Journal of Business Insight and Innovation
Volume 5 Issue 11, 2026
ISSN-p: 3006-2284, ISSN-e: 3006-0982
https://insightfuljournals.com/

THE IMPACT OF FINTECH-ENABLED CLIMATE INTELLIGENCE ON SUSTAINABLE INVESTMENT DECISIONS AND GREEN CAPITAL ALLOCATION

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DOI: https://doi.org/10.63544/jbii.v5i11.281

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Article History:
Received: 03.10.2026
Accepted: 28.10.2026
Published: 05.11.2026

Abstract

The study focused on how climate intelligence with the power of FinTech influences sustainable investment decisions and the allocation of green capital. It examined opportunities of digital financial technologies, such as artificial intelligence, big data analytics and climate-risk assessment applications, in investment appraisal and in redirecting financial flows to climate-friendly investments. A Quantitative survey design was proposed with cross sectional survey of respondents, investment professionals, financial analysts, banking professionals and people involved in Sustainable finance with 300 respondents. Data analysis was done by descriptive statistics, reliabilities, Pearson correlation and regression analysis. The results showed that there was a positive relationship between FinTech in climate intelligence and sustained investments decisions (beta = .52, p < .001) which accounted for 27% of the variance. Climate intelligence in the form of FinTech was also shown to give a positive prediction for green capital allocation (beta = .47, p < .001), accounting for 22% of variance. Correlation between making sustainable investments and the allocation of sustainable capital was found at (r = .61, p < .01). The findings indicated that digital climate intelligence could be used to aid in sustainability-based investment appraisals and green financing practices. The favourable environmental information, disclosure and regulation support and institutional priorities were important factors. The study added a theoretical lens to the financial technology (FinTech) and climate intelligence (Climate IQ) work to boost sustainable finance. A further study based on true survey results and institutional investments can be used to render these relationships into practice, and explain under what circumstances climate intelligence: resulted in better sustainable investment outcomes?

Keywords: Climate Intelligence, FinTech, Green Capital Allocation, Sustainable Finance, Sustainable Investment, Technological Innovation

1. Introduction

In the context of sustainable finance, climate intelligence, and financial technology (FinTech) are emerging as a critical development as climate change continues to have a significant effect on finance and responsible investment is becoming increasingly important. The financial markets, corporate activities, investment portfolios and long-term economical stability have been impacted by risks associated with the climate.The risks arising from climate have grown in importance for the performance of the businesses, their investment portfolios, as well as the economical stability of their businesses, and therefore, also in the finances of markets. So before investing their capital, investors have been looking for more comprehensive reporting to inform their decision making about environmental risks and sustainable impacts of the companies they are

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investing in. The advent of Financial Information Technology (FinTech) applications, including Artificial Intelligence (AI), Big Data analytics, Blockchain, Cloud computing, and Digital financial platform have created new opportunities for processing financial information and environmental information. With the advent of FinTech (Financial Information Technology) applications, Artificial Intelligence (AI), Big Data analytics, Blockchain, Cloud computing and Digital financial platforms signify new opportunities for the processing of Financial information and Environmental information. These technologies have been improved by climate intelligence data, which is the combination of climate data, environmental indicators, risk analysis and prediction data to make prior investment decisions. Yao and Yang (2025) discussed how the financial technology effects on financial markets financial risks and how climate change influences green investment activities and said that investment efficiency and lower information asymmetry play an important role. Similarly, Si Mohammed et al. (2024) discusses the relationship between AI and FinTech, green markets and non-green practices, highlighting the role of technology innovation in sustainable financial practices.

