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Article

Demystification of Readiness, Security, and Technological Enhancements in the Adoption of a Cashless Economy

Heru Susanto [1,2,3], Noor Tamtini [1,2,*], Fahmi Ibrahim [1], Alifya Kayla Shafa Susanto [2,4], Desi Setiana [5,6] and Leu Fang Yie [2,3]

1 School of Business, University Technology Brunei, Bandar Seri Begawan BE1410, Brunei; heru.susanto@utb.edu.bn or heru.susanto@brin.go.id (H.S.)
2 Center for International Research Collaboration of Graph Theory and Combinatory, Members: BRIN (National Research and Innovation Agency), Jakarta Pusat 10340, Indonesia; UTB (University of Technology Brunei), Jalan Tungku Link Gadong BE1410, Brunei; ITB (Institute of Technology Bandung), Bandung 40132, Indonesia; UI (University of Indonesia), Depok 16424, Indonesia; THU (Tunghai University), Taichung 40704, Taiwan; IOU (International Open University), Jakarta 12780, Indonesia; alifya.kayla.s@gmail.com (A.K.S.S.); leufy@thu.edu.tw (L.F.Y.)
3 Center for Artificial Intelligent and Cyber Security, National Research and Innovation Agency, Bandung 40135, Indonesia
4 School of Computing and Informatics, University Technology Brunei, Bandar Seri Begawan BE1410, Brunei
5 Digital Psychology Research Group, Institute of Brunei Studies, University Brunei Darussalam, Bandar Seri Begawan BE1410, Brunei
6 The Southern Correctional Center, BAPAS Jakarta Selatan, Ministry of Law and Human Rights, Jakarta 12940, Indonesia
* Correspondence: noor.tamtini@utb.edu.bn

Abstract: The adoption of a cashless economy was accelerated globally by the devastating impact of the COVID-19 pandemic. Brunei Darussalam was not excluded from this trend, as pandemic-related restrictions were implemented to ensure the safety of its population. In light of the COVID-19 crisis, this research paper examines the factors influencing the readiness and acceptance of a cashless economy among working society in Brunei Darussalam. The integrated concepts of the Technology Acceptance Model (TAM) and Technology Readiness Index (TRI) are applied to examine perceptions impacting their acceptance and readiness to continue adopting a cashless economy. The methodology includes a literature review and the use of secondary data from government reports and industry publications. A quantitative approach is employed, utilizing an online survey to collect non-probability samples from 212respondents. The main instruments used in the survey are structured questionnaires. The study's findings show that factors such as the assessment of payment modes, technological development, digital literacy, knowledge, regulatory policies, and security concerns significantly affect working society's perceptions, readiness, and acceptance of a cashless economy. These results provide insights for policymakers and stakeholders on the key factors influencing continued cashlessness adoption and shaping societal behavior towards cashless payments.

Keywords: adoption; cashless payments; perceptions; technology readiness index; technology acceptance model; COVID-19 pandemic; working society; cashless economy

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1. Introduction

A cashless economy refers to an economic system where transactions are primarily conducted using cards, digital payment methods, and other non-physical forms of money, moving away from cash as the main mode of payment. This concept has gained significant global traction and has been widely anticipated by economic experts as monetary and payment systems have evolved over the years (Srouji 2020). With technological advancements rapidly transforming the financial industry, banking structures and practices have shifted

from traditional cash-based transactions to modern cashless banking, including digital banking services and card payments.

In the context of Brunei, the Digital Economy Masterplan 2025 outlines strategies to transform the nation into a Smart Nation, as envisioned under Wawasan Brunei 2035. A key component of this transformation is the adoption of digital banking and payment systems. In line with Brunei's Smart Nation vision, digital transformation in the banking sector was fully implemented by 2019 (Digital Economy Council 2020). A robust digital ecosystem is a key enabler for a cashless economy, requiring the active participation of stakeholders, including government bodies, financial institutions, and businesses. These stakeholders must play a pivotal role in creating awareness, promoting digital payment methods, and ensuring the security of digital transactions.

The success of a cashless economy is also heavily dependent on the societal adoption of digital payments. While the term "cashless economy" does not imply the complete elimination of cash, it highlights a shift towards non-cash transactions. For certain informal sectors, cash remains a critical form of payment, especially when interacting with formal sectors (Srouji 2020). This dynamic is one of the key areas to explore when assessing society's readiness and willingness to embrace cashless transactions as a primary payment method.

The public perception of a cashless economy is a crucial factor in its acceptance. Attitudes and perceptions are often shaped by the level of knowledge and understanding people have on the subject. Studies have shown that individuals with higher levels of digital literacy and awareness are more likely to adopt and continue using cashless payments (Avirutha et al. 2020). In Brunei, the COVID-19 pandemic accelerated the adoption of digital payments due to the necessity for convenience and compliance with social distancing measures. However, as the country moves into the endemic phase, changes in attitudes towards cashless payments may occur, making it essential to study the factors that influence continued acceptance and the intention to use these payment methods.

Stakeholders in the digital ecosystem play a crucial role in the ongoing adoption of cashless payments. While this study focuses on individual respondents, their responses will reflect the actions and measures taken by these stakeholders in providing, marketing, and maintaining cashless payment systems. For example, the security of digital payments is a key factor influencing user confidence. Ensuring robust protection against card fraud and digital scams will boost the confidence of cashless payment users. In addition to regularly updating platforms with necessary security measures, stakeholders must also raise awareness about how to safely perform digital transactions, which further enhances user confidence (Anshari et al. 2021).

This is closely linked to digital literacy and competency. Studies have shown that digital literacy is a critical factor in the adoption of cashless payments, as it directly influences user acceptance and readiness (Salman and Saleem 2017). People with lower levels of digital literacy are generally more hesitant to embrace and use cashless payments compared to those with higher levels of knowledge. This issue will be addressed in more detail in the study.

The primary goal of this research is to assess the level of acceptance and readiness among Brunei's working population and income earners in the wake of the COVID-19 pandemic, as well as to identify the key factors that influence the continued adoption of a cashless economy in the country. The following objectives are outlined to achieve this goal:

- To investigate the perceptions of Brunei's working population regarding the transition to a fully cashless economy.
- To determine the factors that influence the acceptance of a cashless economy among Brunei's working society.
- To explore the relationship between acceptance and readiness for cashless payments among income earners.

In support of these research objectives, the study will propose a framework for advancing the cashless economy based on the readiness and acceptance of Brunei's working society. This framework will offer recommendations to help facilitate the continued adoption of cashless payments in Brunei Darussalam.

The findings from this study are expected to provide valuable insights into the relationship between acceptance and readiness for cashless payments following the COVID-19 crisis, as well as address the factors influencing their continued use. These insights will benefit cashless payment users by offering a deeper understanding of its potential impacts, enabling them to make informed decisions when adopting digital payment methods.

Additionally, the results will assist stakeholders—such as government bodies, the banking industry, and businesses—in determining the extent of measures needed to foster continued adoption of cashless payments. By influencing societal behavior, these stakeholders can help shape a more cashless society. The findings will also guide the development of action plans to support Brunei's digital economy strategies, further accelerating the growth of the cashless economy and contributing to the realization of the Smart Nation initiative under Wawasan Brunei 2035.

A cashless economy refers to an economic system where transactions are primarily conducted using cards, digital payment methods, and other non-physical forms of money. This concept has gained significant popularity worldwide, with experts predicting its continued growth alongside advancements in monetary and payment systems (Srouji 2020). Technological expansion in the financial sector has rapidly transformed banking structures, shifting from traditional, cash-based transactions to modern cashless services, including card payments and digital banking.

In Brunei Darussalam, the Digital Economy Masterplan 2025 outlines strategies to transform the nation into a Smart Nation as part of Wawasan Brunei 2035. A key aspect of this transformation is the implementation of digital banking and payment systems, which was fully achieved by 2019 (Digital Economy Council 2020). Building a robust digital ecosystem is essential for the success of a cashless economy, with stakeholders such as government agencies, financial institutions, and businesses playing pivotal roles in expanding and strengthening this ecosystem. This involves creating awareness, promoting digital payment options, and ensuring the security of digital transactions.

The COVID-19 pandemic significantly accelerated the adoption of cashless payments globally, including in Brunei, where public safety restrictions were introduced. This research aims to explore the factors influencing the readiness and acceptance of a cashless economy among Brunei's working population. The study integrates the Technology Acceptance Model (TAM) and the Technology Readiness Index (TRI) to assess the perceptions shaping individuals' willingness to continue using cashless transactions.

The methodology includes a literature review and analysis of secondary data from government reports and industry publications. A quantitative approach is utilized, with data collected via an online survey from a non-probability sample of 212 respondents.. The primary instrument for data collection is a structured questionnaire.

The findings suggest that factors such as the evaluation of payment methods, technological advancements, digital literacy, regulatory policies, and security concerns significantly influence the perceptions, readiness, and acceptance of a cashless economy among Brunei's working society. These results provide valuable insights for policymakers and stakeholders, highlighting the key drivers of continued adoption and helping to shape public attitudes toward digital transactions.

The main objective of this research is to assess the level of acceptance and readiness among working individuals and income earners in Brunei following the COVID-19 pandemic, as well as to identify the factors impacting the continued growth of the cashless economy. The specific aims are to:

1. Investigate the perceptions of Brunei's working population toward transitioning to a fully cashless economy.
2. Identify the factors that influence the acceptance of a cashless economy among the working society.
3. Examine the relationship between acceptance and readiness for cashless payments among income earners.

The findings from this study are expected to clarify the relationship between acceptance and readiness for cashless payments post-COVID-19 while addressing the contributing factors influencing their ongoing use. These insights will benefit users of cashless payments by helping them make informed decisions based on enhanced knowledge. Furthermore, the results will guide stakeholders, including government bodies, the banking industry, and businesses, in identifying necessary actions to support continued adoption, align with digital economy strategies, and ultimately contribute to the Smart Nation vision of Wawasan Brunei 2035.

2. Literature Review

2.1. Global Shift Towards Cashless Economies

A wealth of studies worldwide has examined the shift toward a cashless economy, with a particular focus on user readiness and adoption. In Brunei, the move toward a cashless society gained significant momentum during the COVID-19 pandemic, as the need to shift from contact-based to contactless activities became essential for daily life.

2.2. Historical Development of Cashless Payment Systems

According to Fabris (2019), cashless societies have existed since the early days of human civilization, when livelihoods relied on barter and other forms of exchange that did not involve currency. However, the modern concept of a cashless society represents a more advanced stage, where physical money is replaced by digital alternatives, enabling transactions to occur electronically. The first cashless payments emerged in the 1950s, and since then, a variety of cashless instruments have been developed (Jain and Jain 2017). Recent trends show that cashless transactions are now common not only in large financial exchanges but also in everyday small-scale transactions.

2.3. Technological Advancements

Technological advancements have been instrumental in driving the shift toward cashless societies, with innovations in digital payment systems and mobile banking playing a key role. Countries with strong e-commerce infrastructures and supportive government policies, such as China, Sweden, and Finland, have led this transition. In China, rapid urbanization and strategic government initiatives have propelled the widespread adoption of cashless payments, making the country a global leader in e-commerce and digital payment usage (Thomas 2013; Filipiak 2020). Sweden's aggressive policies have reduced cash transactions to just 20% of all transactions, while Finland excels in card payment frequency and Internet banking penetration (Filipiak 2020).

2.4. Impact of COVID-19 on Cashless Economy

The COVID-19 pandemic had a profound impact on daily life, particularly in how people made payments. Brunei Darussalam's Ministry of Health emphasized the ease with which COVID-19 could spread through physical contact, prompting a shift to contactless methods, including cashless payments (Abdul-Halim et al. 2022). Globally, movement restrictions and safety concerns accelerated the adoption of cashless transactions. The G20 Italian Presidency (2021) noted that the potential of cashless payments to enhance financial inclusion became more apparent during the pandemic as governments promoted digital payments to protect vulnerable populations. However, Kotkowski and Polasik (2021) cautioned that this shift might exacerbate financial inclusion challenges, as pre-pandemic cashless users continued with digital payments while others still relied on cash.

Wisniewski et al. (2021) suggested that the pandemic reshaped payment habits, as fear and apprehension about handling physical cash led many to adopt cashless methods, a trend likely to persist even after the pandemic.

