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APPLICATION OF ARTIFICIAL INTELLIGENCE IN FINTECH: THE DECISION OF YOUTH INVESTORS TO USE ROBO-ADVISOR PLATFORM AS MICRO-INVESTING ALTERNATIVE

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Abstract
In light of the emergence of artificial intelligence in financial technology and the fourth industrial revolution, this study aims to propose a research framework on the decision of youth investors in Malaysia to use robo-advisors. This study will examine the youth investor characteristics and robo-advisor characteristics that may influence youth investors' usage of robo-advisor platforms. Technological advances and knowledge-intensive activities increasingly drive economic growth; therefore, research on factors affecting the use of robo advisors should be performed to understand why more young people are investing in digital platforms. This objective will be answered using logistic regression throughout the study.

Research paper

Keywords: Artificial Intelligence, Financial Technology, Logistic regression, Micro-investing, Robo-advisor

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Introduction

There is no doubt that robots and artificial intelligence (AI) are already reshaping industries across the board, from manufacturing to retail and services (Belanche et al., 2019). According to Wirtz et al. (2018), service robots can differentiate from AI software that works independently and learns over time-based on virtual or physical tasks that involves complex tasks. Based on economies of scale and scope, AI data and knowledge are anticipated to become important competitive advantages for organisations in the future (Flavián et al., 2022; Wirtz et al., 2018; Dana et al., 2022). As a sector that leads internal and customer-focused automation processes, the banking and finance industries have become prototypical examples of the global AI technological revolution. Over the last decade, financial technology has transformed the finance industry by increasing user value and firm revenues (Flavián et al., 2022; Goldstein et al., 2019; Huang & Rust, 2021; Raut et al., 2020). Therefore, because of the development of financial technology in modern society, robo-advisors are now commonly utilized to aid investors in making investment decisions and allowing the investor to construct diverse investment portfolios. Applications for robo-advisors might be viewed as one of the innovations of the contemporary era. Innovation is characterised as a concept, and the outcome is perceived as novel and capable of being used (Joshi, 2017).

As a recent innovation in the financial services industry, this study focuses on robo-advisor platform, which automates or assists in managing investments by replacing human advisory services and the customer's management (Flavián et al., 2022; Goldstein et al., 2019). Financial robo-advisors are digital platforms that provide automated web-based portfolio management with no or little human participation (Gan et al., 2021). A robo-advisor

is an investment advisor based on core artificial intelligence (AI) technology to automate investor's investment portfolio. It automatically creates a portfolio for the investor based on investment goals and risk tolerance. A robo-advisor typically invests investor assets in exchange-traded funds (ETFs), which are groups of stocks, bonds, or other investments. The underlying investments and allocation of an investor's portfolio will vary depending on the robo advisor platform the investor utilises. Due to the substantial market demand for inexpensive automated portfolio management approaches, notably in Malaysia (Gan et al., 2021), the financial sector and academics have paid significant attention to the concept of financial robo-advisors in recent years.

The digital financial technology revolution has impacted financial planning in Malaysia on various financial applications due to digital financial inclusion (Gan et al., 2021). With the emergence of the robo-advisory system, Malaysians have more opportunities to plan for their finances. While individuals prepare for retirement, these changes reshape the entire financial environment regarding the regulatory framework, new ethical considerations, data and privacy concerns, and the challenges of adopting financial technology (Fisch et al., 2018; Tan et al., 2021). By adopting robo-advisors, the younger generation with less investment experience can re-allocate their investment profile and make unbiased financial decisions.

There has been an increase in the use of digital technologies, such as automated robo-advising platforms that do not allow for human interaction, due to higher advisory costs and pre-existing biases. Human financial advisers in Malaysia collect professional fees and commissions for the services they provide, whereas robo-advisors incur annual fees between 0.2 to 1 percent depending on the size of the portfolio (Gan et al., 2021). The automation

of robo-advisors makes their services available at any time and from any location, via mobile applications or the Internet (Gan et al., 2021). Despite their advantages, robo-advisors have drawbacks due to the lack of human engagement and customised advice (Gan et al., 2021).

According to Gan et al. (2021), Malaysia's number of companies offering robo-advisory services is growing. In Malaysia, the digital investment management (DIM) framework has been developed by the Securities Commission of Malaysia for robo-services. The Securities Commission of Malaysia has authorized StashAway, MyTHEO, Raiz Invest, and Wahed Invest, a local Malaysian Halal investment platform, to offer robo-advisory services in Malaysia. This recent occurrence illustrates a trend toward implementing robo-advisors in the Malaysian fintech landscape (Gan et al., 2021).

