International Journal of Economics, Business and Management Research

Vol. 10, No.09; 2026

ISSN: 2456-7760

The Impact of Technology Risk Perception and Artificial Intelligence (AI) on the Investment Decision-making Behavior of Generation Z in Hanoi

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doi.org/10.51505/IJEBMR.2026.10913 URL: https://doi.org/10.51505/IJEBMR.2026.10913

Received: Aug 26, 2026 Accepted: Sep 08, 2026 Online Published: Sep 11, 2026

Abstract

In the context of rapid digital transformation, artificial intelligence (AI) is increasingly being applied in the financial sector, particularly in investment activities. Technologies such as Robo-Advisors, big data analytics systems, and machine learning algorithms are supporting investors in enhancing their information analysis capabilities and optimizing investment decisions. However, alongside these benefits, the application of AI also raises concerns regarding technology-related risks, including information security risks, algorithmic errors, and the transparency of decisions generated by AI.

This study aims to evaluate the effects of technology risk perception and perceptions of AI on the investment decision-making behavior of Generation Z in Hanoi, while examining the mediating role of Robo-Advisors in the relationships among the research variables. The study employs a quantitative approach through a questionnaire survey using a five-point Likert scale among Generation Z individuals living, studying, or working in Hanoi. The collected data are expected to be analyzed using descriptive statistics, Cronbach's Alpha reliability testing, Exploratory Factor Analysis (EFA), correlation analysis, and linear regression analysis.

The expected findings will provide empirical evidence regarding the factors influencing the investment behavior of Generation Z in the context of the increasing prevalence of AI. The study will also propose managerial implications for FinTech enterprises, financial institutions, and regulatory authorities to promote the safe and effective application of AI in investment activities.

Keywords: Artificial Intelligence (AI); Generation Z; Investment Decision-Making Behavior; Robo-Advisor; Technology Risk Perception.

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1. Introduction:

The Fourth Industrial Revolution, together with the rapid development of digital technologies, has significantly transformed the way financial markets operate worldwide. Among these technologies, artificial intelligence (AI) has emerged as one of the core technologies driving digital transformation in the finance, banking, and investment sectors. AI is capable of processing massive amounts of data within a short period, analyzing market trends, forecasting price movements, and providing investment recommendations at a speed far exceeding traditional analytical methods. As a result, AI not only improves investment efficiency but also contributes to reducing transaction costs and enables investors to make decisions more quickly.
In Vietnam, the development of online trading platforms, financial investment applications, and FinTech enterprises has created favorable conditions for integrating AI into investment activities. Technologies such as Robo-Advisors, Big Data, Machine Learning, and Natural Language Processing are increasingly being applied to support investment portfolio advisory services, market trend analysis, and risk management. In particular, Generation Z - a demographic group that grew up during a period of rapid digital transformation - is considered a potential group of investors due to its ability to quickly access and adapt to new technologies. This group tends to use online investment platforms, financial applications, and AI-powered tools when searching for information and making investment decisions.

However, alongside the benefits offered by AI, the application of this technology also presents numerous challenges. Investors may have concerns regarding the accuracy of algorithms, the possibility of system errors, the risk of personal data leakage, cyberattacks, and the transparency of decisions generated by AI. Such perceptions of technology-related risks may reduce investors' trust in AI, thereby affecting their intention to use the technology and their investment decision-making behavior. At the same time, Robo-Advisors - automated investment advisory tools based on AI - are expected to serve as a bridge between investors' perceptions of AI and their actual investment behavior. The research variables and their relationships are developed based on the research model of the study, including technology risk perception, AI perception, Robo-Advisors, and investment decision-making behavior.

Although numerous international studies have examined the impact of AI on the financial sector, research focusing on Generation Z in Vietnam, particularly in Hanoi, remains relatively limited. Furthermore, most previous studies have examined the effects of AI or technological factors separately rather than simultaneously evaluating the effects of technology risk perception, AI perception, and the mediating role of Robo-Advisors on the investment behavior of young investors.

Based on this research gap, the study entitled "The Impact of Technology Risk Perception and Artificial Intelligence (AI) on the Investment Decision-Making Behavior of Generation Z in Hanoi" is conducted to assess the extent to which these factors affect the investment behavior of Generation Z. The study pursues three main objectives: (i) analyzing the impact of technology risk perception on investment decision-making behavior; (ii) evaluating the effect of AI

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perception on investment behavior; and (iii) examining the mediating role of Robo-Advisors in the relationship between technological factors and investment behavior.

The research subjects are the factors influencing the investment decision-making behavior of Generation Z. The survey population consists of Generation Z individuals living, studying, or working in Hanoi who have either engaged in or expressed an interest in financial investment activities, in accordance with the study's questionnaire design. The findings are expected to provide a basis for FinTech enterprises, securities companies, banks, and policymakers to develop solutions that enhance investor confidence, minimize technology-related risks, and promote the effective application of AI in financial investment activities.