2.5. Theoretical Foundations on the Continued Use of Cashless Payments

Many studies utilize the Technology Acceptance Model (TAM) to understand users' intentions to adopt new technology. TAM, derived from the Theory of Reasoned Action (TRA), evaluates Technology Acceptance based on two key factors: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) (Davis 1989). Routray et al. (2019) highlighted the importance of these factors and extended TAM by incorporating additional elements such as information quality, system quality, and service quality. Ahuja and Joshi (2018) identified Ease of Use, Benefits, Trust, and Self-Efficacy as key factors influencing customer perceptions of e-wallets, though they acknowledged limitations in their study due to a small sample size. Similarly, Maqableh et al. (2015) found that perceived trust—encompassing reputation, security, privacy, and transaction size—plays a significant role in the adoption of cashless payments.

The Technology Readiness Index (TRI) assesses users' readiness to adopt new technologies. Mick and Fournier (1998) noted that users often experience both positive and negative emotions when engaging with new technologies. Parasuraman (2000) further argued that the intensity of these emotions varies among individuals, reflecting their openness to embracing innovations. Humbani and Wiese (2018) applied TRI to examine consumer readiness for mobile payment services, identifying both drivers and barriers to adoption. Karim and Muhammad (2022) found that Technology Readiness, Expectation Confirmation, User Satisfaction, and Perceived Security are critical factors influencing the continued use of cashless payments.

2.6. Theoretical Framework

Davis (1989) developed the Technology Acceptance Model (TAM) to analyze user behavior and predict technology adoption. TAM focuses on users' perceptions, emphasizing that a technology's Perceived Usefulness and Ease of Use are key factors influencing its acceptance. Parasuraman (2000) introduced the concept of Technology Readiness, which refers to an individual's willingness to adopt and use new technologies. The Technology Readiness Index (TRI) assesses this readiness by evaluating four dimensions: Optimism, Innovativeness, Discomfort, and Insecurity.

- Optimism: a positive belief that technology offers increased control, efficiency, and flexibility.
- Innovativeness: a tendency to be a technology pioneer and thought leader.
- Discomfort: a perceived lack of control over technology and feeling overwhelmed by it.
- Insecurity: a distrust of technology and skepticism about its ability to work properly.

2.7. Current Trends and Future Directions

Current trends reveal a significant rise in cashless transactions, driven by technological advancements and shifting consumer behaviors, particularly in the wake of COVID-19. Future research should investigate the long-term sustainability of these trends, the impact of emerging technologies like blockchain and cryptocurrencies, and the role of government policies in fostering financial inclusion through cashless systems. Additionally, research should address potential challenges associated with a cashless society, such as data privacy concerns and the digital divide, to provide a comprehensive understanding of the evolution of the cashless economy.

Globally, numerous studies have explored the cashless economy and user readiness and adoption. In Brunei, the momentum toward a cashless society accelerated due to the COVID-19 pandemic, which necessitated a shift from contact-based to contactless daily activities.

The development of cashless societies has deep historical roots. According to Fabris (2019), cashless societies have existed since early human history when bartering and other non-currency exchange methods were used. However, the modern concept of a cashless society represents an advanced stage where physical money is replaced by digital equivalents, facilitating transactions in electronic form. The first cashless payments were introduced in the 1950s, and since then, various cashless instruments have been developed (Jain and Jain 2017). Recent trends indicate that cashless transactions are prevalent not only in large financial transactions but also in smaller everyday transactions.

Thomas (2013) noted that countries with widespread adoption of cashless solutions and high usage rates are considered advanced. His research highlighted China as a leading example, driven by rapid urbanization and supportive government policies that promote cashless payments. China has emerged as a global leader in e-commerce and cashless technology, alongside other advanced countries like Sweden and Finland (Filipiak 2020). In Sweden, aggressive policies and widespread adoption by both businesses and society have reduced cash transactions to just 20% of the total (Filipiak 2020). Similarly, Finland is advancing toward a cashless society, leading in both card payment frequency and Internet banking penetration.

Impact of COVID-19 pandemic on cashless economy

This study examines a crucial aspect of daily life—payment methods—which have undergone significant changes due to the COVID-19 pandemic. The Brunei Darussalam Ministry of Health highlighted that COVID-19 spreads easily through contact with respiratory droplets from an infected person's cough, sneeze, or exhalation. These droplets can land on objects and surfaces, potentially infecting others who touch these surfaces and then touch their eyes, nose, or mouth (Abdul-Halim et al. 2022). Consequently, there was a global shift toward contactless activities, including cashless payments, to enhance safety and minimize physical contact. This transition accelerated financial inclusion as governments promoted digital payments to protect vulnerable populations during the pandemic (G20 Italian Presidency 2021). While the pandemic spurred widespread adoption of cashless transactions, Kotkowski and Polasik (2021) raised concerns about financial inclusion, noting that those already using cashless payments continued to do so, while some persisted with cash transactions despite the pandemic. Wisniewski et al. (2021) suggested that the pandemic changed payment habits, driving users away from physical cash due to fear and apprehension, which may sustain the adoption of cashless transactions even as conditions improve.

Theoretical foundations for understanding the continued use of cashless payments include the Technology Acceptance Model (TAM). Developed by Davis (1989), TAM is based on the Theory of Reasoned Action (TRA) and focuses on Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as key factors influencing Technology Acceptance. Routray et al. (2019) emphasized these factors' importance in consumer behavior but expanded the model by integrating dimensions of quality, such as information quality, system quality, and service quality. Ahuja and Joshi (2018) examined key factors affecting perceptions of e-wallets, including Ease of Use, Benefit, Trust, and Self-Efficacy, though they noted limitations due to a small sample size. Maqableh et al. (2015) found that perceived trust, encompassing reputation, security, privacy, and transaction size, significantly impacts the adoption of cashless payments.

The Technology Readiness Index (TRI), developed by Mick and Fournier (1998), measures users' readiness for new technology. TRI assesses factors such as Optimism, Innovativeness, Discomfort, and Insecurity, reflecting the overall mindset and inclination toward technology adoption (Parasuraman 2000). Studies by Humbani and Wiese (2018) applied TRI to examine readiness for mobile payments, identifying drivers and inhibitors of adoption behaviors. Similarly, Karim and Muhammad (2022) found that Technology Readiness, along with Confirmation Expectation, User Satisfaction, and Perceived Security, influences the continued use of cashless payments.

Theoretical Framework: Davis developed the Technology Acceptance Model in 1989 to study user behavior regarding information technology and predict adoption. TAM emphasizes user perceptions and the belief that technology must be both useful and user-friendly to gain acceptance. The model focuses on two main factors: Perceived Usefulness and Perceived Ease of Use. Parasuraman (2000) defined Technology Readiness as an individual's propensity to embrace and use new technologies for personal and professional goals. The Technology Readiness Index (TRI) measures overall Technology Acceptance based on four factors: Optimism, Innovativeness, Discomfort, and Insecurity (Figure 1).

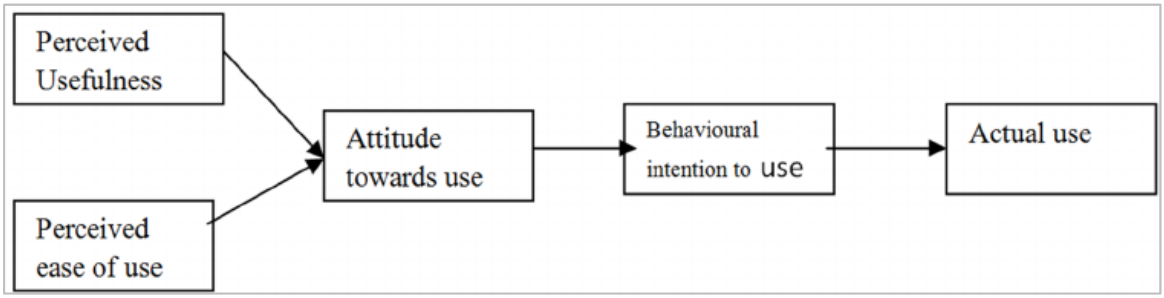

Figure 1. Technology Acceptance Model (Davis 1989).

In Technology Readiness (TR), Parasuraman (2000) identifies several key factors. Optimism reflects a positive belief in technology, with users confident that it enhances control, efficiency, and flexibility. Innovativeness describes a tendency to be an early adopter and a thought leader in technology. Discomfort encompasses feelings of a lack of control over technology and being overwhelmed by its complexities. Lastly, Insecurity involves a distrust of technology and skepticism about its reliability and effectiveness (Figure 2).

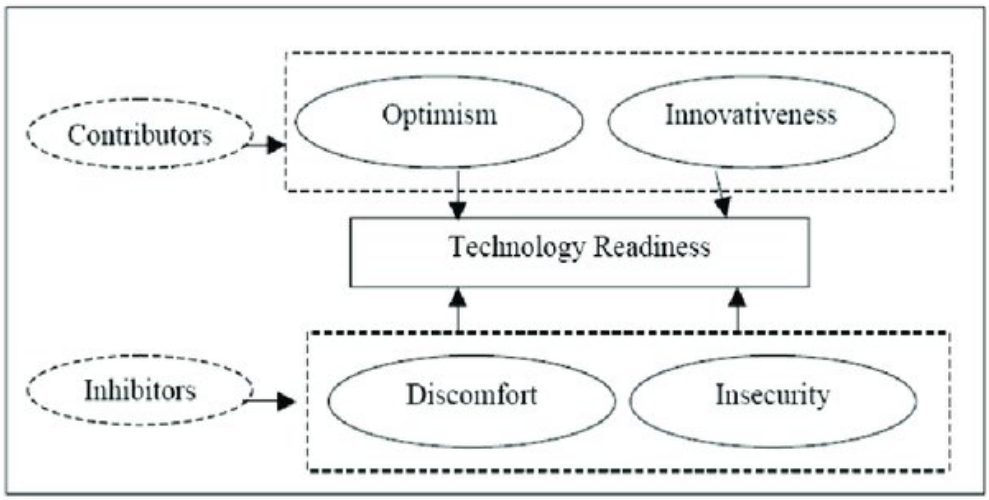

Figure 2. Technology Readiness Index (Parasuraman 2000).

3. Hypothesis Formulation

Seven hypotheses have been developed to test the primary objectives of the research.

3.1. Innovativeness

H1: *Personal Innovativeness with technology leads to high perceived ease of use towards the continued adoption of cashless payments.*

H2: *Personal Innovativeness with technology leads to high perceived usefulness towards the continued adoption of cashless payments.*

Individuals who possess high innovativeness with technology typically have a stronger intrinsic motivation to explore and use new technology. Those highly motivated by innovation are not worried about whether it is user-friendly and may still attempt to try and use it (Dabholkar and Bagozzi 2002).

3.2. Optimism

H3: *Personal Optimism about technology significantly leads to high perceived ease of use towards the continued adoption of cashless payments.*

H4: *Personal Optimism about technology significantly leads to high perceived usefulness towards the continued adoption of cashless payments.*

According to Parasuraman (2000), a technology optimist is someone who believes that new technologies offer increased control, flexibility, and efficiency in their daily lives. This Optimism means that individuals with a positive outlook are likely to view new technology favorably, even if they have not yet used it. Their pre-determined positive attitude influences their readiness to embrace and adopt new technological advancements.

3.3. Discomfort

H5: *Personal Discomfort with technology significantly leads to low perceived ease of use towards the continued adoption of cashless payments.*

H6: *Personal Discomfort with technology significantly leads to low perceived usefulness towards the continued adoption of cashless payments.*

Discomfort involves a perception of having limited control over technology, which can lead to feelings of being overwhelmed (Lin et al. 2007). According to Parasuraman (2000), individuals who experience discomfort with new technology often believe that it will dominate their lives rather than serve them. They may also feel that technology is designed for those with advanced technical knowledge rather than for the average user.

3.4. Insecurity

H7: *Personal Insecurity about technology significantly leads to low perceived ease of use towards the continued adoption of cashless payments.*

H8: *Personal Insecurity about technology significantly leads to low perceived usefulness toward the continued adoption of cashless payments.*

Insecurity refers to a lack of trust in technology and skepticism about its reliability and effectiveness (Lin et al. 2007). Research suggests that individuals who feel insecure about technology are more likely to focus on potential risks rather than the benefits. This apprehension often leads them to avoid adopting new technology altogether (Blut and Wang 2020).