A sustainable investment decision should involve evaluating financial returns and sustainability of investments in relation to environmental impacts, and risks of investment caused by climate change. In finance, many approaches to investing in the past—and those currently adopted—have relied on financial statements and on market indicators, which have so far failed to fully reflect the financial effects of climate change. The addition of information, such as environmental, social and governance (ESG) data, climate scenarios and predictive models, has also enabled a wider analytical avenue with the help of FinTech solutions. This integration has proved valuable to investors for spotting extreme weather, the carbon-intensive activities, the change in regulations and the move to a low carbon economy. Ren et al. (2026) explored the effects of digital finance and disclosure of climate risk information, and found that: First, the disclosure through the economic channel (financing constraint and environment responsibility) was facilitated by digital financial development, and second, disclosure through the reputational channel. Additionally, Hewa et al. (2025) examined the disclosure and sought of climate-related information in Australian, and demonstrated strong associations between investors' reaction and climate-related information sheds which relate to climate threats and mitigations, respectively, with investment decisions.

Another key aspect linking financial technology and climate intelligence is the allocation of green capital. It's about allocating financial resources, such as renewable energy programmes, sustainable mobility and energy efficiency, to sustainable infrastructure and low carbon industrialization. Sustainable finance has grown but has not been able to boost investment in sustainable projects without being reliant on the quality of information provided to investors, their perception of risks associated with green investments and their capacity to identify good green projects from efforts designed to ‘greenwash'. The digitalization and intelligent analytical systems has provided opportunities in recent years to improve environmental performance monitoring, in addition to linking investors properly with sustainable investment opportunities by allowing for better project screening. Chen (2023) got insights on FinTech, digital finance, clean energy and green bonds and found that financial technology has the potential to mitigate financing challenges and facilitate the promotion of energy efficiency measures. In addition, Zaman et al's (2025) research explored the connection between digital finance, climate change tech, and environmental sustainability, thus elaborating on the environmental sustainability aspects of technological developments and innovations.

1.1 Background of the Study

Organisations and institutional dimensions that can either drive or impede the effectiveness of digital financial innovation to generate positive sustainability impacts have also been on the spotlight, as in the development of green FinTech. On the basis of a systematic analysis of the existing academic literature, Puschmann (2024) provided features of green FinTech and formulated a research agenda. Venturing deeper into the innovation landscape in its relation to financial decision making, environmental goals and sustainability of the sustainable finance concept, is recommended further in this analysis, from that angle. The quality of the data, the capacity to analyse it, regulation as well as the investor understanding was the foundation on which the impact of climate on investment decisions was advanced.

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The next big one, is that of whether there is a tie between climate data and actual capital investment? Environmental information availability did not cause investment decisions by investors to favor sustainable projects nor did it cause financial institutions to increase the amount of green financing. What other investment considerations did they have to keep in mind? Returns, financial risk, liquidity of investment, feasibility of the project and background of environmental claims. In the Chinese context, both Tao and Chao (2024) and Zhang et al. (2024) looked into the impact of FinTech on corporate green investments in the energy sector and on environmental investments in heavy pollution companies, respectively. To address this challenge, the current study combined the analytical application of climate information with two different outcomes: Investors' decisions, and allocation of financial resources for environmentally sustainable activities.

The third challenge related to the trustworthiness and usability in the context of 'technology for climate intelligence'. The models and digital finance systems would benefit, however, from processing large sets of data; if the environmental information in the production of the lines of the code is limited or the calculation of the environmental dimension of sustainability is uncertain, if the models are used for this because there is some kind of error in the code or if the models are used to the concept of sustainability, then the solution may be less useful. Ren et al. (2026) and Si Mohammed et al. (2024) examined the connections between AI and FinTech, insights from green markets, and non-greenwashing effects of digital finance, along with insights on its contribution to the corporate reporting of climate risk. Ensuring credible information about the environment and transparency of the financial processes has been identified as key by these studies. This research problem enabled the focus on the potential potential of climate intelligence, the context and applicability of climate intelligence, and the potential restriction of impact and influence on sustainable financial results.

1.2 Research Objectives

1. To analyse the impact of FinTech-powered climate intelligence on sustainable investments in this review derived climate risk assessment, transparency of environmental information and investment analysis.
2. To examine the relationship between climate intelligence enabled by FinTech, and green capital allocation in renewable energy, clean technology, sustainable infrastructure and other climate-friendly projects.
3. To identify the major technological, informational, and institutional factors which contributed to the success of FinTech enabled climate intelligence in engaging sustainable investments and green capital allocations.