Although FinTech AI applications show positive acceptance in the finance industry, there is a lack of research on robo-advisor. Previous research has focused on technical or legal issues and not on the intention of retail investors especially youth which would help to increase the users to use robo-advisor services. According to (Jung et al., 2017), there is a necessity to improve the usability of these systems in order to facilitate users' interaction with them. Nevertheless, given the potential broad expansion of robo-advisors in the finance industry, there is a need to develop a comprehensive model that better explains the key perceptions and motivations driving robo-advisor adoption by a wide range of customers (Belanche et al., 2019).

Profitability and cost reductions are two advantages of AI-based financial services (Flavián et al., 2022). In addition, crucial characteristics like transparency and timely and pervasive access to financial services are fundamental pillars of robo-advisors' proliferation (Belanche et al., 2019; Jung et

al., 2017). Additionally, robo-advisors have the potential to lower the entry barriers to financial advisory services for a wider public; nevertheless, it will take some time for individuals who are not familiar with this new technology to become accustomed to it (Flavián et al., 2022).

According to previous research, the technology adoption model is associated with the perceived usefulness, ease of use, and subjective norms influencing robo-advisor acceptance (Belanche et al., 2019). Also, retail investors' preferences for robo-advisors are correlated with performance expectations and mistrust. According to Jung et al. (2017) some argue that customers are less enthused about robo-advisors than banks since they aren't yet ready to rely on AI-powered systems (Belanche et al., 2020). For instance, Doorn et al., (2016) and Mende et al., (2019) recommended segmenting consumers based on broad characteristics such as their readiness to use new technology (Ben-David & Sade, 2021; Parasuraman & Colby, 2014).

Additionally, it is necessary to understand better how to incorporate AI into service offerings. Several experts in the AI adoption domain have suggested that the technology readiness index (TRI) is a suitable framework (Belanche et al., 2020; Doorn et al., 2016; Flavián et al., 2022; Mende et al., 2019). There was currently one study that employed TRI on robo-advisors. Still, it focuses on North Americans, who score lower in uncertainty avoidance than most European and Asian consumers, particularly those in the Malaysian market (Flavián et al., 2022). Therefore, this study aims to understand the retail-investor especially youth decision to use robo-advisors in Malaysia.

Literature Review

Overview of Robo-advisor

Robo-advisors in the financial services sector benefits both service providers and retail investors (Ponnaiya & Ryan, 2017). Using robo-advisors, service providers can communicate with retail investors who are less knowledgeable, reducing the need for intermediaries and increasing efficiency. As a result of disintermediation, service providers can save money by charging customers less for their services (around 0.2 per cent to 1 per cent per annum). For people with lower net worth, financial robo-advisory services are more cost-effective than traditional human advisors, whose costs may be prohibitive. robo-advisors, on the other hand, may be easily accessed via mobile apps or the Internet at any time and from any location.

In contrast to traditional human advisors, robo-advisers collect information about customers' risk profiles through standardised online questionnaires (Coombs & Redman, 2018; Gan et al., 2021). Through face-to-face communication, traditional human advisors determine customers' risk profiles (Ruhr et al., 2019). Robo-advisors can act like traditional human advisors when creating and implementing investment strategies, but they don't have any emotional biases (Milani, 2019). When a major market movement is identified, rebalancing is automatically undertaken to maintain the desired asset allocations (Gan et al., 2021).

Investor's characteristics

The literature identifies that intention to use robo advisor is influenced by investor characteristics. Nevertheless, fewer studies have discussed factors

relating to investors' characteristics and intentions towards using robo-advisors. Consequently, this research aims to understand those factors. Oehler et al (2021) made hypothesize that the young adults in their survey with investor characteristics such as higher levels of extraversion, openness to new experiences, and optimism are more likely to be less risk averse and to use a robo-advisor. In addition, participants who are willing to use the robo- advisor are more willing to take financial risks, are more extroverted, are more optimistic, and are less pessimistic than participants who are not willing to use the robo-advisor. Some studies found that the adoption of robo-advisors was not affected by socio-demographic characteristics such as gender and age (D'Acunto & Rossi, 2022; Flavián et al., 2022), while other studies discovered that robo-advisory is a male-dominated field (Kim et al. 2019) and that it attracts the interest of people who are more willing to take financial risks (Oehler et al. 2021). Other than investor's characteristics, viewpoint from other people also influence the motivation to use a product or service (Kamalul Ariffin et al., 2019).

Robo-advisor characteristics

Most robo-advisors have different characteristics, such as different annual fees (see Table 1), features, and investment methodologies. For instance, most the robo-advisors charge the fees according to the investor portfolio size; the more significant the investor's portfolio, the lower the fees they must pay. Additionally, there are fees associated with the underlying investments that make up an investor's portfolio in addition to the fees that are charged by the robo-advisor for using their services. robo advisers that invest in unit trust funds are subject to higher costs, in contrast to those that invest

in exchange-traded funds (ETFs), which are subject to lower fees. Therefore, it is anticipated that the fees imposed by the robo-advisor would significantly affect retail investors' decision-making process. An empirical study was carried out by (Ku & Wang (2022) on the factors influencing investors' willingness to use robo-advisors. The findings indicate that perceived ease of use has a positive and significant impact on perceived usefulness, which increases the willingness to use robo-advisors.

