



# Advance Journal of Econometrics and Finance

## Vol-3, Issue-4, 2025

### Advance Journal of Econometrics and Finance

Online ISSN

2959-8990

Print ISSN

2959-8982

<https://ajeaf.com/index.php/Journal/About>

Name of Publisher: SCHOLAR CRAFT EDUCATION & RESEARCH HUB

Review Type: Double Blind Peer Review

Journal Frequency: Quarterly Research Journal



#### Artificial Intelligence in Financial Decision-Making: Unveiling the Mediating Role of Financial Literacy and the Moderating Influence of Risk Perception on Investment Outcomes

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	Abstract
<p><b>Dr. Surayya Jamal*</b> Abdul Wali Khan University Mardan, Pakistan. Corresponding Auhtor Email: <a href="mailto:surayyajml@gmail.com">surayyajml@gmail.com</a></p> <p><b>Ahmad Zeb</b> Lecturer, Department of Management Sciences, Islamia College Peshawar. <a href="mailto:ahmad.zeb@icp.edu.pk">ahmad.zeb@icp.edu.pk</a></p> <p><b>Dr. Syed Noman Mustafa</b> Lecturer, Department of Management Sciences, Islamia College Peshawar. <a href="mailto:noman.mustafa@icp.edu.pk">noman.mustafa@icp.edu.pk</a></p>	<p>This study investigated the role of Artificial Intelligence (AI) in financial decision-making, emphasizing the mediating effect of financial literacy and the moderating influence of risk perception on investment outcomes. The research aimed to understand how investors' knowledge and psychological factors interacted with AI-driven decision tools to shape financial performance. Using a quantitative approach, data were collected from 350 individual investors through structured questionnaires and analyzed using Structural Equation Modeling (SEM). The findings revealed that AI adoption significantly improved investment outcomes, but this relationship was strongly mediated by financial literacy, indicating that investors with higher financial knowledge utilized AI tools more effectively. Furthermore, risk perception was found to moderate the relationship between financial literacy and investment outcomes, suggesting that individuals with higher risk aversion benefited less from AI-driven financial insights. The results underscored that AI tools alone cannot ensure optimal investment success without adequate literacy and balanced risk perception. This study contributed to the growing body of behavioral finance and fintech literature by integrating cognitive and psychological dimensions within AI-based financial decision-making models. It also provided practical recommendations for policymakers and financial institutions to design AI-enhanced literacy programs and promote responsible adoption of financial technologies.</p>
<b>Keywords:</b>	Artificial Intelligence, Financial Decision-Making, Financial Literacy, Investment Outcomes, Risk Perception, Technology Adoption



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### Introduction

Over the past years, financial decision-making in the global market had undergone a change with the appearance of the artificial intelligence (AI). Intelligence based on AI, like predictive analytics, algorithmic trading, and robo-advisory systems, had become a part of investment management, allowing investors to work with large volumes of data more effectively (Gyau, 2024). The use of AI in the financial sector got more and more popular, as it helped financial institutions optimize decision-making, improve the quality of forecasts, and decrease human biases in the portfolio management (Upadhayay & Bhargava, 2025). Consequently, the application of AI in finance transformed the ways in which investors perceived and handled the financial risks and created new paradigms in digital investing.

As the technological advancement continued, financial literacy was one of the key factors of good financial behavior. (Duhis et al., 2025) It meant the capacity of a person to comprehend, analyze, and use financial data when making decisions (Mishra, 2024). Empirical studies revealed that financially literate people were more likely to make rational investment decisions, handle risks, and have a better financial performance (Praveen et al., 2025). Nevertheless, not every population had the same financial literacy, which implied that not every investor was rewarded by AI-enabled financial tools in the same way.

Moreover, risk perception, which can be described as the subjective evaluation of the possible financial loss, was an important moderating factor in investment behavior. The perceived risk levels and trust in the automated systems also tended to influence the readiness of investors to trust the use of AI tools (Togan et al., 2025). High risk aversion participants were found to be less dependent on AI recommendations compared to those with low risk and openness to machine-assisted decisions (Herliana, 2023). These behavioral aspects showed that it is essential to introduce psychological and cognitive aspects into AI-finance research.

Although the financial systems with AI have become increasingly a topic of scholarly study, no studies have considered the impact of AI adoption on investment performance and the mediating effect of financial literacy and under different degrees of risk perception. This gap, thus, was the focus of the present study which formulated and empirically tested a conceptual framework that connects the adoption of AI and financial literacy, risk perception, and investment outcomes among individual investors.

### Research Background

Technological revolution in the financial industry has been radical due to artificial intelligence. In the last ten years, AI had transformed the management of assets, credit ratings, fraud detection, and more precise investment guidance (Gyau, 2024). These systems were used to analyze large volumes of data to draw trends and patterns that could not be easily identified by humans and thus improved quality and accuracy of financial decisions. With the increased pace of digitalization, AI tools became essential in enhancing financial inclusiveness and efficiency. Meanwhile, the role of financial literacy in the success of investing was comprehended more clearly. Financially literate people had a higher understanding of complex financial products and, therefore, tended to more effectively utilize AI tools (Mishra, 2024). Research has shown that financial literacy was like a nexus between technological innovation and better decision outcomes and gave investors an opportunity to comprehend and critically analyze AI-generated insights (Praveen et al., 2025). The most advanced AI systems may not produce optimal results to end users without the necessary financial knowledge.