3.5. Perceived Ease of Use and Perceived Usefulness

H9: *There is a significant positive relationship between Perceived Ease of Use and Perceived Usefulness regarding the continued adoption of cashless payments.*

H10: *There is a significant positive relationship between Perceived Ease of Use and the continued adoption of cashless payments.*

H11: *There is a significant positive relationship between Perceived Usefulness and the continued adoption of cashless payments.*

Numerous studies have been published on the relationship between the two cognitive dimensions of the Technology Acceptance Model (TAM). Similarly, extensive studies have been published to also test the relationship between Perceived Ease of Use and Perceived Usefulness. Hence, the above hypotheses are developed.

4. Research Methodology

4.1. Research Design

This study utilizes a descriptive research design, which is ideal for capturing a detailed snapshot of the current behaviors, perceptions, and factors influencing the adoption of cashless payments among the working population in Brunei. A descriptive approach facilitates a thorough understanding of these phenomena by identifying patterns and trends within the data.

Research design encompasses the overall planning and systematic methods used to thoroughly examine and address the research questions. It includes outlining how data will be collected, developing measurement tools, and explaining how the gathered information will be analyzed (De Vaus 2001). This study's design considers several factors, such as the study's objectives, the researcher's understanding of the topic, and how the findings will be presented to readers. It also addresses the study's location, timing, examination methods, and the specifics of data analysis.

The complexity of the research design can vary based on the hypotheses and arguments presented in the study (Khalid et al. 2012). The design must align with the problem statement, research questions, and objectives. It addresses key issues such as the study's purpose, location, investigation type, researcher interference, time horizon, and unit of analysis (Sekaran and Bougie 2010).

Research designs can range from simple to complex, depending on the study's nature and specific hypotheses. Some designs require primary data, while others use secondary data or a combination of both. The choice of data-collection methods—whether through observation, surveys, or secondary sources—depends on the research objectives. Experimental designs may be employed to assess program effectiveness or performance (Khalid et al. 2012). Selecting the appropriate research method is crucial, as the quality of the research outcomes hinges on how the study is conducted.

In this study, quantitative methods and secondary sources are employed to address the main research objectives, using numerical measurements and analysis for empirical assessments. Statistical measures will be applied to test hypotheses and evaluate relationships between variables, focusing on the associations between the developed theories and the research findings.

4.2. Data-Collection Method and Procedures

Data collection is the process of gathering information from relevant sources for hypothesis testing and result analysis, consequently contributing to answering the research questions. There are two types of relevant data, namely primary data and secondary data, where the collection method differs. Primary data are considered to be crucial for research as they provide the researcher with original information derived directly. With the quantitative approach applied to this research, online questionnaires using Google Forms are applied as the data-collection strategy for this study. Using up-to-date technology methods such as Google Forms not only speeds up the collection process with better-expected outreach to the targeted group, but it is also cost-free with the administration's ability to record and oversee the data collected. Links to the Google Forms surveys are

then distributed to earners through social network platforms such as WhatsApp and through email distributions. From the distribution made, approximately 221 responses were received. These responses will be analyzed and assessed further in Section 4. In comparison, some secondary data have also been collected for the study. Secondary data, though less critical and readily available, are derived from published sources in official websites, journals, articles, books, previous study references, industrial surveys, and other data that can assist in adding understanding to the research.

Primary data collection involved administering a structured survey chosen for its efficiency in reaching a broad audience and cost-effectiveness. Stratified random sampling was employed to ensure representation across different demographic groups within Brunei's working population. Participants were recruited through professional networks, social media platforms like WhatsApp, and email distributions. Out of 300 distributed surveys, 221 valid responses were received, yielding a response rate of 73.67%. This high response rate enhances the reliability and validity of the study.

The study examined relationships between independent variables—Innovativeness, Optimism, Discomfort, Insecurity, Perceived Ease of Use, and Perceived Usefulness—and the dependent variable, which is the adoption and continued use of cashless payments. These relationships were analyzed using SmartPLS version 4.1, a tool selected for its ability to handle partial least-squares structural equation modeling (PLS-SEM version 4), particularly suited for complex models and exploratory research. SmartPLS helped assess the measurement and structural models, validate constructs, and examine path coefficients.

The sample size of 221 respondents is representative of Brunei's working population, estimated at 212,382 according to the 2021 labor force survey. This sample size provides sufficient statistical power to detect significant effects. To mitigate potential biases such as self-selection and non-response, strategies like random sampling and follow-up reminders were implemented. Ethical considerations, including informed consent and confidentiality, were strictly maintained throughout the study.

The survey utilized a five-point Likert scale to measure attitudes and perceptions, selected for its simplicity and effectiveness. The survey instrument was pre-tested with a small group of respondents and reviewed by experts to ensure clarity and relevance. A pilot study was also conducted to refine the survey questions based on feedback.

Descriptive statistics, including measures of central tendency and dispersion, were used to summarize the data. Exploratory factor analysis (EFA) was performed to identify underlying constructs, with construct validity, convergent validity, and discriminant validity assessed using established thresholds, such as Cronbach's Alpha ≥ 0.7 for reliability. The structural model was evaluated for multicollinearity, path coefficients, and overall fit, with bootstrapping (using 5000 resamples) employed to estimate the precision of the PLS-SEM results. EFA provided insights into the dimensionality of constructs while bootstrapping enhanced the robustness of the results by offering confidence intervals for the path coefficients.

Tables and figures were incorporated into the text to present data clearly and effectively, including descriptive statistics, factor loadings, reliability measures, and structural model assessments. Overall, the chosen methodology—encompassing research design, sampling techniques, data-collection methods, and analytical tools—ensures a thorough and reliable examination of the factors influencing cashless payment adoption in Brunei. The validation of the survey instrument, bias mitigation efforts, and application of robust statistical techniques contribute to the study's overall validity and reliability.

4.3. Research Framework

The research model presented in Figure 3 integrates elements from both the Technology Acceptance Model (TAM) developed by Davis (1989) and the Technology Readiness Index (TRI) developed by Parasuraman (2000). This model is designed to examine the impact of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) on technology adoption. Similar conceptual frameworks have been employed in previous studies, such as by Godoe

and Johansen (2012), who explored the adoption of new technologies among employees in Norwegian organizations, and by Yusoff et al. (2022), who investigated readiness attitudes towards mobile payment applications in Indonesia.

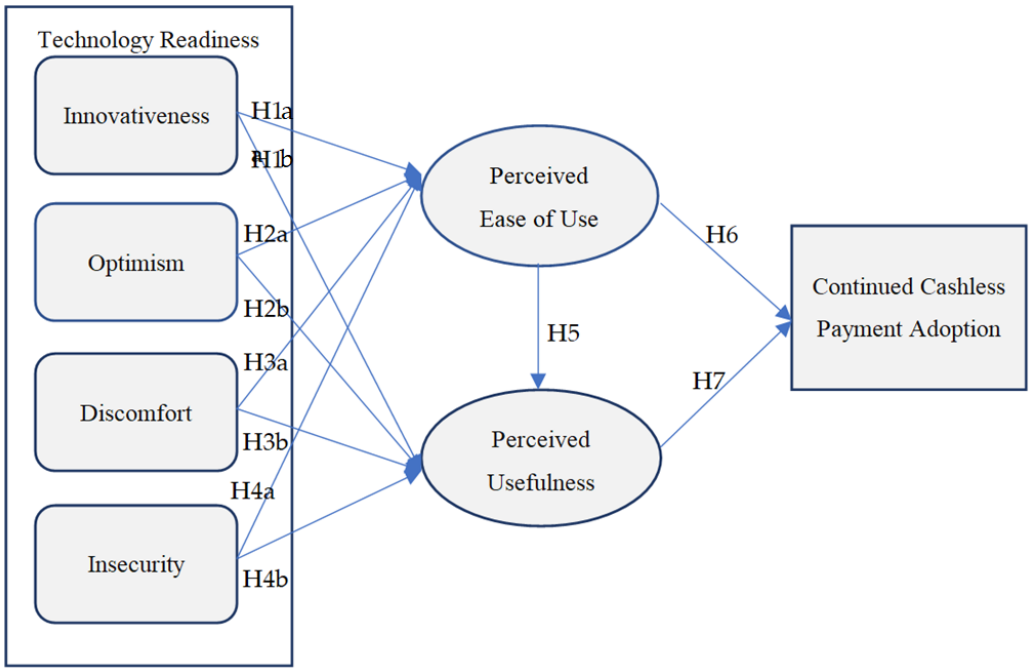

Figure 3. Proposed research model.

Study Design

The examination of independent variables (Innovativeness, Optimism, Discomfort, Insecurity, Perceived Ease of Use, Perceived Usefulness) on the continued adoption of cashless payments is one of the methods applied to deduce their influencing relationship to the subject matter. Cross-sectional approaches are applied to collect the data from the respondent through the distribution of questionnaires and surveys developed based on previous studies and will be analyzed using SPSS version 23 and SmartPLS v4.0. The study will primarily focus on the sample means derived from the variables to measure the perception level as well as the correlation between the independent variables and dependent variables. The cause–effect relationship between the variables relating to readiness and acceptance will also be examined.

Study Population

The target group for this study is earners or the working population in Brunei Darussalam. Based on the 2021 labor force survey published by Brunei's Department of Economic Planning and Studies under the Ministry of Finance and Economy, a total of around 212,382 people are employed in Brunei's labor force. Acknowledging this total number, a study population of 212 is proposed for the observed sampling for the study. In the analysis of the data in Section 4, the sample size observed will be presented with the letter "N", for example, N = 221.

Sampling

Though the main objective of the quantitative research method is to achieve generalization, studying the whole population of interest is not possible. Sampling is crucial to enable a researcher to efficiently use resources and obtain detailed information as well as information that is not easily available. In this study, because it is aimed at investigating the acceptance and readiness of working society towards a cashless economy, income earners within Brunei will be targeted as respondents to the survey. A sample size of

212 respondents aims to ensure that it is sufficiently representative and that the results can be generalized and are free from bias. The probability sampling method will be applied to allow statistical interpretations to be made based on the collected data to draw conclusions about the targeted population. Ethical procedures on the survey are applied by respondents indicating their consent to participate in the study before completing the survey. A confidentiality statement will also be included, as well as non-requirement of identifiable information, to ensure that the privacy of their response is protected at the same time.

Development of survey instrument

A survey technique is used to collect information about the continued adoption of cashless payments among earners in Brunei. The survey is divided into two sections with a total of 28 questions that will measure and analyze individual responses and facts. Each question has also been designed to capture as much information as possible based on the respective area of study. Part A of the questionnaire is designed to collect the demographic information of the individual and their use of cashless payments. Part B is designed to capture information on the constructs affecting the continued adoption of cashless payments that have been developed in the research framework, which includes Innovativeness, Optimism, Discomfort, Insecurity, Perceived Ease of Use, and Perceived Usefulness. This part of the survey is measured with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Table 1 shows the summarized structure of the developed questionnaire.

Table 1. Questionnaire Design and Structure.

Section	Category	Details Included
Part A	Respondents Profile	Gender, Age Group, Education Level, Type of Employment, Monthly Income
	Cashless Payment Usage	Types of cashless payments used, Frequency of use
Part B	Dependant and Independent Variables	Constructs of Dependant and Independent Variables

Measurement of Construct

The questionnaire design enables the consistent collection of data, which can be quantified into internally reliable statistics to be assessed and analyzed. In Part C of the questionnaire, statement questions are developed based on previous studies' sources. These questions intend to obtain valid responses that can be evaluated to answer the research questions and reach its objectives. Only individuals responding to using cashless payments will be recorded for Part C of the questionnaire, where respondents were asked to rank their level of agreement on each question statement based on a 5-point Likert scale ranging from 1 (strongly disagree) up to 5 (strongly agree). Tables 2 and 3, respectively, show the 5-point Likert scale and the measurement items with sources.

Table 2. The 5-point Likert scale.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Table 3. Survey questions based on measurement sources.

