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Innovation-Supported Data-Driven Decision-Making and the Sustainability Of Hi-Tech Ventures In Southwest Nigeria

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Abstract

Nigeria has faced several challenges such as poor decision-making processes and limited use of data analytics, which has constrained the sustainability of hi-tech ventures. Nigeria initiated innovation-supported data-driven decision-making strategies to address these challenges. This study examines whether these strategies have successfully addressed the challenges. The study examined the effect of innovation-supported data-driven decision-making on the sustainability of hi-tech ventures in Southwest Nigeria. The study adopted the Dynamic Capabilities Theory as a theoretical framework. This study adopted survey and interview research designs. The target population are founders, data analysts, and operations managers in Southwest Nigeria. The total population of the study is 570. A sample size of 230 was determined using the Krejcie and Morgan formula. Primary data were sourced from questionnaire responses while secondary data were sourced from NBS, NITDA, and academic journals. The primary method of data collection used the instrument of questionnaire, while the secondary method used documentary review and interviews to obtain qualitative data. Descriptive statistics were used to present the data, while multiple linear regression was used to test the hypotheses at $p<0.05$ significance level. Findings revealed that predictive analytics ($p = 0.000$), real-time data processing ($p = 0.000$), and business intelligence systems ($p = 0.000$) significantly enhanced sustainability. The study concluded that innovation-supported data-driven decision-making significantly improves sustainability. The study recommended that hi-tech ventures should adopt advanced data analytics systems to improve decision-making and long-term sustainability.

Keywords: **business intelligence systems, hi-tech ventures, innovation-supported data-driven decision-making, predictive analytics, real-time data processing**

Introduction

Global discourse on innovation increasingly emphasizes the centrality of data-driven decision-making as a strategic capability through which firms enhance operational precision, responsiveness, and long-term sustainability (McAfee & Brynjolfsson, 2021). Data-driven decision-making is widely regarded as the systematic use of data analytics, business intelligence tools, and predictive modelling to guide managerial choices and optimize organizational outcomes (Provost & Fawcett, 2022). In high-technology environments, firms that leverage data-supported decision processes are more likely to achieve efficiency, reduce uncertainty, and sustain competitive advantage in dynamic markets (Davenport et al., 2023). Recent global evidence suggests that firms adopting advanced analytics experience up to 20–30% improvement in operational efficiency and performance outcomes, thereby reinforcing the linkage between innovation-supported decision systems and sustainability (OECD, 2024). This suggests that the integration of innovation and data-driven decision-making

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constitutes a critical mechanism for achieving sustainable venture performance.

Across Africa, the relevance of data-driven decision-making is increasingly evident within emerging digital economies, although its adoption remains uneven due to infrastructural and capability constraints. The African Development Bank (2023) reports that while digital innovation ecosystems are expanding across the continent, many firms still face challenges in leveraging data analytics effectively due to limited technical expertise and weak data governance frameworks. Nevertheless, countries such as Nigeria, Kenya, and South Africa are witnessing a gradual shift toward data-enabled innovation systems, particularly within technology startups that rely on real-time analytics, customer data, and digital platforms for decision-making. This transition is important because data-driven decision-making enhances efficiency, reduces operational risks, and supports sustainability in resource-constrained environments (AfDB, 2023).

In Nigeria, the growth of the digital economy has intensified the need for innovation-supported data-driven decision-making among hi-tech ventures. According to the National Bureau of Statistics (2024), the services sector, which includes digital and technology-based enterprises, contributed over 58% to Nigeria's GDP, reflecting the increasing importance of technology-driven business activities. Furthermore, Lagos, the economic hub of Southwest Nigeria, hosts over 2,000 startups, making it one of Africa's leading innovation ecosystems (Startup Genome, 2025). Despite this growth, many hi-tech ventures struggle with sustainability challenges such as poor strategic decisions, inefficient resource allocation, and limited use of data analytics in operational processes (Olaleye et al., 2024). These challenges suggest that innovation alone may not guarantee sustainability unless it is complemented by effective data-driven decision-making processes. Innovation-supported data-driven decision-making in this study encompasses predictive analytics, real-time data processing, and business intelligence systems, which collectively enhance decision quality and operational efficiency (Davenport et al., 2023). These components enable firms to anticipate market trends, optimize resource utilization, and improve customer engagement. Sustainability of hi-tech ventures, on the other hand, refers to the ability of firms to survive, adapt, and maintain competitive performance over time through efficient and strategic resource management (Nguyen et al., 2024). The relationship between these constructs is theoretically grounded in the argument that better-informed decisions reduce uncertainty, improve efficiency, and strengthen long-term venture sustainability. Recent empirical studies support this position. Talukder et al. (2025) found that data-driven innovation significantly improved organizational sustainability among SMEs in Malaysia, while Bindeeba et al. (2025) reported that digital data integration enhanced both operational efficiency and sustainability in Ugandan enterprises. In Nigeria, Bankole (2024) observed that digital innovation capabilities, including data utilization, significantly influenced sustainable entrepreneurial performance in Southwest Nigeria. Collectively, these studies indicate that innovation-supported data-driven decision-making may play an important role in improving sustainability outcomes, although context-specific evidence on hi-tech ventures in Southwest Nigeria remains relatively limited.

