et al. (2016) agreed to rectify the discriminant validity issue by dropping the cross-loading item from the analysis. At a later date, scholars altogether proposed a more comprehensive approach to mitigate the discriminant validity issue. Hair et al. (2022) provided two trains of thought to handle the discriminant validity issues, by increasing the average monotrait-heteromethod correlations or decreasing the average heteromethod-heterotrait correlations. The researchers may opt to eliminate items with low correlation with other items within the same measurement construct or split them into homogenous sub-constructs, provided with solid theoretical support as an effort to increase the average monotrait-heteromethod correlations (Hair et al., 2022; Henseler et al., 2015). On the other hand, the researchers who seek to decrease the average heteromethod-heterotrait correlation may consider eliminating items that are strongly correlated with items in the opposing construct or relocating them to the opposing construct whenever the theories support (Hair et al., 2022; Henseler et al., 2015). However, it is worth noting that there is no rigid rule of thumb or threshold value to determine the decision based on statistical grounds. Henceforth, the researcher relied on both statistical analysis and theoretical support to mitigate the discriminant validity problem.

The present study then inspected the factor loadings. The factor loadings for IB1, IB2, IB3 and IB4 are 0.812, 0.678, 0.800 and 0.807, respectively measuring the Intention to Buy construct. The researcher opted to increase the average monotrait-heteromethod correlations by removing item IB2 in the

Intention to Buy construct which has a relatively low correlation with other items measuring the Intention to Buy construct, after careful consideration.

The Perceived Persuasiveness construct also reflected discriminant validity with the Intention to Buy construct. The examination of cross-loadings provided a hint to drop item PP2 from its strong correlation with the Intention to Buy construct. The minimal difference in cross-loading to measure the Perceived Persuasiveness construct over the Intention to Buy construct is 0.164, hence warranted action to remove it from the measurement construct.

Armed with statistical analysis from the factor loading, it is observed that item DS1 possesses a strong correlation with the Primary Task Support construct with a minimal difference of 0.108. The researcher considered either eliminating item DS1 from the measurement construct or reassigning it to the Primary Task Support construct. Meanwhile, the case for item DS2 is similar. The item DS2 appears to showcase a strong correlation towards the Primary Task Support construct, which differs negligibly at 0.182. The rationale for not dropping the items is that those items were developed based on the actual principles implemented on the TNG eWallet. If the items were dropped, this may reflect bias in measuring the users' attitudes and behaviour reacting to the mobile application. Thus, a decision to relocate them to the Primary Task Support construct may be more sensible.

Grounded on theoretical perspectives, the description of DS1 'Touch 'n Go eWallet prompts reminders for ongoing promotions or new products' and DS2 'Touch 'n Go eWallet suggests the most suitable insurance plan for me' resembles the system design principles of Reduction and Tailoring, wherein both indicators are more closely aligned with the functional goal of Primary

Task Support construct. Instead of motivating interaction between users and the mobile applications, the researcher then realised the underlying mechanism of reminders and recommendations for insurance plans prompted by TNG eWallet confined dual-way communication. This stands for a solid reason to relocate both items DS1 and DS2 from the Dialogue Support construct to the Primary Task Support construct as a remedy to the inflated HTMT.

4.7.5 Post-Hoc Data Analysis

A post hoc data analysis is often contested for its conformation to neither the population nor the randomization model of statistical inference (Curran-Everett & Milgrom, 2013). Citing Hoenig and Heisey (2001), the scholars defended that "Observed power can never fulfil the goals of its advocates because the observed significance level of a test also determines the observed power". This is especially prevalent in the field of medical science (Althouse, 2021). Despite the persisting argument on post hoc analysis which arises from time to time, the present study finds the significance of post hoc data analysis for its supplementary clue on the research study. The conduct of post hoc analysis in the present study also acts to confirm that the discriminant validity remedies are well-fitted to the research framework.

This section presents the post hoc reflective measurement model evaluation after the necessary action taken to relieve the problematic discriminant validity issue. Notably, the Dialogue Support construct which initially consisted of 3 items, is left with one single measurement item after the relocation of items DS1 and DS2 from the Dialogue Support construct to the

Primary Task Support construct. This entails that the Dialogue Support construct is regarded as a single-item construct. The persisting debate over the deleterious employment of single-item constructs raises concerns among scholars. The single-item construct is appropriate to use, in the event that the study encounters challenges like data collection from a small sample size, budget constraints or dyadic data (Diamantopoulos et al., 2012). Notwithstanding, Hair et al. (2022) featured the appropriateness of adopting a single-item construct for observable characteristics. This applies to the present study, wherein the measurement items under the PSD principles are developed based on the evaluation of the actual implementation of the TNG eWallet. With that, the alignment substantiates that the construct is directly observable and measurable, which succinctly relieves potential concerns about the single-item construct as a risky decision that may impair the research findings. Hereinafter, the ensuing reporting of post hoc data analysis excludes the Dialogue Support construct.

Referring to Table 4.20, it is observed that all constructs fulfil the suggested rule of thumb, ρ_a>0.60. The composite reliability ranges from 0.738 and 0.923, with Primary Task Support showcasing the highest reliability at 0.923, followed by System Credibility Support (0.866), Social Support (0.815), Intention to Buy (0.786) and Perceived Persuasiveness (0.738).

Table 4.20: Construct Reliability After Treatment

Construct	Cronbach's alpha	Composite reliability (ρa)	Composite reliability (ρc)
PTS	0.921	0.923	0.936
SCS	0.861	0.866	0.897
SS	0.811	0.815	0.888
PP	0.713	0.738	0.838
IB	0.785	0.786	0.875

Source: Developed for the study

Succinctly, the researcher assessed the convergent validity as partial fulfilment of the post hoc data analysis and reported in Table 4.21. Be guided by the general rule of thumb wherein AVE shall attain 0.50 or higher to ensure the construct explains more than half of the variance of its indicator, all constructs satisfy the rule of thumb. The highest AVE is observed in Social Support (0.726), followed by Intention to Buy (0.699), Primary Task Support (0.646), Perceived Persuasiveness (0.634) and System Credibility Support (0.594). Citing the System Credibility Support as an exemplary, the construct explicates 59.40% of the variance captured by its corresponding indicators. Thereby, this further validates that the remedy to the problematic discriminant validity issue is reasonable.

Table 4.21: Convergent Validity After Treatment

Construct and indicator	Loadings	Average variance extracted (AVE)
PTS		0.646
DS1	0.827	
DS2	0.698	
PTS1	0.845	
PTS2	0.842	
PTS3	0.822	
PTS4	0.766	
PTS5	0.833	
PTS6	0.785	
SCS		0.594
SCS1	0.808	
SCS2	0.859	
SCS3	0.755	
SCS4	0.818	
SCS5	0.701	
SCS6	0.665	
SS		0.726
SS1	0.810	
SS2	0.865	
SS3	0.879	
PP		0.634
PP1	0.778	
PP3	0.743	
PP4	0.863	
IB		0.699
IB1	0.854	
IB3	0.847	
IB4	0.806	

Source: Developed for the study

After the implementation of remedies to decrease the average heteromethod-heterotrait correlations by dropping items PP2 and IB2, as well as shifting items DS1 and DS2 from Dialogue Support to Primary Task Support, the discriminant validity is established with all HTMT values falling below 0.90. the researcher conducted a bootstrapping procedure and found that the confidence interval does not have a value of 1. This further confirms the establishment of discriminant validity. Therefore, this allows the researcher to

continue further with data analysis. Figure 4.3 illustrates the research model after treating the discriminant validity issue. The result of discriminant validity analysis after treatment is presented in Table 4.22 illustrating the PLS path model of the present research after treating discriminant validity issues.

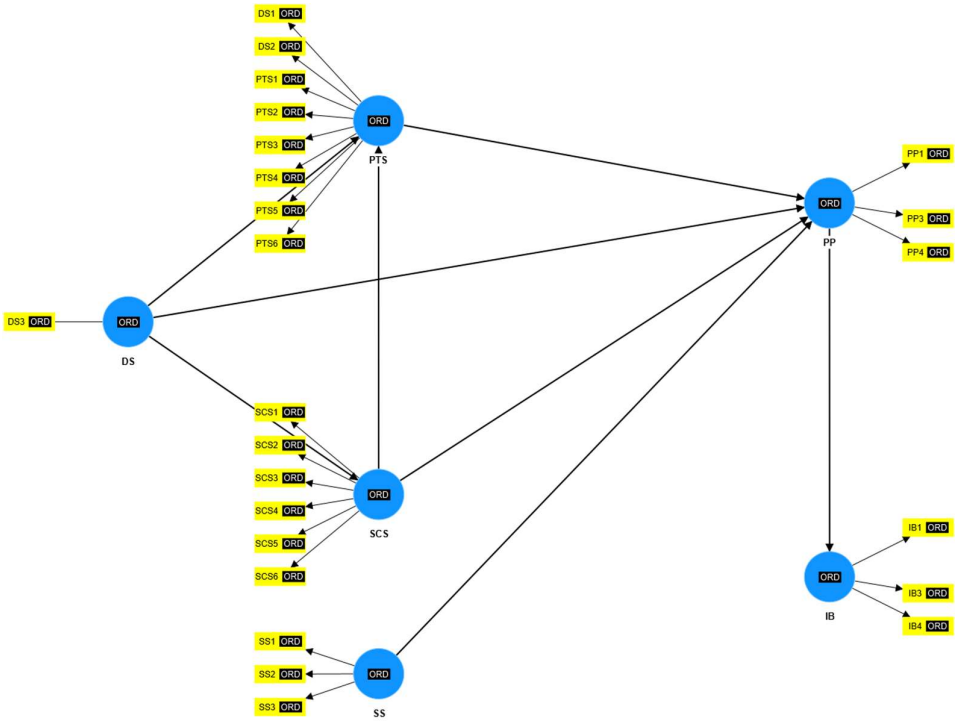


Figure 4.3: Revised PLS Path Model of Research Model

Note(s): (1) PTS=Primary Task Support, DS=Dialogue Support, SCS=System Credibility Support, SS=Social Support, PP=Perceived Persuasiveness, IB=Intention to Buy. (2) Indicators DS1 and DS2, which were originally placed under Dialogue Support, are relocated to Primary Task Support. (3) Indicator PP2 and IB2 are dropped from the construct.

Source: Developed for the study

Table 4.22: Discriminant Validity After Treatment

	DS	IB	PP	PTS	SCS	SS
DS						
IB	0.589 CI.95(0.509, 0.667)					
PP	0.485 CI.95(0.392, 0.576)	0.789 CI.95(0.713, 0.867)				
PTS	0.728 CI.95(0.664, 0.784)	0.716 CI.95(0.633, 0.791)	0.671 CI.95(0.582, 0.755)			
SCS	0.658 CI.95(0.0.576, 0.734)	0.799 CI.95(00.728, 0.868)	0.837 CI.95(0.766, 0.906)	0.842 CI.95(0.765, 0.906)		
SS	0.549 CI.95(0.466, 0.628)	0.792 CI.95(0.716, 0.864)	0.838 CI.95(0.760, 0.915)	0.719 CI.95(0.633, 0.796)	0.873 CI.95(0.820, 0.922)	

Source: Developed for the study

As a closing note for this section, the post hoc data analysis of the measurement model, which included evaluations of construct reliability, discriminant validity, and convergent validity, confirmed that the rectifying measures were appropriate. In particular, the removal of items DS1 and DS2 and the shifting of items IB2 and PP2 successfully resolved the issues with discriminant validity while remaining alignment with theoretical underpinnings. This enables the structural analysis to proceed with confidence.

4.7.6 Summary of Reflective Measurement Model Evaluation

While evaluating the reflective measurement model in the present study, the findings underscore the fulfilment of indicator reliability, construct reliability, and convergent validity. However, a careful examination of discriminant validity revealed certain challenges, prompting the researcher to take strategic actions to address these validity concerns.

To address the identified issues, the researcher executed a careful process involving the removal of specific items (PP2 and IB2) and a strategic reallocation of items based on theoretical content analysis (DS1 and DS2 were placed under the Primary Task Support construct). These targeted interventions were undertaken to relieve concerns related to discriminant validity. The results returned from the post hoc data analysis proven that the remedies undertaken to relieve the problematic discriminant validity issue is fair and reasonable. In summary, the assessment of the measurement model reveals that the reflective measurement model applied in the current research exhibits remarkable reliability and validity.

4.8 Structural Model Evaluation

Once the construct measures are reliable and valid, the researcher proceeds with the next step to assess the structural model results. The structural model evaluation examines the constructs of interest and relationship with one another on the basis of structural theory (Hair et al., 2022). By doing so, it allows the researcher to better understand the capability of a model in explaining the subject matter and make relevant predictions in a similar context of study.

4.8.1 Collinearity

Collinearity was tested using VIF. The result of the collinearity test is reported in Table 4.23. As recommended by Hair et al. (2022), the VIF value should be less than five and a value below three is considered satisfactory. The VIF values of all latent variables tested in the present study were below 3, with the exception of PTS1, PTS2 and SCS2, wherein they range between 3 and 5. Since all VIF values satisfy the rule of thumb for remaining below 5, there is no collinearity issue.

Table 4.23: Variance Inflation Factor

Indicators	Variance Inflation Factor (VIF)
DS1	2.598
DS2	1.625
DS3	1.000
IB1	2.001
IB3	1.948
IB4	1.390
PP1	1.320
PP3	1.409
PP4	1.563
PTS1	2.923
PTS2	3.037
PTS3	2.656
PTS4	2.108
PTS5	2.566
PTS6	2.286
SCS1	2.748
SCS2	3.284
SCS3	1.768
SCS4	2.048
SCS5	1.621
SCS6	1.499
SS1	1.533
SS2	2.051
SS3	2.008

Source: Developed for the study

4.8.2 Path Coefficient

The key indicators to test whether the hypotheses are supported by empirical data, the following analysis is broken down into the significance of path coefficient (β) along with its *p*-value and the R^2 value. The present study adopted 10,000 resamples to conduct the bootstrap analysis. Table 4.24 showcased the significance of the path coefficient (β) for all constructs. The present study found that Primary Task Support and Dialogue Support have

insignificant influence over Perceived Persuasiveness with β=0.074, p>0.05 and β=-0.023, p>0.05, respectively, supported by the failure to fulfil p-value<0.05. It is worthwhile to note that the Dialogue Support presented a negative relationship with Perceived Persuasiveness. Whereas the remaining Persuasive System Design Principles are found to significantly influence the Perceived Persuasiveness with System Credibility Support for β=0.365, p<0.05 and Social Support for β=0.353, p<0.05.

The present study hypothesised that Dialogue Support has influence over Primary Task Support and System Credibility Support. With empirical evidence shown in the present study, it is found that the hypotheses are significantly affirmed. As such, Dialogue Support presented a positive influence towards both constructs for Primary Task Support with β=0.383, p<0.05 and for System Credibility Support with β=0.609, p<0.05. Succinctly, the hypothesis of the present study expecting System Credibility Support to influence Primary Task Support is confirmed empirically. The System Credibility Support demonstrates a positive effect on Primary Task Support with β=0.520, p<0.05. Perceived Persuasiveness has a positive effect on Intention to Buy with β=0.610, p<0.05.

Table 4.24: Path Coefficients and Hypotheses Testing

Hypothesis		β	*t* value	*p*-value	Decision
H1	PTS → PP	0.074	1.064	0.288	Not Supported
H2	DS → PTS	0.383	5.849	0.000	Supported
H3	DS → SCS	0.609	13.424	0.000	Supported
H4	DS → PP	-0.023	0.361	0.718	Not Supported
H5	SCS → PTS	0.520	7.628	0.000	Supported
H6	SCS → PP	0.365	4.657	0.000	Supported
H7	SS → PP	0.353	5.753	0.000	Supported
H8	PP → IB	0.610	17.822	0.000	Supported

Source: Developed for the study

4.8.3 Coefficient Of Determination

The coefficient of determination (R^2) value is often used to measure the explanatory power of the structural model. The R^2 value ranges from 0 to 1; the higher value indicates better explanatory power (Hair et al., 2022). The rule of thumb for determining the acceptable value of R^2 remains debatable among scholars. Nevertheless, the present study refers to the R^2 value as an indicator of explained variance in the endogenous variables in correlation to its underlying exogenous variables.

Table 4.25 presents the R^2 value of the endogenous variables explained by its correlating exogenous variables. The results returned that the R^2 value for Intention to Buy is 0.372, suggesting that 37.20% of the variance in Intention to Buy can be explained by Perceived Persuasiveness. The R^2 value of Perceived Persuasiveness is 0.503, indicating that 50.30% of the variance in Perceived Persuasiveness can be explained by the PSD constructs.

The researcher observed that PTS showcased the highest R^2 value with 0.660, accounting for 66.00% of the variance, which can be explained by Dialogue Support and System Credibility Support. Succinctly, the R^2 value for System Credibility Support is found to be the lowest at 0.370, indicating 37.00% of the variance can be explained by Dialogue Support.

Table 4.25: Coefficient of Determination

Construct	R^2
Intention to Buy	0.372
Perceived Persuasiveness	0.503
Primary Task Support	0.660
System Credibility Support	0.370

Source: Developed for the study

Subsequently, the assessment of the f^2 effect size was conducted. Table 4.26 shows the result of the f^2 effect size. With the rule of thumb of 0.02, 0.15, and 0.35 reflecting small, moderate, and large effect sizes (Hair et al., 2019, it is obvious that Dialogue Support and Primary Task Support do not pose any effect size on Perceived Persuasiveness. The System Credibility Support and Social Support portrayed a small effect size on the Perceived Persuasiveness, with an f^2 effect size lower than 0.15 but greater than 0.02. It is worth noting that Dialogue Support reflected a moderate effect size on Primary Task Support (f^2=0.272). The largest f^2 effect size is shown on Dialogue Support towards system Credibility Support with f^2=0.588, followed by Perceived Persuasiveness towards Intention to Buy with f^2=0.593 and System Credibility Support towards Primary Task Support with f^2=0.502.

Table 4.26: f^2 Effect Size

f2 Effect Size						
	DS	IB	PP	PTS	SCS	SS
DS			0.001	0.272	0.588	
IB						
PP		0.593				
PTS			0.004			
SCS			0.085	0.502		
SS			0.116			

Source: Developed for the study

4.8.4 Predictive Power

The present study is grounded on the basis of marketing to understand consumer behaviour in the fintech landscape. It is essential to test the feasibility of the present research model from the samples derived. Therefore, this

warranted the assessment of the predictive power of the structural model. The merit of using PLS-SEM is its ability to surmount the traditional detrimental issue between explanation and division (Shmueli et al., 2019). Therewith, the PLS-SEM is conducive to predicting the result for out-of-samples along with its capability to facilitate the amount of explained variance to the maximum extent of the dependent constructs incorporated in a path model grounded in causal explanations (Hair et al., 2012; Hair et al., 2011; Shmueli et al., 2019). Since the present study acquired substantial samples, the number of folds and number of repetitions were set at 10, respectively, following the general PLSpredict choices (Chin et al., 2020; Hair et al., 2022; Shmueli et al., 2019).

As recommended by Shmueli et al. (2019), the predictive model assessment should be conducted on the endogenous variables. The researcher focused the prediction analysis on key endogenous constructs, including the Intention to Buy construct and the Perceived Persuasiveness construct. Albeit the Primary Task Support construct and System Credibility Support construct act as the endogenous construct in H2, H3 and H5, neither of these two constructs play as the key constructs are irrelevant for prediction in consumer behaviour to promote insurance through the e-wallet mobile application. Thereby, the Primary Task Support construct and System Credibility Support construct are not examined for the prediction assessment.

The primary step is to ensure all indicators in the endogenous constructs fulfil the most naïve benchmark outlined by $Q^2_{predict}$ value. The present study withheld $Q^2_{predict}$ value as the most naïve benchmark to measure the predictive power of the research model. A positive $Q^2_{predict}$ value is favourable as it showcased that the PLS models' prediction error is smaller than the prediction

error outlined by the most naïve benchmark. Table 4.27 showcases that the Q^2 prediction value surpassed the minimum value of 0. Therefore, this asserted that the PLS-SEM-based predictions have outperformed the most naïve benchmark.

Table 4.27: Predictive Power

			PLS Indicator Prediction Summary					
			PLS-SEM		LM		PLS-LM	
	Indicator	Q^2predict	RMSE	MAE	RMSE	MAE	RMSE	MAE
Intention to Buy	IB1	0.240	1.461	1.181	1.381	1.056	0.080	0.125
	IB3	0.238	1.433	1.145	1.356	1.021	0.077	0.124
	IB4	0.208	1.197	0.937	1.145	0.885	0.052	0.052
Perceived Persuasiveness	PP1	0.281	1.212	0.935	1.204	0.893	0.008	0.042
	PP3	0.113	1.304	1.025	1.283	1.015	0.021	0.010
	PP4	0.325	1.106	0.874	1.069	0.814	0.037	0.060

Source: Developed for the study

Next, the researcher continued to assess the comparison between PLS-SEM analysis and the naïve LM benchmark. The scholars recommended primarily referring to RMSE; otherwise, the MAE when a specific situation applies where the distribution of the data is highly non-symmetrical (Shmueli et al., 2015, 2019). The residual plot illustrated in Figure 4.4, indicating the distribution of PLS-SEM prediction errors from PLS-SEM (on the left column) and LM (on the right column), suggests that the distribution is slightly symmetric. Hence, the present study evaluated the predictive power on the basis of RMSE. It is worthwhile to note that, notwithstanding the MAE not causing a substantial difference in the interpretation of the predictive power, the present study attached the results of MAE as supplementary evidence.

Referring to Table 4.27, the RMSE value for PLS-SEM is larger than LM for all indicators in the key endogenous constructs, leading to positive values in PLS-LM values. This implies that all indicators do not fulfil the rule

of thumb of PLS-SEM value lower than LM. Hence, the predictive relevance is not established.