Measures	Item		Source
Optimism	OPT1	Cashless payments give me flexibility in making payments	(Balakrishnan and Shuib 2021)
	OPT2	Cashless payments fit my lifestyle	
	OPT3	Cashless payments make me more productive in my personal life	(Parasuraman and Colby 2015)
	OPT4	Cashless payments make me more efficient in my profession	
	OPT5	I feel confident that cashless payments will follow through with what I instruct them to do	
Innovativeness	INN1	I find cashless payments to be mentally stimulating	(Parasuraman and Colby 2015)
	INN2	I can usually figure out how to use cashless payments without help from others	
	INN3	I am among the first in my circle of friends to adopt cashless payments when it is introduced	
	INN4	I feel that other people come to me for advice on how to use cashless payments	
Discomfort	DIS1	I feel it is not safe to do transactions online	(Parasuraman and Colby 2015)
	DIS2	Sometimes, I think that cashless payments are not designed for use by ordinary people	
	DIS3	It is embarrassing when I have trouble with cashless payments while other people are watching	
	DIS4	I feel that cashless payments have risks that are not known until after people have used them	
Insecurity	INS1	I feel cashless payments expose my financial information online	(Parasuraman and Colby 2015)
	INS2	I do not feel confident buying or doing business with a place that only accepts cashless payments	
	INS3	Any cashless payment transaction should be confirmed later with a separate communication	
Perceived Ease of Use	PEOU1	I use cashless payments based on my own personal wants	(Subawa et al. 2021)
	PEOU2	In my opinion, the use of cashless payments is flexible (can be used anytime and anywhere)	
	PEOU3	Overall, cashless payments are easy to use	
Perceived usefulness	PU1	I feel cashless payments enable me to make payments effectively	(Balakrishnan and Shuib 2021)
	PU2	I feel cashless payments help to manage my financesbetter	
	PU3	I find cashless payments make it easier to accomplish my payment activities	(Moh'd Taisir Masa'deh et al. 2013)
	PU4	I feel cashless payments area practical option formaking payment	(Teo et al. 2020)
Continued Adoption of Cashless payments	CA1	I have been an active user of cashless payments for some time	(Rahman et al. 2020)
	CA2	I intend to continue using cashless payments in the future	(Teo et al. 2020)
	CA3	I intend to increase thefrequency of cashless payments in my daily life	(Rahman et al. 2020)
	CA4	I will always recommend that others use cashless payments	

Pilot Test

Pilot testing is one of the critical methods for examining the quality of the developed survey instruments. Prior to releasing the instruments, it is crucial to test the research design with a small number of participants through pilot testing. For this study, the instruments were distributed to the first 10 participants and subsequently to another 30 participants, of which responses and feedback were collected to improve the instrument. From the outcome of the pilot testing, one of the improvements made was the addition of question items under cashless payment usage, whereby individuals are required to respond on whether they use cashless payments or otherwise. Cronbach Alpha of the constructs was also tested to examine the reliability of the instruments. Numerous studies refer to the work of George and Mallery (2003) for benchmarking on acceptable Cronbach Alpha coefficient, which is in the range of 0.7 and above. Hair et al. (2020) further reiterated Cronbach's Alpha rule of thumb, as shown in Table 4 below.

Table 4. Cronbach Alpha rule of thumb.

Cronbach's Alpha	Internal Consistency
More than 0.90	Excellent
0.80–0.89	Good
0.70–0.79	Acceptable
0.60–0.69	Questionable
0.50–0.59	Poor
Less than 0.50	Unacceptable

Based on the pilot testing, all constructs are found to be reliable with Cronbach's Alpha values above the 0.70 acceptable level with constructs of Innovativeness, Optimism, Perceived Ease of Use, Perceived Usefulness, and Continued Adoption having high Cronbach's Alpha values. Table 5 below shows the reliability results from the pilot testing.

Table 5. Pilot test—reliability results.

Variables	Constructs	Cronbach Alpha
Innovativeness	4	0.900
Optimism	5	0.974
Discomfort	4	0.876
Insecurity	3	0.717
Perceived Ease of Use	3	0.981
Perceived Usefulness	4	0.962
Continued Adoption of Cashless Payments	4	0.978

Descriptive Analysis:

Before conducting diagnostic or predictive analyses, it is essential to first evaluate the behavior and perceptions of the respondents through a comprehensive descriptive analysis. Descriptive analysis, one of the fundamental types of data analysis, involves applying statistical methods to summarize and interpret datasets, providing valuable insights from raw data. In this study, the data gathered from the questionnaire will undergo detailed examination using measures such as frequency distribution, central tendency (mean, median, mode), standard deviation, and percentiles. These methods will allow for a deeper understanding of the patterns and trends within the data. In addition to analyzing the demographic profile (as presented in Table 6), both independent and dependent variables will be assessed across the full sample. The results from the descriptive analysis will provide a foundational understanding of the data and will be discussed in detail in Section 4, serving as a basis for subsequent analyses.

Table 6. Details of demographic profile.

Demographic Profile	
Gender	• Male • Female
Age group	• Below 20 years • 21–30 years • 31–40 years • 41–50 years • 51–60 years • Above 60 years
Level of education	• Certificate • Undergraduate degree • Postgraduate degree • Professional qualification • Others
Monthly income	• Below BND1000 • BND1000–BND2000 • BND2001–BND3000 • BND3001–BND4000 • BND4001–BND5000 • Above BND5000
Do you use cashless payments (Debit Cards/Credit Cards/Internet Banking/Mobile Banking/E-wallet QR Codes) when making or transferring payments?	• Yes • No.
Two (2) cashless payment modes mostly used	• Credit and/or Debit Card • Internet Banking • Mobile Banking • E-wallet QR Codes

Measurement Model Assessment

Measurement model assessment analyses the quality of measurement to improve its usefulness and accuracy. With the quantitative approach, the constructs of the instrument will be assessed for factor loading, validity, and reliability. Considering the reliability and validity of data-collection instruments is critical when conducting and discussing research. However, it is also crucial to begin the measurement model assessment by examining the factor analysis of the variable items to determine how well the item represents the underlying factor.

Reliability and Validity Analysis

For this study, confirmatory factor analysis will be performed to confirm the validity of the hypotheses and measurement instruments. This will be performed through SmartPLS 4. To ensure how well the applied method of the questionnaire can measure the responses, reliability and validity analysis will be performed. Reliability refers to the consistency of a measure. Studies by Heale and Twycross (2015), in measuring behaviors relating to nursing practices, explain that participants completing a quantitative instrument would result in providing the same response each time it is completed. When analyzing reliability for this study, internal consistency will be assessed to determine the extent to which hall the items on a scale measure a construct. In this sense, Cronbach's Alpha, being the most common test, will be used to determine the internal consistency of the questionnaire with a measurement of test or scale between 0 and 1. According to Tavakol and Dennick (2011), alpha value increases when items correlate. However, it is also important to note that a high alpha coefficient would not represent a high level of internal consistency if there were a lack in the length of the test. Therefore, depending on the assessment

conducted for indicator reliability, composite reliability may also be applied to testing for its reliability. Validity analysis refers to the accuracy of a measure in a quantitative study. In other words, it determines whether results obtained accurately represent the desired measure. In measuring for validity, construct validity and criterion validity will be measured by examining homogeneity and convergent validity, respectively. Discriminant validity will also be measured to determine whether the items measure something else unexpectedly. The heterotrait–monotrait (HTMT) ratio of correlations approach will be applied to determine it. Studies by Henseler et al. (2015) found it to be of superior performance when compared to the Fornell–Larcker criterion.

Structural Model Assessment

Prior to examining the hypothesis proposed, the structural model will be tested. Structural moment assessment focuses on analyzing the relationship between independent variables, dependent variables, the mediator connection between two variables, or moderation analysis with an additional variable affecting the relationship, that include the path coefficient (ß), the coefficient of determination (R^2), and the effect size (F^2) in the assessment of the structural model. For this study, the path coefficient and the coefficient of determination will be analyzed to validate the structural model. The bootstrapping process will be applied to determine whether the path coefficient is statistically significant or otherwise. Assessment will be done through PLS-SEM software, which can evaluate the significance and relevance of path coefficients, upon which the model's explanatory and predictive power can be assessed. It is crucial to note that the initial step in the evaluation of structural model constructs is the assessment of whether there are issues of collinearity. Structural models showing high multicollinearity can affect the path coefficient and change the sign of these coefficient. Therefore, a test for collinearity will be performed prior to structural model assessments which is shown in Figure 4.

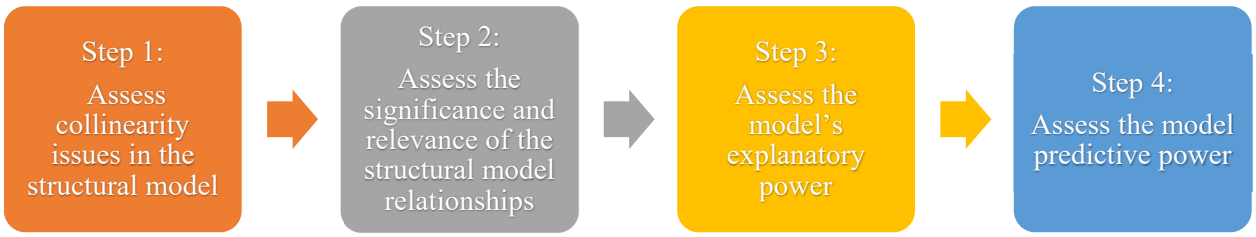

Figure 4. Structural model assessment performed.

5. Finding

The study employed partial least-squares structural equation modeling (PLS-SEM) to rigorously assess the measurement model, a robust technique well suited to complex predictive modeling and theory-building. PLS-SEM is particularly advantageous for handling intricate research models and smaller sample sizes, providing flexibility in managing multiple dependent constructs and accommodating non-normal data distributions. This methodology was chosen to explore the causal relationships between constructs related to the cashless economy, including readiness, security, and technological enhancement. PLS-SEM is ideal for exploratory research where theoretical frameworks may still be developing.

To ensure the reliability and validity of the constructs, several measures were implemented. Reliability was evaluated using Cronbach's Alpha and composite reliability (CR), while convergent validity was confirmed through average variance extracted (AVE) values exceeding the 0.50 threshold. Discriminant validity was assessed using the Fornell–Larcker criterion and the heterotrait–monotrait (HTMT) ratio to ensure that each construct was distinct. For constructs like "Insecurity", which may show lower reliability coefficients, potential inconsistencies were addressed by reviewing item wording, the conceptual domain, and contextual factors of the study.

The structural model analysis was comprehensive, with significant path coefficients clearly linked to the study's hypotheses or research questions. A concise summary of results was presented in tabular format for easy reference, enhancing clarity. The interpretation of findings emphasized their implications for broader research questions, discussing unexpected results or deviations from prior literature. Possible explanations for these anomalies, such as sample characteristics or measurement issues, were explored, and directions for future research were suggested.

Results were integrated with the study's overarching research questions, demonstrating how each statistical outcome contributes to understanding the dynamics of the cashless economy, readiness, security, and technological advancement. This synthesis provided a cohesive narrative, highlighting the study's contributions to theory, practice, and policy. For example, insights on security may inform regulatory changes, while findings on technological enhancement could guide improvements in user interfaces for cashless payment systems.

In conclusion, the Data Analysis section critically evaluated the study's limitations and suggested areas for future research, enhancing the study's scholarly rigor and contributing to ongoing academic discourse. Practical implications were discussed in detail, offering recommendations for policymakers, industry practitioners, and researchers to advance cashless economy initiatives. Strategies for improving security in digital transactions and increasing public readiness for a cashless economy were particularly emphasized (Table 7).

Table 7. Summary of hypotheses and results.

Hypothesis	Path Coefficient	Significance (*p*-Value)	Supported (Yes/No)
H1	0.35	<0.01	Yes
H2	−0.12	0.05	No
H3	0.45	<0.01	Yes
...	...	...	...

Demographic Analysis

A total of 219 responses (N = 219) were collected over 4 weeks through an online survey, forming the quantitative foundation of this study. Initially, the survey was distributed via WhatsApp and email to friends and family, ensuring a broad reach within known networks. To further expand the respondent base, the distribution was later extended to include random participants. To maintain data integrity, all survey questions were set as mandatory, ensuring that each respondent provided complete answers. As a result, all responses received are considered valid for analysis.

Tables 7–9 present the demographic profile of the respondents (=219). According to Table 7, the sample consists predominantly of female respondents, with 144 participants (64.86%), compared to 75 male respondents (33.78%). This gender distribution highlights a higher female representation in the study.

Table 8. Demographic profile by gender and age (N = 219).

Respondent Profiles		Frequency	%	Cumulative %
Gender	Male	75	33.78%	34.2%
	Female	144	64.86%	100%
Age Group	Below 20 Years	12	5.41%	5.50%
	21–30 Years	21	9.46%	15.1%
	31–40 Years	49	22.07%	37.4%
	41–50 Years	112	50.45%	88.6%
	51–60 Years	23	10.36%	99.1%
	Above 60 Years	2	0.90%	100%

Table 9. Demographic profile by education, employment, and income level (N = 219).