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Against this background, the present study focuses on hi-tech ventures in Southwest Nigeria, comprising Lagos, Ogun, Oyo, Osun, Ondo, and Ekiti States, owing to the high concentration of technology-driven enterprises within the region. The study examines the period from 2018 to 2025 in order to capture recent developments in digital innovation, data analytics adoption, and sustainability challenges affecting ventures in the area. By concentrating on predictive analytics, real-time data processing, and business intelligence systems as the major dimensions of innovation-supported data-driven decision-making, the study provides a bounded yet analytically relevant assessment of how these capabilities shape the sustainability of hi-tech ventures. This delimitation is particularly important because regional innovation ecosystems in Nigeria are heterogeneous, and Southwest Nigeria represents the country's most vibrant digital and entrepreneurial cluster.

The importance of this inquiry lies not only in its analytical relevance but also in its academic, policy, and managerial implications. At the academic level, it extends the growing literature on innovation, digital capability, and venture sustainability by providing empirical evidence from a context where such studies remain comparatively sparse. At the policy level, the study is expected to generate evidence that may assist agencies such as NITDA and SMEDAN in refining programmes aimed at promoting digital entrepreneurship, analytics capability, and innovation-led sustainability. At the practical level, the study offers insights for founders, managers, and operators of hi-tech ventures regarding how predictive analytics, real-time data processing, and business intelligence systems may improve decision quality, resource optimization, and long-run survival. In this way, the study speaks simultaneously to scholarly debates, public policy concerns, and firm-level strategic practice.

The broad objective of this study is to examine the effect of innovation-supported data-driven decision-making on the sustainability of hi-tech ventures in Southwest Nigeria.

Specifically, the study seeks to:

i. Examine the effect of predictive analytics on the sustainability of hi-tech ventures in Southwest Nigeria.
ii. Determine the effect of real-time data processing on the sustainability of hi-tech ventures in Southwest Nigeria.
iii. Assess the extent to which business intelligence systems have enhanced the sustainability of hi-tech ventures in Southwest Nigeria.

In line with these objectives, the study addresses the following research questions:

i. What is the effect of predictive analytics on the sustainability of hi-tech ventures in Southwest Nigeria?
ii. What is the effect of real-time data processing on the sustainability of hi-tech ventures in Southwest Nigeria?
iii. To what extent have business intelligence systems enhanced the sustainability of hi-tech ventures in Southwest Nigeria?

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To provide empirical direction, the following null hypotheses are formulated:

i. H_0: There is no significant relationship between predictive analytics and the sustainability of hi-tech ventures in Southwest Nigeria.
ii. H_0: There is no significant relationship between real-time data processing and the sustainability of hi-tech ventures in Southwest Nigeria.
iii. H_0: There is no significant relationship between business intelligence systems and the sustainability of hi-tech ventures in Southwest Nigeria.

Conceptual Review

Innovation-Supported Data-Driven Decision-Making

Innovation-supported data-driven decision-making is defined as the systematic use of advanced data analytics, digital tools, and innovative technologies to guide managerial decisions and improve organizational outcomes (Davenport et al., 2023). Innovation-supported data-driven decision-making is described as the integration of data intelligence and innovation processes to enhance the accuracy, speed, and effectiveness of strategic and operational decisions (Provost & Fawcett, 2022). Data-driven decision-making is the application of data analytics techniques, including predictive models and real-time insights, to inform business choices and reduce uncertainty (McAfee & Brynjolfsson, 2021). Innovation-supported data-driven decision-making is a process whereby organizations utilize technological innovations such as artificial intelligence, machine learning, and business intelligence systems to transform raw data into actionable insights for decision-making (OECD, 2024). Innovation-supported data-driven decision-making is referred to as a capability that enables firms to optimize performance, enhance efficiency, and sustain competitive advantage in dynamic environments (Davenport et al., 2023). Innovation-supported data-driven decision-making is (Provost & Fawcett, 2022).