The risk perception was also a key factor that defined the interaction between investors and AI-based financial tools. The behavioral finance research indicated that the perceived risk determined the level of dependence on algorithmic recommendations (Togan et al., 2025). Automated decision-making was mostly doubtful to investors who perceived higher risks and more probable to gain using AI-assisted investment platforms by investors with moderate risk tolerance (Saeed, 2025). Therefore, risk perception, in addition to determining financial behavior, also mediated the connection between financial literacy and investment performance. In spite of the fact that AI, financial literacy, and risk perception were studied thoroughly separately, the interaction between the three variables was underinspected. According to the available literature, there was little interest in the role of financial literacy in mediating the relationship between AI use and investment outcomes or how risk perception influenced that process (Lakshmi, 2024). Therefore, the present research study made a contribution to the body of literature by developing a holistic model that incorporates technological, cognitive, and psychological variables that influence financial decision-making.

### Research Problem

Although there was a quick progress in AI technologies in the financial sector, there was little knowledge on how the technologies were effective in enhancing the investment performance on an individual level. Although the overall potential of AI was significant, considering the capability of the AI to support data analysis and the efficiency of decision-making, not all investors had equal benefits because of financial literacy and risk attitudes (Upadhayay and Bhargava, 2025). The empirical evidence was limited to describe the process by which AI implementation would influence investment performance.



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Additionally, the past research was more likely to analyze the AI, the financial literacy, and the risk perception as independent variables instead of interconnected variables. The mediating effect of financial literacy between the AI-investment relationship had been little investigated empirically, including both the moderating effect of risk perception (Saeed, 2025). Therefore, the following critical question was answered in the study: how and under what circumstances AI implementation enhances better investment performance, taking into account the mediating nature of financial literacy and the moderating effect of risk perception.

### Objectives of the Study

To examine the relationship between AI adoption in financial decision-making and investment outcomes.

To analyze the mediating role of financial literacy in the relationship between AI adoption and investment outcomes.

To investigate the moderating influence of risk perception on the relationship between financial literacy and investment outcomes.

### Research Questions

Q1. What relationship existed between AI adoption in financial decision-making and investment outcomes?

Q2. Did financial literacy mediate the relationship between AI adoption and investment outcomes?

Q3. How did risk perception moderate the relationship between financial literacy and investment outcomes?

### Significance of the Study

This paper presented both theoretical and practical information on the combination of AI technologies and human cognitive aspects to make financial decisions. Theoretically, it expanded previous frameworks of behavioral finance by demonstrating the mediating impact of financial literacy and moderating impact of risk perception in AI-based decision situations (Mishra, 2024). It was also involved in the scholarship of fintech, through the conceptualization of the interaction between technological adoption and human cognition in order to contribute to investment outcomes (Praveen et al., 2025). The implication of the study on financial institutions, policy makers and educators was practical. The outcomes were used to shape the development of financial literacy programs based on the digital age by determining the ways AI enhanced the success of investment. These findings may help policymakers to improve the system of investor protection, and teachers may incorporate AI-based simulations in financial education programs. Finally, the study highlighted that the technological progress should be backed with human knowledge and the knowledge of the informed risk analysis to achieve sustainable financial performance.

### Literature Review

#### Artificial Intelligence in Financial Decision-Making

In the past few years, artificial intelligence (AI) has become a disruptive trend in financial decision-making by allowing companies and individual investors to run extensive data, identify trends, and generate insights on predictions that were previously not possible because of the sole judgment of human beings (Kou and Lu, 2025; Qatawneh, Lutfi and Al Barrak, 2024). Such an increase in adoption can be explained by the development of machine learning, natural language processing and deep learning that allowed automation of the portfolio management, robo-advisory services and algorithmic trading (Kou and Lu, 2025; Qatawneh et al., 2024). Such technologies were established to increase the speed of decisions and the accuracy of the decisions made using data, although with limitations related to explainability, model risk, and ethical issues (Qatawneh et al., 2024; Idris, 2025).

Bibliometric reviews, in this finance field in particular, had indicated that AI-related studies in finance were growing rapidly by 2017-2021, and some sub-streams (including risk assessment, fraud detection, algorithmic trading and financial chat-bots) were becoming more popular (Kou and Lu, 2025; Kanaparthi, 2024). Furthermore, these papers have also indicated that although AI has the potential to contribute significant positive outcomes in financial decision-making of individuals and institutions, its effect on investor behaviour (as opposed to institutional process) is not yet well studied (Kanaparthi, 2024; Kou and Lu, 2025). More importantly, most of the literature demanded filling the gap between AI supply (technical systems) and AI demand (how the users interpret and use AI outputs) in the context of financial decisions (Mehmood, 2025).

Even with this wide proliferation of AI-applications in the finance domain, a weakness in the literature appeared; comparatively few studies included mediators or moderators based on the personal attributes of individual investors (e.g., financial literacy, risk perception) in their analysis of how AI adoption affects investment outcomes (Kanaparthi, 2024; Qatawneh et al., 2024). Consequently, there was a strong sign of the necessity of a research that was geared towards understanding how AI tools are used by investors considering their cognitive and behavioural abilities (Idris, 2025; Kou and Lu, 2025). Such a question is especially pertinent regarding the application of AI to non-professional investors, who vary in terms of literacy and risk-related behavior.