Respondent Profiles		Frequency	%	Cum %
Education Level	Certificate/Diploma Level	77	34.68%	35.2%
	Undergraduate Degree	61	27.48%	63.0%
	Postgraduate Degree	68	30.63%	94.1%
	Professional Qualification	11	4.95%	99.1%
	Others	2	0.90%	100%
Employment Status	Employed (Government)	113	50.90%	51.6%
	Employed (Private)	78	35.14%	87.2%
	Self-employed	6	2.70%	90.0%
	Unemployed	16	7.21%	97.3%
	Retired	6	2.70%	100%
Monthly Gross Income	Below BND1000	31	13.96%	14.2%
	BND1000–BND2000	33	14.86%	29.2%
	BND2001–BND3000	36	16.22%	45.7%
	BND3001–ND4000	44	19.82%	65.8%
	BND4001–BND5000	55	24.77%	90.9%
	Above BND5000	20	9.01%	100%

In terms of age distribution, most respondents fall within the 41–50 years age group, accounting for over half of the sample (50.45%). The next largest age group is 31–40 years, representing 22.07% of respondents. Smaller percentages of participants are spread across other age groups: 21–30 years (9.46%), 51–60 years (10.36%), below 20 years (5.41%), and above 60 years (0.90%). This demographic breakdown provides a comprehensive overview of the respondent characteristics, indicating a diverse range of ages, with a concentration in the middle-age categories. These demographic insights will be essential in contextualizing the findings of the study and understanding how different age and gender groups perceive the issues explored.

Table 8 offers a detailed breakdown of respondents' demographic profiles, categorized by education level and employment status. The data shows that most respondents have attained either a Certificate/Diploma or a Postgraduate Degree, representing 34.68% and 30.63% of the sample, respectively. Those with an Undergraduate Degree constitute 27.48% of the respondents. These statistics indicate a highly educated participant pool, with a significant proportion having achieved advanced education.

Regarding employment status, government employees are the largest group, accounting for 50.9% of the respondents. This is followed by those working in the private sector, who make up 35.14% of the sample. A smaller segment, 2.70%, are self-employed, while 9.91% are currently unemployed, totaling 21 individuals. Despite their unemployment status, these individuals are considered valuable for the study as they may still have other income sources and represent potential future members of the workforce.

In terms of income distribution, most respondents fall within the monthly income bracket of BND4001 to BND5000, making up 24.77% of the sample. This is followed by those earning between BND3001 and BND4000, who represent 19.82% of respondents. Including unemployed respondents in the data analysis provides a more comprehensive view of income dynamics and economic participation across various segments of society, highlighting potential future earnings and contributions to the workforce.

To address the research questions, the study focuses on individual customers who use cashless payment methods, using this segment as the sample for further analysis. As illustrated in Table 9, out of the 219 respondents who initially participated, 14 individuals were identified as non-cashless payment users and were therefore excluded from the analysis. The remaining 205 respondents, who use cashless payment methods, provide the basis for the subsequent analysis (Table 10).

Table 10. Respondents based on cashless payment user (N = 219).

Respondent Profiles		Frequency	%
Cashless Payment User	No	14	6.31%
	Yes	205	92.34%

Among these 205 cashless payment users, a significant portion, 34.10%, reports using cashless payments 3 to 5 times a day. In contrast, an equal percentage of respondents, 27.30%, use cashless payments either once or twice a day. This distribution indicates a relatively high frequency of cashless payment usage among a substantial number of respondents.

Regarding the modes of cashless payments preferred by respondents, the majority show a strong preference for credit and debit cards, with 95.10% using them for transactions. Mobile banking follows as the second most popular method, used by 76.60% of respondents. These preferences highlight the dominance of traditional card payments and the growing role of mobile banking in cashless transactions.

Figures 5 and 6 provide visual representations of these findings. Figure 5 depicts a bar graph illustrating the frequency of daily cashless payment usage among the 205 respondents, while Figure 6 presents a bar graph showing the percentage of each cashless payment method utilized. These figures offer a clear overview of the usage patterns and preferences among cashless payment users, facilitating a deeper understanding of the data.

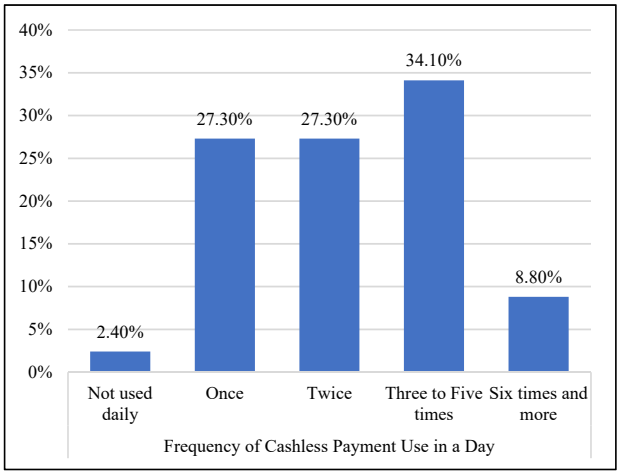

Figure 5. Frequency % of cashless payment use in a day (N = 205).

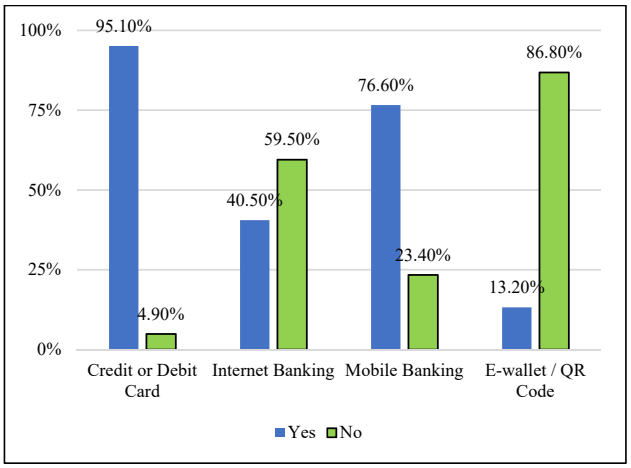

Figure 6. Percentage of cashless payment modes used (N = 205).

Preliminary Data Analysis

Before conducting any statistical analyses, a thorough data screening process was undertaken to ensure the validity and completeness of the collected data. Out of the initial 219 responses, 14 were excluded from the dataset. This exclusion was based on the identification of non-response bias, particularly related to questions concerning indicators central to the study. These 14 respondents were classified as non-cashless payment users, and their responses did not meet the study's criteria for valid data, rendering them unusable for the research.

Extreme Values/Outliers: The accuracy and reliability of statistical analysis depend heavily on the quality of the data, which must be screened for missing values and extreme outliers (Pallant 2020). In this study, data cleaning was performed using SPSS software to identify and address outliers and extreme values, with the goal of achieving a normal distribution of the dataset. Marcoulides and Saunders (2006) emphasize that removing extreme values and outliers is crucial before conducting statistical tests, as they can skew results and affect the validity of the findings.

During the data-cleaning process, a normality test was conducted using SPSS, which identified three cases with extreme values. These cases were removed to ensure that the final dataset adhered to normality assumptions. Consequently, the revised dataset included 203 valid responses. Table 11 illustrates the responses and constructs associated with the extreme values and outliers identified during this process. This careful screening and cleaning of the data ensures that the remaining dataset is robust and suitable for subsequent statistical analysis.

Table 11. Extreme values identified and excluded.

Respondent No.	OPT	INN	DIS	INS	PEOU	PU	CA
36	1	1	2	2	1	1	1
77	2	2	3	2	1	1	2
189	1	1	3	3	2	1	1

Note: One (1) = Strongly Disagree, Two (2) = Disagree, Three (3) = Neutral, Four (4) = Agree, Five (5) = Strongly Agree.

Normality of Data

A normality test is commonly utilized to determine whether the data are collected from a normally distributed population. Research data verified to be normally distributed will enable the study to apply parametric tests such as a t-test, ANOVA, correlation, and regressions for its statistical analysis. Essentially, for parametric tests, the assumption of normality needs to be checked, as the validity of the test depends on it. The normality of data is achieved when the significant critical values are more than 0.05 (p-values> 0.05) (Ghasemi and Zahediasl 2012). One of the techniques in checking for normality of data is the Kolmogorov–Smirnov test performed using the SPSS software. A previous study by Mohd Sapian and Norziah Ismail (2021) applied this test method based on the number of responses collected exceeding50 responses applied this test. Table 12 illustrates the result of the Kolmogorov–Smirnov test performed where all the variables indicate that normal distribution cannot be assumed, as significant p-values are less than 0.05, therefore rejecting the null hypothesis that the data are normally distributed. As the normality of data cannot be assumed, it can be concluded that data analysis will be further tested using the non-parametric techniques of SmartPLS version 4.

Table 12. Result of normality for all constructs.

Variables	Kolmogorov–Smirnov	
	Statistic	**Sig.**
Optimism (OPT)	0.146	0.000
Innovativeness (IN)	0.095	0.000
Discomfort (DIS)	0.080	0.003
Insecurity (INS)	0.117	0.000
Perceived Ease of Use (PEOU)	0.248	0.000
Perceived Usefulness (PU)	0.152	0.000
Continued Adoption of Cashless Payments (CA)	0.117	0.000
H0 = Data are normally distributed		

Descriptive Analysis

Descriptive analysis was constructively used to describe and summarize significant data points as well as identify patterns within the variables to gain accessible insights prior to performing further data analysis (Bush 2020). Utilizing SPSS software, descriptive statistics of the mean, standard deviation, and frequency were used to describe the obtained data. Based on six independent variables and one dependent variable developed for the study, the mean and standard deviation were computed to determine the median and central tendencies. Table 13 shows the measurement of the central tendencies for both the independent and dependent constructs. The analysis was factored based on a5-point Likert scale for each question with a scale from one (strongly disagree) to five (strongly agree). Based on the calculations, independent variables Discomfort, with a low mean of 2.971 and standard deviation of0.74, and Insecurity, with a low mean of 3.02 and deviation of 0.77,indicatethat respondents neither agree nor disagree about having lack of control and feelings of distrust towards cashless payments. Independent variables of Optimism, Innovativeness, Perceived Ease of Use, and Perceived Usefulness showed higher means, ranging from 3.43 to 4.28,with a standard deviation of 0.703 to 0.870, which indicates that most respondents agreed with the questions under each variable. Perceived Ease of Use showed the highest mean of 4.28, giving a further indication that respondents agree that cashless payments are easy to use rather than respondents being disagreeable towards them.

Table 13. Central tendencies for all constructs.

Constructs	Mean	SD
Optimism	3.978	0.870
Innovativeness	3.438	0.753
Discomfort	2.971	0.740
Insecurity	3.023	0.772
Perceived Ease of Use	4.281	0.708
Perceived Usefulness	4.046	0.703
Continued Adoption of Cashless Payments	4.061	0.767

In terms of the dependent variable, Continued Adoption of Cashless Payments had a high mean value of 4.06 with a standard deviation of 0.76. This further shows that most respondents are agreeable to continuing to adopt and use cashless payments.

Dissecting it further into each item of the construct provides further insight into the respondents' level of agreement with the questions posed in the survey distributed. This will be further discussed in Section 5. Table 14 shows the central tendencies according to the question items under each construct.

Table 14. Central tendencies for each indicator.

