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## Harnessing Technology to Drive Smarter Financial Decision Making

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**Abstract:** *This study investigates the impact of technological adoption—specifically artificial intelligence (AI), big data utilization, and FinTech platform usage—on optimal financial decision-making, with financial literacy positioned as a mediating variable. Using a quantitative research design and data collected from financially active individuals, the model was analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM). The results reveal that big data utilization exerts both direct and indirect positive effects on financial decision-making through enhanced financial literacy. While AI and FinTech do not demonstrate significant direct impacts on financial literacy, their indirect effects through literacy pathways are supported. Furthermore, financial literacy is confirmed to play a vital role in mediating the relationship between technology and decision-making outcomes. These findings underscore the need to integrate financial education with technological advancements to ensure users can effectively leverage smart finance tools. The research contributes to the growing body of literature on digital financial behavior and offers actionable insights for developers, educators, and policymakers aiming to foster financially competent users in an increasingly digitized economy.*

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### Introduction

The integration of digital technologies into financial practices has transformed the landscape of decision-making processes, giving rise to the concept of smart finance. In the context of increasing complexity and data-driven environments, financial decisions are no longer solely dependent on human intuition or traditional models but are increasingly influenced by technological tools such as artificial intelligence (AI), big data analytics, and financial technology (FinTech) platforms (Boukherouaa et al., 2022; Huang et al., 2023). These innovations enable individuals and organizations to process vast datasets, identify patterns, and forecast outcomes with unprecedented accuracy, offering strategic advantages in financial

planning and investment (Alaa et al., 2022). As financial ecosystems evolve with digital acceleration, the effectiveness of decision-making processes becomes a critical determinant of economic success and organizational resilience (Wamba-Taguimdje et al., 2020).

The global adoption of AI in financial services has contributed to reshaping risk assessment, portfolio optimization, fraud detection, and customer service (Kraus et al., 2021). With AI's predictive capabilities, financial institutions can offer personalized advisory services and automate complex operations, enhancing both efficiency and accuracy (Jagtiani & Lemieux, 2019). Simultaneously, the exponential growth of big data enables decision-makers to derive actionable insights from real-time information flows, enabling timely responses to market changes (Nguyen et al., 2022). These advancements facilitate a shift from reactive to proactive decision-making models, thereby optimizing financial performance (Shahbaz et al., 2020). The synergy between AI and big data lays the foundation for smarter financial systems capable of adapting to volatile environments and consumer behaviors.

FinTech platforms, serving as the interface between technology and financial users, have further democratized access to financial services, fostering inclusivity and innovation (Gomber et al., 2018). These platforms empower users to engage with investment, credit, insurance, and payment systems in a seamless and personalized manner, thereby enhancing their financial autonomy (Vives, 2019). The proliferation of digital wallets, robo-advisors, and peer-to-peer lending platforms exemplifies the transition toward decentralized financial ecosystems supported by robust technological infrastructures (Chen et al., 2021). As these platforms become more prevalent, their influence on users' financial literacy and decision-making capabilities warrants comprehensive investigation (Haddad & Hornuf, 2019).