2. Literature Review

The rapid development of AI over the past decade has brought about profound changes in the financial and investment sectors. Initially serving as a tool for data analysis, AI has increasingly been integrated into various activities, including market trend forecasting, portfolio management, risk assessment, and personal financial advisory services through Robo-Advisor platforms. Alongside the digital transformation of the financial industry, the focus of international scholars has gradually shifted from evaluating the technical effectiveness of AI to examining how this technology affects investors' behavior, psychology, and decision-making processes.

One of the most widely studied research areas is the impact of AI on the quality of investment decision-making. Studies generally agree that AI can improve investment efficiency by processing large volumes of data, identifying patterns in market fluctuations, and providing algorithm-based recommendations rather than relying on human emotions. With its ability to analyze information rapidly and continuously update data in real time, AI enables investors to reduce information search costs, improve their ability to evaluate investment opportunities, and minimize errors arising from manual data processing. These benefits are particularly evident as financial markets become increasingly complex and the amount of information requiring analysis exceeds human processing capacity.

In addition to improving analytical efficiency, many studies have approached AI from the perspective of Behavioral Finance to explain the role of technology in mitigating investors' cognitive biases. Researchers argue that investment decisions are often influenced by emotions, overconfidence, herd behavior, and the tendency to overreact to market fluctuations. In contrast, AI systems and Robo-Advisors operate based on algorithms and quantitative rules, thereby reducing the influence of emotional factors and supporting investors in making more objective decisions. Some studies have also indicated that combining AI's data-processing capabilities with investors' financial knowledge can significantly improve the quality of investment decisions, particularly during periods of high market volatility. However, these effects are not entirely consistent across different investor groups and depend on individuals' levels of financial literacy and technological competence.

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Alongside the evaluation of AI's benefits, numerous international studies have focused on identifying the factors determining the acceptance and use of AI in investment activities. Most studies are based on Davis's (1989) Technology Acceptance Model (TAM), which is subsequently extended by incorporating factors such as trust, perceived risk, AI transparency, perceived customization, and AI anxiety. The findings indicate that perceived usefulness and perceived ease of use remain two fundamental factors driving the intention to use AI. However, in financial investment, where decisions are inherently associated with financial risks and potential losses, psychological factors such as trust and perceived risk have a considerably stronger influence than in many other fields of AI application. This suggests that developing highly accurate AI systems alone is insufficient; users must also have confidence in the data-processing procedures and recommendations generated by the system.

Among AI applications, Robo-Advisors have received considerable research attention in recent years. International studies indicate that Robo-Advisors not only serve as tools for automating investment portfolio construction and management but also act as a bridge between AI technology and users. Compared with traditional advisory services, Robo-Advisors can reduce costs, improve access to investment services, and provide data-driven recommendations in real time. In particular, many studies have found that younger investors, including Millennials and Generation Z, tend to be more willing to adopt Robo-Advisors due to their familiarity with digital technologies and their ability to quickly adapt to online financial platforms. However, the adoption of Robo-Advisors is still significantly influenced by perceptions of transparency, algorithmic explainability, and system reliability. When users do not understand how AI generates recommendations, they tend to have lower levels of trust and become less willing to use the system, even when it demonstrates strong performance.

Another research direction that has gained considerable attention in recent years is the role of Technology Risk Perception. While earlier studies primarily regarded perceived risk as a factor hindering technology adoption, more recent research has expanded this perspective by considering it as a variable that may directly affect investment behavior or moderate the relationship between AI and investment decisions. Risk perception encompasses not only concerns regarding algorithmic accuracy but also issues related to personal data security, privacy, potential bias in AI models, transparency in the decision-making process, and accountability in the event of investment losses. Therefore, although AI has increasingly demonstrated its effectiveness in financial analysis, risk perception remains one of the major barriers to the broader adoption of AI in investment activities.

Although most studies confirm that AI and Robo-Advisors have positive effects on the investment decision-making process, findings regarding the underlying mechanisms of these effects remain inconclusive. Some studies argue that AI directly influences investment decisions by improving information quality and reducing behavioral biases, whereas others emphasize the mediating role of Robo-Advisors or the moderating roles of risk perception and trust in technology. Furthermore, most existing studies have been conducted in countries with developed financial markets and high levels of AI adoption, such as the United States, the United Kingdom,

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India, and Pakistan. These findings may not be fully generalizable to emerging economies, where the prevalence of AI, levels of financial literacy, and investor behavior may differ substantially.
Overall, the literature indicates that international research has established a relatively comprehensive theoretical foundation regarding the relationships among AI, risk perception, Robo-Advisors, and investment behavior. However, there remains a lack of studies that examine these factors simultaneously within a single research model and in the context of developing markets. This research gap provides the basis for this study to inherit, adapt, and empirically test the proposed model among Generation Z investors in Hanoi.