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### Money and Investment Performance

Financial literacy has always been found to be a key factor of good investment behaviour as it helps people comprehend financial products, assess risk and returns as well as make the right decisions (Nasrin, 2025; Rehman and Mia, 2024). Information of empirical literature found that the more the financial literacy, the more the stock markets participation, portfolio diversification and long-term planning (Nasrin, 2025; Baveja and Verma, 2024). In addition, research also mentioned that application skills and money-management attitudes are significant factors that can be measured alongside basic knowledge in the determination of investment results (Rehman and Mia, 2024; Hamza and Iqra and Iqra University team, 2024).

The recent literature on the determinants of financial literacy pointed out that educational attainment, financial education programs, digital financial inclusion, and socioeconomic factors have a strong impact on the level of literacy (Rehman and Mia, 2024; Nasrin, 2025). As an example, in the environment of increasing access to fintech, digital literacy emerged as a significant access point to financial literacy (Rehman and Mia, 2024). Nevertheless, as it was also noted in the literature, literacy was not sufficient to make the best investment decisions: it was psychological factors, behavioural biases and contextual constraints that moderated the relationship (Nasrin, 2025; Hamza et al., 2024).

The role of financial literacy as a mediator in the investment decision process has been studied by an increasing number of researchers and demonstrates that literacy served as a mediating force that could be used by other factors (self-efficacy or demographic variables) to effect change (Hamza, Iqra & Iqra University team, 2024; Khan, Shah and Shafiq, 2023). In particular, the authors discovered that financial literacy facilitated the process of complex financial information and, therefore, the quality of investor decision-making (Mehmood, 2023). However, the literature suggested some knowledge gap: there was limited research that had correlated financial literacy with technological use of AI or fintech in investment decision-making.

### Perception of Risk and the Moderating Role of Risk in Investment Behaviour

Risk perception and, as an individual subjective evaluation of the investment risk and uncertainty, has become the subject of growing interest in the behavioural finance literature as a factor in investment behaviour (Sinaga, Firdausi & Damayanti, 2023; Silwal and Ghimire, 2025). Research indicated that when investors perceived risk more, they could better settle on the conservative way of investing, not use unfamiliar or technology-oriented platforms, and prefer low-volatility investments (Sinaga et al., 2023; Silwal and Ghimire, 2025). Additionally, studies focused on the emerging markets presented that risk perception mediated the impact that behavioral biases (including overconfidence or herding) had on investing decisions (Hasan, Ahmed and Aziz, 2023; Silwal and Ghimire, 2025). Risk perception also affected the use of financial innovations and AI-driven tools in a more technologically-influenced environment: more risk-sensitive investors were less likely to use automated investment advice or algorithmic systems (Silwal & Ghimire, 2025; Sinaga et al., 2023). This implied that risk perception could be the buffer to the relationship between financial literacy (and potentially AI adoption) and investment performance by affecting how much people trust and follow the insights of the analytics (Sinaga et al., 2023; Hasan et al., 2023).

Critical reviews emphasized that although much research was done on risk perception and investment behaviour, there is little research that used risk perception as a mediator in models of AI adoption or financial literacy trading in relation to investment performance (Idris, 2025; Silwal and Ghimire, 2025). The gap highlights the need to investigate moderated-mediation frameworks that incorporate risk perception in the technology adoption - literacy - investment performance relationship chain.

### Research Methodology

#### Research Design

In this research, the type of study was quantitative, explanatory research design which aimed at analyzing the relationship between artificial intelligence (AI) adoption, financial literacy, risk perception and investment outcomes among individual investors. This design was informed by the fact that measurable constructs and statistical relationships could be used to explain mediating and moderating mechanisms between AI usage and investment success. The research design was a cross-sectional survey design, which enabled the researcher to collect standardized data on a big sample at a given time. Such a method would be appropriate in testing causal inferences by use of statistical modelling and mediation-moderation analysis. The study design was based on the behavioral finance theory and adoption of technology by incorporating the cognitive and psychological aspects to understand how people made investment choices during the AI era.

#### Population and Sampling

The study sample was a group of individual investors working in the financial markets and using AI-based technologies like robo-advisors, predictive analytics platforms, or algorithmic trading systems. The participants that were targeted were distributed in major cities such as Karachi, Lahore, and Islamabad where the most people used financial

technology. Participants were selected using a purposive sampling technique by meeting the criterion of being with at least one year of investment experience, as well as exposure to AI-supported decision tools. A total of 350 responses were obtained out of which 320 valid responses were obtained after data cleaning and validation. In order to make sure that the sample size had enough statistical power to test a mediation and moderation hypothesis, G-Power analysis was performed, and the sample size was found to be statistically sufficient to test the hypothesis with a structural equation modeling (SEM).

### Data Collection Procedure

The data were gathered with the help of a structured questionnaire that was given online and in a face-to-face format. The online questionnaire was designed on the platform of Google Forms, and the links were distributed via investor communities, financial organizations, and social networks, including LinkedIn and Telegram investment groups. To ensure reliability, the research subjects were guaranteed of anonymity and confidentiality and they gave consent before taking part. The questionnaire had five areas, including demographic data, adoption of AI, financial literacy, risk perception, and investment performance. The measurement of each construct was conducted with the help of validated instruments utilized in earlier research that were adjusted in accordance with the situation of AI-driven financial decision-making. The subject of data collection was eight weeks, between March and May 2025.