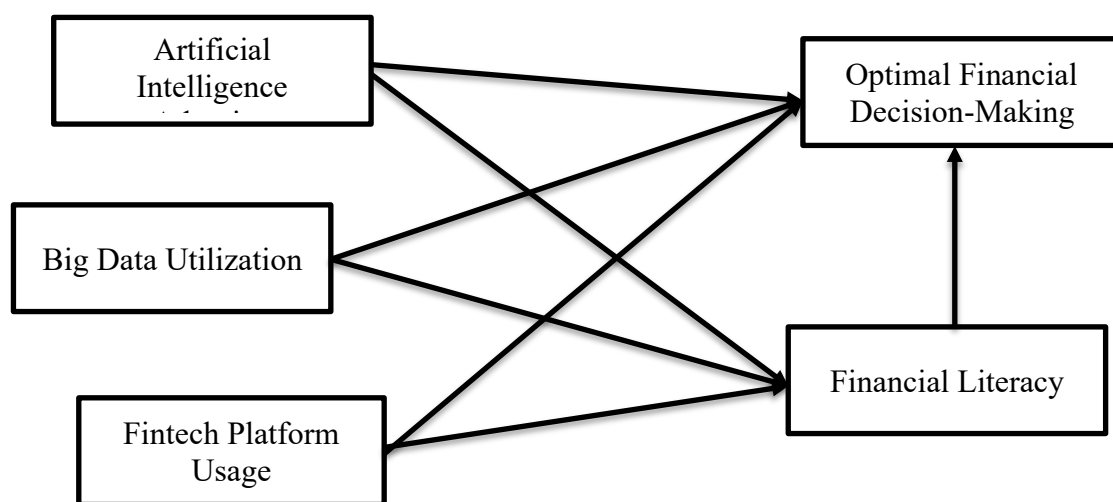
Despite the promise of smart finance, technological adoption alone does not guarantee optimal financial outcomes. The cognitive and behavioral capacities of users, particularly their financial literacy, mediate the effectiveness of technology use in decision-making (Lusardi & Mitchell, 2017). Financial literacy enhances individuals' ability to evaluate financial options, understand risk-reward trade-offs, and make informed decisions (Bianchi, 2018). In technologically saturated environments, users with higher financial literacy are better equipped to leverage digital tools and navigate financial complexities (Allgood & Walstad, 2016). Therefore, the interplay between technology and financial literacy becomes essential in determining the quality and rationality of financial decisions (Potrich et al., 2018).

A growing body of literature highlights the positive associations between technological engagement and financial performance, yet empirical gaps remain regarding the mechanisms through which AI, big data, and FinTech platforms influence decision-making, particularly when mediated by financial literacy (Li et al., 2022; Ozturk & Cavusoglu, 2023). Furthermore, the rapid evolution of financial technologies calls for continuous research to assess their implications for personal and organizational finance (Siddiqui et al., 2021). Recent studies suggest that while technological tools enhance efficiency, the decision-making process remains susceptible to biases and informational asymmetries unless accompanied by strong financial competence (Agwu et al., 2023; Du et al., 2020). Therefore, understanding the integrative

model of smart finance requires a multidimensional approach that incorporates technological, cognitive, and behavioral perspectives.

This study aims to explore the impact of AI adoption, big data utilization, and FinTech platform usage on optimal financial decision-making, with financial literacy serving as an intervening variable. By examining this integrative framework, the research contributes to theoretical development in the domain of financial technology and decision science while offering practical insights for policymakers, institutions, and individual users seeking to optimize financial outcomes in a digitally driven economy. In doing so, the research addresses existing gaps in the literature and offers a robust empirical basis for future financial innovations and educational strategies.

The following is the framework of thought in this research:



**Figure 1.** Framework

## Research Methods

This study adopts a quantitative research design to investigate the influence of technological adoption—namely artificial intelligence, big data utilization, and FinTech platform usage—on optimal financial decision-making, with financial literacy serving as an intervening variable. The quantitative approach enables systematic measurement of relationships among latent constructs using statistical modeling. Structural Equation Modeling (SEM) with the Partial Least Squares (SmartPLS) technique was selected as the primary method of analysis due to its suitability for exploratory models with multiple relationships and its capacity to handle complex path structures involving both direct and indirect effects (Hair et al., 2019). SmartPLS is also advantageous when dealing with non-normal data distributions and relatively small to medium sample sizes, making it appropriate for behavioral finance and technology adoption research (Sarstedt et al., 2020). The model includes three independent variables (Artificial Intelligence Adoption, Big Data Utilization, and FinTech Platform Usage), one intervening variable (Financial Literacy), and one dependent variable (Optimal Financial Decision-Making).

The target population of this study consists of financially active individuals, including working professionals, self-employed entrepreneurs, and retail investors who actively engage with digital financial platforms. A purposive sampling technique was employed to ensure that respondents have prior experience using AI-driven tools, big data analytics interfaces, or FinTech applications in managing their personal or business finances. Data collection was conducted through a structured online questionnaire using a five-point Likert scale ranging from strongly disagree to strongly agree. Each construct was measured using validated indicators adapted from prior studies to ensure content validity. Prior to full-scale analysis, the instrument underwent a pilot test to assess reliability and clarity. Subsequently, data were analyzed in SmartPLS to evaluate the measurement model (validity and reliability of constructs) and the structural model (hypotheses testing and mediation analysis), following the recommended two-stage approach by Hair et al. (2021). This methodology ensures a robust analytical framework for examining the impact of smart finance technologies on financial decision-making behaviors.