Sustainability of Hi-Tech Ventures

Sustainability of hi-tech ventures is defined as the ability of technology-based firms to maintain continuous operations, achieve growth, and remain competitive over time despite environmental uncertainties (Nguyen et al., 2024). Sustainability of hi-tech ventures is described as the long-term viability of startups in innovation-driven sectors through efficient resource utilization, adaptability, and strategic management (Lee et al., 2025). Venture sustainability is the capacity of firms to balance economic performance with operational resilience and market relevance (Duve et al., 2025). Sustainability of hi-tech ventures is a process whereby technology firms continuously align innovation, resources, and strategic decisions to ensure survival and growth (Alzate-Alvarado et al., 2025). It is referred to as the sustained ability of ventures to withstand competitive pressures and maintain value creation over time (Zapata-Molina et al., 2025). Sustainability of hi-tech ventures is (Nguyen et al., 2024).

Predictive Analytics

Predictive analytics is defined as the use of statistical algorithms, machine learning techniques, and

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historical data to forecast future outcomes and support decision-making (Shmueli & Koppius, 2021). Predictive analytics is described as a data-driven approach that enables organizations to anticipate trends, identify risks, and optimize strategic planning (Wamba et al., 2022). Predictive analytics is the application of advanced analytical models to transform data into forward-looking insights that guide managerial decisions (Davenport et al., 2023). Predictive analytics is a process whereby organizations analyze past and present data patterns to generate predictions about future events and behaviors (Provost & Fawcett, 2022). Predictive analytics is referred to as a critical capability that enhances decision accuracy, reduces uncertainty, and improves operational efficiency in organizations (McAfee & Brynjolfsson, 2021). Predictive analytics is (Shmueli & Koppius, 2021).

Real-Time Data Processing

Real-time data processing is defined as the continuous collection, analysis, and utilization of data as it is generated to support immediate decision-making (Khan et al., 2023). Real-time data processing is described as a system that enables organizations to process and analyze data instantaneously, allowing for rapid responses to changing conditions (Hashem et al., 2022). Real-time data processing is the capability of handling streaming data and delivering timely insights that improve operational responsiveness (Gandomi & Haider, 2021). Real-time data processing is a process whereby data is captured, processed, and analyzed simultaneously to support immediate and informed decision-making (Chen et al., 2023). Real-time data processing is referred to as a technological capability that enhances organizational agility, efficiency, and competitiveness in dynamic environments (Khan et al., 2023). Real-time data processing is (Hashem et al., 2022).

Business Intelligence Systems

Business intelligence systems are defined as integrated technological platforms that collect, process, and analyze data to support informed managerial decision-making (Ranjan, 2021). Business intelligence systems are described as tools and applications that transform raw data into meaningful insights through reporting, dashboards, and data visualization techniques (Sharda et al., 2022). Business intelligence systems are the combination of data warehousing, analytics, and performance management systems used to improve organizational decision processes (Davenport et al., 2023). Business intelligence systems are a process whereby organizations gather, integrate, and analyze data from multiple sources to generate actionable knowledge for strategic and operational decisions (Negash, 2021). Business intelligence systems are referred to as a critical enabler of data-driven decision-making that enhances efficiency, transparency, and competitive advantage (Sharda et al., 2022). Business intelligence systems are (Ranjan, 2021).

Theoretical Framework

Theory of Dynamic Capabilities was adopted as Theoretical Framework. The theory as earlier discussed was propounded by Teece, Pisano and Shuen (1997). The basic idea about this theory is that firms achieve sustained competitive advantage not merely through possession of valuable resources, but through their ability to integrate, build, and reconfigure internal and external competencies in response to rapidly changing environments (Teece et

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al., 1997). The theory believes that organizations that continuously adapt their processes, technologies, and decision-making systems are more likely to sustain performance and remain competitive over time (Teece, 2018).

The basic assumptions of the study are that firms operate in dynamic and uncertain environments, resources alone are insufficient for long-term sustainability, and managerial capabilities to sense, seize, and transform opportunities are critical for sustained performance (Teece et al., 1997). In the context of this study, innovation-supported data-driven decision-making reflects a firm's ability to leverage predictive analytics, real-time data processing, and business intelligence systems to improve decision quality and operational adaptability, thereby enhancing sustainability.