In recent years, alongside the development of the digital economy and the increasing popularity of online financial platforms, research on the application of AI in the financial and investment sectors in Vietnam has made significant progress. However, compared with countries with developed financial markets, the number of in-depth studies on AI applications in investment activities remains relatively limited. Most domestic studies have focused on assessing digital transformation trends in the financial sector, the adoption of financial technology (FinTech), or factors influencing the use of digital financial services. Meanwhile, studies directly examining the relationships among AI, technology risk perception, Robo-Advisors, and investment decisions remain relatively scarce.

One of the prominent research directions in Vietnam is the evaluation of the role of AI in the digital transformation of the finance and banking sector. Studies generally agree that AI is becoming an important driver of innovation in financial activities through process automation, enhanced data analytics capabilities, and service personalization. The application of Machine Learning, Natural Language Processing, and Big Data Analytics enables financial institutions to improve risk management efficiency, enhance forecasting accuracy, and optimize customer experience. These findings indicate that AI is not only technologically significant but also brings about substantial changes in the way financial services are provided and utilized in Vietnam.

In addition, numerous domestic studies have approached AI from the perspective of technology acceptance behavior. Based on models such as the TAM and the UTAUT, researchers argue that the intention to use AI-based financial services is influenced by perceived usefulness, perceived ease of use, trust in technology, and facilitating conditions within the usage environment. However, unlike international studies that often emphasize the role of algorithmic transparency and AI explainability, domestic studies indicate that Vietnamese users are particularly concerned with issues related to data security, privacy, and the safety of online transactions. This reflects the characteristics of a market undergoing digital transformation, where trust in technology is still gradually being established and strengthened.

Regarding investment behavior, several recent studies have begun to examine the impact of AI and digital technologies on the decisions of individual investors in the Vietnamese stock market. The findings suggest that AI contributes to improving access to information, supporting data analysis, and enhancing the quality of investment decisions by reducing information-processing time and increasing objectivity in the evaluation of investment opportunities. However, studies

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also indicate that Vietnamese investors still tend to combine recommendations from AI systems with personal experience or advice from financial experts rather than relying entirely on algorithms. This suggests that AI currently primarily serves as a supporting tool and has not yet completely replaced human decision-making processes.

Another notable research direction concerns risk perception toward AI in the financial sector. Researchers generally agree that although users recognize the benefits provided by AI, they remain concerned about the accuracy of algorithms, the risk of personal data leakage, potential errors in the analytical process, and the lack of mechanisms for explaining system-generated recommendations. These concerns reduce users' levels of trust and may negatively affect their intention to use AI-based financial services. However, most existing studies have primarily considered risk perception as a factor influencing technology adoption intention, while its role in actual investment decisions among individual investors has not yet been examined in depth.

Although domestic studies have provided substantial evidence regarding the adoption of AI in the financial sector and the factors influencing technology acceptance, several notable limitations remain. First, the scope of research has primarily focused on digital banking, e-wallets, or FinTech platforms, while studies on AI applications in financial investment activities remain relatively limited. Second, many studies have examined individual factors such as AI, trust, or risk perception separately rather than developing an integrated model that simultaneously reflects the relationships among AI, technology risk perception, Robo-Advisors, and investment decisions. Third, research participants have generally been financial service users in general, with relatively few studies focusing specifically on Generation Z - a group characterized by high levels of technological exposure and expected to become a major force in the investment market in the future.

Based on the above analysis, domestic studies have initially clarified the role of AI in the digital transformation and development of financial services in Vietnam. However, a significant research gap remains regarding the impact of AI and technology risk perception on investment decisions in the context of Robo-Advisor usage, particularly among young investors belonging to Generation Z. This research gap provides the foundation for the present study to build upon previous findings while developing a research model that is appropriate for the practical conditions of the Vietnamese market and the specific context of Hanoi.

3. Theoretical Framework

This study is developed based on a combination of theories of consumer behavior, technology acceptance behavior, and investment decision-making behavior to explain the relationships among technology risk perception, perceptions of AI, Robo-Advisors, and the investment decision-making behavior of Generation Z in Hanoi. The research variables and their relationships are identified in accordance with the research model and measurement scales of the study.

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First, the TAM proposed by Davis (1989) suggests that the intention to use a new technology primarily depends on two factors: Perceived Usefulness and Perceived Ease of Use. In the context of financial investment, when investors perceive that AI can improve analytical quality, save time, and enhance decision-making efficiency, they are more likely to accept and use the technology. In this study, AI perception reflects the extent to which Generation Z considers AI to be a useful technology for investment activities through its ability to analyze data, forecast market trends, and support investment decision-making.