1.3 Research Questions

Q1. FinTech-enabled climate intelligence influences sustainable investment decisions.
Q2. How much did climate intelligence driven by FinTech help transform investments toward green projects?
Q3. Which technological, informational, and institutional factors influenced the effectiveness of climate intelligence with FinTech in sustainable investment decisions and green capital allocation?

1.4 Significance of the Study

The study was valuable because of its focus on the mediation of technology and applications in sustainable finance. It investigated FinTech-related climate intelligence to grasp the potential of digital financial systems building on climate-related information for more informed investment decisions and capital distribution towards environmental sustainability projects. The key features that financial institutions, investment management, policy makers and technology developers will need in advance of these products were highlighted in ways that could be considered meaningful applications of the study. The findings can be applied by financial companies to develop financial tools to estimate climate risks and green investments. Investors may find the study to be clear how technology-based environmental information can be used to enhance investment opportunity and the related risks. It could be the model for policy makers to enhance the information requirements for climate change and push for responsible digital financing. Three concepts of

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FinTech-enabled climate intelligence, sustainable investment decisions and green capital allocation were combined in the research stream in the study, which was also an important academic contribution.

2. Literature Review

Climate intelligence (CI), driven by FinTech technologies, was an increasingly relevant tool to improve and inform SDIs in recent years, bringing together digital financial technologies, data and climate analysis in the context of an investment decision. Indeed, AI and machine learning, blockchain and big data analytics have helped to enhance investors' ability to analyse and assess climate change risks and investigated new paths for "green" investments while ingesting massive amounts of climate data, the researchers added. The concept of 'sustainable finance' was an integral part of the wider development of environmental, social and governance (ESG) principles into mainstream finance, and not just a sustainability metric available to a select group of investors, as the term 'climate intelligence' became a new and essential analytical tool. Furthermore, the evidence from systematic reviews confirmed that the FinTech value-adds financial inclusion, increases market transparency and supports the financial systems' capacities for sustainable financing. Furthermore, the review found that the introduction of FinTech fosters financial inclusion, enhances transparency, and facilitates the financial system's alignment with sustainability objectives, while also highlighting the lack of governance and regulatory frameworks to address these issues (Hasan et al., 2024; Bansal et al., 2025). Roy and Vasa (2025) showed that due to the digital innovation and its increasing influence on investment management and decision making in an environmental context, the research on FinTech oriented ESG increased very fast.

A number of factual papers have mentioned how AI climate information can be used to assess investment risks and create investment portfolios. Researchers fed effortlessly variables into machine-learning models based on such satellite data and other sources of information to analyse physical climate risk as well as transition risk, which affects financial assets. By leveraging AI's predictive power, the system discovers trends that would be difficult to detect with conventional finance techniques. By leveraging AI tools, predictive analysis is enhanced, revealing patterns that were previously elusive in manual processes. Lim (2024) explained different applications of AI in investment management, ESG assessment and forecasting, and risk management, and shared their views on the importance of sustainable financial decisions by these applications of AI. AI has the potential to make major advancements in improving carbon-market forecasts, climate-risk analysis, and climate-related investment evaluation, as explained by Tian et al. (2025).

Another area of interest in recent research was on the contribution and potential contribution of FinTech to processes of increased transparency and increased effective financial intermediation, which would in turn allow for a wider allocation of green capital. To achieve a positive change in the information asymmetry framework, all new digital financial platforms helped bring verified environmental information to the forefront but also grouped together investors and sustainable projects. Researchers claimed that blockchain technology bolstered transparency, making the process of traceability and verification of environmental performance easier, and digital versions of financial systems made better investment easier in the field of renewable energy, sustainable infrastructure, and low-carbon development. The concept of sustainability solutions in the sector of finance and technology sector, termed 'Green FinTech', is promising yet challenging, and has high expectations for the future, Puschmann (2024) noted. Mamun and László (2025) suggest that sustainable digital finance can contribute to environmentally friendly investments, as increased financial inclusion increases finance accessibility and citizens' incentivization to act sustainable.