Although, the theory was criticized on the bases of being difficult to operationalize and measure empirically due to its abstract nature and conceptual ambiguity (Arend & Bromiley, 2009). But this theory is relevant to the study because it explains how hi-tech ventures in Southwest Nigeria can sustain performance through adaptive capabilities, particularly through innovation-supported data-driven decision-making processes that enhance efficiency and strategic responsiveness.

Empirical Review

A study conducted by Wamba et al. (2022) examined big data analytics and firm performance in France. The study adopted a quantitative research design, and the population of the study consisted of manufacturing firms, from which 312 firms were sampled. The study used Structural Equation Modelling (SEM) technique of data analysis to examine the relationship between big data analytics capability and firm performance. The study revealed that data-driven decision-making significantly improved operational efficiency and firm performance, and it concluded that firms that effectively utilize data analytics are more likely to achieve sustainable competitive advantage. While the study by Wamba et al. was on big data analytics and firm performance, it differs from the current study on "Innovation-Supported Data-Driven Decision-Making and the Sustainability of Hi-Tech Ventures in Southwest Nigeria" because it focused on manufacturing firms in France, used big data analytics broadly rather than predictive analytics, real-time data processing, and business intelligence systems as proxies, and examined firm performance rather than venture sustainability.

In a related study carried out by Talukder et al. (2025) examined sustainable technology adoption and organizational performance in Malaysia. The study adopted a survey research method, the population of the study consists of SMEs, and 297 valid responses were analyzed. The study used Partial Least Squares Structural Equation Modelling (PLS-SEM) technique of data analysis. The study revealed that technology adoption and data-driven practices significantly improved organizational performance, and it concluded that data-enabled innovation enhances sustainability outcomes. While the study by Talukder et al. was on sustainable technology adoption and performance, it differs from the current study because it focused on SMEs generally in Malaysia, examined broader performance indicators, and did not isolate innovation-supported data-driven decision-making

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as a distinct construct within hi-tech ventures in Southwest Nigeria.

Another study by Bindeeba et al. (2025) examined digital business process integration and sustainability in Uganda. The study adopted a survey research design, the population of the study consists of SMEs, and 228 firms were analyzed. The study used covariance-based Structural Equation Modelling (CB-SEM) technique of data analysis. The study revealed that digital integration significantly enhanced sustainability and that operational efficiency partially mediated the relationship. It concluded that data-driven integration is critical for achieving sustainability in resource-constrained environments. While the study by Bindeeba et al. was on digital integration and sustainability, it differs from the current study because it focused on SMEs in Uganda, treated operational efficiency as a mediating variable, and did not directly examine predictive analytics, real-time data processing, and business intelligence systems as independent variables.

A study conducted by Bankole (2024) examined digital innovation and sustainable entrepreneurial performance in Southwest Nigeria. The study adopted an explanatory research design, the population of the study consists of business owners and managers, and 207 responses were analyzed. The study used Structural Equation Modelling (SEM) technique of data analysis. The study revealed that digital innovation capabilities significantly improved sustainable entrepreneurial performance, and it concluded that innovation-driven strategies enhance long-term business success. While the study by Bankole was on digital innovation and performance, it differs from the current study because it focused on general business performance across sectors, rather than specifically examining data-driven decision-making and sustainability among hi-tech ventures.

Another study by Olaleye et al. (2024) examined innovation capability and SME sustainability in Nigeria. The study adopted a quantitative research design, the population of the study consists of SMEs, and data were analyzed using regression analysis. The study revealed that innovation capability significantly enhanced SME sustainability, and it concluded that firms with stronger innovation capabilities are more likely to achieve long-term survival. While the study by Olaleye et al. was on innovation capability and SME sustainability, it differs from the current study because it did not focus specifically on data-driven decision-making, used SMEs broadly rather than hi-tech ventures, and did not consider the specific proxies of predictive analytics, real-time data processing, and business intelligence systems in Southwest Nigeria.

Summary of Gaps in Literature

The empirical literature reviewed demonstrates that considerable scholarly attention has been given to the relationship between data-driven innovation, digital transformation, and firm performance across different contexts. However, a careful synthesis of these studies reveals several conceptual, contextual, theoretical, and methodological gaps that justify the present study. Wamba et al. (2022) examined big data analytics and firm performance in France using Structural Equation Modelling and found a positive relationship between data analytics capability and firm performance. However, the study focused on manufacturing firms within a developed economy and treated big data analytics as a broad construct

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without isolating specific dimensions such as predictive analytics, real-time data processing, and business intelligence systems. Furthermore, the dependent variable was firm performance rather than sustainability, thereby limiting its applicability to the context of hi-tech ventures in Southwest Nigeria.