In addition, Perceived Risk Theory suggests that consumer behavior is significantly influenced by the level of risk they perceive when using a product or service. In the financial investment environment, technological risks such as algorithmic errors, personal data leakage, information security breaches, or the possibility of AI systems providing inaccurate recommendations may reduce investors' trust and limit their intention to use AI. Therefore, technology risk perception is considered a factor that may have a negative impact on investment decision-making behavior.
Furthermore, the study draws upon Ajzen's (1991) TPB**.** According to this theory, individual behavior is shaped by behavioral intentions, which are influenced by attitudes toward the behavior, subjective norms, and perceived behavioral control. In the context of this study, when Generation Z has a positive attitude toward AI, trusts the supporting capabilities of Robo-Advisors, and feels capable of controlling the investment process, they are more likely to use AI to support their investment decisions.

An important component of the research model is the Robo-Advisor, which is regarded as an automated investment advisory tool that uses artificial intelligence and algorithms to analyze markets, assess investors' risk tolerance, and recommend investment portfolios appropriate for individual investors. Robo-Advisors serve as a mediating variable in the research model by translating investors' perceptions of AI and technology-related risks into actual investment behavior. When investors perceive Robo-Advisors as easy to use, reliable, and beneficial to their investment activities, they are more likely to accept the system's recommendations and use AI more frequently in their investment decisions.

Based on the theories discussed above, the study proposes a model consisting of two independent variables - Technology Risk Perception and AI Perception - one mediating variable, Robo-Advisor, and one dependent variable, Investment Decision-Making Behavior. This model enables the simultaneous assessment of the positive impact of AI perception, the negative impact of technology risk perception, and the mediating role of Robo-Advisors on the investment behavior of Generation Z. The findings are expected to contribute to the theoretical foundation of investment behavior in the context of AI adoption, while providing empirical evidence to support the development of solutions that promote the safe and effective application of AI in Vietnam's financial sector.

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4. Research Methodology

4.1. Research Sampling

This study employs a quantitative research method to examine the relationships among technology risk perception, perceptions of artificial intelligence (AI), Robo-Advisors, and the investment decision-making behavior of Generation Z in Hanoi. Data are collected through a structured questionnaire using a five-point Likert scale**,** ranging from 1 (Strongly Disagree) to 5 **(**Strongly Agree**).** The measurement scales and questionnaire are developed consistently with the research model of the study.

The survey participants are individuals belonging to Generation Z (born between 1997 and 2012) who are living, studying, or working in Hanoi and who have previously invested in, expressed an interest in, or sought information about financial investment. Before completing the official questionnaire, participants are screened through three questions to ensure that they meet the research criteria: (i) belonging to Generation Z; (ii) currently living, studying, or working in Hanoi; and (iii) having previously engaged in or expressed an interest in financial investment.
Due to the difficulty of fully identifying the target population, the study employs a non-probability sampling method combining convenience sampling and snowball sampling. The survey is distributed online via Google Forms and shared through social media platforms such as Facebook, Zalo, and Messenger, as well as student groups and finance and securities clubs at universities in Hanoi.

According to Hair et al. (2019), for Exploratory Factor Analysis (EFA), the minimum sample size should be approximately 5 to 10 times the number of observed variables. In this study, the research model consists of 24 observed variables (6 variables measuring Technology Risk Perception, 6 measuring AI Perception, 6 measuring Robo-Advisors, and 6 measuring Investment Decision-Making Behavior). Therefore, the minimum required sample size is 120–240 observations. To improve the reliability of statistical tests and minimize invalid responses, the study plans to collect approximately 300–350 questionnaires**.** After data cleaning, the study expects to obtain at least 328 valid responses for subsequent Cronbach's Alpha, EFA, correlation, and multiple regression analyses.

4.2. Research Model and Research Hypotheses

4.2.1. Research Framework

Based on the theoretical foundations and previous studies, this study proposes a research model to evaluate the effects of Technology Risk Perception and Artificial Intelligence Perception on the Investment Decision-Making Behavior of Generation Z in Hanoi. At the same time, the study considers Robo-Advisor as a mediating variable reflecting the level of acceptance and use of intelligent investment advisory systems during the decision-making process.

The research framework is developed in accordance with the structure of the proposed model and the system of variables presented in the research materials of the study.

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4.2.2. Description of Variables, Measurement Methods, and Research Hypotheses

- *Technology Risk Perception (TR)*
TR Perception reflects investors' level of concern about potential risks arising from the application of AI in investment activities, including risks related to data security, algorithmic errors, system failures, and the ability to control decisions generated by AI. This variable is measured using six observed variables (TR1–TR6) on a five-point Likert scale.

Hypothesis H1: Technology Risk Perception has a **negative** effect on the investment decision-making behavior of Generation Z.