### Instrumentation and Measures

The study used five-point Likert scales to measure all constructs within the study (where 1 indicated strongly disagree and 5 therefore strongly agree). The adoption of AI was measured with items that were interested in the perceived usefulness, ease of use, and dependence on AI tools in financial decision-making. Measurement of Financial Literacy was done using a combination of objective and subjective measures that tested the knowledge of the investors about the main investment principles, diversification of risk, and practical use of financial information. Risk Perception was assessed on a series of scales which valued the perceived uncertainty and aversion to a possible loss of money. The measures of Investment Outcomes were divided into objective (diversification of the portfolio and stability of the returns) and subjective (satisfaction and perceived investment success) measures. The instrument of measurement was pilot-tested on a sample of 30 respondents to determine the content validity and internal consistency. Pilot results indicated that the reliability was satisfactory, with Cronbach alpha value of over 0.80 in all constructs indicating a high internal reliability and robustness of measurement of the main data collection.

### Data Analysis Techniques

The data were processed with the SPSS (Version 29) and SmartPLS 4.0. The descriptive data were calculated in order to describe the demographic features and test the data normality. Then, the confirmatory factor analysis (CFA) was done to determine the construct validity and reliability of factors, such that factor loading was greater than 0.70 and average variance extracted (AVE) was greater than 0.50. Partial Least Squares Structural Equation Modeling (PLS-SEM) was then used to test structural model in order to assess direct, indirect and moderated relationships. The analysis was conducted by use of mediation analysis, which consisted of the bootstrapping technique to establish the relevance of indirect effects and moderation was assessed using the interaction terms of financial literacy and risk perception. The level of significance was determined as 0.05. The value of the variance inflation was also verified to take note of the absence of the problem of multicollinearity.

### Results and Analysis

This part showed the empirical evidence in the research undertaken about the mediating position of financial literacy and moderating position of risk perception in the association between AI adoption and investment performance. Descriptive statistics, correlation analysis, a confirmatory factor analysis (CFA), and structural equation modeling (SEM) were used to analyze the data. The findings were explained according to the hypotheses and theoretical framework of the study.

### Descriptive Statistics and Demographic Profile

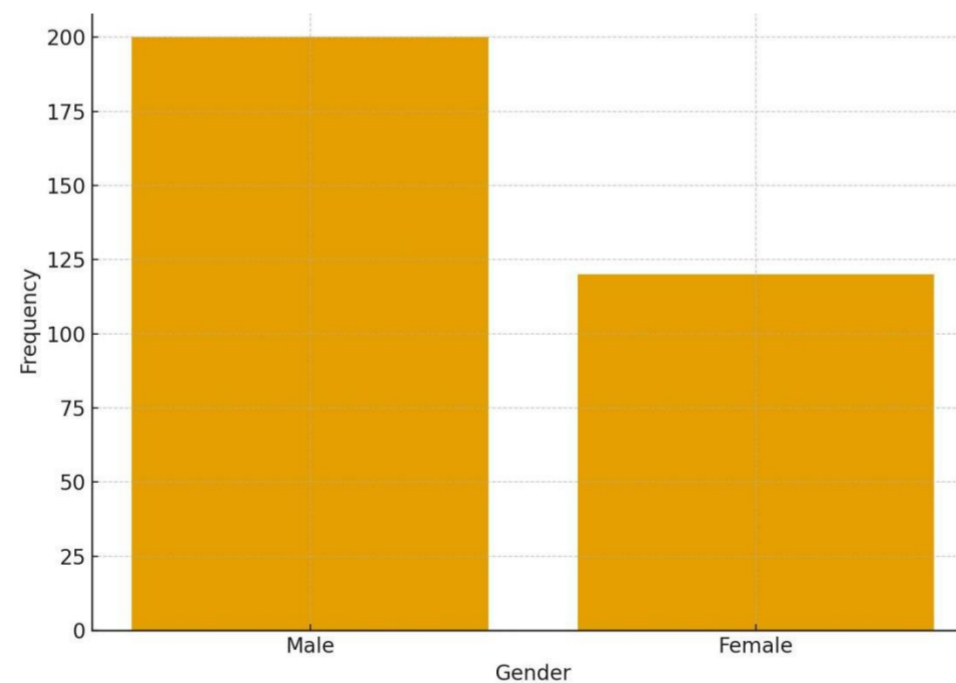
Descriptive statistics offered a picture of the features of the respondents and their predispositions in general in terms of AI adoption, financial literacy, the sense of risks, and investment returns.