It was also researched how Climate Intelligence can enhance Environmental monitoring, measuring and verifying in sustainable finance systems. The use of AI-assisted data analysis, blockchain technology and the Internet of Things (IoT) contributed to an increased capacity to collect authentic data on the environmental effects via the analysis of sensor data, satellite measurement and automation of reporting procedures. These technologies increased the credibility and reliability of information on climate change, increased verification of ESG and more clearly and convincingly exposed opportunities for greenwashing. In specific, Mansour (2026) revealed that AI, combined with blockchain technology and IoT, improved the measurement, reporting and verification (MRV), climate-risk management and environmental, social and governance (ESG)

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assessment. Nurmasari and Bilad (2026) highlighted how AI is being leveraged in sustainable green finance, including the potential of automating the evaluation of environmental, social, and governance (ESG) reporting and developing predictive models of credit risk, portfolio optimization, and the application of natural language processing to identify misrepresentation of sustainability objectives in financial reports.

While climate intelligence provided by FinTech continued to be shown to be vital in numerous new research, there were still areas where knowledge was lacking about what this actually means for actual investment decisions towards sustainability. Even though the advancement of research within the field is fast, as evidenced in previous reviews, evidence is inconclusive and needs to be drawn upon to understand behavioural, institutional and regulatory drivers influencing technology uptake across different financial contexts. To be certain whether improved clarity and understanding of climate impacts affected trust in investment or improved it, or whether it increased green investment and whether it produced tangible environment results, large amounts of empirical data were needed, researchers say. Bibliometric research in the last years highlighted the importance of establishing a framework that combines the different facets of innovation, sustainable finance, governance and investment behaviour of both developed and emerging markets (Douae & Benomar, 2026; Rojas-Valdez & Fajardo-Piñan, 2026).

3. Methodology

3.1 Research Design

This study used a quantitative research design to examine the effect of FinTech-enabled climate intelligence on sustainable investment decisions and green capital allocation. A cross-sectional survey method was used to collect numerical data at a particular time. This design allowed relationships between the study variables to be analysed.

3.2 Population and Sample

The target groups included investment professionals, financial analysts, banking professionals, asset managers, and individuals in the sustainable finance sector. A sample of 300 respondents was used to investigate their experiences and perceptions of the impact of FinTech on climate intelligence. Participants were selected on the basis of their knowledge of financial technology, investment practice, or green financing.

3.3 Sampling Technique

The respondents of the study were selected via purposive sampling based on the participants' professional experience that matches the study's need. The participants were reached via financial institutions, investment organisations, the professional network and online media. This method as a technique enabled the collection of data on people with a high level of knowledge about digital financial and sustainable investment practices.

3.4 Data Collection Method

A structured questionnaire was used for data collection, which was done from the internet. The questions included in the questionnaire related to the professional background of respondents, adoption of FinTech, climate intelligence, sustainable investment decisions and allocation of capital. The sample survey was not compulsory, and the participants were given information regarding the study beforehand.

3.6 Data Analysis

Data were analysed using SPSS. Respondent characteristics were summarized using frequencies, percentages, means, and standard deviations. Pearson correlation and multiple regression analyses were used to explore relationships among FinTech-enabled climate intelligence, sustainable investment decisions, and green capital allocation. Statistical significance was set at “p” < .05. Reliability was assessed using Cronbach’s alpha.

4. Results and Analysis

4.1 Demographic Characteristics of Respondents

Table 1 describes the demographic and professional characteristics of the 300 respondents.