Constructs	Items		Mean	SD.
Innovativeness	INN1	I find cashless payments to be mentally stimulating	3.41	0.839
	INN2	I can usually figure out how to use cashless payments without help from others	3.82	0.923
	INN3	I am among the first in my circle of friends to adopt cashless payments when it is introduced	3.39	1.134
	INN4	I feel that other people come to me for advice on how to use cashless payments	3.13	0.972
Optimism	OPT1	Cashless payments give me flexibility in making payments	4.24	0.954
	OPT2	Cashless payments fit my lifestyle	4.06	0.913
	OPT3	Cashless payments make me more productive in my personal life	3.91	0.996
	OPT4	Cashless payments make me more efficient in my profession	3.79	0.996
	OPT5	I feel confident that cashless payments will follow through with what I instruct them to do	3.88	0.963
Discomfort	DIS1	I feel it is not safe to do transactions online	2.73	0.870
	DIS2	Sometimes, I think that cashless payments are not designed for use by ordinary people	2.65	0.986
	DIS3	It is embarrassing when I have trouble with cashless payments while other people are watching	3.15	1.125
	DIS4	I feel that cashless payments have risks that are not known until after people have used them	3.35	0.986
Insecurity	INS1	I feel cashless payments expose my financial information online	2.93	1.005
	INS2	I do not feel confident buying or doing business with a place that only accepts cashless payments	2.51	0.998
	INS3	Any cashless payment transaction should be confirmed later with a separate communication	3.63	1.145
Perceived Ease of Use	PEOU1	I use cashless payments based on my own personal wants	4.20	0.780
	PEOU2	In my opinion, the use of cashless payments is flexible (can be used anytime and anywhere)	4.29	0.812
	PEOU3	Overall, cashless payments are easy to use	4.36	0.777
Perceived usefulness	PU1	I feel cashless payments enable me to make payments effectively	4.17	0.787
	PU2	I feel cashless payments help to manage my financesbetter	3.69	0.990
	PU3	I find cashless payments make it easier to accomplish my payment activities	4.13	0.776
	PU4	I feel cashless payments area practical option formaking payment	4.20	0.726
Continued Adoption of Cashless payments	CA1	I have been an active user of cashless payments for some time	4.13	0.856
	CA2	I intend to continue using cashless payments in the future	4.25	0.805
	CA3	I intend to increase thefrequency of cashless payments in my daily life	3.86	0.915
	CA4	I will always recommend that others use cashless payments	4.00	0.855

The measurement model evaluates the relationship between latent variables and their corresponding measurements. As outlined in Section 3, the assessment of construct validity and Cronbach's Alpha will be conducted to ensure the quality of these measurements before proceeding to hypothesis testing. To perform this assessment, both SPSS software and PLS-SEM through SmartPLS V4.0 will be employed. Previous research by Zamil et al. (2022) has demonstrated that PLS-SEM is effective in addressing complex modeling issues, including non-normal data distributions. This dual approach will facilitate a comprehensive evaluation of the measurement model's robustness and validity.

Reliability and Validity Test

Validity and reliability are crucial elements when evaluating an instrument for measurement quality (Kimberlin and Winterstein 2008). As the study implements a questionnaire as the instrument to obtain data for measurement and analysis, its ability to measure consistently needs to be examined. For this study, the assessment begins with evaluating the outer model using PLS-SEM and testing for indicator reliability. Assessment of the outer model supports validity by proving how well each item represents the underlying constructs (Joeseph F. Hair et al. 2014). Items with high outer loadings indicate that the items are more in common and, therefore, support the validity of the construct. Studies by Hair et al. (2014) further recommend that factor loading should be at least 0.708 for the acceptable reliability of its item. Using PLS-SEM, the result of the outer loadings can be found in Table 15, which shows that all 11 items of the dependent variables meet the recommended values of over 0.708, deducing indicator reliability for Continued Adoption, Perceived Ease of Use, and Perceived Usefulness. Loadings for items of the independent constructs, however, showed 5 items with weaker loadings below the cut-off point of 0.708. The weaker indicators are those under constructs of Innovativeness (INN1, INN4), Discomfort (DIS3, DIS4), and Insecurity (INS3). Out of the weak loadings, item INS3 showed an unacceptable loading of −0.071, therefore prompting the removal of this item from the construct before proceeding with further analysis (Joeseph F. Hair et al. 2011). The numbers in blue indicated as higher score of Reliability and Validity Test of indicators.

Though SPSS's Cronbach's Alpha was initially applied for the pilot test performed in Section 3, studies by Haji-Othman and Yusuff (2022) suggest using PLS-SEM, which prioritizes the items according to their individual reliability. This also aligns with the assessments recommended by Hair et al. (2020) based on the results of outer loadings. Table 15 shows further reliability after discarding item INS3 from the constructs and running the test using PLS-SEM. All constructs adopted in the questionnaires are found to be acceptably reliable with Cronbach's Alpha. However, based on composite reliability values, there was a lack of reliability found under the Insecurity construct, as composite reliability values are acceptable for above 0.70 (Joeseph F. Hair et al. 2020). Nevertheless, for this study, the reliability value for Insecurity is accepted based on Cronbach's Alpha. However, it is also vital to acknowledge the possibility of the redundancy of the items should internal consistency result in values higher than 0.95. For the constructs assessed, the highest reliability values are the Optimism constructs at 0.939, which could be due to the high number of items for the construct. Nevertheless, the reliability of all the constructs is found to be acceptable, and items are usable for further testing. In assessing validity, convergent validity was conducted using the SmartPLS Software to find out how far measures that are expected to be theoretically related correlate with one another in practice. Average variance extracted (AVE) is one of the common measurements to evaluate convergent validity. Hair et al. (2014) state that convergent validity is supported when each item has outer loadings above 0.70 and when each construct's average variance extracted (AVE) is 0.50 or higher. As shown in Table 16, validity testing results in all variables with AVE values reaching above the 0.5 cut-off point, meaning that these constructs have passed the validity test. High AVE values of 0.792 for Optimism and 0.778 for Continued Adoption imply that both constructs revealed more variance instead of errors in constructs.

Table 15. Outer loadings results for indicator reliability.

	INN	OPT	DIS	INS	PEOU	PU	CA
INN1	0.674	0.434	−0.043	−0.088	0.398	0.429	0.357
INN2	0.803	0.482	−0.157	−0.285	0.507	0.463	0.438
INN3	0.843	0.396	−0.15	−0.333	0.364	0.452	0.509
INN4	0.697	0.351	−0.062	−0.289	0.253	0.39	0.413
OPT1	0.477	0.868	−0.092	−0.221	0.593	0.5	0.559
OPT2	0.491	0.885	−0.231	−0.313	0.517	0.517	0.598
OPT3	0.516	0.916	−0.187	−0.291	0.537	0.57	0.547
OPT4	0.497	0.879	−0.163	−0.321	0.455	0.497	0.513
OPT5	0.491	0.902	−0.176	−0.307	0.49	0.516	0.537
DIS1	−0.203	−0.209	0.742	0.475	−0.07	−0.139	−0.243
DIS2	−0.071	−0.195	0.85	0.4	−0.102	−0.161	−0.248
DIS3	−0.043	0.02	0.65	0.213	−0.039	−0.109	−0.025
DIS4	−0.05	−0.065	0.618	0.406	0.088	−0.056	−0.086
INS1	−0.222	−0.252	0.504	0.796	−0.154	−0.224	−0.302
INS2	−0.315	−0.286	0.458	0.882	−0.219	−0.302	−0.357
INS3	0.023	0.037	0.182	−0.071	0.121	0.115	0.057
PEOU1	0.476	0.469	−0.059	−0.145	0.803	0.55	0.543
PEOU2	0.387	0.489	−0.059	−0.23	0.896	0.658	0.577
PEOU3	0.49	0.565	−0.125	−0.287	0.91	0.643	0.674
PU1	0.534	0.461	−0.063	−0.322	0.631	0.793	0.603
PU2	0.453	0.459	−0.253	−0.254	0.367	0.743	0.489
PU3	0.447	0.532	−0.161	−0.289	0.64	0.9	0.666
PU4	0.472	0.481	−0.154	−0.275	0.66	0.857	0.64
CA1	0.509	0.558	−0.224	−0.385	0.625	0.648	0.879
CA2	0.466	0.6	−0.203	−0.348	0.678	0.682	0.933
CA3	0.518	0.492	−0.196	−0.309	0.512	0.566	0.8
CA4	0.518	0.533	−0.253	−0.377	0.607	0.682	0.912

Table 16. Reliability and validity results (after exclusion of indicator INS3).

Constructs	Cronbach's Alpha	CR	AVE
Innovativeness	0.768	0.842	0.574
Optimism	0.939	0.950	0.792
Discomfort	0.729	0.810	0.519
Insecurity	0.708	0.620	0.472
Perceived Ease of Use	0.846	0.904	0.759
Perceived Usefulness	0.846	0.895	0.681
Continued Adoption of Cashless Payments	0.904	0.933	0.778

Fornell and Larcker (2016) suggest that discriminant validity is established if a latent variable reveals more variance in its items instead of other constructs within the same model. For this study, the heterotrait–monotrait (HTMT) ratio of correlation was relied on in accordance with the criteria developed by Henseler et al. (2015) to further assess for discriminant validity. Numerous studies suggest HTMT is the superior method in performing the analysis with higher sensitivity rates to detect discriminant validity when compared to the Fornell and Larcker method. Hair et al. (2020) recommend the cut-off points of 0.85 and 0.90 as acceptable values when interpreting the results of HTMT. As shown in Table 17 for HTMT results, all values are below the recommended value of 0.90, which confirms that all constructs have acceptable levels of discriminant validity.

Table 17. Discriminant validity—heterotrait–monotrait criterion.

	CA	DIS	INN	INS	OPT	PEOU	PU
Continued Adoption							
Discomfort	0.250						
Innovativeness	0.694	0.180					
Insecurity	0.467	0.774	0.424				
Optimism	0.673	0.215	0.657	0.377			
Perceived Ease of Use	0.786	0.127	0.635	0.270	0.656		
Perceived Usefulness	0.832	0.226	0.725	0.389	0.660	0.827	

Structural Model Assessment

A structural model represents the theory of the relationship between constructs and can only be analyzed when measurement model assessments are successfully validated. Through structural model assessment, hypothesis testing will be performed to conclude hypothesis acceptance and rejections. For this study, structural model assessment was conducted in PLS-SEM due to its ability to evaluate the explanatory and predictive power of the model. Studies by Hair et al. (2020) include path coefficient, coefficient of determination, and the effect size in the model assessment.

Multicollinearity

When assessing the structural model, it is essential to check for collinearity. According to Hair et al. (2020), the structural model with high multicollinearity becomes a problem as it affects the size and the positive or negative signs of beta coefficients (Joeseph F. Hair et al. 2020). To check for collinearity, the correlation strength between independent variables will be examined. In that sense, the variance inflation factor (VIF) will be used to identify problems of multicollinearity, where further adjustments to the structural model can be made to resolve the issues. Table 18 shows the inner VIF values resulting from PLS-SEM and found that all VIF indicators are below 3.0, indicating that multicollinearity is unlikely to become a problem. However, also suggest that VIF values of 5 and above indicate collinearity problems. If this occurs, eliminating or combining indicators is one of the measures that can be undertaken to reduce the collinearity further.

Table 18. Results of variance inflation factor (VIF).

Inner Model	VIF
Innovativeness -> Perceived Ease of Use	1.501
Innovativeness -> Perceived Usefulness	1.628
Optimism -> Perceived Ease of Use	1.495
Optimism -> Perceived Usefulness	1.805
Discomfort -> Perceived Ease of Use	1.419
Discomfort -> Perceived Usefulness	1.421
Insecurity -> Perceived Ease of Use	1.558
Insecurity -> Perceived Usefulness	1.558
Perceived Ease of Use -> Perceived Usefulness	1.657
Perceived Ease of Use -> Continued Adoption of Cashless Payments	2.015
Perceived Usefulness -> Continued Adoption of Cashless Payments	2.015

Regression Analysis

In further evaluating the quality of the model, variance in the dependent variables, which is based on the independent variables' predictions, must be examined. In assessing this, Joeseph F. Hair et al. (2014) recommend using PLS-SEM, where the R-squared (R^2) method was applied to measure the structural model's accuracy in prediction. The study also suggests a rule of thumb on the levels of effects for R^2 to be acceptable, which are represented as 0.75 for a substantial level, 0.50 for a moderate level, and 0.25 as a weak level of predictive accuracy.

As shown in Table 19, the R^2 values of Continued Adoption (0.588) and Perceived Usefulness (0.588) are considered moderate, whereas Perceived Ease of Use (0.397) is weak. Explaining further PEOU results for R^2, it can be suggested that the 38.9% change in PEOU can be predicted by the independent variables of TRI. Another study by Chin (1998), however, argues that acceptable levels of R^2 can be recommended as 0.67 for substantial, 0.33 as a moderate level, and 0.19 as a weak level. This may also indicate that PEOU results for R^2 are of moderate level, whereas R^2 values for CA and PU are considered substantial levels. Overall, TR constructs explained that the variance to continue cashless payment is 58.60% (R^2 = 0.595). Based on this assessment, it can be concluded that the model meets adequate levels of predictive accuracy.

Table 19. R^2 results for all dependent variables.