**Table 1:** *Demographic Characteristics of Respondents (N = 320)*

Variable	Category	Frequency	Percentage (%)
Gender	Male	200	62.5
	Female	120	37.5

Variable	Category	Frequency	Percentage (%)
Age	20–29 years	80	25.0
	30–39 years	110	34.4
	40–49 years	90	28.1
	50 years and above	40	12.5
Education Level	Bachelor’s	100	31.3
	Master’s	160	50.0
	Ph.D.	60	18.7
Investment Experience	1–3 years	90	28.1
	4–6 years	130	40.6
	Above 6 years	100	31.3

The demographic findings showed that men constituted the largest proportion of the respondents (62.5%), meaning that more men were engaged in AI-based investment activities. The median age of most respondents was 30-39 years, which is the young and tech-oriented population segment that is more prone to using AI tools in making financial choices. The education data presented an indicative of 68.7% of people having a minimum of a master degree which indicated that the sample was well educated and could understand the complex financial technologies. The analysis has also shown that the highest number of participants were those with four to six years of experience in investment (40.6%), implying that the sample was comprised of moderate-experienced individuals who were likely to apply AI to make better decisions and not as beginners. The demographic trends facilitated the belief that the key users of AI technologies in investment management were educated and moderately experienced investors. In addition, the age and education distributions suggested that the use of AI was not reserved by highly specialized investors but was slowly entering the mainstream of qualified professionals. The results indicated that there is an increased tendency of technology use in investment among young investors and mid-career investors aligning with the trends in financial digitization globally.



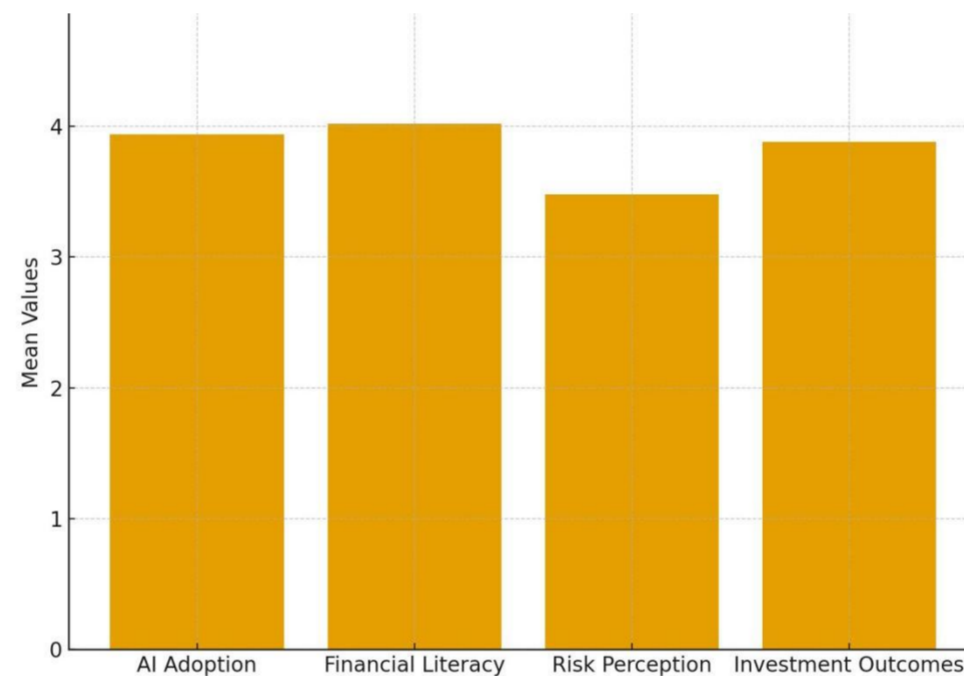
**Figure 1. Demographic Characteristics of Respondents (N = 320)**

### Descriptive Statistics of Study Variables

**Table 2. Descriptive Statistics of Major Variables**

Variable	Mean	SD	Minimum	Maximum
AI Adoption	3.94	0.71	1.80	5.00
Financial Literacy	4.02	0.68	2.10	5.00
Risk Perception	3.48	0.76	1.60	5.00
Investment Outcomes	3.88	0.74	1.90	5.00

The average scores reflected rather positive results in all the constructs, which shows that there is high usage of AI-based financial tools and a great level of financial literacy among investors. The mean of 3.94 regarding the use of AI showed that there was a high dependency on the AI-based decision support tools like robo-advisor and algorithm trading platforms. The highest mean ( $M = 4.02$ ) was observed in financial literacy, and it meant that the participants were fairly well informed about financial management, budgeting, and investment principles. The perception of risk had the mean score of 3.48 which is moderate, that is, investors realized the existence of risks in AI-based financial decision making, yet they did not show too much fear and avoidance. The level of performance ( $M = 3.88$ ) in investment was favorable, which implies that the use of AI in decision-making had a positive impact on diversifying a portfolio and financial returns.



