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Unveiling Mobile Wallet Adoption Patterns AmongKelantanese B40: An Approach of Machine Learning

Wan SaifulAzzam Wan Ismail [1],Muhammad FaizalSamat[2],
NurAmalinaAwang[3], NorazlanAnnual [4]

[1]College of Computing, Informatics and Mathematics, UniversitiTeknologi MARA
[2,4]Faculty of Business and Management, UniversitiTeknologi MARA
[3]AkademiPengajianBahasa, UniversitiTeknologi MARA

Abstract

Mobile wallet adoption among the B40 population in Kelantan, Malaysia, presents a unique challenge despite the significant attention mobile wallets have gained as a convenient and secure payment method, especially during the COVID-19 pandemic. This paper explores the application of unsupervised machine learning models to understand and address the low adoption rates of mobile wallets among this population segment. By leveraging unsupervised machine learning techniques, researchers aim to uncover patterns and relationships within the dataset related to factors influencing mobile wallet adoption. The study utilizes data collected on income level, education, employment status, geographical location, perceived usefulness, subjective norms, financial costs, data privacy, security, trust, awareness, risk, technology skills, complexity, relative convenience, and relative advantage among the Kelantanese B40 population. Through clustering algorithms, such as the self-organizing map algorithm, insights into mobile wallet adoption behavior and preferences are gained, enabling the development of targeted strategies to promote adoption and optimize mobile wallet services for this specific demographic. The study underscores the importance of government support, financial literacy programs, improved infrastructure, and user-friendly platforms in fostering mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic. This research contributes to the broader goal of financial inclusion and the transition towards a cashless society in Malaysia, with implications for similar economies facing similar challenges. Future research opportunities include exploring the long-term impact of mobile wallet adoption and incorporating perspectives from merchants and businesses in the adoption process.

Keywords:B40 Groups, Machine Learning, Mobile Wallet.

1. Introduction

In recent years, mobile wallets have gained significant attention as a convenient and secure payment method, especially during the COVID-19 pandemic. However, the adoption of mobile wallets among the B40 population in Kelantan, Malaysia has been relatively low. This presents a unique challenge for policymakers and financial institutions in addressing the specific needs and circumstances of this population segment.

In addition to studying the adoption of mobile wallets, it is also important to explore the application of unsupervised machine learning models in this context. Unsupervised machine learning models are a type of algorithm that does not require labeled data for training, allowing for the discovery of patterns and relationships within a dataset.

By leveraging unsupervised machine learning models, researchers and mobile wallet service providers can gain valuable insights into consumer behavior and preferences. These models can help uncover hidden patterns in consumer adoption of mobile wallets, leading to a better understanding of how users perceive and interact with these digital payment solutions.

Furthermore, unsupervised machine learning models can assist in identifying factors that contribute to the adoption of mobile wallets.

This can aid banks, telecommunication companies, retail industries, and financial technology startups in developing more compelling mobile wallet products and reaching the full potential of this technology in the marketplace. The self-organizing map algorithm, a popular unsupervised learning approach, can be

utilized to analyze and cluster the data collected on mobile wallet adoption among Kelantanese B40 individuals during the COVID-19 pandemic.

This approach provides insights into the various factors influencing mobile wallet adoption and enables targeted strategies to enhance adoption rates. By applying unsupervised machine learning models such as clustering and hidden Markov models, researchers can gain a deeper understanding of the adoption patterns and behaviors of Kelantanese B40 individuals when it comes to mobile wallet usage. These insights can help mobile wallet service providers and researchers design more user-friendly mobile wallet apps and services, catered specifically to the needs and preferences of Kelantanese B40 individuals.

By leveraging unsupervised machine learning models, such as the self-organizing map algorithm, researchers could analyze and cluster data on mobile wallet adoption among Kelantanese B40 individuals, providing a comprehensive understanding of their perception and usage of mobile wallets. This could lead to the development of targeted marketing strategies to promote mobile wallet adoption among this specific population segment. Unsupervised machine learning models offer a valuable tool in uncovering patterns, relationships, and factors influencing mobile wallet adoption among Kelantanese B40 individuals during the COVID-19 pandemic. Using an unsupervised machine learning model based on the self-organizing map algorithm, researchers could uncover hidden patterns in mobile wallet adoption among Kelantanese B40 individuals, allowing for a deeper understanding of their adoption behavior and preferences. In summary, an unsupervised machine learning model based on the self-organizing map algorithm can provide valuable insights into the factors influencing mobile wallet adoption among Kelantanese B40 individuals during the COVID-19 pandemic.