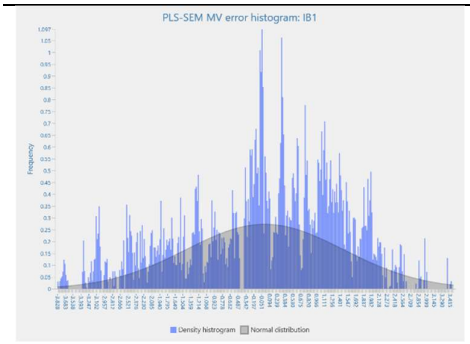
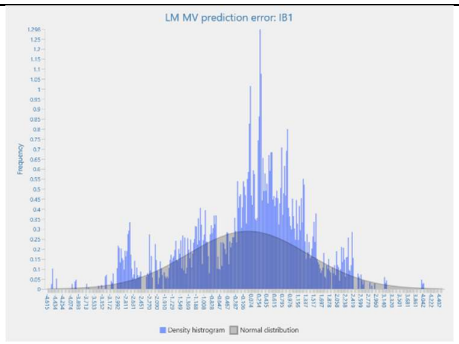
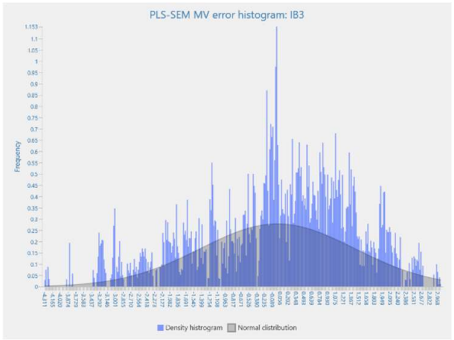
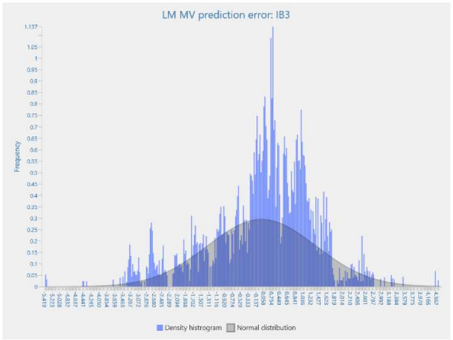
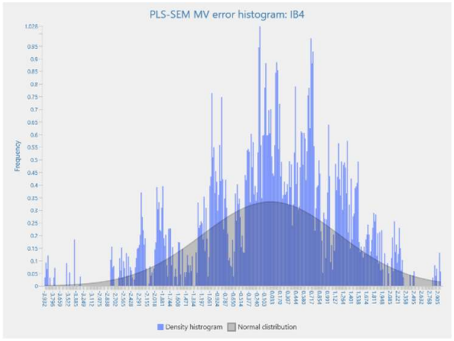
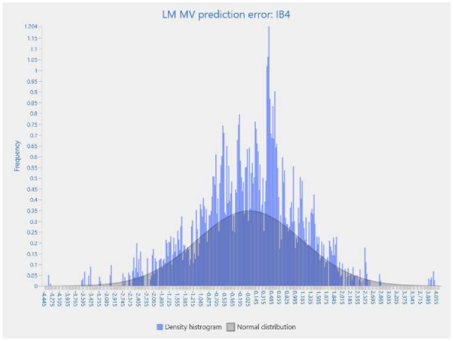
PLS-SEM	LM
	
	
	

Figure 4.4: Residual plot for IB construct

Source: Developed for the study

Furthermore, the researcher compared the CVPAT value for both Model A (the alternative model, AM) and Model B (the established model, EM) for a more robust check on the prediction power. The aim of conducting the CVPAT

test is to examine whether the AM offers higher predictive power than the EM and, therefore, to determine whether to retain the AM.

The researcher let the proposed research framework be AM, while the research framework from the prior study by Lehto and Oinas-Kukkonen (2015) is the EM. The result of the CVPAT comparison is illustrated in Table 4.28. The present study found that the AM (CVPAT=-0.564) showcased lower predictive error than the EM (CVPAT=-0.464). The *p*-value also suggests relative support for the acceptance of AM based on the comparison. Thus, the present research opted for the AM, which provides higher predictive relevance based on the empirical evidence above. On the same note, the research model in the present study returned higher prediction power. Overall, it confirmed the present model's predictive capabilities in explaining users' intention to buy.

Table 4.28: CVPAT Results

	Average losses			
	EM	AM	EM-AM	*p*-value
CVPAT results	-0.464	-0.564	0.1	0.000

Note(s): (1) EM=established model; AM=alternative model. (2) The null hypothesis is equal predictive ability, and the alternative hypothesis is that the AM has better predictive ability than EM. (3) The *p*-value is based on 10,000 bootstrap samples. (4) A negative average loss value difference between the EM and AM indicates that the EM has a smaller average loss and is therefore preferred. If the average loss value difference is positive, the AM has superior predictive power.
Source: Developed for the study

4.9 Robustness Check

Following the recommendations by Shmueli et al. (2019), the present study conducted the robustness check on endogeneity, unobserved

heterogeneity, nonlinearity and heteroskedasticity after the model evaluation to justify the validity of the results.

4.9.1 Endogeneity

The subsequent assessment for robustness sheds light on endogeneity. Endogeneity is defined as the result when one or more regressors are correlated with the error term, thus creating violations of the fundamental causal modelling assumption of regression analysis (Becker et al., 2022; Papies et al., 2017; Rutz & Watson, 2019; Wooldridge, 2015). Simply put, endogeneity happens when the researcher confuses the cause-and-effect variables in forming the regression equation. The usual root cause lies within the omission of latent variables that correlate with both the endogenous variable and exogenous variable in the research framework (Sarstedt et al., 2020; Vaithilingam et al., 2024).

Based on the review conducted in a recent study (Vaithilingam et al., 2024), the Gaussian copula approach is mostly preferred attributable to its instrumental variable-free nature for assessment and outstanding ability to handle multiple endogenous regressors at a single time, added to its convenience to directly model the correlation between the endogenous variable and the error term using copula approach (Hult et al., 2018). The instrument variable-free method of assessing endogeneity not only examines the potential endogeneity problem but also improves the precision of the endogenous regressor's parameter estimate in practice (Becker et al., 2022).

Nevertheless, the assessment of endogeneity is elective, primarily depending on the objective of the study (Ebbes et al., 2011; Hult et al., 2018;

Vaithilingam et al., 2024). In the case of a confirmatory study, wherein the primary focus of the study is to test causal inferences, the assessment of endogeneity is necessary to adequately test for hypotheses (Papies et al., 2017). On the other hand, in the case of a predictive study, wherein the study sheds light on predicting new observations, the controlling of endogeneity may deflate the predictive relevance (Vaithilingam et al., 2024). Hendra & Hill (2019) consistently advocate for clear-cut segregation of the research intent, either confirmatory or predictive. However, the researchers de facto generally expect high predictive relevance while being grounded on well-developed causal explanations, which is referred to as explanation and prediction theory in the work of Gregor (2006).

The present study showcased an inclining priority towards predictive relevance over explanatory rigour for several reasons. Firstly, the investigation of the influence of PSD on e-wallets towards the promotion of insurance is grounded on a newly developed research framework that lies within the novel intersection of persuasive system design and fintech. The accentuation lies in validating the predictive power, rather than explaining the causal inferences. Additionally, the outstanding predictive power (refer to Section 4.9.4) confirms the predictive relevance of the present study. This further solidifies the stances of inclining towards predicting over confirmation. While acknowledging that endogeneity is a critical assessment in part of the robustness check, it is deemed trivial at the expense of forgoing notable predictive performance.

4.9.2 Unobserved Heterogeneity

The unobserved heterogeneity issue occurs when there is an unknown source of deviation between the assumption of investigating an unrealistic set of homogenous populations and the actual analysis of investigating a heterogenous sample (Hair et al., 2022; Sarstedt et al., 2022). In practice, the heterogeneity issue is not pronounced theoretically, thus, the assessment of unobserved heterogeneity is required (Vaithilingam et al., 2024).

The present study follows the guidelines showcased in the systematic finite mixture partial least square (FIMIX-PLS) analysis procedure (Sarstedt et al., 2020). The researcher initiated the FIMIX-PLS analysis with a one-segment solution and the default settings for the stop criterion (10^{-9}), the maximum number of iterations (5,000) and the number of repetitions (10). Then, the crucial part lies in the determination of the maximum number of segments. According to the theoretical suggestion (Hair et al., 2016), the range of possible segment numbers shall consider two major components, wherein the sample size acquired, and the minimum sample size required, to conduct a reliable estimation for the research model. Employing the Gamma-exponential method of estimating the minimum sample size required (refer to Section 4.3), the upper bound yielded from the mathematical division approach is 4 (i.e., 404÷92=4.39). Fitting into the present context, a similar process of assessing FIMIX-PLS was repeated with higher-segment solutions of up to 4 using the same algorithm settings. This implies that the calculation using FIMIX-PLS is conducted with k=2, k=3 and k=4.

Subsequently, the result is retrieved and recorded in Table 4.29 to provide an overview of the fit indices in FIMIX-PLS. Based on the extensive discussions on the information criteria (Hair et al., 2016), the present study adheres to the recommended usage of multiple information criteria, namely the AIC_3 (modified Akaike's information criterion with Factor 3), AIC_4 (modified AIC with Factor 4), BIC (Bayesian information criterion) and CAIC (consistent AIC), to validate the optimal number of segment solutions. AIC3 suggested a 4-segment solution, AIC4 suggested a 3-segment solution, whereas BIC and CAIC suggested a 2-segment solution. Referring to the recommended joint analyses using AIC_3 and CAIC, AIC_3 and BIC, or AIC_4 and BIC (Hair et al., 2016), none of the combined indicators point towards a specific segment solution. This implies a divergent result. Taking into consideration, the general rule to choose a smaller number of segments indicated by AIC and a bigger number of segments indicated by MDL5 (minimum description length with factor 5) suggested considering a 2 or 3-segment solution (Hair et al., 2016). Supported by the complementary employment of EN (normed entropy statistic), which indicates the reliability of the partition, the consideration is acceptable, whereby an EN value greater than 0.5 is often accompanied by a better-quality partition (Hair et al., 2016).

Table 4.29: Fit indices for FIMIX-PLS

Criteria	No. of Segments			
	1	2	3	4
AIC (Akaike's information criterion)	3516.323	3274.356	3232.901	**3219.057**
AIC3 (modified AIC with Factor 3)	3528.323	3299.356	3270.901	**3270.057**
AIC4 (modified AIC with Factor 4)	3540.323	3324.356	**3308.901**	3321.057
BIC (Bayesian information criterion)	3564.34	**3374.391**	3384.955	3423.129
CAIC (consistent AIC)	3576.34	**3399.391**	3422.955	3474.129
MDL5 (minimum description length with factor 5)	**3852.408**	3974.533	4297.17	4647.418
EN (normed entropy statistic)	0	0.593	0.612	0.583

Note: The value in bold indicates the most optimal outcome per segment retention criterion.
Source: Developed for the study.

The assessment then proceeded by assessing the relative segment sizes as presented in Table 4.30. Provided with the requirement of minimum sample size (refer to Section 4.3), the absolute size of each segment shall surpass the value of 92.

Table 4.30: Relative Segment Sizes

	Relative Segment Sizes			
No. of segments	Segment 1	Segment 2	Segment 3	Segment 4
1	1.000			
2	0.705	0.295		
3	0.576	0.268	0.156	
4	0.475	0.239	0.154	0.132

Source: Developed for the study

The detailed calculation is presented as follows.

For a 2-segment solution,

$$\text{Segment 1: } 0.705 \times 404 \approx 284$$

$$\text{Segment 2: } 0.295 \times 404 \approx 119$$

For a 3-segment solution,

Segment 1: 0.576×404≈232

Segment 2: 0.268×404≈108

Segment 3: 0.156×404≈63

Worth noting, the relative segment sizes indicated that Segment 3 for the 3-segment solution only accounted for 63 observations, which failed to fulfil the minimum sample size requirement of 92. Thus, the 3-segment solution is rejected in this case to warrant a valid analysis. In general, the overall result reasonably assumes that the present study is free from unobserved heterogeneity, further affirming the robustness of the structural model.

4.9.3 Nonlinearity

A linear relationship is often represented by straight lines, either a positive or negative slope, in graphical output, while a non-linear relationship constitutes that the associations between variables are curved (Hair et al., 2024). The non-linear relationship depicts that the effect size relies on the magnitude of change in the independent variable (Hair et al., 2024; Vaithilingam et al., 2024).

The assumption of a monotonic positive linear relationship between constructs can be asymptotic, aligned to the “too-much-of-a-good-thing effect”

(Pierce & Aguinis, 2013). Nonetheless, the nonlinear relationship is common due to the complex setting in the real world (Eisenbeiss et al., 2014; Hay & Morris, 1991). To avoid erroneous linearity assumptions for the hypotheses investigated, scholars strongly advocate the necessity to establish the nonlinear effect through careful theoretical reasoning (Hair et al., 2024; Sarstedt et al., 2020; Vaithilingam et al., 2024).

The present study assessed the linearity between variables using the two-stage approach for its utmost versatility in dealing with reflective or formative-characterised exogenous constructs within a research model (Hair et al., 2024). The non-linearity assessment established quadratic terms on each relationship and conducted a bootstrapping procedure with 10,000 subsamples subsequently. To determine the linearity of the relationship between constructs, the main indicator referred to is the significance of the 95% confidence intervals bias corrected. The significance of the nonlinear effect is established when the 95% confidence interval does not include a value of zero, according to the recommended rule of thumb (Hair et al., 2024). On the other hand, the examination of the *p*-value or *t*-value also justifies the establishment of the significance of the quadratic effect (Hair et al., 2024).

Per Table 4.31, the results returned a *p*-value of 0.046 for the quadratic relationship between Primary Task Support and perceived persuasiveness. This implies that the quadratic term, PTS^2 is significant at a 5% significance level. This is further supported by the value of zero falling out of the range from 0.005 and 0.224. Henceforth, this concludes that Primary Task Support imposed a significant quadratic effect on Perceived Persuasiveness. Apart from that, the quadratic effect of all hypotheses developed was found to be statistically

insignificant (p-value>0.05), which indicates no evidence of a nonlinear relationship. Thus, this affirms the establishment of linear relationships between the constructs.

Table 4.31: Nonlinearity Assessment

Hypothesis	β	Confidence Interval Bias Corrected	p-value	t value
QE (PTS) → PP	0.113	[0.005 , 0.224]	0.046	2.000
QE (SCS) → PP	-0.04	[-0.164 , 0.079]	0.513	0.654
QE (SCS) → PTS	-0.008	[-0.074 , 0.058]	0.802	0.250
QE (PP) → IB	0.003	[-0.046 , 0.050]	0.904	0.121
QE (DS) → PP	-0.038	[-0.138 , 0.056]	0.442	0.769
QE (DS) → PTS	-0.072	[-0.159 , 0.017]	0.108	1.607
QE (DS) → SCS	-0.031	[-0.124 , 0.064]	0.526	0.634
QE (SS) → PP	-0.036	[-0.135 , 0.050]	0.448	0.758

Source: Developed for the study.

4.9.4 Heteroskedasticity

The presence of heteroskedasticity is identified when the variance of an estimated path coefficient differs from the change in the exogenous variable, the remaining residual variability changes as a function of random variables that are not included in the model (Cohen et al., 2013; Fox, 1997; Griffiths, 2003). Simply put, heteroskedasticity measures the heterogeneity in the variance (Vaithilingam et al., 2024). Tovohery et al. (2020) conducted a Monte Carlo experiment on various approaches to assess heteroskedasticity and found that Levene's test is the most optimal for its robustness and sensitivity outperformed other tests considered in the study.

While existing scholarly materials failed to identify the problematic impact of violating the heteroskedasticity assumption (Hair et al., 2022, 2024; Hair et al., 2014, 2019), added to the unpopularized assessment of

heteroskedasticity among the diverse studies using PLS-SEM, limited studies are found to perform the heteroskedasticity assessment. Nonetheless, to the best of the knowledge of the researcher, existing studies have not outlined any guidelines to indicate the extent to which heteroskedasticity is violated. Added to that, Vaithilingam et al. (2024) acknowledged the methodological gap, wherein the employment of regression-based PLS-SEM along with the bootstrapping procedure in generating test statistics, contradicted the relevance of the heteroskedasticity assumption in accordance with the Gauss-Markov theorem. Henceforth, the present study did not examine heteroskedasticity for the aforementioned downfalls.

4.10 Summary

This chapter represents the inferential analysis of data collection. The researcher strictly adhered to every single step to analyse the data for a precise analysis. Before the distribution of the online survey questionnaire, the researcher conducted a pilot test with 30 samples collected beforehand. The data collected were tested on the reliability of the construct. All construct items exhibited a consistent figure of Cronbach's alpha.

Thereafter, the online survey questionnaire was distributed and collected with the aid of Google Forms. After coding and editing the data, the researcher performed data cleaning to remove invalid data. A total of 404 responses were taken into account for quantitative data analysis. Later, the researcher proceeded with inferential analysis using PLS-SEM. Necessary remedies were executed to treat the discriminant validity issues during the measurement model assessment.

Results showed that the constructs exhibited satisfying reliability and validity. Then, there were eight hypotheses tested during the structural model assessment. Among all eight hypotheses proposed, two hypotheses pertaining to the influence towards Perceived Persuasiveness stemming from Primary Task Support and Dialogue Support were not supported with the indicator of low significance. Other than that, all variables showed a positive correlation. The result obtained serves as the fulfilment of research objectives 2 and 3. Next, the assessment of the predictive power confirmed that the present research model encompasses predictive ability.

The researcher also conducted the robustness check before and after the model evaluation, regarding nonnormality, endogeneity, unobserved heterogeneity, nonlinearity and heteroskedasticity, to manifest the statistical rigour. The following chapter further discusses the findings based on the present analysis.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

The present research study was conducted to explore the influence of persuasive system design on users' intention to buy insurtech offerings through e-wallet penetration. The research evaluated the persuasive system design principles implemented in the e-wallet, particularly the TNG eWallet as a case study. The present study also attempted to investigate the impact of persuasive system design on users' perceived persuasiveness and intention to buy insurtech offerings, specifically referring to MHI. Thereupon, this chapter discusses the research findings in the previous chapter. Then, the succeeding section synthesises the research contribution, presents the limitations of the present research and provides recommendations for future research to expand the knowledge of the domain. Finally, the thesis is wrapped up with a closing remark.

5.2 Discussion on Findings

The present study is conducted to fulfil the following research objectives: (1) to evaluate the persuasive system design features applied to TNG eWallet, (2) to study the influence of those persuasive system designs applied

toward the perceived persuasiveness and (3) the influence of the perceived persuasiveness toward purchase intention of insurtech offerings among the Malaysian population.

Based on the empirical results in the prior chapter, all objectives are attained. Among the eight hypotheses proposed, six hypotheses are accepted with a significant positive relationship. In contrast, the present study fails to affirm two hypotheses that were set out to examine the influence of Primary Task Support and Dialogue Support towards Perceived Persuasiveness. The following subsections present the hypotheses with findings obtained from the empirical study, along with corresponding discussions.

5.2.1 Primary Task Support and Perceived Persuasiveness

The Primary Task Support principles are regarded as the features or functionalities that directly assist users in accomplishing the main task within a system. In the context of the present study, the investigation set out to examine the design principles implemented in the case of TNG eWallet and its influence on users' perception of persuasiveness. Therein, Hypothesis 1 is formed.

Hypothesis 1: Primary Task Support positively influences Perceived Persuasiveness.

The results revealed that the impact of Primary Task Support towards Perceived Persuasiveness is insignificant with $\beta=0.074$ and p-value>0.05. The relationship between Primary Task Support and perceived persuasiveness in the present study is not supported. The resulting finding does not align with a prior study which was conducted in the context of consumer health and wellness

applications (Win et al., 2019). The researcher argued that the insignificant impact is due to the users' priority when using the e-wallet. As an example, the security aspect of the e-wallet has shadowed the Primary Task Support principles, particularly when financial scam cases were scattered all over the Internet (Kumar, 2022; The Star, 2022a). Hence, it limits the influence of the Primary Task Support towards perceived persuasiveness.

Besides that, another plausible explanation for the insignificant relationship between Primary Task Support and perceived persuasiveness is the lack of simulation on how to submit a claim when an undesirable incident happens. Despite the implementation of design principles under Primary Task Support fulfils 6 out of 7 (refer to Table 2.2), it is found that the system design emphasised underwriting and distribution, leading users to purchase insurance. In other words, it has neglected one of the troublesome yet important processes, namely the claiming of insurance. From the users' perspective, this explains that users might be reluctant to proceed with the purchase of insurance through TNG eWallet primarily due to the uncertainty with which the claim process is. The obscure presentation of the claim process in the system design of TNG eWallet will potentially heighten the users' perceived risk in purchasing insurance through the mobile application.

Supported by the quadratic relationship identified, it indicates that the implementation of Primary Task Support principles does not significantly influence the users' Perceived Persuasiveness. The quadratic relationship between Primary Task Support and Perceived Persuasiveness with β=0.113 suggests a U-shaped relationship, offering a nuanced explanation for the previously observed insignificant relationship. The identification of a non-linear

relationship suggests that the influence of Primary Task Support on Perceived Persuasiveness varies depending on the change in Primary Task Support. The users may perceive greater persuasiveness during low and high levels of implementation of Primary Task Support, while a weakened tie of Perceived Persuasiveness at a moderate level of implementation of Primary Task Support. With minimal implementation of Primary Task Support, users naturally compare the minimal presence of Primary Task Support with their earlier expectations. The baseline at this stage is relatively low, minimal features are considered significantly, hence any improvement in the system design regarding the Primary Task Support may elevate users' perceived persuasiveness in purchasing insurance protection through the e-wallets mobile applications. Gradually, when the implementation of Primary Task Support increases to a modest level, other key priorities come into play and tend to overshadow the implementation of Primary Task Support, especially since the present study focuses on fintech domains. Users emphasise safety and trust over task facilitation at this stage, making the Primary Task Support lose the significance it holds. This coincides with the findings in the present study whereby System Credibility Support carries the greatest weightage in influencing Perceived Persuasiveness. At a higher level of implementation, the importance of Primary Task Support resurfaces, allowing the users to recognise its usability. The U-shaped relationship identified further asserted the need to break down the process of claim submission by demonstrating a user-friendly walkthrough. No matter in the case of the traditional insurance industry or leading fintech platforms, claim submissions are often expected to be hassle-free (Pattnaik et al., 2019). This is anticipated to relieve the friction in adopting insurance

through digital channels, confirming the role of Primary Task Support in bolstering users' perception regarding persuasiveness.

5.2.2 Dialogue Support and Primary Task Support

Dialogue Support is to facilitate communication between the system and the users. It is believed that users are motivated to conduct the targeted behaviour when the communication process between the system and users is smooth. Thus, the users are motivated to engage actively with the system. Henceforth, the Hypothesis 2 is formed.

Hypothesis 2: Dialogue Support positively influences Primary Task Support.

Scant research has been conducted to examine the relationship between Dialogue Support and Primary Task Support. The result findings contribute to the knowledge that Dialogue Support has a significantly positive influence towards the Primary Task Support.

In the present study, a necessary remedy is applied to treat the troublesome methodological issue. The Dialogue Support construct is eventually measured by a single indicator, referring to the Liking principle. This explains that the visual appeal of TNG eWallet attracts users to engage with the system. The rationale of the aforementioned statement is founded on easily understandable visual elements, appropriate spacing between buttons and consistent colour that represents TNG as a brand.