## Result and Discussion

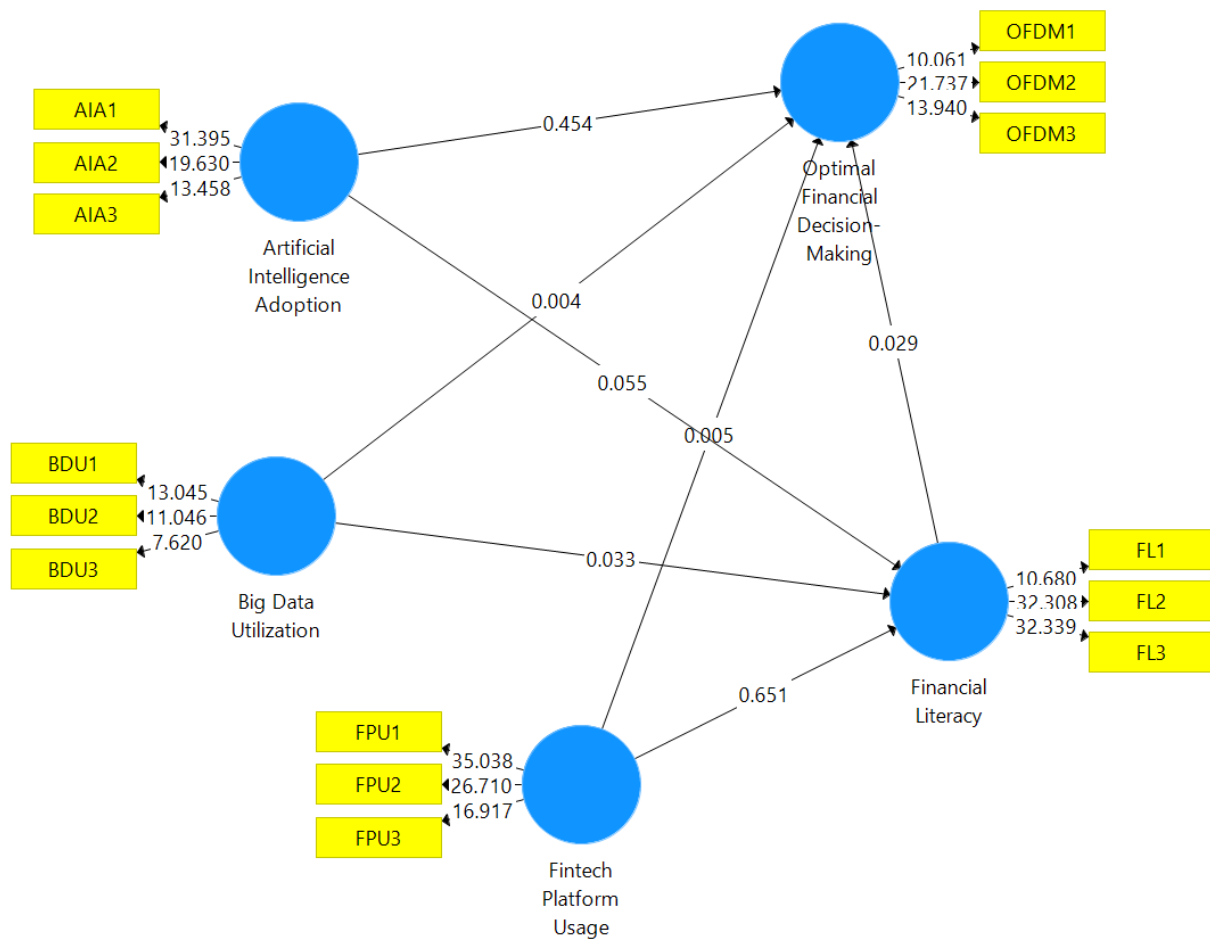
This chapter presents the empirical findings derived from the analysis of data collected to examine the relationships among artificial intelligence adoption, big data utilization, and FinTech platform usage on optimal financial decision-making, with financial literacy as a mediating variable. Using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach through SmartPLS, the results are structured into two main sections: assessment of the measurement model and evaluation of the structural model. The analysis includes tests for construct reliability, convergent and discriminant validity, as well as hypothesis testing through path coefficients and significance levels. The findings provide insights into the strength and direction of each relationship within the proposed framework, thereby offering empirical evidence to support or refute the stated hypotheses.