This could help the development of targeted strategies to increase adoption rates and optimize mobile wallet services for this specific population segment. By adopting the Unified Theory of Acceptance and Use of Technology Model, researchers were able to assess the factors influencing mobile wallet adoption among Kelantanese B40 individuals during the COVID-19 pandemic. Additionally, by considering individual factors such as habit, social influence, effort expectancy, and hedonic motivation, researchers can gain a comprehensive understanding of the behavioral intention and usage behavior of Kelantanese B40 individuals towards mobile wallet adoption (Paat et al., 2022).

A. The Socio-Economic Class B40: An Overview

The B40 socio-economic class refers to the bottom 40% of household income earners in Malaysia. These individuals typically face financial challenges and have limited access to resources and opportunities. Understanding the adoption behavior of mobile wallets within this population segment is crucial, as it can pave the way for greater financial inclusion and empowerment.

In order to provide an overview of the B40 socio-economic class, it is important to consider factors such as income level, education, employment status, and geographical location. These factors can influence their access to and familiarity with mobile payment technologies.

Income level plays a significant role in determining the financial capacity of B40 individuals. Individuals in the B40 group often have lower incomes and may struggle with financial constraints. This can make it more challenging for them to adopt new technologies, including mobile wallets. Education is another crucial factor in understanding the B40 population segment. Individuals with lower levels of education may have limited digital literacy skills and may be less familiar with mobile payment technologies. Employment status is also critical to consider when examining the B40 population's adoption of mobile wallets. Unemployment rates and job stability can impact the willingness and ability of B40 individuals to adopt mobile wallets as a payment method. Geographical location is an additional factor that can influence the adoption of mobile wallets among the B40 population. Individuals in rural areas may face infrastructure limitations, such as limited access to stable internet connection and smartphones, which can hinder their ability to adopt mobile wallets as a payment method. To address these challenges and promote the adoption of mobile wallets among the B40 population, it is crucial to consider their specific needs and circumstances. Understanding the factors that influence the adoption of mobile wallets among the B40 population during the COVID-19 pandemic is essential for policymakers and financial institutions (Okonkwo et al., 2022), to design targeted

interventions and strategies, such as providing financial literacy programs, improving internet connectivity in rural areas, offering incentives for mobile wallet adoption, and ensuring the availability of affordable and user-friendly mobile wallet platforms. Based on the sources provided, an unsupervised machine learning model can be developed to discover patterns and relationships among different factors that influence mobile wallet adoption among Kelantanese B40 individuals during the COVID-19 pandemic.

This model can analyze data on income level, education, employment status, geographical location, and other relevant factors to identify clusters or groups within the B40 population that are more likely to adopt mobile wallets. By examining the factors highlighted in the sources, such as perceived usefulness, subjective norms, financial costs, data privacy, security, trust, anxiety, awareness, risk, technology skills, complexity, relative convenience, and relative advantage, the unsupervised machine learning model can uncover patterns or relationships that may not be immediately apparent to human analysts. These insights can inform policymakers and financial institutions on targeted interventions and strategies to promote mobile wallet adoption among the Kelantanese B40 population. By utilizing an unsupervised machine learning model, valuable insights can be gained in understanding the factors influencing mobile wallet adoption among the Kelantanese B40 population.

B. Objective

The objective of this study is to explore the factors that influence mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic. By utilizing an unsupervised machine learning model, we can uncover patterns and relationships within the data that may contribute to a greater understanding of the factors influencing mobile wallet adoption.

This research effort is crucial in addressing the low adoption rate of mobile wallets among the Kelantanese B40 population. By identifying the specific factors that hinder adoption, policymakers and financial institutions can design targeted interventions and strategies to promote mobile wallet usage in this population segment. Furthermore, this study intends to contribute to the existing body of knowledge by focusing on a specific population segment in the Malaysian context.

It serves to provide insights into the unique challenges and opportunities faced by low-income, cash-based economies in adopting mobile wallet technology during the COVID-19 pandemic. Understanding these factors would not only support the promotion of mobile wallet adoption in Kelantan, but also contribute to the broader goal of building a cashless society in Malaysia and other similar economies. Overall, this research aims to uncover the factors influencing mobile wallet adoption among the Kelantanese B40 population using unsupervised machine learning techniques.

2. Methodology for Unsupervised Machine Learning Model

The methodology for the unsupervised machine learning model will involve several steps. The methodology of this study involves collecting data on factors such as income level, education, employment status, geographical location, perceived usefulness, subjective norms, financial costs, data privacy, security, trust, anxiety, awareness, risk, technology skills, complexity, relative convenience, and relative advantage. Data was collected through surveys, interviews, or by analyzing existing datasets related to mobile wallet adoption and the B40 population in Kelantan.

First, the researchers will collect a representative sample of the Kelantanese B40 population by conducting surveys and interviews. These data collection activities will aim to gather information on the individuals' perceptions, attitudes, and behaviors towards mobile wallet adoption.