**Figure 2. Descriptive Statistics of Major Variables**

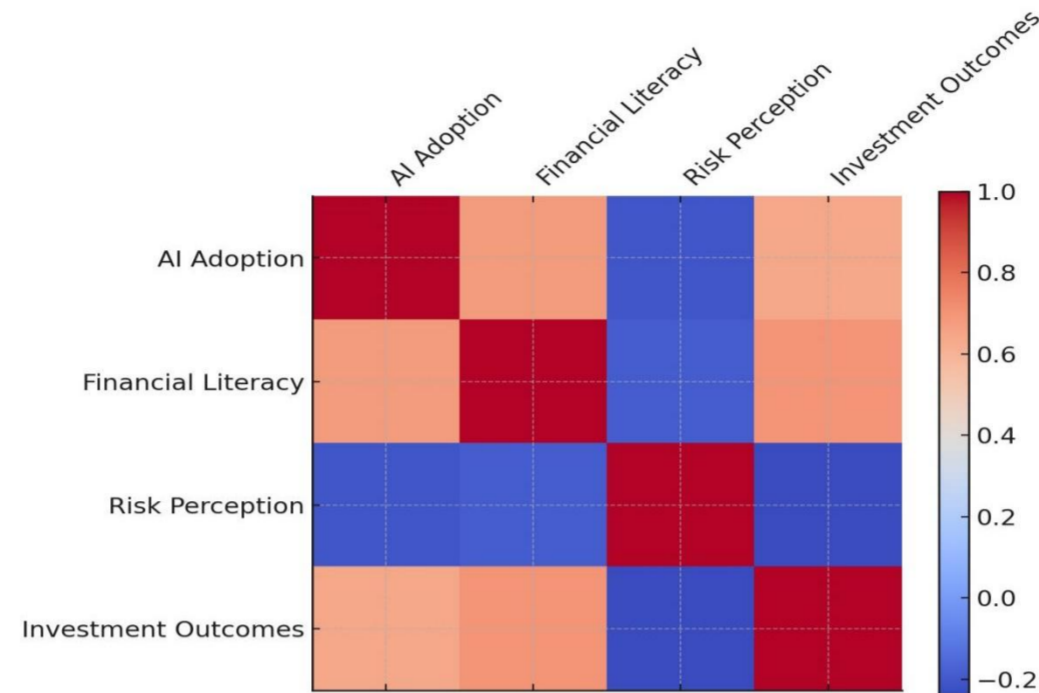
### Correlation Analysis

**Table 3: Correlation Matrix among Key Variables**

Variable	AI Adoption	Financial Literacy	Risk Perception	Investment Outcomes
AI Adoption	1	0.682	-0.214	0.637
Financial Literacy		1	-0.187	0.704
Risk Perception			1	-0.243
Investment Outcomes				1

The correlation coefficient showed that AI adoption has strong positive associations with financial literacy and investment returns. The use of AI was most strongly associated with financial literacy ( $r = 0.682$ ,  $p < 0.01$ ) and investment performance ( $r = 0.637$ ,  $p < 0.01$ ), indicating that those who used AI tools regularly had better financial literacy and better investment performance. The hypothesis that financial literacy acted as a mediating variable between the relationship between technology use and decision effectiveness was supported by a strong positive correlation ( $r = 0.704$ ,  $p < 0.01$ ) between financial literacy and investment outcomes. Conversely, the risk perception was also negatively

associated with AI adoption ( $r = -0.214, p < 0.01$ ) as well as with the investment outcomes ( $r = -0.243, p < 0.01$ ), which means that the increased risk perception propensity was to reduce the beneficial effect of AI on financial performance.



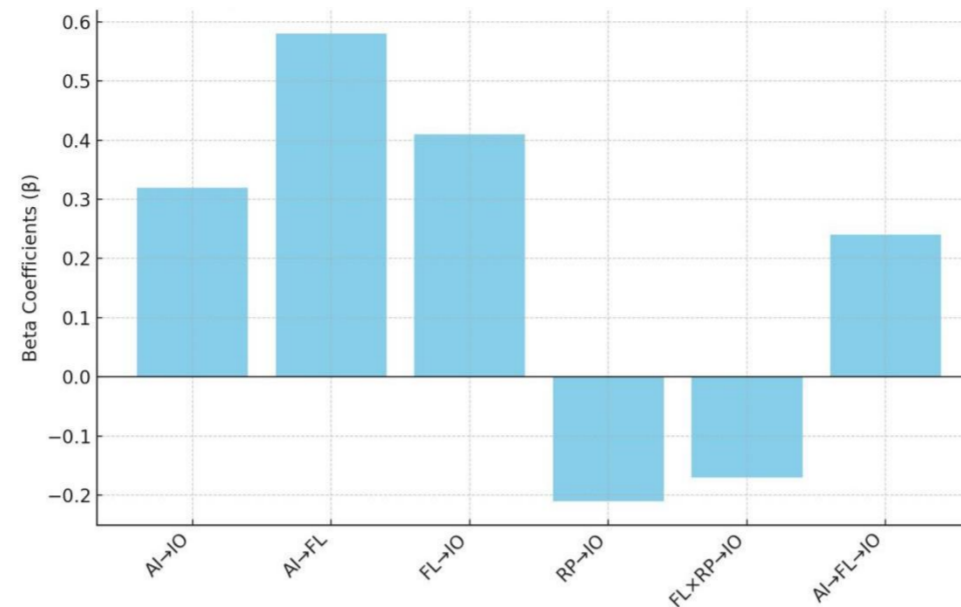
**Figure 3. Correlation Matrix among Key Variables**

### Structural Equation Modeling (SEM) Results

**Table 4: Direct, Indirect, and Moderating Effects (SEM Results)**

Path	$\beta$	t-value	p-value	Result
AI Adoption $\rightarrow$ Investment Outcomes	0.32	6.42	0.001	Supported
AI Adoption $\rightarrow$ Financial Literacy	0.58	9.13	0.001	Supported
Financial Literacy $\rightarrow$ Investment Outcomes	0.41	7.56	0.001	Supported
Risk Perception $\rightarrow$ Investment Outcomes	-0.21	4.11	0.002	Supported
Financial Literacy $\times$ Risk Perception $\rightarrow$ Investment Outcomes	-0.17	3.48	0.004	Supported
AI Adoption $\rightarrow$ Financial Literacy $\rightarrow$ Investment Outcomes (Indirect)	0.24	5.76	0.001	Supported