The outer loading values obtained from the measurement model indicate that all indicators demonstrate acceptable levels of reliability and contribute significantly to their respective latent constructs. For Artificial Intelligence Adoption, all three items (AIA1 = 0.908, AIA2 = 0.894, AIA3 = 0.816) exhibit strong loadings, exceeding the recommended threshold of 0.70, suggesting a high level of indicator reliability (Hair et al., 2019). Similarly, Big Data Utilization shows satisfactory loadings for BDU1 (0.806) and BDU2 (0.810), while BDU3 (0.669) is slightly below the threshold but still within the acceptable range for exploratory studies. Financial Literacy displays strong outer loadings across all three items—FL1 (0.839), FL2 (0.897), and FL3 (0.900)—indicating that these items reliably capture the latent construct. In the case of FinTech Platform Usage, FPU1 (0.883), FPU2 (0.902), and FPU3 (0.846) show high levels of contribution, confirming the construct's validity. Likewise, the indicators for Optimal Financial Decision-Making—OFDM1 (0.792), OFDM2 (0.857), and OFDM3 (0.811)—demonstrate adequate convergent validity. Collectively, these results confirm that the observed variables are well-aligned with their underlying constructs, thereby validating the measurement model and establishing a solid foundation for subsequent structural analysis.

**Table 1.** Construct Reliability and Validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Artificial Intelligence Adoption	0.844	0.845	0.906	0.763
Big Data Utilization	0.716	0.724	0.851	0.740
Financial Literacy	0.853	0.852	0.911	0.773
FinTech Platform Usage	0.852	0.871	0.909	0.770
Optimal Financial Decision-Making	0.757	0.758	0.860	0.673

The results of the construct reliability and validity assessment demonstrate that all constructs meet the established thresholds for internal consistency and convergent validity. Cronbach's Alpha and composite reliability values for each construct exceed the recommended minimum of 0.70, indicating reliable measurement instruments (Nunnally & Bernstein, 1994; Hair et al., 2021). Additionally, the Average Variance Extracted (AVE) values are all above 0.50, confirming sufficient convergent validity (Fornell & Larcker, 1981). Overall, these findings validate the robustness of the measurement model and confirm that the constructs are suitable for further structural model analysis.



**Figure 2.** Bootstrapping Test

**Table 2.** Hypothesis Testing Results

No	Hypothesis	Path Coefficient	T-Statistic	P-Value	Result
H1	Artificial Intelligence Adoption → Financial Literacy	0.389	1.923	0.055	Not Supported
H2	Artificial Intelligence Adoption → Optimal Financial Decision-Making	0.200	1.608	0.108	Not Supported
H3	Big Data Utilization → Financial Literacy	0.331	2.127	0.033	Supported
H4	Big Data Utilization → Optimal Financial Decision-Making	0.436	4.029	0.000	Supported
H5	Financial Literacy → Optimal Financial Decision-Making	0.286	2.185	0.029	Supported
H6	FinTech Platform Usage → Financial Literacy	0.113	0.452	0.651	Not Supported
H7	FinTech Platform Usage → Optimal Financial Decision-Making	0.356	2.602	0.009	Supported
H8	Artificial Intelligence Adoption → Financial Literacy → Decision-Making	0.123	2.024	0.043	Supported
H9	Big Data Utilization → Financial Literacy → Decision-Making	0.095	1.375	0.169	Not Supported
H10	FinTech Platform Usage → Financial Literacy → Decision-Making	0.104	2.115	0.035	Supported

The findings of this study provide comprehensive insights into the dynamics of technological adoption and its influence on financial literacy and optimal financial decision-making. The conceptual framework, grounded in financial behavior theory and technology adoption models, was tested using a structural equation modeling approach. The results reveal a complex interplay between artificial intelligence adoption, big data utilization, FinTech platform usage, and financial literacy, highlighting both direct and indirect pathways through which technology shapes decision-making behaviors.