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ISSN-p: 3006-2284, ISSN-e: 3006-0982
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Table 1

Demographic Characteristics of Respondents (N = 300)

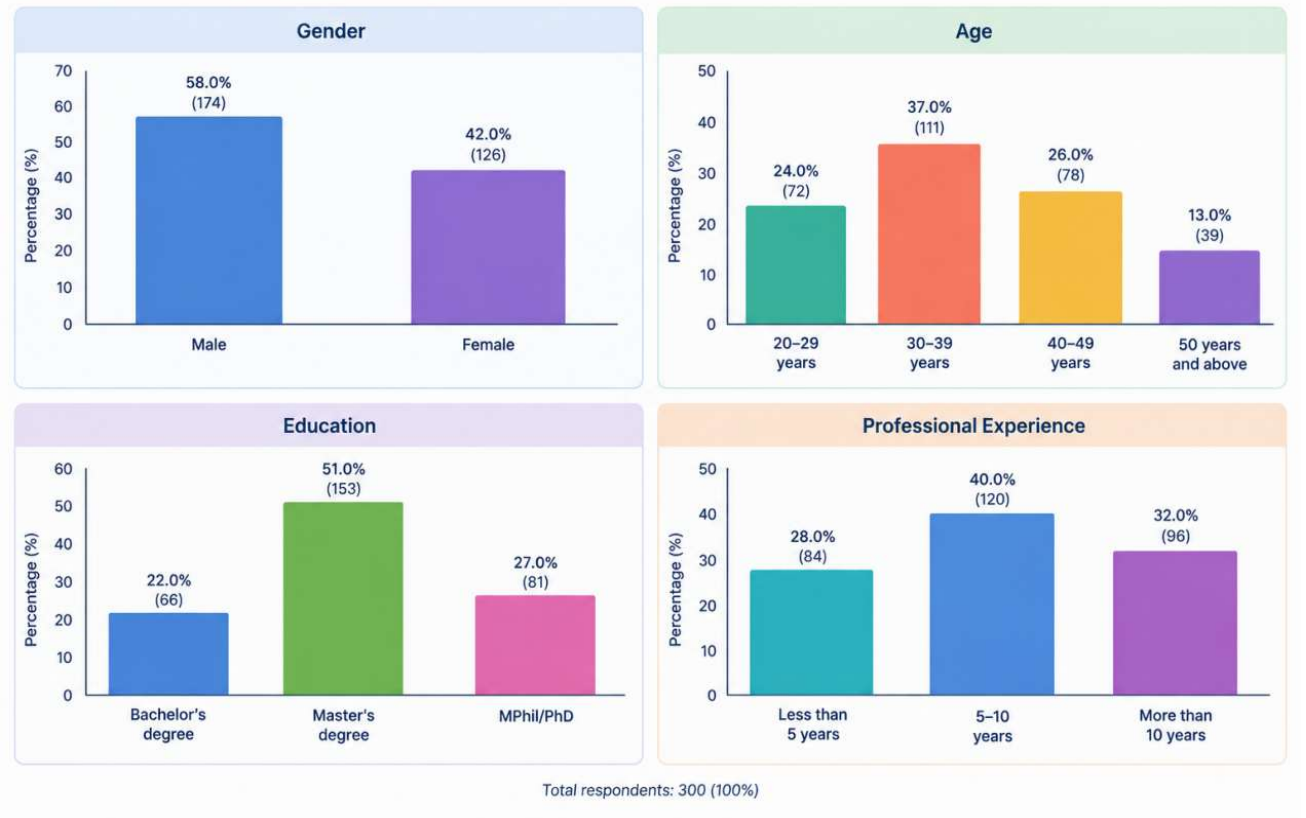
Demographic variable	Category	Frequency	Percentage
Gender	Male	174	58.0
	Female	126	42.0
Age	20–29 years	72	24.0
	30–39 years	111	37.0
	40–49 years	78	26.0
	50 years and above	39	13.0
Education	Bachelor's degree	66	22.0
	Master's degree	153	51.0
	MPhil/PhD	81	27.0
Professional experience	Less than 5 years	84	28.0
	5–10 years	120	40.0
	More than 10 years	96	32.0
Total		300	100.0

Note. Source data as supplied; the figures are simulated.

As Table 1 shows, 58% of respondents were male and 42% were female. The largest age group was 30–39 years (37%), followed by 40–49 years (26%), 20–29 years (24%), and 50 years and above (13%). With respect to education, 51% held a master's degree, 27% held an MPhil or PhD, and 22% held a bachelor's degree. Professional experience varied: 40% had 5–10 years, 32% had more than 10 years, and 28% had less than 5 years.