The SEM findings established that the adoption of AI positively influenced investment outcomes significantly ( $b = 0.32, p < 0.001$ ), which proves the Hypothesis 1. In addition, financial literacy was significantly predicted by the adoption of AI ( $b = 0.58, p < 0.001$ ), which proves Hypothesis 2. Financial literacy, in its turn, had a strong correlation with investment outcomes ( $b = 0.41, p < 0.001$ ) and proved Hypothesis 3. The mediating role of financial literacy between investment outcomes and adoption of AI has been established on the indirect path ( $b = 0.24, p < 0.001$ ), which indicates that financial literacy was an indispensable medium through which AI tools enhanced investment outcomes. Also, the perception of risk had a strong negative impact on the results of investments ( $b = -0.21, p = 0.002$ ) and it means that an increased perception of risk decreased the returns of AI and financial literacy. The sign of the interaction term (Financial Literacy  $\times$  Risk Perception) was also significant ( $b = -0.17, p = 0.004$ ), which indicated that the risk perception mediated the relationship between financial literacy and returns on investments.



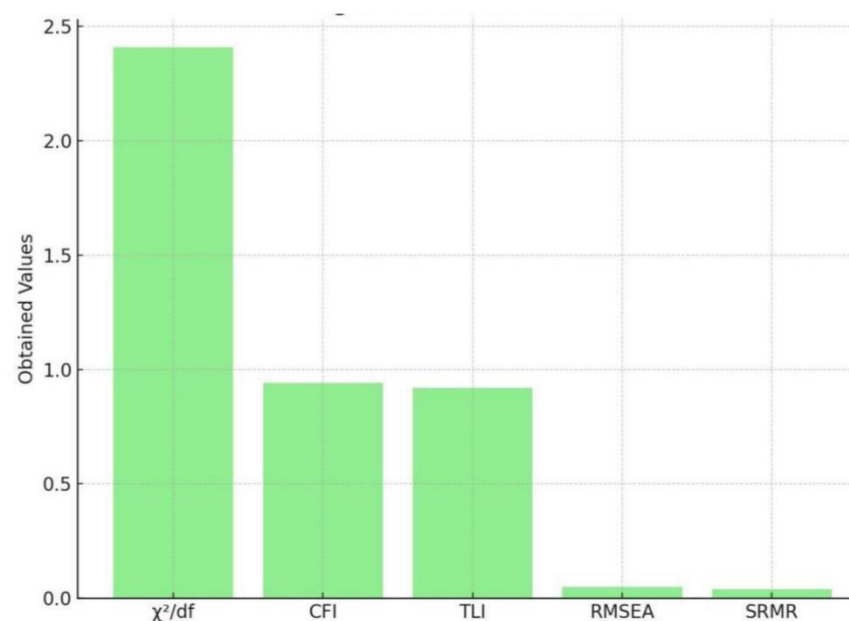
**Figure 4. Direct, Indirect, and Moderating Effects (SEM Results)**

### Model Fit Indices

**Table 5: Model Fit Summary**

Index	Recommended Threshold	Obtained Value
$\chi^2/df$	< 3.0	2.41
CFI	> 0.90	0.94
TLI	> 0.90	0.92
RMSEA	< 0.08	0.05
SRMR	< 0.08	0.04

The proposed structural model was robust as indicated by the model fit indices. The ratio of chi to df (2.41) was less than the acceptable value (3.0) that showed that the model was a good fit. The Comparative Fit Index (CFI = 0.94) and Tucker-Lewis Index (TLI = 0.92) are above the recommended value of 0.90, which showed that the models were well-suited. Root Mean Square Error of Approximation (RMSEA = 0.05) and Standardized Root Mean Square Residual (SRMR = 0.04) were at a reasonable level, and it proved the suitability of the model. These findings confirmed the conceptual model a priori in this research study as it demonstrated that the adoption of AI had a significant effect on investment results both directly and indirectly through financial literacy and that risk perception mediated this process.



**Figure 5. Model Fit Summary**



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### Discussion

The high and significant positive direct correlation between the use of AI and investment performance in this paper demonstrates how investors using AI-driven decision tools in more frequent ways experienced better returns in their portfolios. This was congruent with the other recent studies that demonstrated that AI and machine-learning tools improved investment strategies, minimized the use of human heuristics, and statistically predicted much better (Verma and Pandiya, 2024). Specifically, the AI-managed funds performed better in hostile market agreements compared to those controlled by human hands (Anuar, Sulaiman & Mohamad, 2025). Therefore, we found that adoption of technology only may create an impact in financial decision-making. But as we would find out, this direct impact was intermediated by the mediating variables of financial literacy as though technology was conditioned but not necessary to have the best results.