Meanwhile, the Liking principle also contributes to reducing the users' cognitive load in interpreting the visuals within the TNG eWallet mobile application (Dunlap & Lowenthal, 2016). For instance, the GOprotect mini

program, which directs users to the insurance interface, is symbolised with a shield icon (as identified in Table 2.2). Also, the protection policy for different usage is illustrated with corresponding icons. It is important to note that each insurance policy is attached with a yellow-blue shield, which reminds the users about the functionality. Hence, users are allowed to focus on navigating among the system functionalities. This concludes that Hypothesis 2 is significant.

5.2.3 Dialogue Support and System Credibility Support

Hypothesis 3 suggests that Dialogue Support has a positive impact towards System Credibility Support. The logic of the aforementioned statement is that Dialogue Support facilitate interactive communication that delivers plausible information to the users.

Hypothesis 3: Dialogue Support positively influences System Credibility Support.

There is scarce evidence that affirms the relationship between Dialogue Support and System Credibility Support. The present study provides a contribution by confirming that Dialogue Support has a profound impact on System Credibility Support. The resulting finding is aligned with prior studies (Halttu & Oinas-Kukkonen, 2021). It is worthwhile noting that Dialogue Support delivers outstanding impact towards the System Credibility Support. As identified in Table 2.3, where the mobile application developers leave appropriate space between functional buttons and engage main theme colours like blue and yellow consistently throughout the system design, the researcher noticed the visual appeal of TNG eWallet is leaning towards a classical aesthetic,

which emphasises simplicity and clarity. Oyibo et al. (2018) pointed out that a classical, pleasing interface is more likely to correlate to credibility than a complex interface.

5.2.4 Dialogue Support and Perceived Persuasiveness

A prior study believes that the positive influence of Dialogue Support will motivate users' belief when the users receive and accept an adequate amount of information about the advantages of switching to new behaviour, consequences of sticking with the old behaviour or tips and tricks to overcome the resistance of adoption (Nguyen & Masthoff, 2008). Along with this standpoint, the present study was set forth to investigate the relationship between Dialogue Support and Perceived Persuasiveness. With that, it builds the formulation of Hypothesis 4.

Hypothesis 4: Dialogue Support positively influences Perceived Persuasiveness.

The empirical results obtained in the previous chapter show that there is an insignificant negative effect of Dialogue Support on Perceived Persuasiveness with β =-0.023 at *p*-value>0.05. Therefore, the hypothesis is not supported. Notably, the Dialogue Support construct is measured by the Liking principles after the necessary remedy for the discriminant validity issue. This has a close relation with the decision to relocate indicators DS1 and DS2. The rationale for explaining the relocation of DS1 is due to the inclination of the Reminder prompt towards task orientation, wherein the reminders sent to users often call for immediate action to purchase the insurance offerings. A relevant study conducted in the case of charity events revealed that reminders may

escalate the cost of annoyance, thus creating avoidance behaviour (Damgaard & Gravert, 2018).

The relocation of indicator DS1 also provides a hint at the importance of message framing (Ku et al., 2018). Message framing is often considered a tool of persuasion in conventional communication yet is not covered in the Dialogues Support construct. It addresses the consequences of whether or not performing an action, in terms of gain and loss (Levin et al., 1998; Levin & Gaeth, 1988). A recent study confirmed the importance of coherence between subject matter and frame used during the persuasion process (Gier et al., 2023). The author also substantiated that, communicating the negative consequences of the negative subject matter within an appropriate frame message is an ideal approach to persuasion (Gier et al., 2023). Particularly in the context of Malaysia, insurance is often regarded as an unattractive option (Muhamat et al., 2017; Rambeli et al., 2023; Thanasegaran & Shanmugam, 2008). Thereby, negative message framing, in this case, may help to reduce the common misconception of 'too good to be true' among the users, thus potentially promoting the perceived persuasiveness of insurance solutions offered through TNG eWallet. In other words, it is crucial to acknowledge that sole positive message framing may appear overly promotional or intrusive, which can in turn regarded as pushy leading to scepticism, rather than persuasion (Belanche, 2019; Kim et al., 2019; Kim & So, 2018).

Likewise, the implementation of the Suggestion principle is unclear, thus requiring the shifting of DS2 from the Dialogue Support construct to the Primary Task Support construct. It can be explained by the mechanism of suggestions designed. In the case of TNG eWallet, the suggestion on the most

suitable plan is given based on the setup by users. The users are required to answer three health questionnaires based on their settings. Then, the system generates a general health protection plan based on the data inputted. Considering the mechanism of Suggestion principles implemented, the researcher argued that the indicator fits better with Tailoring principles located under the Primary Task Support. Aligned to the argument, Konstan and Terveen (2021) highlighted that offline analysis contributes as a distractor from the human-computer interaction, hence necessitating a more thoughtful system design to offer suggestions. Overall, the poor implementation of Dialogue Support principles echoed Kelders et al. (2012), who discovered the impact of the enormous implementation of Dialogue Support principles on greater efficacy of intervention in the healthcare-based domain.

Another plausible reason to explain the insignificant negative relationship between Dialogue Support and Perceived Persuasiveness is the contextual difference between prior empirical studies and the present study. Prior studies confirmed a positive relationship between Dialogue Support and Perceived Persuasiveness primarily focused on the healthcare and wellness domain (Mohadis et al., 2016; Segerståhl et al., 2010). Meanwhile, the present study showcased contrasting results as it shed light on the context of fintech. It is undeniable that users behave variedly in different fields of study on a wide range of spectrums. Richter et al. (2019) interpret insurance consumer behaviour through a holistic approach by dissecting it from manifold academic theories and models. The scholar presents multiple reasons that portray obstacles to engaging consumers in the insurance industry (Richter et al., 2019). Furthermore, given the present development of the fintech industry of Malaysia

which remains at an early development stage, the users of TNG eWallet may hesitate to purchase insurance through the e-wallet mobile application. Thus, this sums up the explanation of the insignificant negative relationship between Dialogue Support and Perceived Persuasiveness.

5.2.5 System Credibility Support and Primary Task Support

System Credibility Support is set out to have a positive influence on Primary Task Support. The researcher posits that System Credibility Support acts as a foundational pillar to encourage users to use the e-wallet. System Credibility Support plays an essential role, particularly in relation to the financial field. Thus, the Hypothesis 5 is developed.

Hypothesis 5: System Credibility Support positively influences Primary Task Support.

The positive impact of System Credibility Support on Primary Task Support (β=0.520) is greater than the impact on Perceived Persuasiveness (β =0.365). This simply explains that the System Credibility Support has a greater influence on users to carry out the main task of accessing the insurance. Based on the outer loadings value, it is found that indicator SCS2 'I can assess the brief description of the insurer companies' imposed the strongest contribution to the System Credibility Support construct. This explains that the users are very particular about the Expertise principles. As identified in the evaluation of system design principles implemented under the pillar of System Credibility Support (refer to Table 2.4), TNG eWallet is associated with Alipay partner, which is backed by the well-known founder, Jack Ma. Also, to suit the Malaysia

context, TNG eWallet partnered with the bellwether of the insurance industry, including AIA Malaysia, Allianz, Etiqa, MSIG, Takaful Ikhlas, Takaful Malaysia and Zurich Takaful. As these partners are well known and have provided long-lasting services to the Malaysian community, the successful partnership bolsters the credibility of the mobile application. Hence, it is evident that the implementation of System Credibility Support in TNG eWallet is successful.

5.2.6 System Credibility Support and Perceived Persuasiveness

Opposed to prior studies, which found an insignificant influence of System Credibility Support on Perceived Persuasiveness in the context of fitness application (Oyibo & Vassileva, 2021), the present study proposed to investigate the relationship between System Credibility Support and Perceived Persuasiveness. The rationale of the hypothesis is due to the innovative nature of insurtech. Hence, Hypothesis 6 is formulated to assess the relationship between System Credibility Support and Perceived Persuasiveness.

Hypothesis 6: System Credibility Support positively influences Perceived Persuasiveness.

The results obtained show that there is a positive significant effect of System Credibility Support on Perceived Persuasiveness with $\beta=0.653$ and p-value<0.05. Therefore, Hypothesis 6 is supported. This indicates that users are motivated to purchase insurtech through TNG eWallet due to the System Credibility Support principles implemented. It is worth noting that System Credibility Support has the most potent impact on Perceived Persuasiveness.

The present study contributed by proving the significant relationship between System Credibility Support and Perceived Persuasiveness. The researcher acknowledged that the influence of System Credibility Support is manifold in different contexts. The present study happens to converge with the prior study by Pitthan and De Witte (2021) as insurance is considered a high-involvement offering that involves a large amount of money over a prolonged period of time.

Despite there are insurtech players providing on-demand or subscription-based insurance protection which focuses on flexibility and affordability, the low insurance literacy added to the high risk and low transparency of the insurtech offerings tends to put more weight on the implementation of System Credibility Support (Mamun et al., 2021; Zarifis & Cheng, 2022).

5.2.7 Social Support and Perceived Persuasiveness

Social Support, which is concerned with the social influence among the users, is expected to have a positive impact on Perceived Persuasiveness. When the users are connected to other users, they are more likely to purchase insurtech offerings from the e-wallet. Therefore, Hypothesis 7 was formed based on the aforementioned argument.

Hypothesis 7: Social Support positively influences Perceived Persuasiveness.

The results revealed that Social Support has a significant positive impact on Perceived Persuasiveness with β =0.353 and p-value<0.05. This suggests that the Social Support principles implemented in the TNG eWallet mobile

application contribute positively to how persuasively users perceive the e-wallet. Indicator SS3, referring to the accessibility of TNG eWallet at most merchant touch points, contributed the most to the Social Support construct with outer loadings of 0.874. The above result indicates that the accessibility of TNG eWallet at multiple touchpoints (as identified in Table 2.5) provides enhanced connectivity and mobility to the users.

Furthermore, it is plausible to explain that the significant positive relationship between Social Support and Perceived Persuasiveness is built upon the sharing of experience and review among peers. This is supported by indicator SS2, concerning the sharing of information and personal experience about insurance products of TNG eWallet, which carries an outer loading of 0.869. The positive impact stemming from the sense of community and positive social interactions persuades the users to follow suit.

On top of that, as the present study was conducted in Malaysia when insurtech was not popularised, social influence in a collectivistic cultured country is a major motivator (Masimba et al., 2019). The influence of cultural context shall not be omitted, despite TNG eWallet not implementing all Social Support principles (as identified in Table 2.5) throughout the mobile application system design yet granting a significant positive impact on Perceived Persuasiveness.

5.2.8 Perceived Persuasiveness and Intention to Buy

Hypothesis 8 is proposed based on the Theory of Reasoned Action, wherein the scholars asserted that one's attitude has a positive corresponding

impact on the behavioural intention. Current research was undertaken to study the influence of perceived persuasiveness towards the outcome of users' intention to buy insurance through an e-wallet mobile application. MHI is the primary focus of present research to overcome the critical issue of the protection gap among the Malaysian population.

Hypothesis 8: Perceived Persuasiveness positively influences Intention To Buy.

The results revealed that perceived persuasiveness has a significant positive relationship with intention to buy with $\beta=0.610$ and p-value<0.05. The findings align with the PSD framework, which proposed that perceived persuasiveness is a key determinant in shaping users' behavioural intentions. Hence, it confirmed the acceptance of H8.

Citing a study conducted by Alhammad and Gulliver (2015) in the context of e-commerce, the present study aligns with the prior study wherein perceived persuasiveness drives behavioural intention. Extending from the prior study from the context of e-commerce, the present study contextualises the impact within the fintech domain, particularly promoting the digital insurance uptake through e-wallets mobile applications. The results suggest that users who perceive that the system design is persuasive intend to purchase MHI through TNG eWallet in the future.

Theoretically, perceived persuasiveness in the digital environment is the subjective perception of an individual on the extent of persuasion or motivation embedded in the digital communication channel (Li et al., 2024). The present study illustrates the strong association between perceived persuasiveness and intention to buy, thus confirming the applicability of PSD in diverse digital environments. As the digital environment continually expands its integration

into real-life contexts, perceived persuasiveness in the digital environment gains its growing significance to meaningfully persuade or convince users through computing technology. By employing strategic implementation of PSD principles, socio-technical instruments or mobile applications can effectively leverage behavioural triggers to enhance users' intention to buy accordingly.

5.3 Research Contributions

There are several valuable contributions discovered from the findings in the present research study. The following subsection further articulates the theoretical, practical and methodological contributions of the study.

5.3.1 Methodological Contribution

The noteworthy methodological contribution of the present research is made by employing confirmatory tetrad analysis to identify the nature of measuring persuasive system design constructs. The results commend a reflective measurement model to effectively capture the nuances of persuasive system design. This methodological insight enhances the precision and reliability of future studies in this domain.

The investigation of predictive power is another methodological contribution made by the present study. The present study optimises the research framework of the Behaviour Change Support System (BCSS) by validating that the proposed framework possesses superior predictive power compared to previous studies by Lehto and Oinas-Kukkonen (2015). This

enhancement in the framework aligns with the dynamic nature of technology and user interactions, ensuring a more effective tool for understanding and predicting behaviour change in digital environments.

5.3.2 Practical Contribution

The practical contribution in the present study is manifold, particularly benefiting insurers, TNG Digital Sdn Bhd, fintech players venturing into digital insurance offerings and system solution engineers. The practical implications are delineated as follows.

The research study offers a significant contribution to insurers by providing valuable insights into the potential of persuasive systems design to boost their confidence in digitalization efforts. As the insurance industry increasingly adopts digital platforms, understanding how persuasive features can influence users' perceptions and behaviours becomes paramount. With that, the insurers are equipped with better ideas on how to upgrade their infrastructure for information technology. The research delves into the specific design elements that can be incorporated into e-wallet applications to enhance insurance uptake. Drawing insights from the significant relationship between System Credibility Support and Primary Task Support, plus the strongest emphasis on the Expertise principle, it unquestionably establishes the value of partnering with respected entities. The insurers should proactively expand the distribution channels through digital solutions and communicate with renowned entities for strategic collaboration to further its impact on protecting households. By identifying the persuasive strategies that resonate with users, insurers can

tailor their digital offerings to provide a seamless and persuasive insurance purchase experience. Ultimately, this contributes to fostering consumer trust and willingness to embrace digital insurance solutions.

For TNG Digital Sdn Bhd, the dedicated system provider of TNG eWallet, the present study provides actionable insights to employ a strategic focus on revisiting Primary Task Support and Dialogue Support to bolster users' performance in conducting the task and facilitate effective interaction. In terms of the enhancement of Primary Task Support, TNG eWallet should consider illustrating the claim submission workflows in partial fulfilment of better transparency. Added to that, as a bellwether in the e-wallet mobile application, TNG Digital Sdn Bhd should strive to outperform traditional insurance and collaborate with insurers to offer real-time claim status tracking. This undoubtedly provides additional information to the users and reduces the uncertainty throughout the process. Apart from that, as proven by the substantial contribution carried by item SS3, wherein the accessibility of TNG eWallet at merchant touch points matters in motivating users' perception positively, the system provider should consider increasing the touch points of TNG eWallet by continuously expanding their accessibility. Likewise, supported by the significant influence between Dialogue Support towards Primary Task Support and System Credibility Support, TNG Digital Sdn Bhd is recommended to continue adopting the yellow and blue as part of the brand positioning. Empirical evidence from the present study proves that the aesthetic interface added to the overall simplicity and clarity, further establishing the TNG eWallet mobile application as a strong and secure digital solution for daily financial

needs. With this in mind, TNG Digital Sdn Bhd can pursue increased competitiveness in both short-term and long-term success.

The study ought to offer valuable insights to fintech companies, particularly those delivering digital insurance offerings. The research study offers valuable guidance to optimize their digital insurance offerings. By analysing how different persuasive features influence users' perceptions and motivate intention for insurance purchases, the present study provides a rich repository of best practices and effective design strategies. Fintech players can draw inspiration from implementations of persuasive systems design in TNG e-wallet mobile applications and tailor their interfaces accordingly. This includes the consistent use of colour-matching throughout the entire mobile application, appropriate space between the buttons, and intuitive and easy-to-understand icons for clear navigation. The relocation of items DS1 and DS2 provide valuable lessons for the fintech players in the field to learn. It is suggested that the fintech players should stress delivering reminders that are personalised to user-specific data and provide relevant recommendations on insurance products that fit the particular individuals. The emphasis on user-centred system design serves as a blueprint for the architecture of systems designed to provide insurance via digital channels. Particularly in the Malaysian market where insurance-related fraud cases are common, fintech companies should also proactively address users' concerns about the security features while ensuring a high level of transparency in terms of the system design. Considering the wild competition on the battlefield, fintech players are recommended to provide niche offerings, including but not limited to customisable, modular or pay-as-you-go insurance plans. The fintech companies can fill gaps where TNG Digital

Sdn Bhd fall short and flexibly match users' spending patterns. With every aspect, the fintech companies that deliver digital insurance offerings may refer to TNG eWallet as a prototype, fix the flaws and copy its positive features to compete with TNG Digital Sdn Bhd and establish distinctive value propositions. A healthy competition is desired to spur the insurance industry, then gradually close the underinsurance gap by making insurance offerings more accessible and appealing to a broader demographic.

The research study serves as a practical resource for system solution engineers in the fintech sector. It provides more precise guidelines on which persuasive features should be emphasized in the context of fintech applications, specifically digital payment mobile applications in promoting insurance products. A key recommendation for fintech system solution providers is to provide corresponding simulations and highlight successful claims through multiple channels other than the mobile application. This strategic move aims to demonstrate user-friendly walkthroughs in compliance with Primary Task Support and address context-specific concerns like financial risk aversion, which is an important factor in influencing user behaviour. Furthermore, fintech players can boost their overall persuasive impact by reinforcing Social Support. The system solution engineers should consider integrating testimonials or reviews in the mobile application to share authentic experiences or tips related to insurance. The user-generated content consummates the potential fallacy of information asymmetry, thereby enhancing Social Support and amplifying the purchase intention among prospective users. Armed with this knowledge, engineers and developers should avoid officious reminders and replace them with properly framed, informative messages that accurately address users'

concerns about insurance, while maintaining cultural sensitivity to the local context. Given the significant impact of Dialogue Support towards Primary Task Support and System Credibility Support, which is primarily measured by the Liking principle, the system solution engineer should be aware of the importance of a visually appealing interface and consistently conduct an aesthetic usability evaluation to test the perfect set of design choices that affect users' impressions of trust and ease of navigation. It is also interesting to highlight the neglected PSD principles which have not been applied to the e-wallet mobile application. The system solution engineers can introduce A/B testing to optimise the system design for a more flourished digital solution and maximise users' perceived persuasiveness. By aligning their development efforts with persuasive design principles, the system solution engineers can contribute to creating compelling and persuasive interfaces that facilitate insurance adoption.

5.3.3 Theoretical Contribution

For a number of reasons, the results of the current study made substantial contributions to the body of literature. The research study significantly enriches the field of persuasive theories and contributes to the fruitfulness of research in the domain. This academic contribution expands the existing literature on persuasive systems design, providing new insights and empirical evidence to inform future research endeavours. The confirmation of Hypothesis 8 in which Perceived Persuasiveness has a significant impact towards users' Intention to Buy, thus providing evidence for system functionality, user behaviour and

contextual factors of the PSD framework. The study's findings serve as a basis for further investigations into persuasive technologies and their applications in other domains, extending the academic discourse on the role of technology in influencing consumer behaviour.

Broadly, the study fits with the larger goal of behaviour change support systems and extends the application of persuasive system design in the field of fintech. Hypothesis 6 and Hypothesis 7 addressed the question raised by Oinas-Kukkonen (2010), by confirming the combination of System Credibility Support and Social Support has ample impacts in the case of promoting insurance uptake through e-wallet mobile applications. By investigating the impact of persuasive systems design on insurance promotion in the context of e-wallet penetration, the study advances the understanding of user behaviour in digital insurance environments. Understanding and influencing user behaviour at the crossover point of financial and digital settings is a critical need that the study addresses by implementing persuasive design principles in the fintech context.

The study sought to provide a deeper understanding of the interactions between different design principles in the context of e-wallets, thereby contributing to the wider marketing field. Referring to Hypothesis 2, Hypothesis 3 and Hypothesis 5, the research findings add new insights and provide empirical evidence for the interrelationship between PSD principles. These findings imply that the interrelationship between PSD principles matters and may have contextual dynamics. Additionally, as the present study established significant relationships for the interdependence of PSD principles, it contributes to the ongoing academic discourse by opening exciting pathways to

further investigate the complex interrelationship between PSD principles under diverse contexts.

The study challenges conventional thinking by rejecting common assumptions regarding the correlations between Primary Task Support, Dialogue Support, and perceived persuasiveness. Hypothesis 1 and Hypothesis 4 were not supported, which contradicts prior studies (Koranteng et al., 2022; Mohadis et al., 2016; Segerståhl et al., 2010). This subsequently reflects that the Primary Task Support and Dialogue Support fail to predict similar results in prior studies. This critical assessment forces researchers to reevaluate long-standing connections in persuasive system design, encourage refinement and contextualisation of theoretical models and delve further into the workings of persuasive system design principles on digital platforms.

This summed up the theoretical contributions of the present study to the body of knowledge in the field of persuasive system design, fintech or the greater context of human-computer interaction that advances the understanding of digital persuasion.

5.4 Research Limitations

Present research paves a path for future research emerging from the area of Persuasive System Design in the domain of fintech, such as insurtech. Nonetheless, it is unavoidable that present research is bound with some limitations.

Unlike other pillars of persuasive system design, the present study does not manage to draw inferences between Social Support and the other persuasive

system design constructs. The absence of a relationship between Social Support and other pillars of the persuasive system design model is worth noting and warrants further investigation. The absence of scholarly articles to establish an inference between Social Support and other persuasive system design constructs underscores a crucial research gap and inconclusive empirical findings. The researcher is eschewed from making unsupported hypotheses. Meanwhile, this underlines future opportunities for researchers to investigate the inter-relationship between Social Support and other persuasive system design constructs.

Subsequently, the present study is a quantitative study by collecting self-reported data from the target respondents. The adoption of a self-administered survey questionnaire invites the potential of respondents to answer based on the favourable image of themselves (Mortel, 2008). Thus, it might lead to social desirability bias. The respondents are then required to rate their answers based on a fixed scale. This limits the depth and range of responses, therefore missing out on nuanced information that might be placed outside the range of options.

Following that, the present study also acknowledges the uneven demographic distribution of respondents in terms of age and generation, with Generation Z, who are aged between 18 and 26, predominantly occupying the dataset. This implies that the drawing of research findings in the present study is inclined to Generation Z. Henceforth, this may influence the generalisability of the research findings in representing the voice of Malaysian consumers concerning the adoption of insurtech through e-wallets.