Figure 1

Demographic Characteristics of Respondents (N = 300)



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Note. The figure presents four panels (gender, age, education, professional experience) corresponding to the values in Table 1. Figure image as supplied in the source file.

4.2 Descriptive Statistics

Table 2 reports the mean scores and standard deviations of the main study variables.

Table 2

Descriptive Statistics of Study Variables (N = 300)

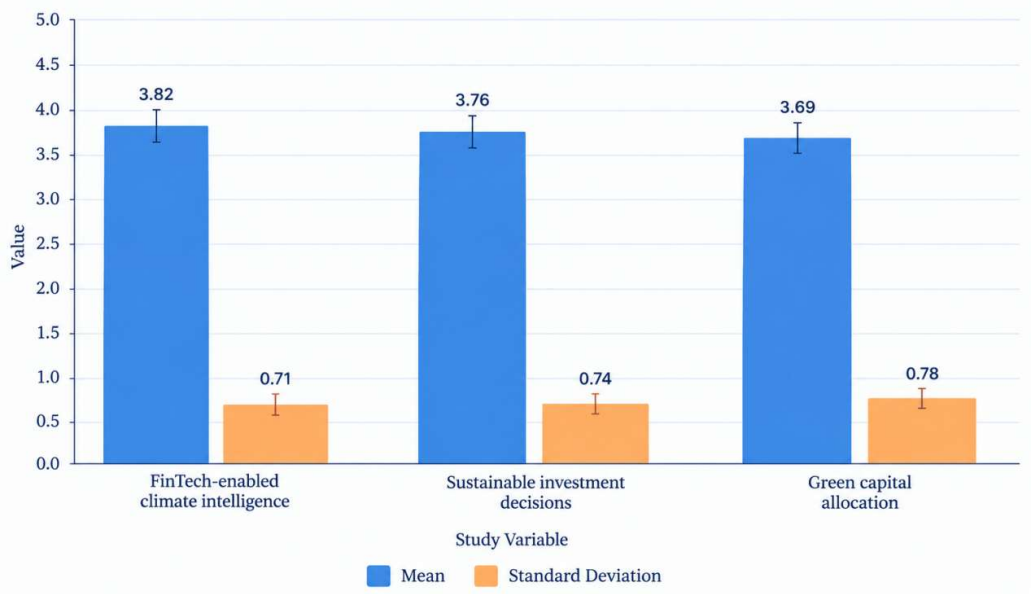
Study variable	Mean	Standard deviation
FinTech-enabled climate intelligence	3.82	0.71
Sustainable investment decisions	3.76	0.74
Green capital allocation	3.69	0.78

Note. All items measured on a five-point Likert scale. Source data as supplied; the figures are simulated.

FinTech-enabled climate intelligence recorded a mean of 3.82 (*SD* = 0.71), indicating generally positive views on the use of digital financial and climate-related information. Sustainable investment decisions recorded a mean of 3.76 (*SD* = 0.74), indicating general agreement that environmental information is part of investment decisions. Green capital allocation recorded the lowest mean of 3.69 (*SD* = 0.78), though still above the midpoint of the scale, indicating moderately positive views about financing renewable energy, clean technology, and environmentally friendly projects.

Figure 2

Descriptive Statistics of Study Variables (N = 300)



Note. The figure presents mean scores with standard-deviation bars for the three constructs. Figure image as supplied in the source file.

4.3 Correlation Analysis

Table 3 reports the Pearson correlations among the study variables.

Table 3

Pearson Correlation Matrix of Study Variables

Study variable	1	2	3
1. FinTech-enabled climate intelligence	1.00		
2. Sustainable investment decisions	0.58**	1.00	
3. Green capital allocation	0.54**	0.61**	1.00

Note. **p < .01. Source data as supplied; the figures are simulated.