Dependant Variables	R-Square
Continued Adoption of Cashless Payments	0.595
Perceived Ease of Use	0.397
Perceived Usefulness	0.588

Hypothesis Testing

Hypothesis testing is most common in any study as it allows researchers to test their theories, verifying the accuracy of their assumptions and analysis, which then consequently can be developed into strategies and action plans for the benefit of their organization or businesses. Following the assessment of the collinearity and R^2 effects, its structural path is evaluated for the size and significance of its coefficients to enable testing of the hypothesis. Each path connecting 2 constructs within the structural model represents a hypothesis. In testing for the research objectives, the hypothesis of TRI constructs will be conducted to influence the continued adoption of cashless payments. Using the PLS-SEM bootstrapping method, t-values were generated for path coefficients significance with a significance level of 5% ($p < 0.05$), and threshold values for significance level are set as t-value < 1.65. As shown in Figure 7 below for the structural path of the hypothesis, not all beta coefficients are found to be significant, therefore challenging the hypothesis proposed.

As shown in Table 20, the path coefficient between the two constructs was calculated to validate the proposed hypothesis. H1 and H2 evaluate whether Innovativeness positively influences the Perceived Ease of Use of cashless payments and Perceived Usefulness, respectively. The results show that Innovativeness has a significant and positive relationship with PEOU (ß = 0.277, t = 3.643, $p < 0.000$) and PU (ß = 0.210, t = 3.139, $p < 0.002$). This indicates that an increase in Innovativeness will increase both Perceived Ease of Use and Perceived Usefulness for a cashless payment user. Thus, the hypothesis proposed for the TRI construct for Innovativeness is supported. Further supporting this outcome are previous studies that also found the same results (Chen et al. 2012). Hypotheses 3 and 4 evaluate whether Optimism positively influences the Perceived Ease of Use of cashless payments and Perceived Usefulness, respectively. Results found that Optimism has a positive relationship and significant relationship with the Perceived Ease of Use (ß = 0.433, t = 4.825, $p < 0.000$) only. Results for Optimism's relationship with Perceived Usefulness showed that it did not fulfill both significant levels of t-values and *p*-values to support the hypothesis despite its path coefficient result, which showed a significant positive effect (ß = 0.152, t = 1.777, $p < 0.076$). Hence, only H3 was supported.Hypotheses5 and 6 evaluate whether Discomfort negatively influences the Perceived Ease of Use of cashless payments and Perceived Usefulness, respectively. As shown in Table 19, the TRI construct for Discomfort is found to have a negative effect on Perceived Usefulness (β = −0.058, t = 0.716, $p < 0.474$) only, whereas it showed a positive effect on the Perceived Ease of Use (β = 0.035, t = 0.351, $p < 0.726$). Furthermore, results also found no significant relationship between Perceived Ease of Use and Perceived Usefulness where all values of significance were not fulfilled. Due to the lack of significant results, the hypothesis for Discomfort was not supported in totality. Hypotheses

7 and 8 evaluate whether Insecurity negatively influences the Perceived Ease of Use of cashless payments and Perceived Usefulness, respectively. Results showed that Insecurity has a negative effect on the Perceived Ease of Use (β = −0.016, t = 0.174, $p < 0.862$)) and Perceived Usefulness (β = −0.061, t = 1.022, $p < 0.307$). However, despite this, no significant relationship was found with both dependent variables. Therefore, the overall hypothesis for the Insecurity construct could also not be supported. Hypothesis 9 evaluates whether there is a significant positive relationship between the Perceived Ease of Use and Perceived Usefulness. Results showed a strong, significant, and positive relationship between the two constructs of the Technology Acceptance Model (ß = 0.495, t = 8.304, $p < 0.00$). This result indicates that any increase in Perceived Ease of Use will directly increase a user's Perceived Usefulness on cashless payments. Thus, hypothesis H9 is supported. Many studies have also found the same results, thus supporting the hypothesis further (Chan et al. 2020; Kınış and Tanova 2022). Hypotheses 10 and 11 evaluate the relationship between the Perceived Ease of Use and Continued Adoption and Perceived Usefulness and Continued Adoption of Cashless Payment, respectively. Results showed that all relationships are positively significant. Results show that both constructs have a significant and positive relationship with Continued Adoption. In a comparison of the two constructs, Perceived Usefulness is found to have higher coefficients and t-values (ß = 0.490, t = 6.179, $p < 0.00$) than Perceived Ease of Use (ß = 0.342, t = 3.495, $p < 0.00$). This indicates a superior relationship between Continued Adoption and Perceived Usefulness. This consequently supports H10 and H11 and rejects the null hypothesis.

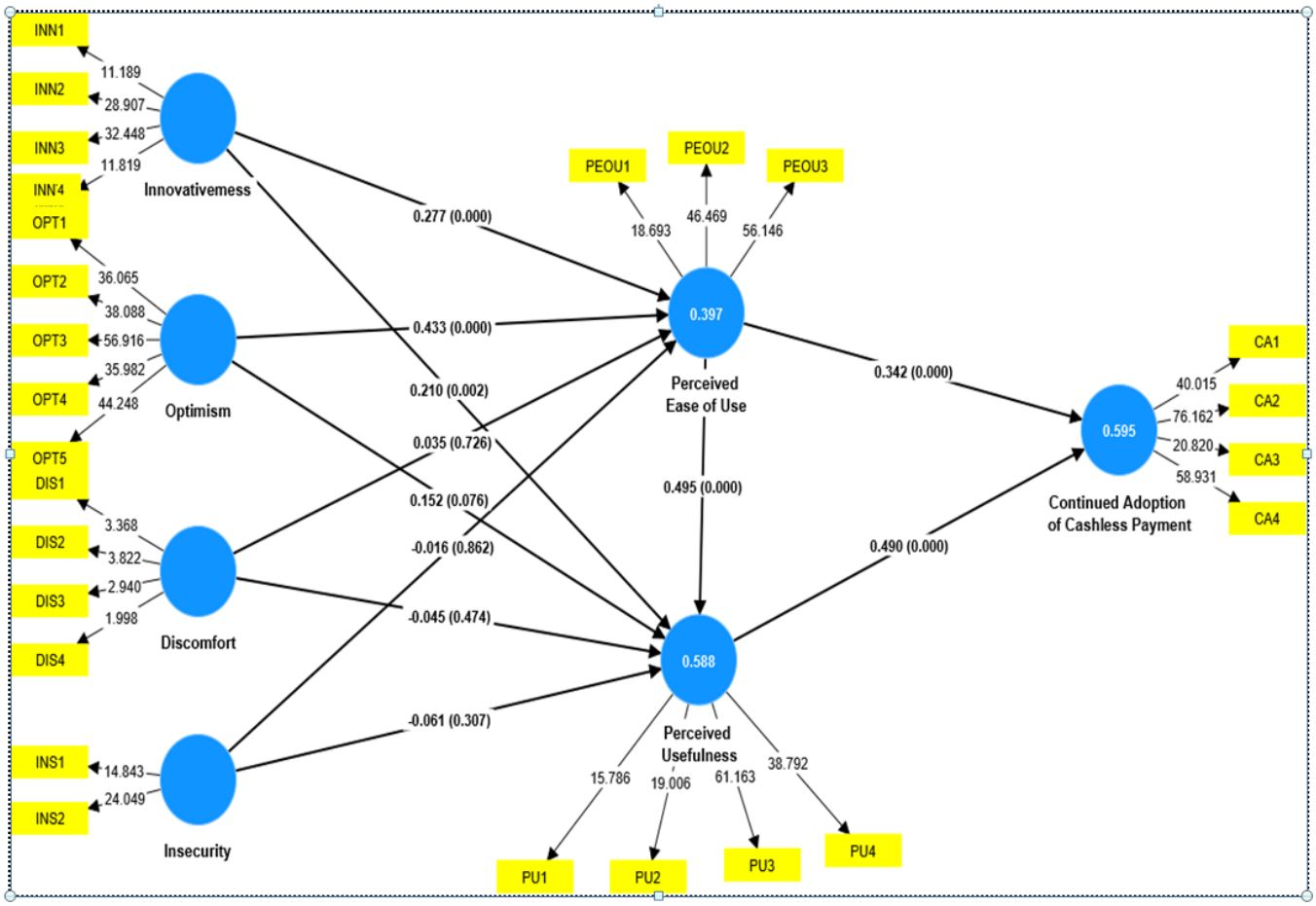

Figure 7. Structural model result (bootstrapping).

Table 20. Hypothesis results.

Hypothesis		R^2	ßetaCoefficients	T Statistics	*p*-Values
H1	INV --> PEOU		0.277	3.643	0.000
H2	INV --> PU		0.210	3.139	0.002
H3	OPT --> PEOU		0.433	4.825	0.000
H4	OPT --> PU		0.152	1.777	0.076
H5	DIS --> PEOU		0.035	0.351	0.726
H6	DIS --> PU		−0.045	0.716	0.474
H7	INS -- PEOU		−0.016	0.174	0.862
H8	INS -- PU		−0.061	1.022	0.307
H9	PEOU --> PU	0.595	0.495	8.304	0.000
H10	PEOU --> CA	0.397	0.342	3.495	0.000
H11	PU --> CA	0.588	0.490	6.179	0.000

To summarize the hypothesis testing, results imply that only the TRI drivers Innovativeness and Optimism directly and significantly affect Perceived Ease of Use and Perceived Usefulness, whereas TRI inhibitor factors do not directly and significantly affect the dependent variables. The summarized hypothesis decisions are shown in Table 21 below. Findings on this will be elaborated further in Section 5 and are supported by previous literature.

Table 21. Summarized hypothesis testing results.

	Hypothesis	Decision
H1	Personal Innovativeness about technology leads to high perceived ease of use toward continued adoption of cashless payments	Supported
H2	Personal Innovativeness about technology leads to high perceived usefulness towards continued adoption of cashless payments	Supported
H3	Personal Optimism about technology significantly leads to high perceived ease of use towards continued adoption of cashless payments	Supported
H4	Personal Optimism about technology significantly leads to high perceived ease of use towards continued adoption of cashless payments	Not Supported
H5	Personal Discomfort withtechnology significantly leads to low perceived ease of use towards continued adoption of cashless payments	Not Supported
H6	Personal Discomfort withtechnology significantly leads to low perceived ease of use towards continued adoption of cashless payments	Not Supported
H7	Personal Insecurity about technology significantly leads to low perceived ease of use towards continued adoption of cashless payments	Not Supported
H8	Personal Insecurity about technology significantly leads to low perceived ease of use towards continued adoption of cashless payments	Not Supported
H9	There is a significant positive relationship between Perceived Ease of Use and Perceived Usefulness towards continued adoption of cashless payments	Supported
H10	There is a significant positive relationship between Perceived Ease of Use and continued adoption of cashless payments	Supported
H11	There is a significant positive relationship between Perceived Usefulness and the continued adoption of cashless payments	Supported

6. Discussion

The study examines the factors influencing Technology Acceptance within the context of a cashless economy, revealing significant roles played by Optimism, Perceived Ease of

Use (PEOU), and Perceived Usefulness (PU). These factors offer critical insights into user behavior and technology adoption patterns.

Influencing Factors:

- Optimism: Contrary to initial expectations, the impact of Optimism on Perceived Usefulness was found to be insignificant. This result diverges from previous literature, suggesting that Optimism may not be as influential in shaping perceptions of usefulness in the realm of cashless payments. Potential explanations for this finding include users' skepticism about new technologies or the overshadowing influence of perceived risks, which might undermine the positive effect of Optimism.
- Perceived Ease of Use (PEOU): PEOU demonstrates a significant impact on both PU and Technology Acceptance, affirming its crucial role. This finding aligns with the Technology Acceptance Model (TAM), which posits that users are more likely to embrace technology if they find it easy to use. Ease of Use thus remains a pivotal factor in technology adoption.
- Perceived Usefulness (PU): PU continues to be a robust predictor of Technology Acceptance, consistent with prior research. Users' perceptions of the benefits and efficiencies gained from using cashless payment systems strongly drive their adoption behavior. This reinforces the foundational aspect of TAM that emphasizes the importance of perceived benefits in Technology Acceptance.

One of the primary objectives of this study is to investigate how income earners perceive the cashless economy using the research model developed. To begin, we will discuss the central tendencies analyzed in Section 4, which measure the average perceptions of respondents based on Likert-scale responses for each variable.

The analysis of central tendencies reveals that among the various factors influencing the continued use of cashless payments, the constructs of Optimism, Perceived Ease of Use (PEOU), and Perceived Usefulness (PU) exhibit high median values. Notably, PEOU has the highest median value among these constructs, indicating that respondents generally find cashless payments to be easy to use. This suggests that Ease of Use is a critical factor driving the acceptance and continued use of cashless payment systems.