Next, the user's perception of the implementation of persuasive system design principles may not be neutral. As TNG eWallet is adopted as the case

study in the present study, the focus lies on the insurtech embedded in the e-wallet. The users' perception of System Credibility Support may be influenced by the main features of TNG eWallet, including receiving and transferring money, making payments, and others. Therefore, this employment of a case study in the real world may raise the concern of neutrality.

While the study provided valuable insights, it is essential to acknowledge and discuss a significant limitation, namely the difficulty of being inclusive in comprising the booming Islamic fintech and takaful sector. This is essentially important as Muslims occupy a greater proportion of the Malaysian population. Therewith, it shall provide a more comprehensive overall picture of the insurtech adoption through e-wallet mobile application.

Taking into consideration the research context which lies within the digital environment, the present study poses limitations by presenting itself as state-of-art primarily due to the research design employing a cross-sectional approach. This is especially significant under the rapid advancement of digital technologies in business dynamics. Exemplary, the booming integration of artificial intelligence to leverage the effectiveness and efficiency of digital services, ever since the popular introduction of ChatCPT and other brilliant artificial intelligence chatbots, has awarded endless possibilities to the development of system design.

Albeit the aforementioned limitations in the present study, the research has undoubtedly contributed to linking the knowledge of persuasive system design and fintech. The research acknowledged that there are plenty of opportunities for future research in the domain of persuasive system design and fintech.

5.5 Recommendations for Future Research

In order to overcome the aforementioned limitations, it would be beneficial for the body of academia to consider in-depth research and investigation to explore potential links between Social Support and other persuasive system design constructs. With that, future studies can contribute valuable insights into the interrelation of Social Support with other persuasive system design constructs, thus flourishing the study into persuasive system design mode. Such research endeavours could provide a holistic understanding of system design and its impact on navigating users' behavioural intention, subsequently leading to the intervention of actual behaviour.

Future research could consider incorporating both quantitative and qualitative techniques to design the research study. With the acknowledgement that both research method has their respective flaws, the triangulation method is purported to complement the shortcomings of a single research method (Duque-Hurtado et al., 2020). This helps to understand subtle attitude alterations through examination of the brain activity (Braeutigam et al., 2019). For instance, future research could further explore users' brain reactions according to different system designs implemented with the application of electroencephalography along with the emerging research on consumer neuroscience (Bazzani et al., 2020). Henceforth, it contributes different insights into consumer behaviour.

In order to tackle the uneven distribution of age and generation among respondents, future research should employ probability sampling. With probability sampling, future researchers can collect data from the subject matter

equally, fairly and adequately. This leverages the representation of the target population, thereby enabling a more balanced and inclusive understanding of the consumers' behavioural intention.

It is also suggested that future research can examine mobile applications that centralise their system design on insurtech offerings only. For instance, VSure Insurance provides nothing else but only on-demand lifestyle digital insurance. This allows comparison in different business contexts. Thus, the research study in relation to insurtech flourishes.

As the present research fails to establish a comprehensive study including the Islamic fintech and takaful, future research should look into the booming sector. Cultivating a healthy Islamic digital economy not only paves vast opportunities to attract business collaboration but also ensures the underinsured problems in the Malaysian community get tackled in no time.

In correspondence to the dynamic business opportunities granted by the fast-paced digital environment, it is recommended that the future researcher employ a longitudinal study to understand the subject matter from a more holistic perspective. The employment of a longitudinal study allows the future researcher not only to dissect consumer behaviour in response to the e-wallet penetration but also to reveal the effectiveness of persuasive system design of e-wallet mobile applications along with the digital trend.

It is also suggested that future studies addressing complex real-world problems necessitate in-depth analysis employing hybrid multi-analytical approaches like necessary condition analysis (NCA) or Structural Equation Modeling using Artificial Neural Network (SEM-ANN). These statistical analysis approaches varied differently, wherein the PLS-SEM is particularly

useful to picture the clear, interpretable map of the predictions and carefully measure the strength of the connection between each construct based on the hypothesised research framework (Hair et al., 2017; Hair et al., 2011, 2014). Meanwhile, SEM-ANN takes advantage of the nonlinear nature and often excels at exploring hidden patterns and complex relationships (Albahri et al., 2022; Chen et al., 2020). SEM-ANN is capable of examining non-linear and non-compensatory relationships, owing to its iterative process of training to learn against noise, non-normal distribution of data distribution and outliers (Ferasso & Alnoor, 2022; Hew et al., 2016; Leong et al., 2019). By way of illustration, researchers incorporated SEM-ANN to uncover valuable insights into consumers' behavioural intentions in the domain of mobile learning (G. W. H. Tan et al., 2014), NFC-enabled mobile credit cards (Leong et al., 2013), mobile wallet (Leong, Hew, Ooi, & Wei, 2020), social commerce (Hew et al., 2019; Leong et al., 2020) and social media (Leong et al., 2019). Scholars asserted that the hybrid SEM-ANN approach is by far the most optimal research methodology as SEM performs hypotheses testing of causal relationships, while ANN compensates for the shortcomings of SEM by detecting nonlinear relationships in a non-compensatory model (Leong et al., 2019). Similarly, NCA comes in place to determine the necessity of individual conditions, evaluate the effect size and statistical significance, and ascertain the extent to of endogenous variables act as a bottleneck to the outcome variable (Dul, 2016; Richter et al., 2020; Sukhov et al., 2023). The assessment of SEM-NCA focuses on what is essential in the hypothesised research framework. It is common for researchers to combine both PLS-SEM and NCA through an expanded analytical process, following the guidance outlined by Dul et al. (2020). Recent

studies benefited from the complementary of PLS-SEM and NCA spotlighted on the domain of public transport services (Sukhov et al., 2022), electric motorcycles (Ngoc Su et al., 2023) and video game live streaming (Koay et al., 2023). In short, the integration of PLS-SEM with ANN and NCA is capable of capturing the linear-nonlinear and compensatory-non-compensatory relationships as well as the sufficient and necessary conditions for an outcome variable to manifest.

5.6 Summary

In conclusion, the present research provides in-depth insights into the results' findings. Succinctly, the main contributions to the theoretical domain and practical domain are presented. The research also addressed the limitations of the study and provided corresponding recommendations for further research.

To sum up, the present study is founded at the intersection of human-computer interaction and fintech. By identifying the persuasive system design principles implemented within TNG eWallet and examining the impact of those system design principles towards users' attitudes and behavioural intentions, the present study found that Primary Task Support, although frequently implemented throughout the e-wallet mobile application, does not have a significant impact on the users' perceived persuasiveness. Likewise, Dialogue Support does not have an impact on persuading users, yet it validates the implementation of Primary Task Support and System Credibility Support. The well-implemented System Credibility Support and Social Support are

determined to influence users' perceived persuasiveness, thus motivating users' intent to buy MHI through e-wallet.

The introduction of insurtech is believed to be a life-changing game to narrow the gap in insurance inclusion. A sound implementation of persuasive system design principles within the mobile application is also necessary to welcome the underinsured community.

REFERENCES

Abdul Hamid, N. A., Cheun, C. H., Abdullah, N. H., Ahmad, M. F., & Ngadiman, Y. (2019). Does persuasive e-commerce website influence users' acceptance and online buying behaviour? The findings of the largest e-commerce website in Malaysia. In Y. Baghdadi & A. Harfouche (Eds.), *ICT for a Better Life and a Better World. Lecture Notes in Information Systems and Organisation* (Vol. 30, pp. 263–279). Springer, Cham. https://doi.org/https://doi.org/10.1007/978-3-030-10737-6_17

Abdulameer, S. S., Yaacob, N. A., & Ibrahim, Y. M. (2020). Measuring leagile supply chain, information sharing, and supply chain performance: Pre-test and pilot test. *International Journal of Technology*, *11*(4), 677–687. https://doi.org/10.14716/ijtech.v11i4.3496

Abdulla, I. S., & Al-Alawi, A. I. (2023). Fintech in the fourth industrial revolution: Literature review on usage and concerns of e-wallet payment transactions. *2023 International Conference on Cyber Management and Engineering, CyMaEn 2023*, 24–28. https://doi.org/10.1109/CyMaEn57228.2023.10051026

Abt, G., Boreham, C., Davison, G., Jackson, R., Nevill, A., Wallace, E., & Williams, M. (2020). Power, precision, and sample size estimation in sport and exercise science research. In *Journal of Sports Sciences* (Vol. 38, Issue 17, p. 1933). https://doi.org/10.1080/02640414.2020.1776002

Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it? *Indian Journal of Medical Specialities*, *4*(2), 330–333. https://doi.org/10.7713/ijms.2013.0032

Aguirre-Urreta, M. I., & Hu, J. (2019). Detecting common method bias: Performance of the Harman's single-factor test. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *50*(2), 45–70. https://doi.org/10.1145/3330472.3330477

AIA Bhd. (2021, July 26). *AIA Malaysia and Touch n Go eWallet Form Long Term Strategic Partnership*. https://www.aia.com.my/en/about-aia/media-centre/press-releases/2021/Press-Release-AIA-Malaysia-and-Touch-n-Go-eWallet-Form-Long-Term-Strategic-Partnership.html

AIA Malaysia. (2021, July 26). *AIA Malaysia and Touch n Go eWallet Form Long Term Strategic Partnership*. https://www.aia.com.my/en/about-aia/media-centre/press-releases/2021/Press-Release-AIA-Malaysia-and-Touch-n-Go-eWallet-Form-Long-Term-Strategic-Partnership.html

Aithal, A., & Aithal, P. S. (2020). Development and validation of survey questionnaire & experimental data – a systematical review-based statistical approach. *International Journal of Management, Technology, and Social Sciences (IJMTS)*, *5*(2), 233–251. https://doi.org/10.2139/ssrn.3724105

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action Control. SSSP Springer Series in Social Psychology.* (pp. 11–39). Springer. https://doi.org/10.1007/978-3-642-69746-3_2

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, *84*(5), 888–918. https://doi.org/10.1037/0033-2909.84.5.888

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. *Journal of Personality and Social Psychology, , Jan 1992, 98-109*.

Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, *22*(5), 453–474. https://doi.org/10.1016/0022-1031(86)90045-4

Akobeng, A. K. (2016). Understanding type I and type II errors, statistical power and sample size. *Acta Paediatrica*, *105*(6), 605–609. https://doi.org/10.1111/apa.13384

Albahri, A. S., Alnoor, A., Zaidan, A. A., Albahri, O. S., Hameed, H., Zaidan, B. B., Peh, S. S., Zain, A. B., Siraj, S. B., Masnan, A. H. B., & Yass, A. A. (2022). Hybrid artificial neural network and structural equation modelling techniques: a survey. *Complex & Intelligent Systems*, *8*(2), 1781–1801. https://doi.org/10.1007/s40747-021-00503-w

Aldenaini, N., Alqahtani, F., Orji, R., & Sampalli, S. (2020). Trends in persuasive technologies for physical activity and sedentary behavior: A systematic review. *Frontiers in Artificial Intelligence*, *3*. https://doi.org/10.3389/frai.2020.00007

Alhammad, M. M., & Gulliver, S. R. (2014). Online persuasion for e-commerce websites. *Proceedings of the 28th International BCS Human Computer Interaction Conference (HCI 2014)*, 264–269. https://doi.org/10.14236/ewic/HCI2014.42

Alhammad, M. M., & Gulliver, S. R. (2015). Persuasive technology and users acceptance of e-commerce: Exploring perceived persuasiveness. In R. Zhang, Z. Zhang, J. Zhang, & K. Liu (Eds.), *LISS 2013* (pp. 1099–1103). Springer. https://doi.org/10.1007/978-3-642-40660-7_165

Althouse, A. D. (2021). Post hoc power: Not empowering, just misleading. *The Journal of Surgical Research*, *259*, A3–A6. https://doi.org/10.1016/j.jss.2019.10.049

Anand, D., & Mantrala, M. (2019). Responding to disruptive business model innovations: The case of traditional banks facing fintech entrants. *Journal of Banking and Financial Technology*, *3*(1), 19–31. https://doi.org/10.1007/s42786-018-00004-4

Anifa, M., Ramakrishnan, S., Joghee, S., Kabiraj, S., & Bishnoi, M. M. (2022). Fintech innovations in the financial service industry. *Journal of Risk and Financial Management*, *15*(7), 287. https://doi.org/10.3390/jrfm15070287

Aon. (2024). *The global medical trend rates report: Global overview and data tables*. https://www.aon.com/en/insights/reports/the-global-medical-trend-rates-report

Ariansyah, K., Sirait, E. R. E., Nugroho, B. A., & Suryanegara, M. (2021). Drivers of and barriers to e-commerce adoption in Indonesia: Individuals' perspectives and the implications. *Telecommunications Policy*, *45*(8), 102219. https://doi.org/10.1016/j.telpol.2021.102219

Armstrong, M. (2019, April 16). *Global data creation is about to explode*. Statista. https://www.statista.com/chart/17727/global-data-creation-forecasts/

Arner, D. W., Barberis, J., & Buckley, R. P. (2016). 150 years of fintech : An evolutionary analysis. *JASSA The Finsia Journal of Applied Finance*, *3*, 22–29.

Asbjørnsen, R. A., Smedsrød, M. L., Solberg Nes, L., Wentzel, J., Varsi, C., Hjelmesæth, J., & van Gemert-Pijnen, J. E. (2019). Persuasive system design principles and behavior change techniques to stimulate motivation and adherence in electronic health interventions to support weight loss maintenance: Scoping review. *Journal of Medical Internet Research*, *21*(6). https://doi.org/10.2196/14265

Asbjørnsen, R. A., Wentzel, J., Smedsrød, M. L., Hjelmesæth, J., Clark, M. M., Nes, L. S., & Van Gemert-Pijnen, J. E. W. C. (2020). Identifying persuasive design principles and behavior change techniques supporting end user values and needs in eHealth interventions for long-term weight loss maintenance: Qualitative study. *Journal of Medical Internet Research*, *22*(11), e22598. https://doi.org/10.2196/22598

Attar, R. W., Shanmugam, M., & Hajli, N. (2021). Investigating the antecedents of e-commerce satisfaction in social commerce context. *British Food Journal*, *123*(3), 849–868. https://doi.org/10.1108/BFJ-08-2020-0755

Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, *16*(1), 74–94. https://doi.org/10.1007/BF02723327

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly*, *36*(3), 421–458. https://doi.org/10.2307/2393203

Baijal, A., Hoppe, F., Chang, W., Davis, S., & Hoong, F. W. (2022). *e-Conomy SEA 2022: Through the waves, towards a sea of opportunity*. https://www.bain.com/insights/e-conomy-sea-2022/

Balqis-Ali, N. Z., Anis-Syakira, J., Fun, W. H., & Sararaks, S. (2021). Private health insurance in Malaysia: Who is left behind? *Asia-Pacific Journal of Public Health*, *33*(8), 861–869. https://doi.org/10.1177/10105395211000913

Bank Negara Malaysia. (2019). *Financial sector blueprint 2022-2026*. https://www.bnm.gov.my/publications/fsb3

Bank Negara Malaysia. (2022a). *Annual report 2021*. https://www.bnm.gov.my/-/ar-e-remittance

Bank Negara Malaysia. (2022b). *Electronic money (E-Money)*. https://www.bnm.gov.my/-/pd-emoney

Bank Negara Malaysia. (2023a). *Annual report 2022*. https://www.bnm.gov.my/documents/20124/10150308/ar2022_en_book.pdf

Bank Negara Malaysia. (2023b). *Financial sector participants directory*. https://www.bnm.gov.my/regulations/fsp-directory

Bank Negara Malaysia. (2024). *Exposure draft on product transparency and disclosure*. https://www.bnm.gov.my/-/ed-prod-trp

Baumgartner, H., & Weijters, B. (2021). Dealing with common method variance in international marketing research. *Journal of International Marketing*, *29*(3), 7–22. https://doi.org/10.1177/1069031X21995871

Baumgartner, H., Weijters, B., & Pieters, R. (2021). The biasing effect of common method variance: Some clarifications. *Journal of the Academy of Marketing Science*, *49*(2), 221–235. https://doi.org/10.1007/s11747-020-00766-8

Bazzani, A., Ravaioli, S., Trieste, L., Faraguna, U., & Turchetti, G. (2020). Is EEG suitable for marketing research? A systematic review. *Frontiers in Neuroscience*, *14*. https://doi.org/10.3389/fnins.2020.594566

Becker, J. M., Proksch, D., & Ringle, C. M. (2022). Revisiting Gaussian copulas to handle endogenous regressors. *Journal of the Academy of Marketing Science*, *50*(1), 46–66. https://doi.org/10.1007/s11747-021-00805-y

Becker, T. E., Randall, D. M., & Riegel, C. D. (1995). The multidimensional view of commitment and the theory of reasoned action: A comparative evaluation. *Journal of Management*, *21*(4), 617–638. https://doi.org/10.1177/014920639502100402

Belanche, D. (2019). Ethical limits to the intrusiveness of online advertising formats: A critical review of Better Ads Standards. *Journal of Marketing Communications*, *25*(7), 685–701. https://doi.org/10.1080/13527266.2018.1562485

Belozyorov, S., Sokolovska, O., & Kim, Y. S. (2020). Fintech as a precondition for transformations on global financial markets. *Foresight and STI Governance*, *14*(2), 23–35. https://doi.org/10.17323/2500-2597.2020.2.23.35

Bennett, A. (2004). Case study methods: Design, use, and comparative advantages. In D. F. Sprinz & Y. Wolinsky-Nahmias (Eds.), *Models, numbers, and cases: Methods for studying international relations* (1st ed., Vol. 2, pp. 19–55). The University of Michigan Press.

Best, R. de. (2021, November 4). *Number of users of selected mobile wallets in Malaysia in 2020, with forecasts from 2021 to 2025*. Statista. https://www.statista.com/statistics/1271325/mobile-wallet-user-forecast-in-malaysia/

Bhalla, S., Bahar, N., & Kanapathy, K. (2023). Pre-testing semi-structured interview questions using expert review and cognitive interview methods. *International Journal of Business and Management*, *7*(5), 11–19. https://doi.org/10.26666/rmp.ijbm.2023.5.2

Birnbaum, R., Christensen, C. M., Christensen, C. M., & Raynor, M. E. (2005). The innovator's dilemma: When new technologies cause great firms to fail. *Academe*, *91*(1), 80. https://doi.org/10.2307/40252749

Bohari, S. A., Abdul-Rahim, R., & Aman, A. (2022). Role of comparative economic benefits on intention to use e-wallet: The case in Malaysia. *International Journal of Electronic Finance*, *11*(4), 364–382. https://doi.org/10.1504/ijef.2022.126476

Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, *110*(2), 305–314. https://doi.org/10.1037/0033-2909.110.2.305

Bonner, A., Gillespie, K., Campbell, K. L., Corones-Watkins, K., Hayes, B., Harvie, B., Kelly, J. T., & Havas, K. (2018). Evaluating the prevalence and opportunity for technology use in chronic kidney disease patients: A cross-sectional study. *BMC Nephrology*, *19*(28). https://doi.org/10.1186/s12882-018-0830-8

Boon, V., Devi, V. A., Sager, P., Binti Amir Razif Arief, U., Hari Raman, L., Adams Lukman, J., & Huei Lok, Y. (2022). E-payment transaction and consumer behaviour: A study of Touch 'N Go e-wallet during the COVID-19 pandemic in Malaysia. *Advances in Global Economics and Business Journal*, *3*(2), 42–59. https://doi.org/http://dx.doi.org/10.32535/ijafap.v4i3.1205

Braeutigam, S., Lee, N., & Senior, C. (2019). A role for endogenous brain states in organizational research: Moving toward a dynamic view of cognitive processes. *Organizational Research Methods*, *22*(1), 332–353. https://doi.org/10.1177/1094428117692104

Brent, E., & Leedy, P. D. (1990). Practical research: Planning and design. *Teaching Sociology*, *18*(2), 248–249. https://doi.org/10.2307/1318509

Browne, R. P., Bagnato, L., & Punzo, A. (2023). Parsimony and parameter estimation for mixtures of multivariate leptokurtic-normal distributions. *Advances in Data Analysis and Classification*, *18*, 597. https://doi.org/10.1007/s11634-023-00558-2

Cain, M. K., Zhang, Z., & Yuan, K. H. (2017). Univariate and multivariate skewness and kurtosis for measuring nonnormality: Prevalence, influence and estimation. *Behavior Research Methods*, *49*(5), 1716–1735. https://doi.org/10.3758/s13428-016-0814-1

Carros, F. (2024). Exploring human-robot interaction with the elderly: Results from a ten-week case study in a care home. In *Design, Development and Sensemaking of Human-Robot Interaction in Care Settings* (pp. 31–52). Springer Vieweg, Wiesbaden. https://doi.org/10.1007/978-3-658-45233-9_4

Cassell, M. M., Jackson, C., & Cheuvront, B. (1998). Health communication on the internet: An effective channel for health behavior change? *Journal of Health Communication*, *3*(1), 71–79. https://doi.org/10.1080/108107398127517

Chamberlain, J., & Haaga, D. A. F. (1999). Convergent validity of cognitive assessment methods. *Behavior Modification*, *23*(2), 294–315. https://doi.org/10.1177/0145445599232007

Chandler, J. J., & Paolacci, G. (2017). Lie for a dime: When most prescreening responses are honest but most study participants are impostors. *Social Psychological and Personality Science*, *8*(5). https://doi.org/10.1177/1948550617698203

Chang, V. Y. L. (2023). Do InsurTech startups disrupt the insurance industry? *Finance Research Letters*, *57*. https://doi.org/10.1016/J.FRL.2023.104220

Chen, C. C. (2019). Regulatory sandboxes in the UK and Singapore: A preliminary survey. In *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3448901

Chen, F., Du, X., & Wang, W. (2023). Can FinTech applied to payments improve consumer financial satisfaction? Evidence from the USA. *Mathematics*, *11*(2), 363. https://doi.org/10.3390/math11020363

Chen, H., Liu, H., Chu, X., Zhang, L., & Yan, B. (2020). A two-phased SEM-neural network approach for consumer preference analysis. *Advanced Engineering Informatics*, *46*, 101156. https://doi.org/10.1016/j.aei.2020.101156

Chesebro, J. W., & Borisoff, D. J. (2007). What makes qualitative research qualitative? *Qualitative Research Reports in Communication*, *8*(1), 3–14. https://doi.org/10.1080/17459430701617846

Cheung, J. H., Burns, D. K., Sinclair, R. R., & Sliter, M. (2017). Amazon Mechanical Turk in organizational psychology: An evaluation and practical recommendations. *Journal of Business and Psychology*, *32*(4), 347–361. https://doi.org/10.1007/s10869-016-9458-5

Chin, W., Cheah, J. H., Liu, Y., Ting, H., Lim, X. J., & Cham, T. H. (2020). Demystifying the role of causal-predictive modeling using partial least squares structural equation modeling in information systems research. *Industrial Management and Data Systems*, *120*(12), 2161–2209. https://doi.org/10.1108/IMDS-10-2019-0529

Chin, W. W. (1998). Commentary: Issues and opinion on structural equation modeling. *MIS Quarterly*, *22*(1), vii–xvi. http://www.jstor.org/stable/249674

Chiu, M. C., Chang, S. P., Chang, Y. C., Chu, H. H., Chen, C. C. H., Hsiao, F. H., & Ko, J. C. (2009). Playful bottle: A mobile social persuasion system to motivate healthy water intake. *ACM International Conference Proceeding Series*, 185–194. https://doi.org/10.1145/1620545.1620574

Chua, C. S., Lim, W. X., Ng, S. X., & Wong, W. J. (2020). *Exploring the moderating effect of government support on actual adoption of e-wallet among mobile phone users in Malaysia*. [Undergraduate thesis, Universiti Tunku Abdul Rahman]. UTAR Institutional Repository. http://eprints.utar.edu.my/3988

Churchill, G. A., & Illinois, Jr. H. (1976). *Marketing research: Methodological foundations* (1st ed., Vol. 14). The Dryden Press New York. https://doi.org/https://doi.org/10.2307/3151081

Ciptarianto, A. (2022). E-wallet application penetration for financial inclusion in Indonesia. *International Journal of Current Science Research and Review*, *5*(2), 319–322. https://doi.org/10.47191/ijcsrr/V5-i2-03

Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons.