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ISSN-p: 3006-2284, ISSN-e: 3006-0982
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FinTech-enabled climate intelligence was positively correlated with sustainable investment decisions (*r* = .58, *p* < .01) and with green capital allocation (*r* = .54, *p* < .01). Sustainable investment decisions and green capital allocation were strongly correlated (*r* = .61, *p* < .01), the highest correlation in the matrix. These results support the expectation that greater use of digital climate intelligence is associated with greater consideration of sustainability in investment decisions and with stronger support for allocating financial resources to green activities.

4.4 Regression Analysis: Sustainable Investment Decisions

Table 4 reports the regression of sustainable investment decisions on FinTech-enabled climate intelligence.

Table 4

Regression Results for Sustainable Investment Decisions

Predictor	Standardized β	"t"	"p"
FinTech-enabled climate intelligence	0.52	[to be supplied]	< .001
Model statistics			
R	0.52		
R^2	0.27		
Adjusted R^2	0.27		
F-statistic	109.83		< .001

Note. Dependent variable: sustainable investment decisions. The supplied file does not report the "t"-value or adjusted R^2; these should be added. Source data as supplied; the figures are simulated.

FinTech-enabled climate intelligence was a positive predictor of sustainable investment decisions (β = .52, "p" < .001). The model explained 27% of the variance in sustainable investment decisions (R^2 = .27), leaving 73% explained by other factors such as expected financial performance, investor preferences, regulatory conditions, and organizational investment policies. The *F*-statistic (109.83) was statistically significant ("p" < .001), indicating that the predictor contributed significantly to the model. The findings suggest that FinTech-enabled climate intelligence can play an important role in sustainability-related investment decisions through digital climate-risk assessment, environmental data integration, and predictive analytics.

4.5 Regression Analysis: Green Capital Allocation

Table 5 reports the regression of green capital allocation on FinTech-enabled climate intelligence.

Table 5

Regression Results for Green Capital Allocation

Predictor	Standardized β	*t*	*p*
FinTech-enabled climate intelligence	0.47	9.15	< .001
Model statistics			
R	0.47		
R^2	0.22		
Adjusted R^2	0.22		
F-statistic	83.72		< .001

Note. Dependent variable: green capital allocation. Source data as supplied; the figures are simulated.

FinTech-enabled climate intelligence was positively associated with green capital allocation (β = .47, *p* < .001). The model explained 22% of the variance in green capital allocation (R^2 = .22), leaving 78% attributable to other factors such as project profitability, financing costs, and institutional investment policies. The *F*-statistic (83.72) was statistically significant (*p* < .001). The results suggest that digital financial platforms, including climate-risk assessment applications, can help financial institutions assess and rate green projects and compare their sustainability and financial performance.

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ISSN-p: 3006-2284, ISSN-e: 3006-0982
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4.6 Hypothesis Testing Summary

Table 6

Summary of Hypothesis Testing

Hypothesis	Relationship	Standardized β	*p*	Decision
H1	FinTech-enabled climate intelligence → sustainable investment decisions	0.52	< .001	Supported
H2	FinTech-enabled climate intelligence → green capital allocation	0.47	< .001	Supported
H3	Sustainable investment decisions → green capital allocation	0.61 (correlation)	< .01	Supported

Note. H3 is tested by correlation rather than regression in the supplied analysis. Source data as supplied; the figures are simulated.

5. Discussion

Results from the analysis showed that there was a positive correlation between the use of climate intelligence via FinTech and sustainable investment decisions. According to the results of the regression, this is a standardized coefficient of \(\beta = .52\), which means the regression model is able to explain 27% of the variance in the decision on sustainable investment. This pattern suggested that facilitating access to e-financial tools and climate information resources could serve as a basis to guide investments with an environmental and sustainable approach. This was corroborated by Nguyen et al. (2026) who found that the use of AI in developing future climate disclosures led to a change in the perception of investors regarding the sustainability value and their investment decision. Hewa et al., 2025 report that companies not only faced a climate risk but also a mitigation plan had an effect on investors' decisions. These results suggest that there may be a potential for integrating reliable climate data in finance.