In addition to the central tendencies, hypothesis testing results are discussed to further address the research objectives. This involves evaluating whether the assumptions made in the research model are supported by previous studies. The hypothesis testing reveals that only certain personality dimensions of Technology Readiness have a significant impact on Technology Acceptance and Continued Adoption. This finding highlights that not all aspects of Technology Readiness equally influence users' acceptance and ongoing use of cashless payments.

Table 22 provides a summary of the hypothesis testing results, as analyzed in Section 4. It presents a clear overview of which hypotheses were supported or refuted by the data, allowing for a better understanding of how different factors contribute to Technology Acceptance and Continued Adoption in the context of a cashless economy.

Table 22. Summarized hypothesis testing results.

	Hypothesis	Findings	Conclusion
H1	INN -> PEOU	Positive and Significant	Supported
H2	INN -> PU	Positive and Significant	Supported
H3	OPT -> PEOU	Positive and Significant	Supported
H4	OPT -> PU	Positive but Insignificant	Not supported
H5	DIS -> PEOU	Positive and Insignificant	Not supported
H6	DIS -> PU	Negative but Insignificant	Not supported
H7	INS -> PEOU	Negative but Insignificant	Not supported
H8	INS -> PU	Negative but Insignificant	Not supported
H9	PEOU -> PU	Positive and Significant	Supported
H10	PEOU -> CA	Positive and Significant	Supported
H11	PU -> CA	Positive and Significant	Supported

Examining the influencing factors of Innovativeness and Optimism on the Continued Adoption of Cashless Payments: The study hypothesized that Innovativeness would significantly lead to higher acceptance of cashless payments, thus fostering continued adoption. The findings supported this hypothesis, revealing a positive and significant relationship between Innovativeness and Technology Acceptance factors. The beta coefficient results demonstrated a robust positive relationship between Innovativeness and Technology Acceptance, suggesting that cashless payment users in Brunei's working society are likely to embrace new technologies and explore them ahead of others. These users, being technologically adept, expect innovations to meet their demands effectively. This aligns with previous research by Erdoğmu and Esen (2011) and Sohaib et al. (2020), which also highlighted the significant impact of Innovativeness on Technology Acceptance.

Similarly, Optimism was hypothesized to significantly influence the Perceived Ease of Use and Perceived Usefulness of cashless payments. The study partially confirmed this hypothesis, finding a positive and significant relationship between Optimism and Perceived Ease of Use but an insignificant relationship between Optimism and Perceived Usefulness. This indicates that while Optimism impacts users' Perceived Ease of Use, it does not significantly affect their belief in the efficiency of cashless payments for managing daily life. This result deviates from previous studies, such as Parasuraman and Colby (2015), and may be attributed to the shift in consumer behavior post-pandemic. Users might have reverted to cash payments due to reduced COVID-19 restrictions, perceiving cash as less risky and more straightforward compared to cashless options. This shift may explain why Optimism does not strongly influence Perceived Usefulness.

Examining the Influencing Factors of Discomfort and Insecurity on Continued Adoption of Cashless Payments: Discomfort and Insecurity were hypothesized to lead to lower Perceived Ease of Use and Perceived Usefulness of cashless payments. However, the study found that the relationships between these TRI inhibitors and both dimensions of Technology Acceptance were insignificant. Interestingly, Discomfort had a positive beta coefficient for Perceived Ease of Use, contrary to the expected negative direction. This unexpected result could stem from response bias or misunderstandings of survey items. Despite this, the negative impact of Discomfort on Perceived Usefulness and the negative effect of Insecurity on both dimensions of Technology Acceptance were consistent with predictions. This suggests that, despite discomfort and insecurity, users may still find cashless payments beneficial and convenient, especially if they have already integrated these payment methods into their routines during the pandemic.

Examining the Direct Effects of Perceived Ease of Use and Usefulness on Continued Adoption of Cashless Payments: The study hypothesized a significant positive relationship between both dimensions of Technology Acceptance and Continued Adoption of Cashless Payments. The results confirmed this hypothesis, showing a strong positive relationship between Perceived Ease of Use, Perceived Usefulness, and Continued Adoption. The beta coefficients indicated that these dimensions are closely linked, with Perceived Ease of Use and Perceived Usefulness having the highest median values, reflecting their importance in users' continued adoption of cashless payments. These findings align with previous research by Walczuch et al. (2007), Davis (1989), and Zamil et al. (2022), emphasizing the role of Ease of Use and Usefulness in sustaining cashless payment adoption.

Managerial Implications: This research underscores that personal traits contributing to the acceptance of new technologies may not necessarily correlate with perceptions of Ease of Use and Usefulness. For income earners, the adoption of cashless payments during the COVID-19 pandemic was driven more by immediate needs and safety concerns than by long-term perceptions of technology benefits. As society moves into an endemic stage, the focus shifts from Ease of Use and Usefulness to personal comfort and trust in cashless payments. The study highlights the importance of organizations, including governing bodies, financial institutions, and service providers, in enhancing user assurance regarding cashless payment technologies. The observed increase in cashless payment users, as demonstrated by trends from local banks in Brunei, indicates a growing acceptance. To

maintain and boost this trend, service providers should focus on increasing awareness and understanding of cashless payments, ensuring robust security measures, and addressing users' concerns about fraud and identity theft. By improving consumer knowledge and confidence, providers can support the continued growth and acceptance of cashless payment systems.

7. Conclusions and Recommendations

7.1. Conclusions

This research sought to evaluate the acceptance and readiness of Brunei's working population toward cashless payments following the COVID-19 pandemic and to examine the trends influencing the continued adoption of cashless transactions in the country. As Brunei transitions to an endemic stage, the emphasis on technology adoption has shifted from health-related "push factors" to user-driven "pull factors" based on preferences and perceived benefits.

The study's findings indicate that different dimensions of Technology Readiness affect Perceived Usefulness and Perceived Ease of Use in distinct ways. Innovativeness positively impacts both Perceived Usefulness and Ease of Use, while Optimism influences Perceived Ease of Use alone. In contrast, the dimensions of Discomfort and Insecurity do not significantly impact Perceived Usefulness or Ease of Use, which challenges previous research findings.

In conclusion, understanding how personality traits influence Technology Acceptance is crucial. Service providers should factor these relationships into the development and implementation of cashless payment systems. Strategies should be devised to enhance or maintain Technology Readiness according to users' personalities, as these traits significantly impact adoption and usage. Consumer acceptance is essential for planning and investing in new technologies, given the substantial time and cost involved for service providers. The ongoing adoption of cashless payments brings notable benefits, particularly for the banking sector, such as reduced operating costs. The growth of cashless branches in Brunei reflects increasing consumer engagement with cashless transactions and underscores the broader shift towards a cashless economy.

7.2. Recommendations

It is important to recognize that some consumers in Brunei remain hesitant about the current cashless payment options available in the market. Understanding individuals' ability to learn, accept, and eventually adapt to new technology is crucial. During the COVID-19 pandemic, the Brunei government accelerated the shift towards a cashless economy due to movement restrictions and standard operating procedures (SOPs) implemented to protect the population from the infectious disease. Various organizations, including government-linked companies, banks, service providers, and businesses, adopted different strategies to raise awareness about cashless payments, helping users gradually learn and adapt to these systems through campaigns and informational efforts.

From two perspectives—organizations and consumers—the adoption of cashless payments presents different considerations. For consumers, the use of physical credit or debit cards remains a fundamental option for cashless transactions, but it may not be universally preferred. Concerns about security and the potential compromise of private and confidential information persist, affecting the continued adoption of cashless payments. Recognizing that even basic cashless payment modes like credit or debit cards can evoke insecurity, it is crucial for major providers such as banks and fintech companies to enhance the safety and efficiency of financial transactions. This can be achieved by reducing consumer insecurity through robust fraud detection, secure authentication processes including biometrics, and protective measures such as transaction limits. Employing reliable third-party secure payment systems can also bolster consumer confidence.

Awareness and knowledge about the benefits of cashless payments—such as Ease of Use and Usefulness—are essential in not only reassuring existing users but also encouraging

those who have not yet adopted these methods. By combining increased security measures with educational efforts, organizations can enhance consumer confidence and drive greater adoption of cashless payments. To support this, a proposed framework for the continued adoption of cashless payments, based on user acceptance and readiness, is suggested (see Figure 8). This framework could serve as a reference for future studies and guide organizations in fostering the continued use of cashless payments in Brunei. With ongoing initiatives by the government and various organizations, Brunei's cashless transaction market is poised for significant growth, contributing to the realization of the Smart Nation Agenda and Wawasan 2025.

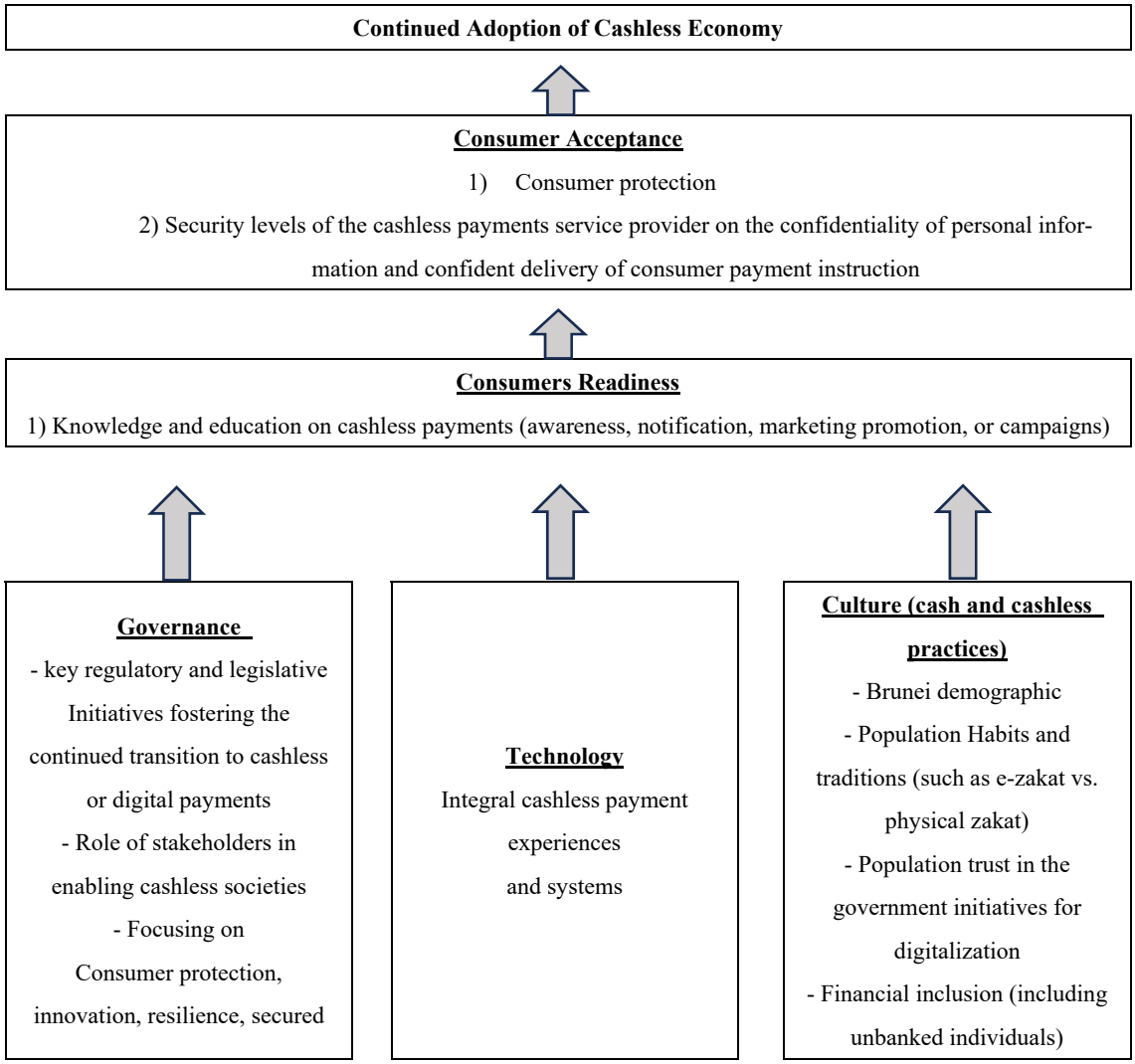

Figure 8. Suggested cashless economy framework.

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