Cohen, J. (1988). Statistical power analysis for the behavioural sciences. Hillside. In *NJ: Lawrence Earlbaum Associates*.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). Applied multiple regression/correlation analysis for the behavioral sciences. In *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences, Third Edition* (3rd ed.). Lawrence Erlbaum Associates, Inc. https://doi.org/10.4324/9780203774441

Colby, S. L., & Ortman, J. M. (2014). *The Baby Boom Cohort in the United States: 2012 to 2060*.

Colman, A. M., Norris, C. E., & Preston, C. C. (1997). Comparing rating scales of different lengths: Equivalence of scores from 5-point and 7-point scales. *Psychological Reports*, *80*(2), 355–362. https://doi.org/10.2466/pr0.1997.80.2.355

Crano, W. D., & Prislin, R. (2006). Attitudes and persuasion. *Annual Review of Psychology*, *57*, 345–374. https://doi.org/10.1146/annurev.psych.57.102904.190034

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334.

Crosno, J. L., Freling, T. H., & Skinner, S. J. (2009). Does brand social power mean market might? exploring the influence of brand social power on brand evaluations. *Psychology and Marketing*, *26*(2), 91–121. https://doi.org/10.1002/mar.20263

Crowther, D., & Lancaster, G. (2008). Research methods: A concise introduction to research in management and business consultancy. In *Butterworth-Heinemann*. Routledge.

Curran, P. G. (2016). Methods for the detection of carelessly invalid responses in survey data. *Journal of Experimental Social Psychology*, *66*, 4–19. https://doi.org/10.1016/j.jesp.2015.07.006

Curran-Everett, D., & Milgrom, H. (2013). Post-hoc data analysis: Benefits and limitations. *Current Opinion in Allergy and Clinical Immunology*, *13*(3), 223–224. https://doi.org/10.1097/ACI.0b013e3283609831

Czaja, R. (1998). Questionnaire pretesting comes of age. *Marketing Bulletin*, *9*, 52–66.

Damgaard, M. T., & Gravert, C. (2018). The hidden costs of nudging: Experimental evidence from reminders in fundraising. *Journal of Public Economics*, *157*, 15–26. https://doi.org/10.1016/j.jpubeco.2017.11.005

Dave, A., Bui, J., & Biswal, B. (2020). *Going Digital: Insights to optimise consumer appetite for online insurance in Indonesia and Malaysia*. https://www.swissre.com/institute/research/topics-and-risk-dialogues/digital-business-model-and-cyber-risk/expertise-publication-going-digital-online-insurance-asia.html

Davern, M. (2013). Nonresponse rates are a problematic indicator of nonresponse bias in survey research. *Health Services Research*, *48*(3), 905–912. https://doi.org/10.1111/1475-6773.12070

Dawkins, M. S., Martin, P., & Bateson, P. (1986). Measuring behaviour: An introductory guide. In *The Journal of Animal Ecology* (Vol. 63, Issue 3). Cambridge University Press. https://doi.org/10.2307/5248

Daxue Consulting China. (2022, August 3). *Mobile payments in China: How China became mobile first*. https://daxueconsulting.com/payment-methods-in-china/

de Jong, N., Wentzel, J., Kelders, S., Oinas-kukkonen, H., & van Gemert-Pijnen, J. (2014). Evaluation of perceived persuasiveness constructs by combining user tests and expert assessments. In A. Öörni, S. Kelders, van Gemert-

Pijnen, & H. Oinas-Kukkonen (Eds.), *BCSS 2014: Behavior Change Support Systems: Proceedings of the Second International Workshop on Behavior Change Support Systems co-located with the 9th International Conference on Persuasive Technology (PERSUASIVE 2014)* (Vol. 1153, Issue Bcss, pp. 7–15). http://ceur-ws.org/Vol-1153/

DeCarlo, L. T. (1997). On the meaning and use of kurtosis. *Psychological Methods*, *2*(3), 292–307. https://doi.org/10.1037/1082-989X.2.3.292

Demirgüç-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2022). *The global findex database 2021: Financial inclusion, digital payments and resilience in the age of COVID-19* (Vol. 1). The World Bank. https://doi.org/10.1596/978-1-4648-1897-4

Department of Statistics Malaysia. (2022, July 29). *Current population estimates, Malaysia, 2022*. https://www.dosm.gov.my/portal-main/release-content/current-population-estimates-malaysia-2022

Diamantopoulos, A., Riefler, P., & Roth, K. P. (2008). Advancing formative measurement models. *Journal of Business Research*, *61*(12), 1203–1218. https://doi.org/10.1016/J.JBUSRES.2008.01.009

Diamantopoulos, A., Sarstedt, M., Fuchs, C., Wilczynski, P., & Kaiser, S. (2012). Guidelines for choosing between multi-item and single-item scales for construct measurement: A predictive validity perspective. *Journal of the Academy of Marketing Science*, *40*(3), 434–449. https://doi.org/10.1007/s11747-011-0300-3

Dijkstra, T. K., & Henseler, J. (2015). Consistent partial least squares path modeling. *MIS Quarterly*, *39*(2), 297–316.

Drozd, F., Lehto, T., & Oinas-Kukkonen, H. (2012). Exploring perceived persuasiveness of a behavior change support system: A structural model. In M. Bang & E. L. Ragnemalm (Eds.), *Persuasive Technology. Design for Health and Safety* (Vol. 7284, pp. 157–168). Springer. https://doi.org/10.1007/978-3-642-31037-9_14

Dul, J. (2016). Identifying single necessary conditions with NCA and fsQCA. *Journal of Business Research*, *69*(4), 1516–1523. https://doi.org/10.1016/j.jbusres.2015.10.134

Dul, J., van der Laan, E., & Kuik, R. (2020). A statistical significance test for necessary condition analysis. *Organizational Research Methods*, *23*(2), 385–395. https://doi.org/10.1177/1094428118795272

Dunlap, J. C., & Lowenthal, P. R. (2016). Getting graphic about infographics: design lessons learned from popular infographics. *Journal of Visual Literacy*, *35*(1), 42–59. https://doi.org/10.1080/1051144X.2016.1205832

Duque-Hurtado, P., Samboni-Rodriguez, V., Castro-Garcia, M., Montoya-Restrepo, L. A., & Montoya-Restrepo, I. A. (2020). Neuromarketing: Its

current status and research perspectives. *Estudios Gerenciales*, *36*(157), 525–539. https://doi.org/10.18046/j.estger.2020.157.3890

Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., … Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *International Journal of Information Management*, *66*. https://doi.org/10.1016/j.ijinfomgt.2022.102542

Ebbes, P., Papies, D., & van Heerde, H. J. (2011). The sense and non-sense of holdout sample validation in the presence of endogeneity. *Marketing Science*, *30*(6), 945–1126. https://doi.org/10.1287/mksc.1110.0666

Eckman, S., Unangst, J., Dever, J. A., & Antoun, C. (2023). The precision of estimates of nonresponse bias in means. *Journal of Survey Statistics and Methodology*, *11*(4), 758–783. https://doi.org/10.1093/jssam/smac019

Edo, O. C., Ang, D., Etu, E. E., Tenebe, I., Edo, S., & Diekola, O. A. (2023). Why do healthcare workers adopt digital health technologies - A cross-sectional study integrating the TAM and UTAUT model in a developing economy. *International Journal of Information Management Data Insights*, *3*(2). https://doi.org/10.1016/j.jjimei.2023.100186

Eisenbeiss, M., Cornelißen, M., Backhaus, K., & Hoyer, W. D. (2014). Nonlinear and asymmetric returns on customer satisfaction: Do they vary across situations and consumers? *Journal of the Academy of Marketing Science*, *42*(3), 242–263. https://doi.org/10.1007/s11747-013-0366-1

Faisal, S., Nor Aziati, A. H., & Abdullah, N. H. (2019). Persuasive system design for global acceptance of smartphone apps. *Procedia Computer Science*, *152*, 44–50. https://doi.org/10.1016/j.procs.2019.05.025

Fakhar Manesh, M., Pellegrini, M. M., Marzi, G., & Dabic, M. (2021). Knowledge Management in the Fourth Industrial Revolution: Mapping the Literature and Scoping Future Avenues. *IEEE Transactions on Engineering Management*, *68*(1), 289–300. https://doi.org/10.1109/TEM.2019.2963489

Fan, P. S. (2018). Singapore approach to develop and regulate FinTech. In *Handbook of Blockchain, Digital Finance, and Inclusion, Volume 1: Cryptocurrency, FinTech, InsurTech, and Regulation* (pp. 347–357). https://doi.org/10.1016/B978-0-12-810441-5.00015-4

Farmer, A. Y., & Farmer, G. L. (2021). *Research methods for social work: A problem-based approach*. SAGE Publications, Inc. https://doi.org/10.4135/9781071878873

Farrell, A. M. (2010). Insufficient discriminant validity: A comment on Bove, Pervan, Beatty, and Shiu (2009). *Journal of Business Research*, *63*(3), 324–327. https://doi.org/10.1016/j.jbusres.2009.05.003

Ferasso, M., & Alnoor, A. (2022). Artificial neural network and structural equation modeling in the future. In A. Alnoor, K. K. Wah, & A. Hassan (Eds.), *Artificial Neural Networks and Structural Equation Modeling: Marketing and Consumer Research Applications* (pp. 327–341). Springer. https://doi.org/10.1007/978-981-19-6509-8_18

Fintech News Indonesia. (2021, October 18). *Indonesia fintech report and map 2020*. https://fintechnews.sg/45513/indonesia/indonesia-fintech-report-and-map-2020/

Fintech News Malaysia. (2022a, January 5). *BNM paves the way for digital insurance with proposed licensing framework*. https://fintechnews.my/30380/insurtech-malaysia/digital-insurance-bnm/

Fintech News Malaysia. (2022b, July 5). *How Will BNM's Digital Insurance License Tackle Malaysia's Underinsured Problem*. https://fintechnews.my/31838/insurtech-malaysia/digital-insurance-malaysia-license/#:~:text=Rohit%20shared%20that%20the%20framework,for%20the%20underserved%20segments%20of

Fintech News Malaysia. (2022c, July 18). *Fintech report 2022: Malaysia charts a new path for fintech growth*. https://fintechnews.my/31945/malaysia/fintech-report-malaysia-2022/

Fintech News Singapore. (2021, November 18). *Fintech adoption surges in Southeast Asia, led by digital payments and online lending*. https://fintechnews.sg/57439/payments/fintech-adoption-surges-in-southeast-asia-led-by-digital-payments-and-online-lending/

Fintech News Singapore. (2022, January 24). *China, India and Indonesia record highest digital wallet adoption rates across APAC*. https://fintechnews.sg/58718/e-commerce/china-india-and-indonesia-record-highest-digital-wallet-adoption-rates-across-apac/

Fintech News Singapore. (2024, November 6). *Singapore fintech report 2024: Losses continue to mount for digital banks*. https://fintechnews.sg/103040/fintech/singapore-fintech-report-2024-summary/

Fogg, B. J. (2002). Persuasive technology: Using computers to change what we think and do. *Ubiquity*, *2002*(December). https://doi.org/10.1145/764008.763957

Fox, J. (1997). *Applied regression analysis, linear models, and related methods*. Sage Publications, Inc.

Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. *Internet Research*, *29*(3), 430–447. https://doi.org/10.1108/IntR-12-2017-0515

Fuentes, C., Hernandez, C., Escobedo, L., Herskovic, V., & Tentori, M. (2014). Promoting self-reflection of social isolation through persuasive mobile technologies: The case of mother caregivers of children with cancer. *International Journal of Human-Computer Interaction*, *30*(10), 802–814. https://doi.org/10.1080/10447318.2014.927279

Gahlot, C. S. S., & Ghosh, S. (2023). Emerging opportunities and challenges in FinTech industry – A comparative study of India with other jurisdictions. In R. K. Misra, A. Shrivastava, & C. Sijoria (Eds.), *Technology, Management and Business (Advanced Series in Management* (Vol. 31, pp. 21–31). Emerald Publishing Limited. https://doi.org/10.1108/S1877-636120230000031003

Geirhos, A., Stephan, M., Wehrle, M., Mack, C., Messner, E. M., Schmitt, A., Baumeister, H., Terhorst, Y., & Sander, L. B. (2022). Standardized evaluation of the quality and persuasiveness of mobile health applications for diabetes management. *Scientific Reports*, *12*(1). https://doi.org/10.1038/s41598-022-07544-2

Gerard, P. D., Smith, D. R., & Weerakkody, G. (1998). Limits of retrospective power analysis. *The Journal of Wildlife Management*, *62*(2), 801–807. https://doi.org/10.2307/3802357

Gerring, J. (2004). What is a case study and what is it good for? *American Political Science Review*, *98*(2), 341–354. https://doi.org/10.1017/S0003055404001182

Gier, N. R., Krampe, C., & Kenning, P. (2023). Why it is good to communicate the bad: Understanding the influence of message framing in persuasive communication on consumer decision-making processes. *Frontiers in Human Neuroscience*, *17*. https://doi.org/10.3389/fnhum.2023.1085810

Goh, J. (2021, July 26). *AIA Group to take a stake in TnG Digital, valuing the e-wallet company at about RM3 bil, say sources*. The Edge Malaysia. https://theedgemalaysia.com/article/aia-group-take-stake-tng-digital-valuing-ewallet-company-about-rm3-bil-say-sources

Gomber, P., Koch, J. A., & Siering, M. (2017). Digital finance and FinTech: Current research and future research directions. *Journal of Business Economics*, *87*(5), 537–580. https://doi.org/10.1007/S11573-017-0852-X/METRICS

Gozman, D., Hedman, J., & Sylvest, K. (2018). Open banking: Emergent roles, risks & opportunities. *26th European Conference on Information Systems*.

Gregor, S. (2006). The nature of theory in information systems. *MIS Quarterly: Management Information Systems*, *30*(3), 611–642. https://doi.org/10.2307/25148742

Griffiths, W. E. (2003). Heteroskedasticity. In B. H. Baltagi (Ed.), *A Companion to Theoretical Econometrics* (pp. 82–100). Wiley. https://doi.org/10.1002/9780470996249.ch5

Groves, R. M., & Peytcheva, E. (2008). The impact of nonresponse rates on nonresponse bias: A meta-analysis. *Public Opinion Quarterly*, *72*(2), 167–189. https://doi.org/10.1093/poq/nfn011

Gruzd, A., & Wellman, B. (2014). Networked Influence in Social Media: Introduction to the Special Issue. In *American Behavioral Scientist* (Vol. 58, Issue 10). https://doi.org/10.1177/0002764214527087

Gudergan, S. P., Ringle, C. M., Wende, S., & Will, A. (2008). Confirmatory tetrad analysis in PLS path modeling. *Journal of Business Research*, *61*(12), 1238–1249. https://doi.org/10.1016/j.jbusres.2008.01.012

Guenther, P., Guenther, M., Ringle, C. M., Zaefarian, G., & Cartwright, S. (2023). Improving PLS-SEM use for business marketing research. *Industrial Marketing Management*, *111*, 127–142. https://doi.org/10.1016/j.indmarman.2023.03.010

Hafiz, U. A., Salleh, F., & Garba, M. (2021). A theoretical basis for innovation, institutions and insurance penetration nexus. *Advances in Social Sciences Research Journal*, *8*(3), 61–72. https://doi.org/10.14738/assrj.84.9796

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications, Inc.

Hair, J. F. J., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202

Hair, J. F. J., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*, 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Hair, J. F. J., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, *26*(2), 106–121.

Hair, J. F., & Sarstedt, M. (2021). Data, measurement, and causal inferences in machine learning: Opportunities and challenges for marketing. *Journal of Marketing Theory and Practice*, *29*(1), 65–77. https://doi.org/10.1080/10696679.2020.1860683

Hair, J. F., Sarstedt, M., Matthews, L. M., & Ringle, C. M. (2016). Identifying and treating unobserved heterogeneity with FIMIX-PLS: part I – method.

European Business Review, *28*(1), 63–76. https://doi.org/10.1108/EBR-09-2015-0094

Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2024). *Advanced issues in partial least squares structural equation modeling* (2nd ed.). Sage Publications.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, *40*(3), 413–433. https://doi.org/10.1007/s11747-011-0261-6

Hair, J., Hollingsworth, C. L., Randolph, A. B., & Chong, A. Y. L. (2017). An updated and expanded assessment of PLS-SEM in information systems research. *Industrial Management and Data Systems*, *117*(3), 442–458. https://doi.org/10.1108/IMDS-04-2016-0130

Hajli, N. (2015). Social commerce constructs and consumer's intention to buy. *International Journal of Information Management*, *35*(2), 183–191. https://doi.org/10.1016/J.IJINFOMGT.2014.12.005

Hale, J. (2022, June 9). *You can't take the insurance out of insurtech*. Forbes. https://www.forbes.com/sites/forbesbusinesscouncil/2022/06/09/you-cant-take-the-insurance-out-of-insurtech/?sh=4a934abe2c4c

Halttu, K., & Oinas-Kukkonen, H. (2017). Persuading to reflect: Role of reflection and insight in persuasive systems design for physical health. *Human-Computer Interaction*, *32*(5–6), 381–412. https://doi.org/10.1080/07370024.2017.1283227

Halttu, K., & Oinas-Kukkonen, H. (2021). Susceptibility to social influence strategies and persuasive system design: exploring the relationship. *Behaviour and Information Technology*, *41*(12), 2705–2726. https://doi.org/10.1080/0144929X.2021.1945685

Haralayya, B. (2021). How Digital Banking has brought innovative products and services to India. *Journal of Advanced Research in Quality Control and Management*, *6*(1), 16–18.

Harsono, I., & Suprapti, I. A. P. (2024). The role of fintech in transforming traditional financial services. *Accounting Studies and Tax Journal (COUNT)*, *1*(1), 81–91. https://doi.org/10.62207/gfzvtd24

Hashim, S., Mohamad, S. F., Abdul Halim Lim, S., & Che Ahmat, N. H. (2022). Pretesting survey questionnaire: A guide on dissemination. *International Journal of Academic Research in Economics and Management Sciences*, *11*(3), 499–508. https://doi.org/10.6007/ijarems/v11-i3/15228

Hassan, M. S., Islam, M. A., Yusof, M. F., & Nasir, H. (2023). Users' fintech services acceptance: A cross-sectional study on Malaysian insurance & takaful industry. *Heliyon*, *9*(11). https://doi.org/10.1016/J.HELIYON.2023.E21130

Hay, D., & Morris, D. (1991). Industrial economics and organization: Theory and evidence. In *Economic Analysis and Policy* (2nd ed., Vol. 23, Issue 1). Oxford University Press.