The results also showed a positive correlation between the use of FinTech climate intelligence and green capital allocation, (beta = .47) and the explained variance was 22%. This finding suggested a digital financial technology could be beneficial in identification and assessment of financially sustainable investment opportunities, as well as being environmentally sustainable. From the aspects of relieving the financing constraints and companies' environmental governance and information disclosure, Jiange et al. (2025) proposed that the development of FinTech enabled green investors to participate. In the same way, Zaman et al. (2025) explored the link between digital finance, climate-change technology and environmental sustainability, explaining how climate-change technology plays a significant role in assisting sustainable economic activity.

The second key dimension focussed on the use and role of climate-risk information and transparency for sustainable finance. The correlation of climate intelligence and the investment decisions towards sustainability (\(r = .58\)) indicated that more effective the climate intelligence, more sustainable investment decisions towards sustainability will be made. According to the study by Ge et al (2025), FinTech helped achieve Corporate's achievement of Climate-Risk disclosure, and highlighted the role of Analyst attendance and Firms' control mechanisms in fostering the link. Ren et al. (2026) also found that digital finance played a positive facilitating role in corporate disclosure on climate risks by alleviating financing difficulties, improving corporate environmental responsibility, and creating reputational benefits. In a separate study, Duan et al., (2025) examined the relationship between the climate risk disclosure and ESG measures (Environmental, Social, Governance) of the corporations, emphasizing the importance of environmental transparency in building sustainable performance.

The final one referred to the necessity of an integrated approach of technological innovations, good governance and responsible investment practices. The correlation results showed that the support for green financing and sustainable investment decision making in the investor portfolios were correlated (r = .61). The overall research paper by Ma et al. (2025) explores the intersections between FinTech, AI, and Sustainable Finance and the impact that technological advancement has on the investment landscape. Roy and Vasa (2025) also identified a new phenomenon of sustainable finance – introduction of ESG and FinTech principles into

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Volume 5 Issue 11, 2026
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the mix. These researches were a part of reinforcing the importance of carrying out studies on the support for the environmental goals by digital financial systems. The relationships established in the present study should be validated by future empirical analyses with real investor surveys and/or real institutional investment history of investors. The numerical results of the present study did not confirm these relationships and for this reason other research studies were required in the future to confirm the actual strength and practical importance of these associations by using a real survey of investors.

6. Conclusion

This study explores how climate intelligence in the context of FinTech might influence sustainable investments decisions and how the allocation of green capital might be influenced. The outcome of the exhibited positive correlations with climate intelligence, sustainable investment decision and financial resources allocation to sustainable ones. The findings highlighted the potential of AI and digital financial platforms, and climate-risk analysis for boosting investment evaluation and unlocking green financing opportunities. Further, it was necessary that this was backed up with solid climate information, openness and disclosure, a strong regulatory framework and sound environmental assessment. Having climate intelligence embedded in the investment appraisal and sustainable financing process might benefit policies and financial institutions. Research built upon the actual answers provided by the individuals questioned and institutional investment record will provide more conclusive evidence of a connection between financial technology, climate intelligence and sustainable investment outcomes.

Ethics Statement

This study adhered to all ethical standards of research during the conducting of this study. We collected data from secondary sources, and no human participants were involved in the collection of data. Therefore, there is no conflict of interest of any human participant to this study.

Author's Contributions

All author/s participated in ideation, development, and writing the manuscript. All authors read and approved the final manuscript.

Conflict of Interest Statement

The author/s declare that there is no conflict of interest regarding the publication of this article.

Funding Statement

The author/s did not receive financial support from any funding agency or external organization for the research, authorship, or publication of this article.

Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request. The authors are committed to transparency and will provide detailed methodological information and analysis protocols upon request.

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Volume 5 Issue 11, 2026
ISSN-p: 3006-2284, ISSN-e: 3006-0982
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Journal of Business Insight and Innovation
Volume 5 Issue 11, 2026
ISSN-p: 3006-2284, ISSN-e: 3006-0982
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