Platform	Launched	Methodology	Annual fees
Akru	2020	Invest in a savvy portfolio of exchange-traded funds that are globally diversified and offer minimal costs.	0.2% to 0.7%
Best Invest	2020	Provides investment recommendations based on a broad portfolio of Shariah-compliant unit trust investments using artificial intelligence and big data technology.	0.5% to 1.8%
MyTheo	2019	Integrated risk-based investing and "smart beta" strategies are incorporated into the functional portfolios that are created using the company's proprietary algorithms.	0.5% - 1%
Raiz	2020	A portfolio of Amanah Saham Nasional Berhad (ASNBunit)'s trust funds will be constructed for investors based on the results of an algorithm that analyses the investor risk profile.	RM1.5 a month (under RM6,000) or 0.3% (RM6,000+)
StashAway	2018	Uses proprietary investment strategy that reacts to economic fundamentals	0.2% - 0.8%
Wahed Invest	2019	Using modern portfolio theory, optimises the investor's holdings to maximise profit while adhering to Shariah law	0.39% - 0.79%
KDI Invest	2022	Enables artificial intelligence-assisted investments in a variety of selected exchange-traded funds (ETFs) that are listed in the United States and that are in line with the preferences of the user.	0.3%-0.7% for investments above RM3000

Table 1. List of robo-advisors available in Malaysia (Source: Lim (2022))

Technology readiness

According to Parasuraman (2000), technology readiness is people's predisposition to embrace and utilise new technologies in order to attain personal and professional goals. Positive and negative technological readiness is measured by the TRI, which has been used to explain the acceptance of new technologies (Flavián et al., 2022). Therefore, positive and negative attitudes toward technology may coexist; the relative dominance of the two attitudes is likely to vary between individuals (Jaafar et al., 2007).

Technology readiness can be measured via four dimensions; motivators (optimism and optimism) and inhibitors (discomfort and insecurity) (Parasuraman & Colby, 2014). The dimensions of optimism and innovation are drivers of technology readiness, while discomfort and insecurity are inhibitors. In terms of their use of high-technology products and services, respondents with high, medium, and low scores on each of these dimensions differ significantly (Jaafar et al., 2007). Prior research has demonstrated the independence of the four dimensions, as each measures an individual's degree of technological openness differently (Lu et al., 2012).

Technological optimism

Technological optimism refers to a positive view of technology and the belief that it affords individuals greater control, flexibility, and efficiency in their daily lives (Parasuraman & Colby, 2014). This definition can be applied to artificial intelligence, as people may perceive it as "hell" or "heaven" (Kaplan & Haenlein, 2019). Pessimistic technology users are less accepting of situations and less willing to use new technologies (Lu et al., 2012), per-

ceiving them as functional and trustworthy while overlooking potential adverse outcomes (Walczuch et al., 2007). Therefore, optimistic customers are more receptive to new technologies (Godoe & Johansen, 2012; Jaafar et al., 2007). More enthusiastic consumers in the financial sector tend to seek new investment opportunities (Clark-murphy & Soutar, 2004; Flavián et al., 2022).

Technological innovativeness

The definition of technological innovation is "the tendency to be a technology pioneer and thought leader" (Parasuraman & Colby, 2014). Highly innovative people tend to be open-minded and more willing to use technologies, such as innovative financial services such as mobile payment (Oliveira et al., 2016; Salamzadeh et al., 2022; Yakubu et al., 2022). Furthermore, innovativeness is a precursor to adoption intentions; creative customers generally have a favourable opinion of technology functionality even when its potential value is uncertain (Flavián et al., 2022; Prodanova et al., 2018).