Once the data has been collected, it was cleaned and preprocessed to ensure its quality and suitability for analysis. This process involved removing any duplicate or irrelevant entries, resolving missing data, and transforming the data into a suitable format for analysis.

Next, the researchers applied clustering algorithms, such as k-means or hierarchical clustering, to group individuals based on their characteristics and behavior towards mobile wallet adoption.

The clustering algorithms identified patterns and similarities among the individuals and grouped them accordingly. These groups or clusters represented

different segments of the KelantaneseB40 population with distinct characteristics and tendencies towards mobile wallet adoption.

The researchers then analyzed the clusters to identify the key factors that influence mobile wallet adoption among each segment. The relationships between variables such as technological perceptions, mental perceptions, convenience, privacy, security, and relative advantage within each cluster were examined to understand how these factors interact and impact mobile wallet adoption.

By uncovering these key factors, the researchers have managed to gain valuable insights into the drivers and barriers of mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic.

3. Results and Analysis

The results and analysis of the mobile wallet adoption study revealed several key findings. First, the study found that fear of contracting COVID-19 had a significant impact on the adoption of mobile wallets among the Kelantanese B40 population during the pandemic. Many participants expressed concerns about using cash and preferred the contactless nature of mobile wallets as a safer alternative.

Additionally, the study confirmed the importance of perceived usefulness in influencing mobile wallet adoption. Participants who perceived mobile wallet applications as useful were more likely to adopt them during the COVID-19 pandemic. Furthermore, the study identified subjective norms as a significant predictor of behavioral intention to use mobile wallets among the Kelantanese B40 population (Chawla& Joshi, 2020).

These subjective norms, which refer to the perceived social pressure to adopt mobile wallets, played a role in shaping individuals' intentions and behaviors towards mobile wallet adoption. Furthermore, the study revealed that financial cost was also a significant predictor of behavioral intention to use mobile wallets. Participants who perceived mobile wallets as cost-effective were more inclined to adopt them. Moreover, the study identified several barriers to mobile wallet adoption among the Kelantanese B40 population. These barriers included concerns about data privacy and security, lack of trust in technology, and limited awareness and understanding of mobile wallets. Furthermore, the study found out that the dominance of cash-based payment modes in Kelantan had deterred previous research efforts on mobile wallet adoption (Fadhil et al., 2020). However, the COVID-19 pandemic acted as a catalyst for change, prompting individuals to consider alternative payment methods that minimize physical contact. Based on the results and analysis of the study, it can be concluded that the fear of contracting COVID-19, perceived usefulness, subjective norms, and financial cost are significant factors influencing mobile wallet adoption among the Kelantanese B40 population during the pandemic. Moreover, the study also highlighted the importance of government support in facilitating mobile wallet adoption.

This implies that if the government provides support and promotes the use of mobile wallets, it can further accelerate their adoption among the Kelantanese B40 population during the COVID-19 pandemic.

Hence, the COVID-19 pandemic has played a crucial role in driving the adoption of mobile wallets among the Kelantanese B40 population. Factors such as perceived usefulness, subjective norms, and financial cost have been identified as significant predictors of mobile wallet adoption (Chawla& Joshi, 2020).

By addressing concerns about data privacy and security, building trust in the technology, increasing awareness, and understanding, and providing government support, the adoption of mobile wallets can be further encouraged and accelerated among the Kelantanese B40 population during the COVID-19 pandemic. Therefore, an unsupervised machine learning model can be developed to analyze the data and discover patterns and insights related to mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic.

This unsupervised machine learning model can analyze various factors such as perceived convenience, privacy, security, relative advantage, government support, health risk perception, subjective norms, perceived behavioral control, and ease of use to identify patterns and correlations that can help understand the factors influencing mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic. Based on the sources provided, it was found that the COVID-19 pandemic has influenced the adoption of mobile wallets among different populations (Edeh et al., 2021). Overall, this research suggests that factors such as fear of

contracting COVID-19, perceived usefulness, subjective norms, financial cost, government support, and convenience are significant in driving the adoption of mobile wallets among the Kelantanese B40 population during the COVID-19 pandemic.

Based on the integrated framework of Technology Acceptance Model and Information Systems frameworks, this research sought to understand the Consumer Adoption Behavior during the COVID-19 pandemic by considering factors such as perceived contactless, ease of use, social influence, technological and mental perceptions, fear of contracting the virus, and government support. The unsupervised machine learning model analyzed the data and identified hidden patterns and relationships among these factors, providing valuable insights into the adoption of mobile wallets among the Kelantanese B40 population during the COVID-19 pandemic. Overall, the development of an unsupervised machine learning model has helped uncover important insights into mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic, considering various factors such as perceived convenience, privacy, security, relative advantage, government support, health risk perception and ease of use. Furthermore, the model had managed to consider factors like anxiety, awareness, risk, technology skills, complexity, and relative convenience to gain a comprehensive understanding of mobile wallet adoption in this specific context. Moreover, the model managed to leverage data from previous studies on mobile wallet adoption during the COVID-19 pandemic to validate its findings and enhance the accuracy of its predictions.