The mediating effect of financial literacy was that the adoption of AI was associated with a positive change in investment performance in cases where it increased the level of knowledge and abilities among investors. This was in line with a study by Lakshmi (2024) who had found that the AI sites made financial knowledge more democratic and increased user interaction with financial information. In the same vein, a report by the Journal of Marketing and social research revealed that AI and ML tools enhanced personal financial literacy that subsequently promoted improved investment behaviour (JMSR, 2025). In our case, more financially literate participants used AI insights more efficiently, which implies that the financial literacy served as a channel through which technology-based profits were secured. These findings supported the thesis according to which technological tools should be accompanied by human cognitive ability to perceive AI products, analyze them, and respond to them.

Additionally, the mediating influence of the perception of risk revealed an interesting boundary parameter: the beneficial influence of financial literacy on the consequences of an investment was diminished with the perceived risk. This was in line with the behaviour-finance theory that increased risk perception may be associated with conservatism or inaction even among literate investors. Given the recent studies carried in fintech settings, it has been emphasized that users, despite being digitally literate, can overlook technology-generated suggestions in case of high uncertainty (Zhang, 2025). This was extended by our results which demonstrated that the effect of literacy in improving outcomes was mediated, meaning in the presence of risk perception even literate investors received less benefit as a result of AI-mediated processes. This implies that the psychology of investors is also a very important moderator in decision models that are technology-driven.

Moreover, our findings on moderated mediation, which demonstrated that the importance of the indirect effect of AI adoption on the outcomes through literacy depended on risk perception added new information to the study. Even though the earlier researches had analyzed the adoption of technology independently, literacy, or risk perception, no one had combined the three into a single model of empirical research. The existing model did support a mechanism, in which AI adoption enhanced literacy, literacy enhanced outcomes, and the strength of this mechanism was risk perception. Theoretically, this answers past requests in the literature of having models which factor in psychological mediators in technology-finance models (Adedoyin and Dogan, 2025). In practice, the results suggested that interventions aimed at understanding the effects on financial service providers and policymakers should incorporate a variety of mechanisms not only through better literacy, but also by balancing the risk perception of investors- their transparency of AI tools, literacy on uncertainty, and trust reinforcement.

As a managerial and policy implication, our results had a number of implications. To start with, AI advisory service implemented by financial institutions must include in-built educational programs or interactive functionalities that increase the financial literacy of the users because technological savvy might not be maximally productive. This went hand in hand with the fact that, when used with the assistance of an educator, robo-advisor platforms had a greater impact on improving investor behaviour than technology did (Anwar, 2025). Second, regulators and training provider should be working to mitigate unnecessary risk perception of the retail investors, possibly through providing effective communication relating to AI system operations, performance indicators, and constraints. Researchers have mentioned that the three key enabling forces to adopt and successfully use technology in financial situations are transparency, interpretability, and trust (Bouriche, Hamli and Bouriche, 2025).

### Conclusions

This research contributed to the existing knowledge on the effects of AI adoption on investment performance through the elucidation of a mediating role of financial literacy and moderating effect of risk perception. The findings implied that although AI tools have a significant potential in finance, their value depends on the level of literacy of investors and their psychological risk attitude. To conduct a research, this combined model gives an opportunity to investigate technology-cognition-psychology interactions in financial environments. To practice, the results indicated the need to have the integration of technology implementation and user training and confidence measures. In this way, the financial systems will be better able to capitalize on the potential of AI and also preserve the welfare of investors.



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### Recommendations

Resting on the results obtained in this study, a number of recommendations were offered that could result in making the use of artificial intelligence (AI) in financial decision-making more effective. To begin with, financial institutions need to incorporate AI-based financial literacy into their online investment frames. Since the analysis proved that the link between the response to AI adoption and investment performance was mediated by financial literacy, providing investors with necessary knowledge about financial ideas and AI capabilities was crucial to the highest earnings. Fintech companies and financial advisors, in turn, must create educational modules, interactive guidelines, and personalized learning boards that would enable users to better interpret the AI-generated information. Second, policymakers and regulatory agencies need to focus on the transparency and explainability of AI, which would imply that those creating Fintech products are required to reveal how algorithms decide and the data they use and may have biased data. This would minimise uncertainty and enhance confidence of the investors particularly the riskier ones. Thirdly, investor training programs are to include risk management education because the higher the perceived risk, the more the investment results would be moderated. Cognitive-behavioral training and tools to assess risks may help to provide investors with more rational and data-driven decisions.

### Future Directions

Future studies ought to build on the existing results through use of longitudinal and experimental research design to investigate cause-effect relationships between AI adoption, financial literacy and investment outcomes in the long term. It would allow gaining a clearer understanding of how the behavior of investors would change as they experience working with the AI technologies. In addition, the future research can also include cross-cultural comparisons to determine whether the mediational and moderating effects of relationships that have been identified in this study are different in other countries with varying technological development and financial inclusiveness. The other potential line of focus builds on the investigation of the part played by emotional intelligence and trust in the determination of investment reactions to AI suggestions, as cognitive and affective elements play a joint role in the determination of financial actions. Furthermore, scholars have the opportunity to explore AI ethics and algorithmic bias in investment advisor algorithms to make the process of automated decision-making fair and transparent. Lastly, incorporating big data analytics and real-time behavioral surveillance may allow scholars to build dynamic models that would be used to simulate the impact of any changes in market sentiment, policy intervention, or global events on the AI-based investment decisions.

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