Hendra, R., & Hill, A. (2019). Rethinking Response Rates: New Evidence of Little Relationship Between Survey Response Rates and Nonresponse Bias. *Evaluation Review*, *43*(5), 307–330. https://doi.org/10.1177/0193841X18807719

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hew, J. J., Leong, L. Y., Tan, G. W. H., Ooi, K. B., & Lee, V. H. (2019). The age of mobile social commerce: An artificial neural network analysis on its resistances. *Technological Forecasting and Social Change*, *144*, 311–324. https://doi.org/10.1016/j.techfore.2017.10.007

Hew, T. S., Leong, L. Y., Ooi, K. B., & Chong, A. Y. L. (2016). Predicting drivers of mobile entertainment adoption: A two-stage SEM-artificial-neural-network analysis. *Journal of Computer Information Systems*, *56*(4), 352–370. https://doi.org/10.1080/08874417.2016.1164497

Hill, R. J., Fishbein, M., & Ajzen, I. (1977). Belief, attitude, intention and behavior: An introduction to theory and research. *Contemporary Sociology*, *6*(2), 244–245. https://doi.org/10.2307/2065853

Hochberg, J. (1956). Perception: Toward the recovery of a definition. *Psychological Review*, *63*(6), 400–405. https://doi.org/10.1037/h0046193

Hoenig, J. M., & Heisey, D. M. (2001). The abuse of power: The pervasive fallacy of power calculations for data analysis. *American Statistician*, *55*(1), 19–24. https://doi.org/10.1198/000313001300339897

Hong Kong Monetary Authority. (2022). *Annual Report*. https://www.hkma.gov.hk/media/eng/publication-and-research/annual-report/2022/AR2022_E.pdf

Hox, J. J., & De Leeuw, E. D. (1994). A comparison of nonresponse in mail, telephone, and face-to-face surveys. *Quality & Quantity*, *28*, 329–344. https://doi.org/10.1007/BF01097014

Hua, X., Huang, Y., & Zheng, Y. (2019). Current practices, new insights, and emerging trends of financial technologies. *Industrial Management and Data Systems*, *119*(7), 1401–1410. https://doi.org/10.1108/IMDS-08-2019-0431

Hua, Z., & David, A. (2009). Study design: Cross-sectional, longitudinal, case, and group. In L. Wei & M. G. Moyer (Eds.), *The Blackwell Guide to Research Methods in Bilingualism and Multilingualism* (pp. 88–107). Blackwell Publishing. https://doi.org/10.1002/9781444301120.ch6

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic Management Journal*, *20*(2), 195–204. https://doi.org/10.1002/(sici)1097-0266(199902)20:2<195::aid-smj13>3.0.co;2-7

Hult, G. T. M., Hair, J. F., Proksch, D., Sarstedt, M., Pinkwart, A., & Ringle, C. M. (2018). Addressing endogeneity in international marketing applications of partial least squares structural equation modeling. *Journal of International Marketing*, *26*(3), 1–21. https://doi.org/10.1509/jim.17.0151

Hunt, S. D., Sparkman, R. D., & Wilcox, J. B. (1982). The pretest in survey research: Issues and preliminary findings. *Journal of Marketing Research*, *19*(2), 269–273. https://doi.org/10.1177/002224378201900211

Idrees, A. R., Kraft, R., Pryss, R., Reichert, M., & Baumeister, H. (2021). Literature-based requirements analysis review of persuasive systems design for mental health applications. *Procedia Computer Science*, *191*, 143–150. https://doi.org/10.1016/j.procs.2021.07.019

Imam, T., McInnes, A., Colombage, S., & Grose, R. (2022). Opportunities and barriers for FinTech in SAARC and ASEAN Countries. *Journal of Risk and Financial Management*, *15*(2), 77. https://doi.org/10.3390/jrfm15020077

Iman, N., Nugroho, S. S., Junarsin, E., & Pelawi, R. Y. (2023). Is technology truly improving the customer experience? Analysing the intention to use open banking in Indonesia. *International Journal of Bank Marketing*, *41*(7), 1521–1549. https://doi.org/10.1108/IJBM-09-2022-0427

Insurance Act (1996). https://www.bnm.gov.my/documents/20124/820862/Insurance+Act+1996.pdf/dbbd84e4-2242-3529-4cb2-532ba2e44650?t=1584637172271

International Institute for Management Development. (2022, September). *World digital competitiveness ranking*. https://www.imd.org/research-knowledge/competitiveness/articles/the-imd-world-digital-competitiveness-ranking/

International Monetary Fund. (2020, February 28). *Malaysia: A flourishing fintech ecosystem*. https://www.imf.org/en/News/Articles/2020/02/27/na022820-malaysia-a-flourishing-fintech-ecosystem

Ismail, I. (2021, April 19). E-wallet use in Malaysia growing. *New Straits Times*. https://www.nst.com.my/opinion/columnists/2021/04/683345/e-wallet-use-malaysia-growing

Jaffar, A., Tan, C.-E., Mohd-Sidik, S., Admodisastro, N., & Goodyear-Smith, F. (2022). Persuasive technology in an mhealth app designed for pelvic floor muscle training among women: Systematic review. *JMIR MHealth and UHealth*, *10*(3), e28751. https://doi.org/10.2196/28751

Jahoda, M., & Fishbein, M. (1968). Readings in attitude theory and measurement. *The British Journal of Sociology*, *19*(2), 220–221. https://doi.org/10.2307/588703

Jameel, A. S., Rahman Ahmad, A., & Alheety, A. S. (2022). Behavioural intention to use e-wallet: The perspective of security and trust. *2022 2nd International Conference on Emerging Smart Technologies and Applications, ESmarTA 2022*, 1–5. https://doi.org/10.1109/eSmarTA56775.2022.9935423

Jermer, D. (2021, May 5). *The insurtech revolution and how it could transform the life insurance industry*. Forbes. https://www.forbes.com/sites/forbescommunicationscouncil/2021/05/05/the-insurtech-revolution-and-how-it-could-transform-the-life-insurance-industry/?sh=4bea8f6e63ea

Jha, A. (2023). Basics of social research. In *Social Research Methodology* (1st ed.). Routledge. https://doi.org/10.4324/9781032624860-3

Jiang, H., & Murmann, J. P. (2022). The rise of China's digital economy: An overview. *Management and Organization Review*, *18*(4), 790–802. https://doi.org/10.1017/mor.2022.32

Jones, M. S., House, L. A., & Gao, Z. (2015). Respondent screening and revealed preference axioms: Testing quarantining methods for enhanced data quality in web panel surveys. *Public Opinion Quarterly*, *79*(3), 687–709. https://doi.org/10.1093/poq/nfv015

Kelders, S. M., Kok, R. N., Ossebaard, H. C., & Van Gemert-Pijnen, J. E. W. C. (2012). Persuasive system design does matter: A systematic review of adherence to web-based interventions. *Journal of Medical Internet Research*, *14*(6), e152. https://doi.org/10.2196/jmir.2104

Kelleher, S. R. (2020, October 11). Coronavirus can remain on paper currency for 28 days, per new study. *Forbes Media LLC*. https://www.forbes.com/sites/suzannerowankelleher/2020/10/11/coronavirus-can-remain-on-paper-currency-for-28-days-per-study/?sh=76a723ac2fc5

Kesmodel, U. S. (2018). Cross-sectional studies – what are they good for? *Acta Obstetricia et Gynecologica Scandinavica*, *97*(4), 388–393. https://doi.org/10.1111/aogs.13331

Kharde, Y., & Madan, P. (2018). Influence of intentions on buying behaviour of women towards insurance purchase: An empirical study. *International Journal of Business and Management Invention (IJBMI)*, *7*(2), 19–27.

Kharisma, D. B. (2021). Urgency of financial technology (Fintech) laws in Indonesia. *International Journal of Law and Management*, *63*(3), 320–331. https://doi.org/10.1108/IJLMA-08-2020-0233

Kim, S., Pjesivac, I., & Jin, Y. (2019). Effects of message framing on influenza vaccination: Understanding the role of risk disclosure, perceived vaccine efficacy, and felt ambivalence. *Health Communication*, *34*(1), 21–30. https://doi.org/10.1080/10410236.2017.1384353

Kim, S., & So, J. (2018). How message fatigue toward health messages leads to ineffective persuasive outcomes: Examining the mediating roles of reactance and inattention. *Journal of Health Communication*, *23*(1), 109–116. https://doi.org/10.1080/10810730.2017.1414900

Kim, T. K. (2015). T test as a parametric statistic. *Korean Journal of Anesthesiology*, *68*(6), 540–546. https://doi.org/10.4097/kjae.2015.68.6.540

Knapp, H. (2017). *Introductory statistics using SPSS* (2nd ed.). SAGE Publications, Inc. https://doi.org/10.4135/9781071878910

Koay, K. Y., Teoh, J. Y., & Cheung, M. L. (2023). Understanding factors influencing viewers' intention to watch video game live streaming on Twitch: Combined use of PLS-SEM and NCA. *First Monday*, *28*(5). https://doi.org/10.5210/fm.v28i5.12644

Kock, F., Berbekova, A., & Assaf, A. G. (2021). Understanding and managing the threat of common method bias: Detection, prevention and control. *Tourism Management*, *86*, 104330. https://doi.org/10.1016/j.tourman.2021.104330

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of E-Collaboration*, *11*(4), 1–10. https://doi.org/http://dx.doi.org/10.4018/ijec.2015100101

Kock, N. (2023). Contributing to the success of PLS in SEM: An action research perspective. *Communications of the Association for Information Systems*, *52*, 730–734. https://doi.org/10.17705/1CAIS.05233

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. *Information Systems Journal*, *28*(1), 227–261. https://doi.org/10.1111/isj.12131

Kock, N., & Lynn, G. S. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, *13*(7), 546–580. https://doi.org/10.17705/1jais.00302

Konishi, T., Nagata, M., Honjo, M., Yoneyama, A., Kurokawa, M., & Mishima, K. (2019). Social behaviors: A social topology and interaction pattern affect the properties of a changed behavior. In H. Oinas-Kukkonen, K. T. Win, E. Karapanos, P. Karppinen, & E. Kyza (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 11433 LNCS* (pp. 310–321). Springer. https://doi.org/10.1007/978-3-030-17287-9_25

Konstan, J. A., & Terveen, L. G. (2021). Human-centered recommender systems: Origins, advances, challenges, and opportunities. *AI Magazine*, *42*(3), 31. https://doi.org/10.1609/aimag.v42i3.18142

Koranteng, F. N., Ham, J., Wiafe, I., & Matzat, U. (2022). The role of usability, aesthetics, usefulness and primary task support in predicting the perceived credibility of academic social networking sites. *Behaviour and Information Technology*, *41*(16), 3617–3632. https://doi.org/10.1080/0144929X.2021.2009570

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610. https://doi.org/10.1177/001316447003000308

Ku, H. H., Yang, P. H., & Chang, C. L. (2018). Reminding customers to be loyal: does message framing matter? *European Journal of Marketing*, *52*(3/4), 783–810. https://doi.org/10.1108/EJM-09-2016-0516

Kumar, G. J. (2022, August 17). E-wallet scam: Two victims lose over RM50,000. *Malaysiakini*. https://www.malaysiakini.com/news/632414

Lawlor, J., Thomas, C., Guhin, A. T., Kenyon, K., Lerner, M. D., & Drahota, A. (2021). Suspicious and fraudulent online survey participation: Introducing the REAL framework. *Methodological Innovations*, *14*(3), 1–10. https://doi.org/10.1177/20597991211050467

Lee, Z. W., & Khaw, D. P. T. (2018). *Transforming mobile phones into e-wallets in Malaysia*. Bank Negara Malaysia. https://www.bnm.gov.my/documents/20124/767010/p7.pdf

Lehto, T., & Oinas-Kukkonen, H. (2015). Explaining and predicting perceived effectiveness and use continuance intention of a behaviour change support system for weight loss. *Behaviour & Information Technology*, *34*(2), 176–189. https://doi.org/10.1080/0144929X.2013.866162

Lehto, T., Oinas-Kukkonen, H., & Drozd, F. (2012). Factors affecting perceived persuasiveness of a behavior change support system. *International Conference on Information Systems, ICIS 2012*, *3*, 1–15. https://aisel.aisnet.org/icis2012/proceedings/HumanBehavior/18

Leong, L. Y., Hew, T. S., Ooi, K. B., & Chong, A. Y. L. (2020). Predicting the antecedents of trust in social commerce – A hybrid structural equation modeling with neural network approach. *Journal of Business Research*, *110*, 24–40. https://doi.org/10.1016/j.jbusres.2019.11.056

Leong, L. Y., Hew, T. S., Ooi, K. B., Lee, V. H., & Hew, J. J. (2019). A hybrid SEM-neural network analysis of social media addiction. *Expert Systems with Applications*, *133*, 396–316. https://doi.org/10.1016/j.eswa.2019.05.024

Leong, L. Y., Hew, T. S., Ooi, K. B., & Wei, J. (2020). Predicting mobile wallet resistance: A two-staged structural equation modeling-artificial neural

network approach. *International Journal of Information Management*, *51*, 102047. https://doi.org/10.1016/J.IJINFOMGT.2019.102047

Leong, L. Y., Hew, T. S., Tan, G. W. H., & Ooi, K. B. (2013). Predicting the determinants of the NFC-enabled mobile credit card acceptance: A neural networks approach. *Expert Systems with Applications*, *40*(14), 5604–5620. https://doi.org/10.1016/j.eswa.2013.04.018

Leslie, R, Robin, K, Odom, R, L., Henson, & K, R. (2002). Data screening : Essential techniques for data review and preparation. In *the Southwest Educational Research Association* (Issue February).

Levertov, A. (2021, September 20). *Consumer expectations for financial services have changed — Make sure you can meet them*. Forbes. https://www.forbes.com/sites/forbesfinancecouncil/2021/09/20/consumer-expectations-for-financial-services-have-changed---make-sure-you-can-meet-them/?sh=557d9de03e68

Levin, I. P., & Gaeth, G. J. (1988). How consumers are affected by the framing of attribute information before and after consuming the product. *Journal of Consumer Research*, *15*(3), 374–378. https://doi.org/10.1086/209174

Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes*, *76*(2), 149–188. https://doi.org/10.1006/obhd.1998.2804

Li, Y., Hou, R., & Tan, R. (2024). How customers respond to chatbot anthropomorphism: the mediating roles of perceived humanness and perceived persuasiveness. *European Journal of Marketing*, *58*(12), 2757–2790. https://doi.org/10.1108/EJM-11-2022-0827

Lian, S. B., & Yoong, L. C. (2023). Customers' satisfaction and continuance intention to adopt fintech services. In M. Naved, V. A. Devi, & A. K. Gupta (Eds.), *Fintech and Cryptocurrency* (1st ed., pp. 105–135). Wiley. https://doi.org/10.1002/9781119905028.ch6

Liengaard, B. D., Sharma, P. N., Hult, G. T. M., Jensen, M. B., Sarstedt, M., Hair, J. F., & Ringle, C. M. (2021). Prediction: Coveted, yet forsaken? Introducing a cross-validated predictive ability test in partial least squares path modeling. *Decision Sciences*, *52*(2), 362–392. https://doi.org/10.1111/deci.12445

Liew, C. M., Tan, Y., Fong, S., Chooi, W. W., Lim, J. N., Chang, M., & Ng, L. H. (2023). *Revolutionising financial inclusion through digital insurance and takaful promoting inclusive insurance in Malaysia*. PwC Malaysia. https://www.pwc.com/my/en/publications/2023/revolutionising-financial-inclusion-through-digital-insurance-and-takaful.html

Lim, K. B., Yeo, S. F., Ta, X. Y., & Tan, C. L. (2023). Investigating the e-wallet usage continuance intention in Malaysia post-COVID 19 pandemic.

International Journal of Business and Technology Management, *5*(1), 333–350. https://doi.org/http://dx.doi.org/10.55057/ijbtm.2023.5.1.26

Lin, L. (2019). Regulating fintech: The case of Singapore. In *SSRN Electronic Journal* (2019/028). https://doi.org/10.2139/ssrn.3481563

Linnenluecke, M. K., Marrone, M., & Singh, A. K. (2020). Conducting systematic literature reviews and bibliometric analyses. *Australian Journal of Management*, *45*(2), 175–194. https://doi.org/10.1177/0312896219877678

Liu, W., Wang, X., & Peng, W. (2020). State of the art: Secure mobile payment. *IEEE Access*, *8*, 13898–13914. https://doi.org/10.1109/ACCESS.2019.2963480

Loh, Y. X., Hamid, N. A. A., Seah, C. Sen, Yo, J. J., Law, Y. C., Tan, S. Y., Chung, H. L., Liew, Y. L., & Chong, C. (2021). The factors and challenges affecting digital economy in Malaysia. *Conference on Management, Business, Innovation, Education and Social Sciences (CoMBInES)*, *1*(1), 1843–1849.

Loh, Y. X., & Hamid, N. A. B. A. (2021). The evaluation of online persuasion criteria on e-commerce website using persuasive system design (PSD) model. *International Journal of Business and Society*, *22*(3), 1143–1157. https://doi.org/10.33736/ijbs.4289.2021

Loy, A., Follett, L., & Hofmann, H. (2016). Variations of Q–Q plots: The power of our eyes! *American Statistician*, *70*(2), 202–214. https://doi.org/10.1080/00031305.2015.1077728

Lye, L., & Jayabalan, P. (2022, August 10). *Touch 'n Go and Shell Malaysia unlock a new cashless experience with Touch 'n Go RFID*. Shell Malaysia. https://www.shell.com.my/media/2022-press-releases/unlocking-cashless-driving-with-the-launch-of-touch-n-go-rfid.html#

MacKenzie, S. B., Podsakoff, P. M., & Jarvis, C. B. (2005). The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology*, *90*(4), 710–730. https://doi.org/10.1037/0021-9010.90.4.710

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the Theory of Planned Behavior and the Theory of Reasoned Action. *Personality and Social Psychology Bulletin*, *18*(1), 3–9. https://doi.org/10.1177/0146167292181001

Maier, C., Thatcher, J. B., Grover, V., & Dwivedi, Y. K. (2023). Cross-sectional research: A critical perspective, use cases, and recommendations for IS research. *International Journal of Information Management*, *70*, 102625. https://doi.org/10.1016/j.ijinfomgt.2023.102625

Mainardes, E. W., Costa, P. M. F., & Nossa, S. N. (2023). Customers' satisfaction with fintech services: evidence from Brazil. *Journal of*

Financial Services Marketing, *28*(2), 378–395. https://doi.org/10.1057/s41264-022-00156-x

Malaysia Digital Economy Corporation. (2022). *Malaysia: Towards becoming ASEAN's digital capital*. https://platform.mdec.com.my/cmscdn/v1.aspx?GUID=c90852a5-74e1-46c2-9006-372ed1d20582&file=MDEC-Huawei_White%20Paper_Malaysia%20as%20the%20ASEAN%20Digital%20Capital_7_Oct_2022.pdf

Malhan, D., Kumar, M., & Preeti. (2022). A measure of consumers' perception toward e-wallet (digital payment method). In B. S. Bodla, R. Sharma, A. Kumar, & J. K. Chandel (Eds.), *Contemporary Issues in Banking, Insurance and Financial Services* (pp. 274–287). ABC Computers.

Malik, A. N. A., & Annuar, S. N. S. (2021). The effect of perceived usefulness, perceived ease of use, reward, and perceived risk toward e-wallet usage intention. In M. H. Bilgin, H. Danis, & E. Demir (Eds.), *Eurasian Studies in Business and Economics* (Vol. 17). Springer. https://doi.org/10.1007/978-3-030-65147-3_8

Mamun, A. Al, Rahman, M. K., Munikrishnan, U. T., & Permarupan, P. Y. (2021). Predicting the intention and purchase of health insurance among Malaysian working adults. *SAGE Open*, *11*(4), 1–18. https://doi.org/10.1177/21582440211061373

Mandeville, G. K., & Roscoe, J. T. (1971). Fundamental research statistics for the behavioral sciences. *Journal of the American Statistical Association*, *66*(333), 224. https://doi.org/10.2307/2284880

Martire, L. M., & Franks, M. M. (2014). The role of social networks in adult health: Introduction to the special issue. *Health Psychology*, *33*(6), 501–504. https://doi.org/10.1037/hea0000103

Masimba, F., Appiah, M., & Zuva, T. (2019). A review of cultural influence on technology acceptance. *2019 International Multidisciplinary Information Technology and Engineering Conference (IMITEC)*, 1–7. https://doi.org/10.1109/IMITEC45504.2019.9015877

Mat Arif, Z. (2023, April 5). Retiree loses almost RM590,000 to insurance scam. *New Straits Times*. https://www.nst.com.my/news/crime-courts/2023/04/896412/retiree-loses-almost-rm590000-insurance-scam

Mathiassen, L., & Stage, J. (1990). The principle of limited reduction in software design. *Information Technology & People*, *6*(2/3), 171–185. https://doi.org/10.1108/EUM0000000003550

Matthews, J., Win, K. T., Oinas-Kukkonen, H., & Freeman, M. (2016). Persuasive technology in mobile applications promoting physical activity: A systematic review. *Journal of Medical Systems*, *40*(3), 72. https://doi.org/10.1007/s10916-015-0425-x

Mazzocchi, M. (2008). Primary data collection: Surveys errors and the research design. In *Statistics for Marketing and Consumer Research* (pp. 46–76). SAGE Publications Ltd. https://doi.org/10.4135/9780857024657

McCall, H. C., Hadjistavropoulos, H. D., & Sundström, C. R. F. (2021). Exploring the role of persuasive design in unguided internet-delivered cognitive behavioral therapy for depression and anxiety among adults: Systematic review, meta-analysis, and meta-regression. *Journal of Medical Internet Research*, *23*(4), e26939. https://doi.org/10.2196/26939

McCarthy, R. V., McCarthy, M. M., & Ceccucci, W. (2022). Know your data: Data preparation. In *Applying Predictive Analytics*. Springer. https://doi.org/10.1007/978-3-030-83070-0_2

Meedya, S., Sheikh, M. K., Win, K. T., & Halcomb, E. (2019). Evaluation of breastfeeding mobile health applications based on the persuasive system design model. In H. Oinas-Kukkonen, K. T. Win, E. Karapanos, P. Karppinen, & E. Kyza (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 11433 LNCS* (pp. 189–201). Springer. https://doi.org/10.1007/978-3-030-17287-9_16

Memon, M. A., Thurasamy, R., Cheah, J. H., Ting, H., Chuah, F., & Cham, T. H. (2023). Addressing common method bias, operationalization, sampling, and data collection issues in quantitative research: Review and recommendations. *Journal of Applied Structural Equation Modeling*, *7*(2), i–xiv. https://doi.org/10.47263/JASEM.7(2)01

Memon, M. A., Ting, H., Cheah, J.-H., Thurasamy, R., Chuah, F., & Cham, T. H. (2020). Sample size for survey research: Review and recommendations. *Journal of Applied Structural Equation Modeling*, *4*(2), i–xx.

Migozzi, J., Urban, M., & Wójcik, D. (2024). "You should do what India does": FinTech ecosystems in India reshaping the geography of finance. *Geoforum*, *151*, 103720. https://doi.org/10.1016/j.geoforum.2023.103720

Milian, E. Z., Spinola, M. de M., & Carvalho, M. M. de. (2019). Fintechs: A literature review and research agenda. *Electronic Commerce Research and Applications*, *34*, 100833. https://doi.org/10.1016/J.ELERAP.2019.100833

Miller, R. L., Acton, C., Fullerton, D. A., & Maltby, J. (2002). Analysis of Variance (ANOVA). In J. Campling (Ed.), *SPSS for Social Scientists* (1st ed., Vol. 92, Issue 6, pp. 145–154). Palgrave. https://doi.org/10.1007/978-0-230-62968-4_8

Ming, K. L. Y., & Jais, M. (2022). Factors affecting the intention to use e-wallets during the COVID-19 pandemic. *Gadjah Mada International Journal of Business*, *24*(1), 82–100. https://doi.org/10.22146/gamaijb.64708

Mohadis, H. M., Mohamad Ali, N., & Smeaton, A. F. (2016). Designing a persuasive physical activity application for older workers: Understanding end-user perceptions. *Behaviour and Information Technology*, *35*(12), 1102–1114. https://doi.org/10.1080/0144929X.2016.1211737

Mooi, E., Sarstedt, M., & Mooi-Reci, I. (2018). Market research: The process, data, and methods using stata. In *Springer Texts in Business and Economics* (1st ed., Vol. 2, Issue 4). Springer. https://doi.org/https://doi.org/10.1007/978-981-10-5218-7

Morgan, P. J. (2022). Fintech and financial inclusion in Southeast Asia and India. *Asian Economic Policy Review*, *17*(2), 183–208. https://doi.org/10.1111/aepr.12379

Morris, N. (2015). Providing ethical guidance for collaborative research in developing countries. *Research Ethics*, *11*(4), 211–235. https://doi.org/10.1177/1747016115586759

Mortel, T. Van de. (2008). Faking it: social desirability response bias in self-report research. *Australian Journal of Advanced Nursing*, *25*(4), 40–48.