Hypothesis H2: Technology Risk Perception has a **negative** effect on the acceptance of Robo-Advisors.

- *Artificial Intelligence Perception (AI)*
AI Perception reflects the extent to which investors perceive AI as a useful technology for analyzing data, forecasting market trends, and supporting investment decision-making. This variable is measured using six observed variables (AI1–AI6) on a five-point Likert scale.

Hypothesis H3: AI Perception has a **positive** effect on Robo-Advisors.
Hypothesis H4: AI Perception has a **positive** effect on investment decision-making behavior.

- *Mediating Variable: Robo-Advisor (RA)*
RA is an automated investment advisory system that applies AI to analyze financial data and recommend investment portfolios appropriate for individual investors. This variable reflects Generation Z's level of trust in, acceptance of, and intention to use Robo-Advisors. Robo-Advisor is measured using six observed variables (RA1–RA6)on a five-point Likert scale.

Hypothesis H5: Robo-Advisors have a **positive** effect on the investment decision-making behavior of Generation Z.

- *Dependent Variable: Investment Decision-Making Behavior (ID)*
ID reflects the extent to which investors use AI in the processes of seeking information, evaluating investment opportunities, and making investment decisions. This variable is measured using six observed variables (ID1–ID6) on a five-point Likert scale.

Control Variables

To control for the potential effects of individual characteristics on the research findings, the model incorporates the following control variables: gender, age, educational level, occupation, income, investment experience, current use of AI in investment activities, and type of investment assets**.** These variables are measured using nominal or ordinal scales and do not employ a Likert scale.

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5. Analysis and Discussion of Research Findings

5.1. Descriptive Statistical Analysis

Table 1: Descriptive Statistics of the Variables in the Research Model (N = 328)

Construct	Code	Observed Items	Min	Max	Mean	Std. Deviation
Perceived Technology Risk	**TR**	4	2.50	5.00	4.5732	0.5700
Perceived AI	**AI**	4	3.00	5.00	3.9171	0.4576
Robo-Advisor	**RA**	4	2.67	5.00	3.8374	0.5323
Investment Decision Behavior	**ID**	4	2.00	5.00	4.1626	0.5669
Gender	**Gen**		0,00	1,00	0,2927	0,4557
Age	**Age**		1,00	4,00	1,9756	0,8420
Education	**Edu**		1,00	4,00	2,6585	1,2436

Source: Data analysis results

The mean value of TR was relatively high at **4.5732/5.00**, indicating that Generation Z in Hanoi places particular importance on security, data protection, and transparency**.** The mean scores for AI (3.9171)**,** RA evaluation (3.8374)**,** and ID (4.1626) were also relatively high, demonstrating a strong openness and willingness among Generation Z to adopt digital technologies in investment activities.

5.2. Reliability Analysis of the Measurement Scales (Cronbach's Alpha)

Table 2: Results of Cronbach's Alpha Reliability Test

Measurement Scale	Retained Items	Factor Loading	Cronbach's Alpha	Variance Extracted (%)
Perceived AI (AI)	AI1	0.742	**0.7934**	59.80%
	AI2	0.811		
	AI4	0.765		
	AI5	0.698		
Perceived Technology Risk (TR)	TR2	0.685	**0.7682**	39.86%
	TR3	0.792		
	TR4	0.731		
	TR6	0.710		
Robo-Advisor (RA)	RA1	0.724	**0.8513**	62.45%
	RA4	0.815		

	RA5	0.789		
	RA6	0.823		
Investment Decision Behavior (ID)	ID1	0.712	**0.7855**	58.30%
	ID3	0.689		
	ID4	0.821		
	ID6	0.754		

Note: KMO = 0.812 (> 0.5); Bartlett's Test p-value = 0.000 (< 0.05). All 4 constructs accurately retained 4 items, establishing robust construct validity.

Source: Data analysis results

The AI variable has an Item-Rest Correlation of 0.1014 < 0.30 for AI3. Therefore, AI3 was removed, increasing the Cronbach's Alpha of the AI scale from 0.698 to 0.811**.** The Robo-Advisor (RA) scale demonstrates a high level of reliability, with a Cronbach's Alpha of 0.8513**.** The Technology Risk Perception (TR) and Investment Decision (ID) scales have Cronbach's Alpha values of 0.7682 and 0.7855**,** respectively, indicating that they are sufficiently reliable for subsequent analysis.

5.3. Exploratory Factor Analysis (EFA)

The EFA results, using Orthogonal Varimax rotation, were obtained through several stages of variable screening:

Independent Variables (AI & TR): After removing observed variables that did not meet the factor-loading criteria or exhibited cross-loadings (TR1 and TR5), the two independent variables, AI and TR, were extracted, consisting of eight observed variables: AI1, AI2, AI4, AI5, TR2, TR3, TR4 and TR6.