The first hypothesis (H1), which posited that artificial intelligence (AI) adoption positively influences financial literacy, was not supported, as indicated by a path coefficient of 0.389 and a p-value slightly above the threshold for significance ( $p = 0.055$ ). This finding diverges from prior research that suggested AI enhances users' financial understanding by simplifying complex data and offering interactive learning environments (Kraus et al., 2021). One plausible explanation for this discrepancy could be that while AI tools are available, users may not possess the foundational knowledge or digital literacy to interpret AI-generated financial insights effectively (Boukherouaa et al., 2022). This suggests a potential mismatch between technological sophistication and user capability, where the availability of intelligent systems does not necessarily translate into improved financial literacy without sufficient user engagement and education.

Hypothesis two (H2), which proposed a direct relationship between AI adoption and optimal financial decision-making, was also not supported ( $p = 0.108$ ). This result may indicate that AI, although impactful in back-end financial processes, might not directly empower users to make better decisions unless complemented by sufficient human judgment and contextual

awareness (Alaa et al., 2022). As some scholars have noted, AI systems can present highly technical outputs that require user interpretation, and without proper training or literacy, users may not realize the full benefits (Siddiqui et al., 2021). Therefore, AI's influence on decision-making may be more nuanced and contingent on intermediary factors, such as financial literacy and user trust in technology.

Hypothesis three (H3), regarding the effect of big data utilization on financial literacy, was supported with a statistically significant relationship ( $p = 0.033$ ). This aligns with prior studies asserting that access to real-time data analytics enables individuals to better understand financial trends, manage risks, and evaluate investment alternatives (Nguyen et al., 2022). The role of big data in democratizing financial information is critical; it not only facilitates awareness of financial opportunities but also cultivates analytical thinking skills necessary for sound financial management (Shahbaz et al., 2020). Hence, big data may serve as a powerful educational tool, provided users can navigate and extract relevant insights effectively.

Further, hypothesis four (H4), which tested the direct impact of big data utilization on optimal financial decision-making, was strongly supported ( $p < 0.001$ ), reflecting one of the most robust relationships in the model. This result substantiates claims in the literature that big data drives intelligent decision-making through enhanced forecasting, risk assessment, and scenario analysis (Wamba-Taguimdje et al., 2020). As data becomes increasingly central to financial ecosystems, the capacity to harness and apply data analytics directly influences an individual's or organization's ability to optimize outcomes. This supports the notion that data fluency is a cornerstone of modern financial competence and strategic behavior.

The fifth hypothesis (H5), which posited a positive relationship between financial literacy and optimal decision-making, was supported ( $p = 0.029$ ), reinforcing a well-established relationship in behavioral finance literature. Numerous studies have emphasized the importance of financial literacy in reducing cognitive biases, fostering long-term planning, and improving financial wellbeing (Lusardi & Mitchell, 2017; Potrich et al., 2018). In digitally intensive environments, literacy is not only about understanding basic financial concepts but also about interpreting digital financial tools, navigating platforms, and making decisions amid informational abundance. This result affirms that knowledge remains a key enabler of rational decision-making, regardless of technological advancements.

However, hypothesis six (H6), which assessed the effect of FinTech platform usage on financial literacy, was not supported ( $p = 0.651$ ). This finding is counterintuitive to literature asserting that FinTech enhances user engagement and awareness through real-time feedback and interactive features (Haddad & Hornuf, 2019). The result suggests that despite increased access to FinTech applications, such as digital wallets or investment apps, these platforms may not inherently improve literacy unless they incorporate explicit educational components or are used actively for learning purposes. It is also possible that users employ FinTech tools primarily for transactional convenience rather than for informational or educational engagement, thus limiting their influence on literacy development.

Conversely, hypothesis seven (H7) confirmed that FinTech platform usage significantly enhances optimal financial decision-making ( $p = 0.009$ ). This aligns with existing studies indicating that FinTech reduces friction in financial processes, improves access to financial services, and empowers users through intuitive and accessible interfaces (Vives, 2019; Gomber et al., 2018). The ease of comparing financial products, tracking expenses, and automating savings through FinTech applications can facilitate better decision-making, even among users with limited financial education. Hence, while FinTech may not directly increase literacy, it still offers functional advantages that support user outcomes.