Muhamat, A. A., Jaafar, M. N., & Alwi, S. F. S. (2017). General Takaful claims: An experience of Takaful operator in Malaysia. *Journal of Emerging Economies and Islamic Research*, *5*(4). https://doi.org/10.24191/jeeir.v5i4.8833

Mulchandani, D., & Orji, R. (2021). Age and the persuasiveness of a game to promote the adoption of COVID-19 precautionary measures. *IEEE 9th International Conference on Serious Games and Applications for Health(SeGAH)*, 1–9. https://doi.org/10.1109/SEGAH52098.2021.9551909

Muthukannan, P., Tan, B., Chiang, F. Ter, & Leong, C. (2021). Novel mechanisms of scalability of financial services in an emerging market context: Insights from Indonesian Fintech Ecosystem. *International Journal of Information Management*, *61*, 102403. https://doi.org/10.1016/j.ijinfomgt.2021.102403

My Government. (2021). *Getting Insurance & Takaful Protection*. https://www.malaysia.gov.my/portal/subcategory/268

Nakagawa, S., & Foster, T. M. (2004). The case against retrospective statistical power analyses with an introduction to power analysis. *Acta Ethologica*, *7*, 103–108. https://doi.org/10.1007/s10211-004-0095-z

Newman, A., Bavik, Y. L., Mount, M., & Shao, B. (2021). Data collection via online platforms: Challenges and recommendations for future research. *Applied Psychology*, *70*, 1380–1402. https://doi.org/10.1111/apps.12302

Ngoc Su, D., Quy Nguyen-Phuoc, D., Thi Kim Tran, P., Van Nguyen, T., Trong Luu, T., & Pham, H. G. (2023). Identifying must-have factors and should-have factors affecting the adoption of electric motorcycles – A combined

use of PLS-SEM and NCA approach. *Travel Behaviour and Society*, *33*, 100633. https://doi.org/10.1016/j.tbs.2023.100633

Nguyen, H., & Masthoff, J. (2008). Designing persuasive dialogue systems: Using argumentation with care. In H. Oinas-Kukkonen, P. Hasle, M. Harjumaa, K. Segerståhl, & P. Øhrstrøm (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 5033 LNCS* (pp. 201–202). Springer. https://doi.org/10.1007/978-3-540-68504-3_18

Nomi, M., & Sabbir, M. M. (2020). Investigating the factors of consumers' purchase intention towards life insurance in Bangladesh: An application of the Theory of Reasoned Action. *Asian Academy of Management Journal*, *25*(2), 135–165. https://doi.org/10.21315/aamj2020.25.2.6

Noor, A., Arifin, M., Astuti, D. P. W., Muryani, M. A., Rosyidah, N., Saputra, M. A. D. C., Wulandari, D., Afif, A. S. M., Supangat, Mashudi, Sulaeman, E., & Maskur, A. (2023). Revolutionizing Indonesia's financial landscape: The impact of information technology on the growth of financial technology start-ups. *Multidisciplinary Reviews*, *6*(4), e2023031. https://doi.org/10.31893/multirev.2023031

Nugraha, D. P., Setiawan, B., Nathan, R. J., & Fekete-Farkas, M. (2022). Fintech adoption drivers for innovation for SMEs in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*, 208. https://doi.org/10.3390/joitmc8040208

Oduor, M., Alahäivälä, T., & Oinas-Kukkonen, H. (2014). Persuasive software design patterns for social influence. *Personal and Ubiquitous Computing*, *18*(7), 1689–1704. https://doi.org/10.1007/s00779-014-0778-z

Oduor, M., Alahäivälä, T., & Oinas-Kukkonen, H. (2017). Software design patterns for persuasive computer-human dialogue: Reminder, reward, and instant feedback. In *Behavior Change Research and Theory: Psychological and Technological Perspectives* (pp. 47–67). Academic Press. https://doi.org/10.1016/B978-0-12-802690-8.00003-7

Oduor, M., & Oinas-Kukkonen, H. (2018). Behavioral economics through the lens of persuasion context analysis: A review of contributions in leading information systems journals. In S. Hammoudi, M. Śmiałek, O. Camp, & J. Filipe (Eds.), *Enterprise Information Systems* (pp. 453–472). Springer.

Oduor, M., & Oinas-Kukkonen, H. (2019). Committing to change: A persuasive systems design analysis of user commitments for a behaviour change support system. *Behaviour and Information Technology*, *40*(1), 20. https://doi.org/10.1080/0144929X.2019.1598495

Oinas-Kukkonen, H. (2010). Behavior change support systems: A research model and agenda. In T. Ploug, P. Hasle, & H. Oinas-Kukkonen (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in*

Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 6137 LNCS (pp. 4–14). Springer. https://doi.org/10.1007/978-3-642-13226-1_3

Oinas-Kukkonen, H. (2013). A foundation for the study of behavior change support systems. *Personal & Ubiquitous Computing*, *17*(6), 1223–1235. https://doi.org/10.1007/s00779-012-0591-5

Oinas-Kukkonen, H., & Harjumaa, M. (2008). Towards deeper understanding of persuasion in software and information systems. *Proceedings of the 1st International Conference on Advances in Computer-Human Interaction, ACHI 2008*, 200–205. https://doi.org/10.1109/ACHI.2008.31

Oinas-Kukkonen, H., & Harjumaa, M. (2009). Persuasive systems design: Key issues, process model, and system features. *Communications of the Association for Information Systems*, *24*, 485–500. https://doi.org/10.17705/1CAIS.02428

Okada, F. (2018). Business model changes through collaborative dynamic capabilities through insurance company use of IT (InsurTech) in the medical and health sectors. In M. Kodama (Ed.), *Collaborative Dynamic Capabilities for Service Innovation* (pp. 153–162). Palgrave Macmillan. https://doi.org/10.1007/978-3-319-77240-0_6

Olano, G. (2022, April 21). Fake insurance agent scam in Malaysia makes away with millions. *Insurance Business Asia* . https://www.insurancebusinessmag.com/asia/news/breaking-news/fake-insurance-agent-scam-in-malaysia-makes-away-with-millions-403160.aspx#:~:text=Insurance%20News,-By%20Gabriel%20Olano&text=A%20company%20manager%20in%20Malaysia,Etiqa%20Insurance%2C%20Malay%20Mail%20reported.

Omair, A. (2014). Sample size estimation and sampling techniques for selecting a representative sample. *Journal of Health Specialties*, *2*(4), 142–147. https://doi.org/10.4103/1658-600X.142783

Omar, O. E., & Owusu-Frimpong, N. (2007). Life insurance in Nigeria: An application of the Theory of Reasoned Action to consumers' attitudes and purchase intention. *Service Industries Journal*, *27*(7), 963–976. https://doi.org/10.1080/02642060701570891

Omarini, A. E. (2018). Fintech and the future of the payment landscape: The mobile wallet ecosystem - A challenge for retail banks? *International Journal of Financial Research*, *9*(4), 97–116. https://doi.org/10.5430/ijfr.v9n4p97

Oyibo, K. (2021). Investigating the key persuasive features for fitness app design and extending the persuasive system design model: A qualitative approach. *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care*, *10*(1), 57–53. https://doi.org/10.1177/2327857921101022

Oyibo, K., Adaji, I., Orji, R., & Vassileva, J. (2018). What drives the perceived credibility of mobile websites: Classical or expressive aesthetics? In M. Kurosu (Ed.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 10902 LNCS* (pp. 576–594). Springer. https://doi.org/10.1007/978-3-319-91244-8_45

Oyibo, K., & Morita, P. P. (2022). The role UX design attributes play in the perceived persuasiveness of contact tracing apps. *Multimodal Technologies and Interaction*, *6*(10), 88. https://doi.org/10.3390/mti6100088

Oyibo, K., Serdah, S., Karkhanis, K., & Pelegrini, P. (2022). Contact tracing apps: A comparative analysis of Canada's COVID alert and India's Aarogya Setu based on persuasive system design model. *International Conference on Persuasive Technology*, *3153*. https://doi.org/https://doi.org/10.1145/3563359.3596986

Oyibo, K., & Vassileva, J. (2020). HOMEX: Persuasive technology acceptance model and the moderating effect of culture. *Frontiers in Computer Science*, *2*(10). https://doi.org/10.3389/fcomp.2020.00010

Oyibo, K., & Vassileva, J. (2021). Relationship between perceived UX design attributes and persuasive features: A case study of fitness app. *Information (Switzerland)*, *12*(9), 365. https://doi.org/10.3390/info12090365

Papies, D., Ebbes, P., & Van Heerde, H. J. (2017). Addressing endogeneity in marketing models. In P. S. H. Leeflang, J. E. Wieringa, T. H. A. Bijmolt, & K. H. Pauwels (Eds.), *Advanced Methods for Modeling Markets* (pp. 581–627). Springer. https://doi.org/10.1007/978-3-319-53469-5_18

Park, D., Irwan Bahrudin, F., & Han, J. (2020). Circular reasoning for the evolution of research through a strategic construction of research methodologies. *International Journal of Quantitative and Qualitative Research Methods*, *8*(3), 1–23.

Pattnaik, A. K., Misra, S. N., & Ghadai, S. K. (2019). Claim settlement: The moment of truth in health insurance. *International Journal of Recent Technology and Engineering*, *8*(2), 581–585. https://doi.org/10.35940/ijrte.B1626.078219

Peterson, R. A. (2013). The process of questionnaire construction. In *Constructing Effective Questionnaires* (pp. 13–28). SAGE Publications, Inc. https://doi.org/10.4135/9781483349022.N2

Peterson, R. A., & Kim, Y. (2013). On the relationship between coefficient alpha and composite reliability. *Journal of Applied Psychology*, *98*(1), 194–198. https://doi.org/10.1037/a0030767

Pierce, J. R., & Aguinis, H. (2013). The too-much-of-a-good-thing effect in management. *Journal of Management*, *39*(2), 313–338. https://doi.org/10.1177/0149206311410060

Pitthan, F., & De Witte, K. (2021). Puzzles of insurance demand and its biases: A survey on the role of behavioural biases and financial literacy on insurance demand. *Journal of Behavioral and Experimental Finance*, *30*, 100471. https://doi.org/10.1016/j.jbef.2021.100471

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*, 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Podsakoff, P. M., Podsakoff, N. P., Williams, L. J., Huang, C., & Yang, J. (2024). Common method bias: It's bad, it's complex, it's widespread, and it's not easy to fix. *Annual Review of Organizational Psychology and Organizational Behavior*, *11*, 17–61. https://doi.org/10.1146/annurev-orgpsych-110721-040030

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*, 879–891. https://doi.org/10.3758/BRM.40.3.879

Presser, S., & Blair, J. (1994). Survey pretesting: Do different methods produce different results? *Sociological Methodology*, *24*, 73–104. https://doi.org/10.2307/270979

Preston, C. C., & Colman, A. M. (2000). Optimal number of response categories in rating scales: Reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica*, *104*(1), 1–15. https://doi.org/10.1016/S0001-6918(99)00050-5

Purpura, S., Schwanda, V., Williams, K., Stubler, W., & Sengers, P. (2011). Fit4Life: The design of a persuasive technology promoting healthy behavior and ideal weight. *CHI '11: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 423–432. https://doi.org/10.1145/1978942.1979003

Radomir, L., & Moisescu, O. I. (2020). Discriminant validity of the customer-based corporate reputation scale: Some causes for concern. *Journal of Product and Brand Management*, *29*(4), 547–469. https://doi.org/10.1108/JPBM-11-2018-2115

Radomski, A. D., Wozney, L., McGrath, P., Huguet, A., Hartling, L., Dyson, M. P., Bennett, K. J., & Newton, A. S. (2019a). Potential reduction of symptoms with the use of persuasive systems design features in internet-based cognitive behavioral therapy programs for children and adolescents with anxiety: A realist synthesis. *JMIR Mental Health*, *6*(10), e13807. https://doi.org/10.2196/13807

Radomski, A. D., Wozney, L., McGrath, P., Huguet, A., Hartling, L., Dyson, M. P., Bennett, K., & Newton, A. S. (2019b). Design and delivery features that may improve the use of internet-based cognitive behavioral therapy for children and adolescents with anxiety: A realist synthesis with a persuasive systems design perspective. *Journal of Medical Internet Research*, *21*(2), e11128. https://doi.org/10.2196/11128

Rahim, R. T. A., & Noor, N. S. M. (2024). New wave of digitalization: The financial transaction medium of foodpreneurs in Perlis. *Semarak International Journal in Modern Accounting and Finance*, *2*(1), 1–9. https://doi.org/https://doi.org/10.37934/sijmaf.2.1.19

Rahman, M. M. (2023). Sample size determination for survey research and non-probability sampling techniques: A review and set of recommendations. *Journal of Entrepreneurship, Business and Economics*, *11*(1), 42–62. https://scientificia.com/index.php/JEBE/article/view/201

Rahman, S., Mirza, A. S., Wathington, D., Green, S., Mayers, Y., Iranmanesh, E., & Woodard, L. (2021). Chronic disease and socioeconomic factors among uninsured patients: A retrospective study. *Chronic Illness*, *17*(1), 53–66. https://doi.org/10.1177/1742395319828430

Rahman, S. ur, Nguyen-Viet, B., Nguyen, Y. T. H., & Kamran, S. (2024). Promoting fintech: Driving developing country consumers' mobile wallet use through gamification and trust. *International Journal of Bank Marketing*, *42*(5), 841–869. https://doi.org/10.1108/IJBM-01-2023-0033

Raj, B., & Upadhyay, V. (2020). Role of FinTech in accelerating financial inclusion in India. *3rd International Conference on Economics and Finance*. https://doi.org/10.2139/ssrn.3591018

Rambeli, N., Jalil, N. A., Katmon, N., Hashim, A., Hashim, E., & Ramdan, M. R. (2023). The distribution of failure in medical and health insurance claim: The implications of Multiple Binary Logistic Regressions. *Journal of Distribution Science*, *21*(11), 91–102. https://doi.org/10.15722/jds.21.11.202311.23

Ramli, F. A. A., & Hamzah, M. I. (2021). Mobile payment and e-wallet adoption in emerging economies: A systematic literature review. *Journal of Emerging Economies and Islamic Research*, *9*(2), 1–39. https://doi.org/10.24191/jeeir.v9i2.13617

Range, L. M. (2023). Case study methodologies. In P. Moglia (Ed.), *Psychology & Behavioral Health* (pp. 320–322). Salem Press.

Razali, N. M., & Wah, Y. B. (2011). Power comparisons of Shapiro-Wilk , Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*, *2*(1), 21–33.

Redzuan, H., Yakob, R., & Isa, Z. (2016). Underinsurance in Malaysia: The application of the Monte Carlo simulation. *Jurnal Pengurusan*, *47*, 131–141. https://doi.org/http://dx.doi.org/10.17576/pengurusan-2016-47-11

Regmi, P. R., Waithaka, E., Paudyal, A., Simkhada, P., & Van Teijlingen, E. (2017). Guide to the design and application of online questionnaire surveys. *Nepal Journal of Epidemiology*, *6*(4), 640–644. https://doi.org/10.3126/nje.v6i4.17258

ReMark Global. (2023). *Global consumer study 2022-23*. https://www.remarkgroup.com/en/global-consumer-study

Richter, A., Ruß, J., & Schelling, S. (2019). Insurance customer behavior: Lessons from behavioral economics. *Risk Management and Insurance Review*, *22*(2), 183–205. https://doi.org/10.1111/rmir.12121

Richter, N. F., Schubring, S., Hauff, S., Ringle, C. M., & Sarstedt, M. (2020). When predictors of outcomes are necessary: guidelines for the combined use of PLS-SEM and NCA. *Industrial Management and Data Systems*, *120*(12), 2243–2267. https://doi.org/10.1108/IMDS-11-2019-0638

Riddell, S., Goldie, S., Hill, A., Eagles, D., & Drew, T. W. (2020). The effect of temperature on persistence of SARS-CoV-2 on common surfaces. *Virology Journal*, *17*(1), 145. https://doi.org/10.1186/s12985-020-01418-7

Ringle, C. M., Sarstedt, M., & Zimmermann, L. (2011). Customer satisfaction with commercial airlines: The role of perceived safety and purpose of travel. *Journal of Marketing Theory and Practice*, *19*(4), 459–472. https://doi.org/10.2753/MTP1069-6679190407

Ritterband, L. M., Thorndike, F. P., Cox, D. J., Kovatchev, B. P., & Gonder-Frederick, L. A. (2009). A behavior change model for internet interventions. *Annals of Behavioral Medicine*, *38*(1), 18–27. https://doi.org/10.1007/s12160-009-9133-4

Robertson, S., & Robertson, J. (2012). *Mastering the requirements process getting requirements right* (3rd ed.). Addison-Wesley Professional.

Romero, L. (2024, November 9). *Number of registered fintech companies in Indonesia from 2011 to 2023*. https://www.statista.com/statistics/1413023/indonesia-number-of-operating-fintech-companies/

Ross, C. E., & Mirowsky, J. (2000). Does medical insurance contribute to socioeconomic differentials in health? *Milbank Quarterly*, *78*(2), 291–321. https://doi.org/10.1111/1468-0009.00171

Rowena, A. (2024, December 12). *Two years in, are Singapore's digital banks performing?* Fintech News Singapore. https://fintechnews.sg/105116/digital-banking-news-singapore/singapore-digital-banks-performance-two-years/

Rutz, O. J., & Watson, G. F. (2019). Endogeneity and marketing strategy research: An overview. *Journal of the Academy of Marketing Science*, *47*(3), 479–498. https://doi.org/10.1007/s11747-019-00630-4

Sait, M. A., Ali, M. A., Almunawar, M. N., & Haji Masri, H. M. (2024). Understanding factors to digital wallet discontinuance intention among past users: An exploratory study. *Journal of Science and Technology Policy Management*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/JSTPM-01-2024-0005

Santoso, A. (2024, January 31). Indonesia's internet penetration hits 79.5 percent, trend continues. *Antara*. https://en.antaranews.com/news/304593/indonesias-internet-penetration-hits-795-percent-trend-continues

Sarstedt, M., Hair, J. F. J., Ringle, C. M., Thiele, K. O., & Gudergan, S. P. (2016). Estimation issues with PLS and CBSEM: Where the bias lies! *Journal of Business Research*, *69*(10), 3998–4010. https://doi.org/10.1016/j.jbusres.2016.06.007

Sarstedt, M., Radomir, L., Moisescu, O. I., & Ringle, C. M. (2022). Latent class analysis in PLS-SEM: A review and recommendations for future applications. *Journal of Business Research*, *138*, 398–407. https://doi.org/10.1016/j.jbusres.2021.08.051

Sarstedt, M., Ringle, C. M., Cheah, J. H., Ting, H., Moisescu, O. I., & Radomir, L. (2020). Structural model robustness checks in PLS-SEM. *Tourism Economics*, *26*(4), 531–554. https://doi.org/10.1177/1354816618823921

Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). Research Methods for Business Students. In *Pearson Education Limited* (8th ed.).

Saunders, M., & Tosey, P. (2012). The layers of research design. *Rapport, (Winter)*, *14*(4), 58–59.

Savitz, D. A., & Wellenius, G. A. (2023). Can cross-sectional studies contribute to causal inference? It depends. *American Journal of Epidemiology*, *192*(4), 514–516. https://doi.org/10.1093/aje/kwac037

Sax, L. J., Gilmartin, S. K., & Bryant, A. N. (2003). Assessing response rates and nonresponse bias in web and paper surveys. *Research in Higher Education*, *44*(4), 409–432. https://doi.org/10.1023/A:1024232915870

Seawright, J., & Gerring, J. (2008). Case selection techniques in case study research: A menu of qualitative and quantitative options. *Political Research Quarterly*, *61*(2), 294–308. https://doi.org/10.1177/1065912907313077

Segerståhl, K., Kotro, T., & Väänänen-Vainio-Mattila, K. (2010). Pitfalls in persuasion: How do users experience persuasive techniques in a web service? In T. Ploug, P. Hasle, & H. Oinas-Kukkonen (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 6137 LNCS* (pp. 211–222). Springer. https://doi.org/10.1007/978-3-642-13226-1_22

Seraj, M. (2012). We create, we connect, we respect, therefore we are: Intellectual, social, and cultural value in online communities. *Journal of Interactive Marketing*, *26*(4), 209–222. https://doi.org/10.1016/j.intmar.2012.03.002

Setia, M. S. (2016). Cross-sectional studies. *Indian Journal of Dermatology*, *61*(3), 261–264. https://doi.org/10.4103/0019-5154.182410

Setiawan, B., Nugraha, D. P., Irawan, A., Nathan, R. J., & Zoltan, Z. (2021). User innovativeness and fintech adoption in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(3), 188. https://doi.org/10.3390/joitmc7030188

Shaw, B., & Kesharwani, A. (2019). Moderating effect of smartphone addiction on mobile wallet payment adoption. *Journal of Internet Commerce*, *18*(3), 291–309. https://doi.org/10.1080/15332861.2019.1620045

Shevchuk, N., & Oinas-Kukkonen, H. (2016). Exploring green information systems and technologies as persuasive systems: A systematic review of applications in published research. *2016 International Conference on Information Systems, ICIS 2016*. https://aisel.aisnet.org/icis2016/Sustainability/Presentations/11

Shevchuk, N., & Oinas-Kukkonen, H. (2019). Influence on intention to adopt green IS: Boosting endogenous motivations with persuasive systems design. *Proceedings of the 52nd Hawaii International Conference on System Sciences*, *2019-January*, 2055–2064. https://doi.org/10.24251/hicss.2019.249

Shmueli, G. (2010). To explain or to predict? *Statistical Science*, *25*(3), 289–291. https://doi.org/10.1214/10-STS330

Shmueli, G., Ray, S., Velasquez Estrada, J. M., & Chatla, S. (2015). The elephant in the room: Evaluating the predictive performance of Partial Least Squares (PLS) path models. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2659233

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. *European Journal of Marketing*, *53*(11), 2322–2347. https://doi.org/10.1108/EJM-02-2019-0189

Silva, M., Hay-Smith, E. J., & Graham, F. (2023). Exploring the use of the behavior change technique taxonomy and the persuasive system design

model in defining parent-focused ehealth interventions: Scoping review. *Journal of Medical Internet Research*, *25*, e42083. https://doi.org/10.2196/42083

Silver, N. (2012). The signal and the noise: why most predictions fail--but some don't. In *Choice Reviews Online* (Issue 08). Penguin Books.