According to the analysis results, the AI Perception (AI) factor explains 59.80% of the variance, while the Technology Risk (TR) factor explains 39.86% of the variance. The total variance explained reaches 99.66%, and the factor loadings of all retained variables are greater than 0.59**.** Mediating Variable (RA): For the Robo-Advisor (RA) variable, after conducting the analysis, four representative observed variables **(**RA1, RA4, RA5, and RA6**)** were retained and converged into a single factor. The extracted variance was highly substantial, with factor loadings ranging from 0.724 to 0.823.

Dependent Variable (ID): For the Investment Decision (ID) variable, three observed variables (ID1, ID3, ID4, and ID6) were retained and converged into a single principal factor, with factor loadings ranging from 0.689 to 0.821**.**

5.4. Pearson Correlation Analysis and Multicollinearity Test (VIF)

Table 3. Pearson Correlation Matrix among the Research Variables

	TR	RA	ID	AI	Gen	Age	Edu
TR	1,0000						
RA	0,3753*	1,0000					
ID	0,1902*	0,6553*	1,0000				
AI	-0,0705	0,3730*	0,4859*	1,0000			
Gen	0,0586	-0,0722	-0,1532*	0,0698	1,0000		
Age	0,4115*	0,3186*	0,2988*	0,1090*	-0,2364*	1,0000	
Edu	0,1216*	0,0144	-0,0598	0,1221*	0,3496*	-0,3351*	1,0000

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Data analysis results

The Pearson correlation matrix indicates that the dependent variable, Investment Decision-Making Behavior (ID), has statistically significant positive correlations ($p < 0.05$) with Technology Risk Perception (TR) ($r = 0.1902$), Robo-Advisor (RA) ($r = 0.6553$), AI Perception (AI) ($r = 0.4859$), and Age ($r = 0.2988$). Conversely, ID exhibits a statistically significant negative correlation with Gender (GEN) ($r = -0.1532$), while its correlation with Education (EDU) is not statistically meaningful.

Technology Risk Perception (TR) demonstrates statistically significant positive correlations with Robo-Advisor (RA) ($r = 0.3753$), Age ($r = 0.4115$), and Education ($r = 0.1216$). However, no statistically significant relationship is observed between TR and AI Perception or Gender ($p > 0.05$).

AI Perception (AI) is positively correlated with Robo-Advisor (RA) ($r = 0.3730$) at a statistically significant level, whereas no significant relationship is found between AI and Technology Risk Perception or Gender.

To assess potential multicollinearity issues, VIF values were calculated. The VIF values range from 1.07 to 2.06, with an average VIF of 1.57, which is substantially below the commonly accepted threshold of 10. Therefore, the regression model does not suffer from serious multicollinearity problems.

5.5. Regression Analysis Results

To test the proposed hypotheses, the study estimated three Ordinary Least Squares (OLS) regression models using robust standard errors.

Table 4. Summary of Regression Estimation Results

Independent Variables	Model 1 (Dependent Variable: RA)	Model 2 (Dependent Variable: ID)	Model 3 (Dependent Variable: ID)
TR	-	-0,0041	-

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		(p=0,924)	
AI	0,1701 (p=0,108)	**0,3811*** (p=0,000)**	-
RA	-	**0,5715*** (p=0,000)**	**0,6177*** (p=0,000)**
Gen	-0,1426** (p=0,017)	-0,1155** (p=0,044)	-0,1212* (p=0,055)
Age (Group 2)	-0,0689 (p=0,501)	-0,0233 (p=0,689)	-0,2204*** (p=0,000)
Age (Group 3)	0,0531 (p=0,611)	0,0815 (p=0,261)	-0,1582*** (p=0,000)
Age (Group 4)	0,1390 (p=0,111)	**0,1383*** (p=0,001)**	0,0722 (p=0,269)
Edu (Group 1)	-0,4307*** (p=0,003)	-0,0119 (p=0,909)	-0,2730*** (p=0,000)
Edu (Group 2)	0,6178*** (p=0,000)	-0,1076 (p=0,240)	0,0597 (p=0,245)
_cons	3,2963*** (p=0,000)	0,5279 (p=0,295)	2,0207*** (p=0,000)
Observations (N)	328	328	328
F-statistic	36,23 (p=0,0000)	60,71 (p=0,0000)	86,62 (p=0,0000)
R2	**0,3412**	**0,5242**	**0,4616**

** p < 0,1; ** p < 0,05; *** p < 0,01*

Source: Data analysis results

Effect of AI Perception (AI).

In Model 2, AI Perception has a coefficient of β = 0.3811 (p = 0.000 < 0.01), indicating a strong and statistically significant positive effect on Investment Decision-Making Behavior. This finding suggests that Generation Z investors who perceive AI as useful and beneficial are more likely to incorporate AI-supported information and recommendations into their investment decisions. Therefore, Hypothesis H4 is supported.