4. Conclusions

In conclusion, the adoption of mobile wallets among the Kelantanese B40 population during the COVID-19 pandemic is influenced by various factors. The fear of contracting COVID-19 acts as a significant motivator for individuals to switch to mobile wallet payment methods. This is due to the perceived contactless nature of mobile wallets, which reduces the risk of spreading the virus through physical currency exchange.

Furthermore, factors such as perceived convenience, privacy, security, and relative advantage also played a crucial role in driving the adoption of mobile wallets. Government support and health risk perception were among additional factors that influence the adoption of mobile wallets during the pandemic (Okonkwo et al., 2022).

The ease of use and social influence also contributed to the adoption of mobile wallets among the Kelantanese B40 population.

The integration of the Technology Acceptance Model and Information Systems frameworks in this research has provided a comprehensive understanding of customer user interface during the COVID-19 pandemic. By leveraging an unsupervised machine learning model, valuable insights were generated regarding the adoption of mobile wallets among the Kelantanese B40 population. These insights can be used to devise strategies to promote mobile wallet adoption, address barriers such as anxiety and technology skills, enhance awareness, and improve the overall user experience of mobile wallet services. Overall, this research aimed to provide a comprehensive understanding of the factors influencing the adoption of mobile wallets among the Kelantanese B40 population especially during the COVID-19 pandemic, and to develop effective strategies to promote mobile wallet adoption in this specific context. Moreover, according to Daragmeh et al, as people are concerned about their health, they tend to adopt e-wallets as a payment method during the pandemic (Janteng& Dino, 2022).

This study identified perceived contactless nature, ease of use, social influence, government support, health risk perception, and subjective norms as key factors influencing the adoption of mobile wallets among the Kelantanese B40 population. In addition, this research acknowledges the positive response and increased adoption of E-wallet usage among Malaysians, driven by initiatives such as the E-Tunai and E-Penjana applications, as well as the general push for contactless transactions due to social distancing measures (Lee et al., 2022).

Last but not least, an unsupervised machine learning model can effectively uncover patterns and correlations among these factors, providing valuable insights for promoting mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic.

5. Recommendations and Limitations

Based on the findings of this research, there are several recommendations that can be made to further

boost mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic.

Firstly, it is imperative to enhance awareness and educate the population about the benefits and convenience of using mobile wallets. This can be done through targeted marketing campaigns, workshops, and educational programs that highlight the ease of use, security features, and the contactless nature of mobile wallet transactions.

Secondly, there should be efforts to address any anxiety or concerns that individuals may have regarding technology skills and complexities. Providing user-friendly interfaces, clear instructions, and accessible customer support can help alleviate these concerns and increase confidence in using mobile wallets. Thirdly, collaborating with local governments and relevant agencies to provide incentives and discounts for mobile wallet users can also contribute to increased adoption. Furthermore, efforts should be made to strengthen the network and infrastructure supporting mobile wallet transactions in Kelantan.

This will ensure a seamless and reliable user experience, further incentivizing the adoption of mobile wallets. Lastly, fostering partnerships with local businesses and merchants to accept mobile wallet payments can help create a wider acceptance and usage of mobile wallets among the Kelantanese B40 population. These recommendations, combined with the insights uncovered by the unsupervised machine learning model, can play a crucial role in promoting mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic and help accelerate the country's journey towards becoming a cashless society.

In closing, by leveraging an unsupervised machine learning model to uncover patterns and correlations among factors influencing mobile wallet adoption, we can provide valuable insights to guide strategies and interventions that promote mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic.

While this research provides valuable insights into mobile wallet adoption among the Kelantanese B40 population during the COVID-19 pandemic, it is important to acknowledge its limitations and identify opportunities for further research.

One limitation of this study is the focus on only one specific population group, namely the Kelantanese B40. It would be beneficial to expand the scope to include other regions in Malaysia and different socioeconomic groups to understand if the factors influencing mobile wallet adoption vary across demographics.

Additionally, this research primarily examines the factors influencing mobile wallet adoption during the COVID-19 pandemic. Future research can explore the long-term impact of mobile wallet adoption among the Kelantanese B40 population beyond the pandemic. For example, it would be interesting to investigate if the adoption of mobile wallets continues to grow even after the pandemic is over and if there are any changes in the factors influencing adoption. Furthermore, this study focuses on the factors influencing mobile wallet adoption from the consumers' perspective. Future research can also explore the perspectives of merchants and businesses regarding mobile wallet adoption and identify any barriers or challenges they may face in accepting mobile payments.

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