Simms, L. J., Zelazny, K., Williams, T. F., & Bernstein, L. (2019). Does the number of response options matter? Psychometric perspectives using personality questionnaire data. *Psychological Assessment*, *31*(4), 557–566. https://doi.org/10.1037/pas0000648

Simonetto, A. (2012). Formative and reflective models: State of the art. *Electronic Journal of Applied Statistical Analysis*, *5*(3), 452–457. https://doi.org/10.1285/i20705948v5n3p452

Singapore Economic Development Board. (2021, July 9). *One in two people to use mobile wallets by 2025, led by South-east Asia*. https://www.edb.gov.sg/en/business-insights/insights/one-in-two-people-to-use-mobile-wallets-by-2025-led-by-south-east-asia.html

Singh, N., & Sinha, N. (2020). How perceived trust mediates merchant's intention to use a mobile wallet technology. *Journal of Retailing and Consumer Services*, *52*, 101894. https://doi.org/10.1016/j.jretconser.2019.101894

Sittig, S., McGowan, A., & Iyengar, S. (2020). Extensive review of persuasive system design categories and principles: Behavioral obesity interventions. *Journal of Medical Systems*, *44*. https://doi.org/10.1007/s10916-020-01591-w

Smith, J. R., Louis, W. R., & Schultz, P. W. (2011). Introduction: Social influence in action. *Group Processes and Intergroup Relations*, *14*(5), 599–603. https://doi.org/10.1177/1368430211410214

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/J.JBUSRES.2019.07.039

Soegoto, D. S., & Tampubolon, M. P. (2020). E-Wallet as a Payment Instrument in the Millennial Era. *IOP Conference Series: Materials Science and Engineering*, *879*(1), 012139. https://doi.org/10.1088/1757-899X/879/1/012139

Spector, P. E. (2019). Do not cross me: Optimizing the use of cross-sectional designs. *Journal of Business and Psychology*, *34*(2), 125–137. https://doi.org/10.1007/s10869-018-09613-8

Stadler, M., Sailer, M., & Fischer, F. (2021). Knowledge as a formative construct: A good alpha is not always better. *New Ideas in Psychology*, *60*, 100832. https://doi.org/10.1016/j.newideapsych.2020.100832

Statista Research Department. (2024, May 29). *Number of users of Alipay and WeChat Pay in China in 2020, with forecasts from 2021 to 2025*. https://www.statista.com/statistics/1271130/mobile-wallet-user-forecast-in-china/

Steenkamp, J. B. E. M., & Maydeu-Olivares, A. (2021). An updated paradigm for evaluating measurement invariance incorporating common method variance and its assessment. *Journal of the Academy of Marketing Science*, *49*(1), 287–305. https://doi.org/10.1007/s11747-020-00745-z

Stoeckli, E., Dremel, C., & Uebernickel, F. (2018). Exploring characteristics and transformational capabilities of InsurTech innovations to understand insurance value creation in a digital world. *Electronic Markets*, *28*(3), 618–632. https://doi.org/10.1007/s12525-018-0304-7

Streukens, S., & Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. *European Management Journal*, *34*(6), 618–632. https://doi.org/10.1016/j.emj.2016.06.003

Sukhov, A., Friman, M., & Olsson, L. E. (2023). Unlocking potential: An integrated approach using PLS-SEM, NCA, and fsQCA for informed decision making. *Journal of Retailing and Consumer Services*, *74*, 103424. https://doi.org/10.1016/j.jretconser.2023.103424

Sukhov, A., Olsson, L. E., & Friman, M. (2022). Necessary and sufficient conditions for attractive public Transport: Combined use of PLS-SEM and NCA. *Transportation Research Part A: Policy and Practice*, *158*, 239–250. https://doi.org/10.1016/j.tra.2022.03.012

Sunarjo, W. A., Nurhayati, S., & Muhardono, A. (2021). Consumer behavior toward adoption of mobile payment: A case study in Indonesia during the COVID-19 pandemic. *Journal of Asian Finance, Economics and Business*, *8*(4), 581–590. https://doi.org/10.13106/jafeb.2021.vol8.no4.0581

Swee, D. L. E., Nathan, R. J., Gorgenyi-Hegyes, E., & Fekete-Farkas, M. (2021). The demand for life insurance in a developing country and the mediating role of persuasion. *Journal of International Studies*, *14*(3), 138–154. https://doi.org/10.14254/2071-8330.2021/14-3/9

Taherdoost, H. (2019). What is the best response scale for survey and questionnaire design: Review of different lengths of rating scale / attitude scale / likert scale. *International Journal of Academic Research in Management (IJARM)*, *8*(1), 1–10.

Taherdoost, H. (2023). Fintech: Emerging trends and the future of finance. In A. Turi (Ed.), *Financial Technologies and DeFi* (pp. 29–39). Springer. https://doi.org/10.1007/978-3-031-17998-3_2

Tan, G. K. S. (2022). Citizens go digital: A discursive examination of digital payments in Singapore's Smart Nation project. *Urban Studies*, *59*(12), 2582–2598. https://doi.org/10.1177/00420980211039407

Tan, G. W. H., Ooi, K. B., Leong, L. Y., & Lin, B. (2014). Predicting the drivers of behavioral intention to use mobile learning: A hybrid SEM-Neural Networks approach. *Computers in Human Behavior*, *36*, 198–213. https://doi.org/10.1016/j.chb.2014.03.052

Teo, S. C., Law, P. L., & Koo, A. C. (2020). Factors affecting adoption of e-wallets among youths in Malaysia. *Journal of Information System and Technology Management*, *5*(19), 39–50. https://doi.org/10.35631/jistm.519004

Thanasegaran, H., & Shanmugam, B. (2008). Exploitation of the insurance industry for money laundering: The Malaysian perspective. *Journal of Money Laundering Control*, *11*(2), 135–145. https://doi.org/10.1108/13685200810867465

The Hindu. (2024, January 18). India among most vibrant fintech hubs: WEF study. *THG Publishing Pvt Ltd*. https://www.thehindu.com/business/Industry/india-among-most-vibrant-fintech-hubs-wef-study/article67751940.ece

The Star. (2020, June 12). *Boost supports government's e-wallet initiatives*. https://www.thestar.com.my/business/business-news/2020/06/12/boost-supports-governments-e-wallet-initiatives

The Star. (2022a, August 11). *Are scammers targetting ewallet users with fake suspension notifications?* https://www.thestar.com.my/news/true-or-not/2022/08/11/quickcheck-are-scammers-targetting-ewallet-users-with-fake-suspension-notifications

The Star. (2022b, September 28). *TnG NFC cards being sold at exorbitant prices on online platforms*. https://www.thestar.com.my/news/nation/2022/09/28/tng-nfc-cards-being-sold-at-exorbitant-prices-on-online-platforms

The Times of India. (2020, October 12). *Can COVID-19 spread through currency notes? Here is the correct way to disinfect them*. https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/can-covid-19-spread-through-currency-notes-here-is-the-correct-way-to-disinfect-them/photostory/78618891.cms?picid=78619034

Thomond, P., Herzberg, T., & Lettice, F. (2003, September). Disruptive innovation: Removing the innovators' dilemma. *British Academy of Management 2002 Conference Proceedings*.

Tikka, P., & Oinas-Kukkonen, H. (2016). RightOnTime: The role of timing and unobtrusiveness in behavior change support systems. In A. Meschtscherjakov, B. De Ruyter, V. Fuchsberger, M. Murer, & M.

Tscheligi (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* (Vol. 9638, pp. 327–338). Springer. https://doi.org/10.1007/978-3-319-31510-2_28

Tikka, P., Woldemicael, B., & Oinas-Kukkonen, H. (2016). Building an app for behavior change: Case RightOnTime. *Fourth International Workshop on Behavior Change Support Systems (BCSS 2016)*, *1573*.

Torning, K., & Oinas-Kukkonen, H. (2009). Persuasive system design: State of the art and future directions. *Persuasive '09: Proceedings of the 4th International Conference on Persuasive Technology*, *350*, 1–8. https://doi.org/10.1145/1541948.1541989

Toscos, T., Faber, A., An, S., & Gandhi, M. P. (2006). Chick Clique: Persuasive technology to motivate teenage girls to exercise. *Conference on Human Factors in Computing Systems - Proceedings*, 1873–1878. https://doi.org/10.1145/1125451.1125805

Touch 'n Go. (2022). *Touch 'n Go eWallet adds SafeTrip to its insurance offerings*. https://www.touchngo.com.my/news/touch-n-go-ewallet-adds-safetrip-to-its-insurance-offerings/

Touch 'n Go Sdn Bhd. (2022). *eWallet User Tiering*. https://www.touchngo.com.my/usertiering/#:~:text=Introducing%20our%20new%20eWallet%20size%20that%20makes%20you%20PREMIUM&text=Upgrade%20from%20entry%20level%20Lite,limits%2C%20tailored%20to%20your%20needs.

Touch 'n Go Sdn Bhd. (2023). *CI Insure*. https://support.tngdigital.com.my/hc/en-my/sections/12088465417625-CI-Insure

Tovohery, J. M., Totohasina, A., & Rajaonasy, F. D. (2020). Application of equality test of coefficients of variation to the heteroskedasticity test. *American Journal of Computational Mathematics*, *10*(01), 73–89. https://doi.org/10.4236/ajcm.2020.101005

Trianto, B., Nik Azman, N. H., & Masrizal, M. (2023). E-payment adoption and utilization among micro-entrepreneurs: a comparative analysis between Indonesia and Malaysia. In *Journal of Science and Technology Policy Management* (ahead-of-print; Ahead-of-Print). https://doi.org/10.1108/JSTPM-12-2022-0207

Utami, A. F., & Ekaputra, I. A. (2020). A paradigm shift in financial landscape: encouraging collaboration and innovation among Indonesian FinTech lending players. *Journal of Science and Technology Policy Management*, *12*(2), 309–330. https://doi.org/10.1108/JSTPM-03-2020-0064

Vaithilingam, S., Ong, C. S., Moisescu, O. I., & Nair, M. S. (2024). Robustness checks in PLS-SEM: A review of recent practices and recommendations

for future applications in business research. *Journal of Business Research*, *173*, 114465. https://doi.org/10.1016/j.jbusres.2023.114465

Venkatesh, V., & Davis, F. D. (2000). Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, *46*(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venturini, S., & Mehmetoglu, M. (2019). PLS-SEM: A stata package for structural equation modeling with partial least squares. *Journal of Statistical Software*, *88*(1), 1–35. https://doi.org/10.18637/jss.v088.i08

Volosovych, S., Zelenitsa, I., Kondratenko, D., Szymla, W., & Mamchur, R. (2021). Transformation of insurance technologies in the context of a pandemic. *Insurance Markets and Companies*, *12*(1), 1–13. https://doi.org/10.21511/INS.12(1).2021.01

Voorhees, C. M., Brady, M. K., Calantone, R., & Ramirez, E. (2016). Discriminant validity testing in marketing: An analysis, causes for concern, and proposed remedies. *Journal of the Academy of Marketing Science*, *44*(1), 119–134. https://doi.org/10.1007/s11747-015-0455-4

Wang, H., Bah, M. J., & Hammad, M. (2019). Progress in outlier detection techniques: A survey. *IEEE Access*, *7*, 107964–108000. https://doi.org/10.1109/ACCESS.2019.2932769

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: Strengths, weaknesses, and recommendations. *CHEST*, *158*(1), 565–571. https://doi.org/10.1016/j.chest.2020.03.012

Wang, X., Yu, C., & Wei, Y. (2012). Social media peer communication and impacts on purchase intentions: A consumer socialization framework. *Journal of Interactive Marketing*, *26*(4), 198–208. https://doi.org/10.1016/J.INTMAR.2011.11.004

Wasserstein, R. L., & Lazar, N. A. (2016). The ASA's statement on p-values: Context, process, and purpose. *The American Statistician*, *70*(2), 129–133. https://doi.org/10.1080/00031305.2016.1154108

Weiksner, G. M., Fogg, B. J., & Liu, X. (2008). Six patterns for persuasion in online social networks. In H. Oinas-Kukkonen, P. Hasle, M. Harjumaa, K. Segerståhl, & P. Øhrstrøm (Eds.), *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics): Vol. 5033 LNCS* (pp. 151–163). Springer. https://doi.org/10.1007/978-3-540-68504-3_14

Wiafe, I., Nakata, K., & Gulliver, S. (2014). Categorizing users in behavior change support systems based on cognitive dissonance. *Personal and Ubiquitous Computing*, *18*(7), 1677–1687. https://doi.org/10.1007/s00779-014-0782-3

Wilson Van Voorhis, C. R., & Morgan, B. L. (2007). Understanding power and rules of thumb for determining sample sizes. *Tutorials in Quantitative*

Methods for Psychology, *3*(2), 43–50. https://doi.org/10.20982/tqmp.03.2.p043

Win, K. T., Roberts, M. R. H., & Oinas-Kukkonen, H. (2019). Persuasive system features in computer-mediated lifestyle modification interventions for physical activity. *Informatics for Health and Social Care*, *44*(4), 376–404. https://doi.org/10.1080/17538157.2018.1511565

Winett, R. A., Anderson, E. S., Wojcik, J. R., Winett, S. G., & Bowden, T. (2007). Guide to health: Nutrition and physical activity outcomes of a group-randomized trial of an internet-based intervention in churches. *Annals of Behavioral Medicine*, *33*(3), 251–261. https://doi.org/10.1007/BF02879907

Wooldridge, J. M. (2015). *Introductory econometrics: A modern approach*. Cengage Learning.

Wozney, L., Huguet, A., Bennett, K., Radomski, A. D., Hartling, L., Dyson, M., McGrath, P. J., & Newton, A. S. (2017). How do ehealth programs for adolescents with depression work? A realist review of persuasive system design components in internet-based psychological therapies. *Journal of Medical Internet Research*, *19*(8), e266. https://doi.org/10.2196/jmir.7573

Wright, G. (2015). An empirical examination of the relationship between nonresponse rate and nonresponse bias. *Statistical Journal of the IAOS*, *31*(2), 305–315. https://doi.org/10.3233/sji-140844

Wu, M. J., Zhao, K., & Fils-Aime, F. (2022). Response rates of online surveys in published research: A meta-analysis. *Computers in Human Behavior Reports*, *7*, 100206. https://doi.org/10.1016/j.chbr.2022.100206

Yan, T. C., Schulte, P., & Lee Kuo Chuen, D. (2018). InsurTech and FinTech: Banking and insurance enablement. In *Handbook of Blockchain, Digital Finance, and Inclusion: Cryptocurrency, FinTech, InsurTech, and Regulation* (Vol. 1, pp. 249–281). Academic Press. https://doi.org/10.1016/B978-0-12-810441-5.00011-7

Yao, W., Xiao, Y., & Zhu, J. (2023). *Life and Health insurance in Hong Kong after the pandemic*. https://www.swissre.com/institute/research/topics-and-risk-dialogues/china/life-health-insurance-hong-kong-after-pandemic.html

Yeh, J. Y., Seah, C. Sen, Loh, Y. X., Low, M. P., Nuar, A. N. A., & Jalaludin, F. W. (2024). Exploring the actual implementation of e-wallet application in Malaysia. *Baghdad Science Journal*, *21*(2(SI)), 600–608. https://doi.org/10.21123/bsj.2024.9864

Yin, N. W., & Chen, N. H. (2022). An empirical study on the adoption of e-wallet in Malaysia. *International Journal of Early Childhood Special Education (INT-JECS*, *14*(3).

Yong, L. (2023). On the development of fintech in Asia. In Z. Zheng (Ed.), *Proceedings of the Second International Forum on Financial Mathematics and Financial Technology* (pp. 1–30). Springer. https://doi.org/10.1007/978-981-99-2366-3_1

Zarifis, A., & Cheng, X. (2022). A model of trust in Fintech and trust in Insurtech: How Artificial Intelligence and the context influence it. *Journal of Behavioral and Experimental Finance*, *36*, 100739. https://doi.org/10.1016/j.jbef.2022.100739

Zavolokina, L., Mateusz, D., & Schwabe, G. (2016). Fintech - What ’s in a name? *Thirty Seventh International Conference on Information Systems*, *December 2016*.

Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2010). Business Research Methods. In *Cengage Learning.* (8th ed.).

Zina, O. (2021). *The essential guide to doing your research project* (4th ed.). Sage Publications Ltd.

APPENDIX A

SURVEY QUESTIONNAIRE

Persuasive Systems Design Features in Promoting Insurance Through E-Wallet Penetration

Dear respondent,

My name is Yeh Jia Yee, a postgraduate student from Universiti Tunku Abdul Rahman (UTAR) Sungai Long campus. I would like to investigate the persuasive system design (PSD) features in e-wallets that persuade the users to purchase insurance products. The research focuses on users of Touch 'n Go eWallet. You are identified as a user of Touch 'n Go eWallet, you are voluntarily invited to participate in this research by completing this questionnaire.

The following questionnaire will require not more than 15 minutes to complete. Kindly provide your responses and answer all the questions to the best of your knowledge. There are no wrong responses to any of these statements. All responses are collected for academic research purposes and will be kept strictly confidential.

Your participation is very much appreciated to assist me in my academic research endeavors.

Should you have any doubt, kindly contact me at 013-7461036 or jjjiayeeee@1utar.my

Yours faithfully,
Yeh Jia Yee

* Indicates required question

1. Email *

2. Acknowledge of Notice *

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:
a) Name
b) Identity card
c) Place of Birth
d) Address
e) Education History
f) Employment History
g) Medical History
h) Blood type
i) Race
j) Religion
k) Photo
l) Personal Information and Associated Research Data

2. The purposes for which your personal data may be used are inclusive but not limited to:
a) For assessment of any application to UTAR
b) For processing any benefits and services
c) For communication purposes
d) For advertorial and news
e) For general administration and record purposes
f) For enhancing the value of education
g) For educational and related purposes consequential to UTAR
h) For replying any responds to complaints and enquiries
i) For the purpose of our corporate governance
j) For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no

longer required.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
6. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

7. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

8. You may access and update your personal data by writing to me at jjjiayeeee@1utar.my

Mark only one oval.

- ◯ I have been notified and that I hereby understood, consented and agreed per UTAR above notice
- ◯ I disagree, my personal data will not be processes *Skip to section 5 ()*

Questionnaire Filter

3. Do you use Touch 'n Go eWallet? *

Mark only one oval.

- ◯ Yes
- ◯ No *Skip to section 5 ()*

Skip to section 5 ()

Demographic Information

Please fill or tick for the most appropriate answer for each question, unless indicated otherwise.

4. What is your gender? *

Mark only one oval.

- ◯ Male
- ◯ Female

5. What is your age? *

Mark only one oval.

- ◯ Below 18
- ◯ 18-26
- ◯ 27-42
- ◯ 43-58
- ◯ 59-68
- ◯ 69-77
- ◯ 78-95

6. What is your highest education level? *

Mark only one oval.

- ◯ Primary school
- ◯ Secondary school
- ◯ Pre-university
- ◯ Undergraduate
- ◯ Postgraduate

7. What is your current employment status? *

Mark only one oval.

- ◯ Employed
- ◯ Self-employed
- ◯ Unemployed
- ◯ Student
- ◯ Retired

8. What is your average household income level? *

Mark only one oval.

- ◯ Below RM4,850
- ◯ Between RM4,851 to RM10,960
- ◯ Above RM10,960

9. Which type of insurance(s) do you own currently? *

Mark only one oval.

- ◯ Life and health insurance
- ◯ Non-life insurance
- ◯ Both
- ◯ None of the above

10. Do you think insurance is important? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Maybe

11. Do you consider Touch 'n Go eWallet as your mainstream payment method? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Maybe

12. What is your tier in Touch 'n Go eWallet? *

Go to Touch 'n Go eWallet > Tap on your Profile (top right corner) > Scroll down to Account Details > See My Tier

Mark only one oval.

- ◯ LITE
- ◯ PRO
- ◯ PREMIUM

13. Do you secure yourself with insurance product(s) on Touch 'n Go eWallet? *

Select "Yes" if you subscribe to any of the followings:
a. CarInsure
b. MotoInsure
c. CI Insure
d. WalletSafe
e. SafeTrip
f. SafeHome

Mark only one oval.

- ◯ Yes
- ◯ No

14. Which insurance product(s) have you purchased on Touch 'n Go eWallet? *

Check all that apply.

- ☐ CarInsure
- ☐ MotoInsure
- ☐ CI Insure
- ☐ WalletSafe
- ☐ SafeTrip
- ☐ SafeHome
- ☐ None of the above

15. Are you aware of Insurance Technology (InsurTech)? *

Mark only one oval.

- ◯ Yes
- ◯ No

Persuasive System Design Features on Touch 'n Go eWallet

This section examines your perception on each of the following statements. On a scale of 1 (strongly disagree) to 7 (strongly agree) for each statement, indicate your extent of agreement for each statement.

16. PTS1_ I can manage my insurance policies easily with fewer clicks on Touch 'n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

17. PTS2_ Touch 'n Go eWallet provides clear guidance through the management of insurance policies.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

18. PTS3_ Touch ‘n Go eWallet can support immediate quotations based on my needs.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

19. PTS4_ I can rearrange the recently used features easily on Touch ‘n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

20. PTS5_ I can track and monitor the insurance policies purchased on Touch ‘n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

21. PTS6_ I can compare and contrast the difference between protected situations and non-protected situations on Touch ‘n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

22. PTSG_ The system design of Touch 'n Go eWallet supports me to purchase insurance products.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

23. DS1_ Touch 'n Go eWallet prompts reminders for ongoing promotions or new products.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

24. DS2_ Touch 'n Go eWallet suggests the most suitable insurance plan for me.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

25. DS3_ The system design of Touch 'n Go eWallet is visually appealing.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

26. DSG_ The system design of Touch 'n Go eWallet allows me to interact with the system.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

27. SCS1_ Touch 'n Go eWallet provides enhanced security to authorise transactions.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

28. SCS2_ I can assess the brief description of the insurer companies.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

29. SCS3_ I can see a limited number and a logical reason for ads on Touch 'n Go eWallet to be professional.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

30. SCS4_ I can contact customer service of Touch ‘n Go Digital for assistance or seek help through frequently asked questions according to the well-organised topics.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

31. SCS5_ Touch ‘n Go eWallet provides endorsements from Bank Negara Malaysia.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

32. SCS6_ Touch ‘n Go eWallet provides links to verify the accuracy of insurance products.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

33. SCSG_ The system design of Touch 'n Go eWallet appears credible and thus more credible.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

34. SS1_ I can check reviews of Touch ‘n Go eWallet on the external platform.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

35. SS2_ There are many users who share information and personal experiences about the insurance products of Touch ‘n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

36. SS3_ Touch ‘n Go eWallet is accessible at most merchant touch points.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

37. SSG_ The system design of Touch 'n Go eWallet leverages the social influence.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

38. PP1_The system design of Touch ‘n Go influences me to purchase insurance products via the app.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

39. PP2_ Touch ‘n Go eWallet is personally relevant to me.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

40. PP3_ Touch ‘n Go eWallet makes me reconsider the way to get myself insurance products.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

41. PP4_ The features on Touch ‘n Go eWallet is convincing.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

42. IB1_ I am positive towards purchasing insurance products on Touch 'n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

43. IB2_ I am likely to purchase insurance products on Touch 'n Go eWallet in the near future.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

44. IB3_ I have the intention to purchase insurance products through Touch 'n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

45. IB4_ It is possible for me to purchase insurance product on Touch 'n Go eWallet.

Mark only one oval.

	1	2	3	4	5	6	7	
stro	◯	◯	◯	◯	◯	◯	◯	strongly agree

END OF QUESTIONNAIRE

Thank you for your participation.

All responses will be kept private and confidential.

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