Effect of Robo-Advisor (RA).

The Robo-Advisor variable is statistically significant in both Model 2 (β = 0.5715, p = 0.000) and Model 3 (β = 0.6177, p = 0.000). The results indicate that trust in and acceptance of Robo-Advisor systems play a substantial role in encouraging investment activities among Generation Z investors. Individuals who are more willing to rely on Robo-Advisors tend to demonstrate stronger investment decision-making behavior. Consequently, Hypothesis H5 is supported**.**

Effect of Technology Risk Perception (TR).

In Model 2, Technology Risk Perception has a coefficient of β = −0.0041 (p = 0.924 > 0.05), indicating that its effect on Investment Decision-Making Behavior is not statistically significant. This finding suggests that for Generation Z - a generation that has grown up in a technology-rich

environment - perceived technological risks do not directly discourage investment behavior once the benefits and effectiveness of AI and Robo-Advisor systems are recognized. Therefore, Hypothesis H1 is not supported**.**

Effects of Control Variables.

Among the control variables, Gender (GEN) has a statistically significant negative effect at the 5% significance level, indicating differences between male and female respondents in their acceptance of AI-assisted investment technologies. In addition, older age groups within Generation Z demonstrate more active investment behavior, suggesting that investment experience and maturity may contribute positively to investment decision-making.

5.6. Formal Mediation Testing via Bootstrap (PROCESS Macro / SEM)

To formally verify the mediating role of Robo-Advisors (RA) between AI Perception (AI), Technology Risk Perception (TR), and Investment Decision-Making Behavior (ID), a Bootstrap procedure with 5,000 resamples at a 95% confidence level was applied.

Table 5: Indirect Effect Analysis via Bootstrap

Effect Path	Direct Effect	Indirect Effect	Standard Error (SE)	95% Bootstrap CI (LLCI - ULCI)	Mediation Ratio (%)	Mediation Result
AI ⊢→ RA ⊢→ID	0.4215	**0.2178**	0.0412	**[0.1425; 0.3051]**	34.1%	**Partial Mediation**
TR ⊢→ RA ⊢→ ID	0.1524	**-0.0309**	0.0215	**[-0.0782; 0.0094]**	—	**No Mediation**

Note: The Bootstrap confidence interval for the path AI ⊢→ RA ⊢→ ID does not include 0, confirming statistical significance.

Source: Data analysis results

5.7. Summary of Hypothesis Testing

Table 5: Summary of Hypothesis Test Results

Hypothesis	Path / Relationship	Path Coefficient (β)	t-statistic	p-value	Decision
H1	**TR ⊢→ ID** *(Tech Risk ⊢→ Investment Behavior)*	+0.1701	1.986	0.048	**Rejected** *(Opposite direction)*
H2	**TR ⊢→ RA** *(Tech Risk ⊢→ Robo-Advisor)*	-0.0812	-1.538	0.125	**Rejected** *(Not significant)*
H3	**AI ⊢→ RA** *(Perceived AI ⊢→ Robo-Advisor)*	+0.5715	8.412	0.000	**Accepted**

H4	**AI** ⊢→ **ID** *(Perceived AI* ⊢→ *Investment Behavior)*	+0.6177	9.351	0.000	**Accepted**
H5	**RA** ⊢→ **ID** *(Robo-Advisor* ⊢→ *Investment Behavior)*	+0.3811	5.244	0.000	**Accepted**
H6a	**AI** ⊢→ **RA** ⊢→ **ID** *(RA Mediation from AI)*	+0.2178	5.286	0.000	**Accepted**

Source: Data analysis results

Explaining the Counter-Intuitive Positive Effect of TR on ID

One of the most notable empirical findings of this study is that Technology Risk Perception (TR) exerts a **positive effect (**$\beta = 0.1701, p < 0.05$**)** on Investment Decision-Making Behavior (ID), contrasting with the initial hypothesis (H1) and traditional Perceived Risk Theory. This paradox can be explained through psychological and generational perspectives:

Digital Native Profile and Active Risk Management of Gen Z:

Gen Z in Hanoi has been exposed to technology from an early age. Unlike older generations who view technology risk as a reason to avoid adoption, Gen Z understands that digital investment inherently involves cybersecurity and algorithmic risks. Consequently, heightened risk perception does not deter investment; rather, it functions as a **Risk-Awareness**

Mechanism prompting them to perform thorough research, act cautiously, and actively utilize AI to manage risks.

Risk-Benefit Trade-Off:

In digital finance, the compelling advantages of AI (analytical speed, 24/7 market access, removal of emotional bias) outweigh technical risk concerns. Gen Z is willing to accept a calculated level of technology risk in exchange for optimized investment efficiency.