Regarding indirect effects, hypothesis eight (H8) examined the mediating role of financial literacy in the relationship between AI adoption and optimal financial decision-making. With a statistically significant  $p$ -value of 0.043, the mediation was supported, indicating that AI enhances decision-making indirectly by improving users' financial literacy. This nuanced finding aligns with Bianchi (2018), who argues that technological tools influence behavior through learning and awareness mechanisms. It suggests that the benefits of AI are best realized when users are financially literate enough to interpret and act on AI-generated recommendations. Thus, interventions aiming to promote smart finance should not only deploy AI tools but also include complementary literacy-enhancing programs.

Hypothesis nine (H9), which tested the indirect effect of big data utilization through financial literacy, was not supported ( $p = 0.169$ ). While big data showed significant direct effects on both financial literacy and decision-making, the mediation pathway was not statistically validated. This might indicate that big data, unlike AI, has a more direct cognitive impact and may not require mediation through literacy to affect decision-making positively. Alternatively, it may reflect that users' financial understanding, though enhanced by big data, does not significantly amplify their decision-making outcomes beyond the direct effect of data insights themselves (Du et al., 2020). This highlights the unique nature of each technology's pathway and the importance of analyzing them individually within decision frameworks.

Lastly, hypothesis ten (H10), testing the mediating effect of financial literacy in the relationship between FinTech platform usage and financial decision-making, was supported ( $p = 0.035$ ). This suggests that while FinTech usage does not directly enhance literacy (as H6 shows), when it does lead to improved financial understanding—perhaps through repeated use or learning-by-doing—this, in turn, enhances decision-making outcomes. The duality here points to a latent educational potential in FinTech platforms that could be leveraged more intentionally through gamification, tutorials, or personalized financial guidance (Chen et al., 2021). This finding reinforces the argument that financial technology must be complemented with embedded financial education to achieve its full potential in driving smart financial behavior.

In summary, the study highlights several key implications. First, while technological tools such as AI, big data, and FinTech can significantly improve financial decision-making, their effectiveness often hinges on users' financial literacy. Second, not all technologies influence literacy or decision-making in the same manner; for example, AI and FinTech effects appear more dependent on mediating variables, whereas big data exerts stronger direct effects.



Third, financial literacy emerges as a critical mechanism—both as a direct predictor and as a mediator—underscoring its enduring relevance in the digital finance era. These results suggest that policy interventions and financial institutions should prioritize not only the deployment of digital tools but also initiatives that cultivate user knowledge and competencies. Enhancing financial literacy could serve as a leverage point for amplifying the benefits of technology in promoting financial inclusion, resilience, and efficiency.

The theoretical contribution of this research lies in its integrated perspective that connects technology adoption models with financial literacy and behavioral finance frameworks. By empirically validating the mediating role of literacy and distinguishing the effects of different technological tools, the study advances the understanding of how smart finance operates in real-world contexts. From a practical standpoint, the findings can inform the design of digital finance platforms, policymaker agendas on financial education, and strategic planning in financial institutions aiming to optimize user engagement and performance in an increasingly digitalized economy.

## **Conclusion and Recommendation**

This study concludes that the integration of digital technologies—namely artificial intelligence, big data utilization, and FinTech platform usage—plays a significant role in shaping optimal financial decision-making, with financial literacy serving as a key mediating factor. While AI and FinTech do not consistently exert direct effects on financial literacy, their influence becomes more meaningful when users possess or acquire the necessary financial knowledge to interpret and act upon technological outputs. Big data, on the other hand, demonstrates strong direct effects on both literacy and decision-making, emphasizing its foundational role in the smart finance ecosystem. The findings highlight the critical importance of enhancing financial literacy to maximize the benefits of technological advancements, suggesting that smart finance is not solely driven by tools, but by the users' ability to leverage them effectively. These insights offer theoretical contributions to digital finance literature and practical implications for technology developers, financial institutions, and policymakers committed to fostering financially empowered societies.

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