Technology discomfort

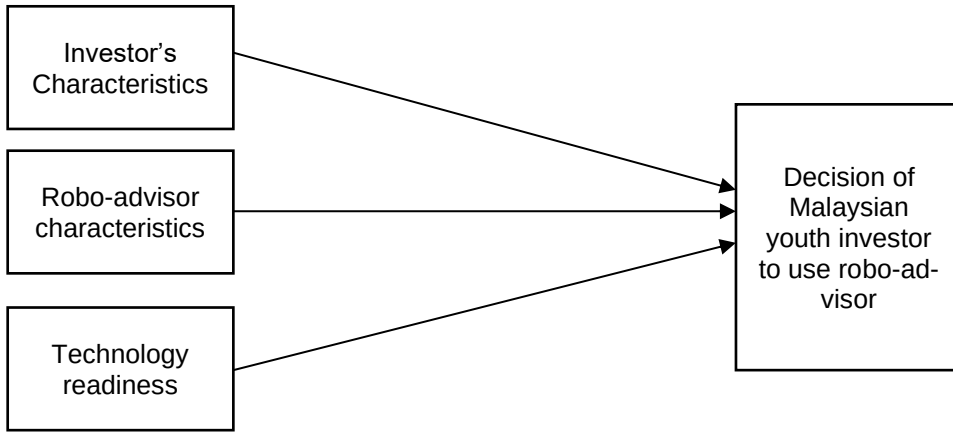
The definition of technology discomfort is "a perceived lack of control over technology and a sense of being overwhelmed by it" (Parasuraman and Colby, 2015, p. 60). People who are uncomfortable with technologies view them as complicated and incapable of meeting their needs (Lu et al., 2012; Jaafar et al., 2007). Customers with a high level of discomfort in an unfamiliar technology environment may be reluctant to use new technology-based products and services (Tsang et al., 2004; Jaafar et al., 2007). The perception of a lack of control or the inability to manage technology can lead to the rejection

of innovative systems. Customers who are hesitant to hand over control to an automated system may avoid using robo-advisor services (Flavián et al., 2022).

Technology insecurity

The definition of technology insecurity is distrust of technology, stemming from scepticism about its ability to function properly and worries about its potential negative consequences (Parasuraman & Colby, 2014). Users must have a fundamental understanding of how AI systems operate in order to have faith in them (Jaafar et al., 2007; Kaplan & Haenlein, 2019). Customers with high technological insecurity might choose not to use them (Lu et al., 2012). Prior research has concluded that in the financial sector, customers who feel insecure are reluctant to adopt new technology-based services (Flavián et al., 2022; Oliveira et al., 2016). Therefore, this study proposes a conceptual framework and the variables in the research model are explained in Figure 1 to understand the intention of youth investor to use the robo-advisors as micro-investing alternative.

Figure 1. Conceptual Framework on intention of Youth Investors to use robo-advisor



Design and Methodology

A survey will be prepared and distributed via Google Forms to acquire important information about potential robo-advisor investors. This online platform allows us to reach many respondents and has a high response rate for a low cost. The survey will be distributed to the more digitally savvy youth to gather relevant information about potential robo-advisor users. Logistic regression is used when the dependent variable is on a categorical scale. The robo-advisor is a dichotomous measure of interest of youth investors in robo-advisor. A binary choice model indicates there are only two alternatives (i and j) available in C_m. The choice of probabilities that utility i is greater than utility j is expressed as:

$$P_n(i) = \Pr(U_{in} > U_{jn}) = \Pr(V_{in} - V_{jn} > \varepsilon_{jn} - \varepsilon_{in})$$

Thus, the probability of choosing the alternative j is expressed as

$$P_n(_j) = 1 - P_n(_i)$$

When analyzing the factors that influence youth investors to use robo-advisor, the dependent variable is binary. Intention to use robo advisor is measured using observations of youth investor such as "has intention" which equals one and "no intention to use robo-advisor", zero otherwise. It can be defined as follows:

$Y = 1$ if $Y = \alpha Z_i + \varepsilon_i \geq 0$

$Y = 0$ otherwise,

Z is a vector of investor characteristics, robo-advisor characteristics and technology readiness (see Table 2). ε_i is the error term.

Table 2. Descriptions of proposed variables use in the empirical analysis

Explanatory Variable	Description
Investor's characteristics	
Gender	Dummy variable that equals one when the investor is male and zero otherwise.
Age	Age of the investor.
Education	Dummy variables for educational attainment of the investor that equals one when the education is higher than high school and zero otherwise.
Marital status	Dummy variable that equals one if single and zero otherwise
Knowledge	Dummy variables of financial knowledge that equals one when the investor has financial knowledge and zero otherwise.
Robo-advisor Characteristics	
Ease of use	Ease of use variable measured based on seven-point Likert scale
Annual fees	Annual fees charged by robo-advisor
Technology Readiness	
Technological optimism	Technological optimism variable measured based on seven-point Likert scale
Technology innovativeness	Technological innovativeness variable measured based on seven-point Likert scale
Technology discomfort	Technological discomfort variable measured based on seven-point Likert scale
Technology insecurity	Technological insecurity variable measured based on seven-point Likert scale

Conclusions

Fewer research have examined the investor characteristics, robo-advisor characteristics, technology readiness and intentions of youth investors concerning the use of robo-advisors. Consequently, this study seeks to comprehend these elements. The empirical findings of this study are anticipated to assist the financial sector in promoting robo-advisors and developing more efficient marketing methods. Additionally, this study provides useful insights into the marketing strategy of robo-advisor services.

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