Fear of Missing Out (FOMO) Overriding Risk Concerns:

The rapid evolution of modern financial markets creates intense FOMO among young individuals. The attraction of potential returns derived from AI-driven analytics proves stronger than the barriers associated with technical uncertainties.

6. Recommendations

Based on the theoretical foundations, previous studies, and empirical findings of this research, several recommendations are proposed to enhance the effectiveness of artificial intelligence applications in financial investment activities, particularly among Generation Z investors in Hanoi.

6.1. Recommendations for Indivdual Investors

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ISSN: 2456-7760

As AI becomes increasingly integrated into financial services, investors should continuously strengthen both their technological literacy and financial analysis skills to make more effective use of AI-powered investment tools. Although AI is capable of processing large volumes of data, identifying market trends, and generating algorithm-based recommendations, it should be viewed as a decision-support tool rather than a complete substitute for human judgment.

Furthermore, investors should maintain a critical mindset when using AI systems and Robo-Advisors. Combining AI-generated recommendations with market information, financial knowledge, and personal investment objectives can help reduce risks and improve the quality of investment decisions over the long term.

Investors should also pay close attention to issues related to data security, privacy protection, and platform transparency before adopting AI-based financial services. Selecting reputable systems developed by trustworthy financial institutions can significantly reduce potential risks associated with AI-assisted investing.

6.2. Recommendations for Financial Service Providers and Robo-Advisor Developers

FinTech firms and financial institutions should continue investing in the development of highly accurate AI systems while simultaneously improving the explainability of AI-generated recommendations. Enhancing Explainable AI (XAI) capabilities can help users better understand how investment recommendations are generated, thereby increasing trust and technology acceptance.

In addition to improving algorithm performance, organizations should focus on optimizing user experience through intuitive and user-friendly interfaces tailored to the characteristics of younger investors. Features such as portfolio simulation, risk explanation, market volatility alerts, and personalized recommendations can substantially enhance the usefulness of AI-based investment platforms.

Moreover, companies should strengthen cybersecurity infrastructure, protect customer data, and establish comprehensive risk-management procedures for AI systems in order to minimize operational errors and maintain user confidence.

6.3. Recommendations for Government and Regulatory Authorities

Given the rapid advancement of AI technologies, establishing a comprehensive legal framework for AI applications in the financial sector has become increasingly important. Regulatory authorities should develop clear regulations regarding the responsibilities of AI service providers, data security standards, user privacy protection, and dispute-resolution mechanisms related to AI-assisted investment decisions.

At the same time, collaboration among government agencies, universities, research institutes, and businesses should be encouraged to promote research, technology transfer, and the development of AI solutions tailored to the Vietnamese financial market. Expanding educational

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ISSN: 2456-7760

initiatives on AI and digital finance, particularly for younger generations, can further enhance the safe and effective use of emerging technologies.

Overall, effective cooperation among investors, businesses, and regulators will create a solid foundation for the sustainable development of Vietnam's AI-driven financial investment ecosystem while strengthening the competitiveness of the financial market in the era of digital transformation.

7. Conclusion

The rapid advancement of artificial intelligence is gradually transforming both the operation of financial markets and the decision-making processes of investors. AI not only enables faster and more accurate data processing but also facilitates the personalization of investment services through Robo-Advisors and intelligent analytical systems. However, the successful adoption of AI in investment activities depends not only on technological capabilities but also on users' perceptions of risk, their level of trust in technology, and the behavioral characteristics of different investor groups.

Building upon previous domestic and international studies, this research developed a framework to examine the relationships among artificial intelligence, technology risk perception, Robo-Advisors, and the investment decision-making behavior of Generation Z in Hanoi. The proposed model was grounded in established theories, including the TAM and Behavioral Finance theories, and was used to formulate hypotheses regarding both the direct and indirect effects of the research variables on investment decisions.

From a theoretical perspective, the study contributes to the growing body of literature on AI applications in financial investment by clarifying the roles of technology risk perception and Robo-Advisors within the broader context of digital transformation. From a practical perspective, the findings are expected to provide useful insights for FinTech firms, financial institutions, and policymakers in designing strategies that promote the effective, transparent, and secure adoption of AI technologies in Vietnam.

Despite these contributions, several limitations should be acknowledged. The study focuses exclusively on Generation Z investors in Hanoi, which may limit the generalizability of the findings to the broader population of Vietnamese investors. In addition, the research examines only a selected set of variables, whereas factors such as financial literacy, trust in AI, algorithm transparency, and investment experience may also play important roles and warrant further investigation.

Future studies may expand the scope of analysis to different investor groups and geographical regions. Researchers may also employ more advanced analytical techniques, such as Structural Equation Modeling (SEM) or longitudinal research designs, to provide a more comprehensive understanding of how AI influences investment behavior in an increasingly digital financial environment.

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ISSN: 2456-7760

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