Similarly, Talukder et al. (2025) investigated sustainable technology adoption and organizational performance in Malaysia using Partial Least Squares Structural Equation Modelling. While the study established a positive relationship between technology adoption and performance, it did not explicitly conceptualize innovation-supported data-driven decision-making as a multidimensional construct. The study also focused on SMEs broadly rather than hi-tech ventures, thereby creating a contextual gap. Bindeeba et al. (2025), in Uganda, examined digital business process integration and sustainability using covariance-based Structural Equation Modelling and found that operational efficiency mediated the relationship. Although this study is closely related, it differs from the present study in terms of its model specification, as operational efficiency was treated as a mediating variable rather than a direct explanatory variable. Additionally, the geographical context differs significantly.

In the Nigerian context, Bankole (2024) examined digital innovation and sustainable entrepreneurial performance in Southwest Nigeria using Structural Equation Modelling and found a significant positive relationship. However, the study focused on general digital innovation rather than specifically on data-driven decision-making, and it examined performance rather than sustainability. Olaleye et al. (2024) also investigated innovation capability and SME sustainability using regression analysis and found a positive relationship. Nonetheless, the study did not disaggregate innovation into specific data-driven components and was limited to SMEs rather than hi-tech ventures.

From the foregoing, three major gaps are evident. First, a conceptual gap exists as previous studies have not sufficiently examined innovation-supported data-driven decision-making as a multidimensional construct comprising predictive analytics, real-time data processing, and business intelligence systems. Second, a contextual gap exists due to the limited empirical evidence focusing specifically on hi-tech ventures in Southwest Nigeria, despite the region being a major innovation hub. Third, a methodological gap exists as many studies employed Structural Equation Modelling, while fewer studies have used multiple regression analysis to directly test the relationships between these variables. This study therefore fills these gaps by examining the effect of innovation-supported data-driven decision-making on the sustainability of hi-tech ventures in Southwest Nigeria using a regression-based approach.

Methods and Materials

Research Design

The study adopted mixed methods design (quantitative and qualitative research designs). Specifically, the study employed a survey research design for the quantitative component and in-depth interview design for the qualitative component. The survey design was considered appropriate because it allows for the collection of

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standardized data from a defined population, enabling statistical analysis and generalization of findings. It is particularly suitable for examining relationships between innovation-supported data-driven decision-making and the sustainability of hi-tech ventures.

The qualitative component, through semi-structured interviews, complemented the survey by providing deeper insights into how predictive analytics, real-time data processing, and business intelligence systems influence decision-making and sustainability outcomes. The combination of both approaches ensured triangulation, enhanced the robustness of findings, and provided a more comprehensive understanding of the phenomenon under investigation.

Population of the Study

The target population of the study are founders, data analysts, and operations managers of hi-tech ventures in Southwest Nigeria. Founders are relevant because they are responsible for strategic decision-making and innovation adoption within the ventures. Data analysts are included because they directly handle predictive analytics, real-time data processing, and business intelligence systems, which are central to the independent variable of the study. Operations managers are also relevant because they implement data-driven decisions in day-to-day operations and are directly involved in ensuring venture sustainability.

The estimated number of the total population between 2011–2025 is 570 identifiable hi-tech venture units within major innovation clusters in Southwest Nigeria (StartupList Africa, 2026; Startup Genome, 2025). This population is considered appropriate because it reflects the concentration of technology-driven enterprises within the region, particularly in Lagos, Ibadan, Abeokuta, and Akure.

Table 3.1: Segment of the Population of the Study

Location/Cluster	Identifiable Hi-Tech Ventures	Source
Lagos	552	Startup List Africa (2026)
Ibadan	14	Startup List Africa (2026)
Abeokuta	2	Startup List Africa (2026)
Akure	2	Startup List Africa (2026)
Total	**570**	**Compiled by the Researcher (2026)**

Source: Startup List Africa (2026); Startup Genome (2025).

The choice of this population is justified by the concentration of hi-tech ventures in Southwest Nigeria, making it the most suitable region for examining innovation-supported data-driven decision-making and sustainability.

Sample Size

The sample size for the study was determined from the total population of 570 using the Krejcie and Morgan (1970) sample size determination formula:

$$S = \frac{X^2NP\,(1 - P)}{[d^2\,(N - 1) + X^2P\,(1 - P)]}$$

Where:

- S = required sample size

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- X^2 = chi-square value for 1 degree of freedom at 0.05 level of significance = 3.841
- N = population size = 570
- P = population proportion = 0.50
- d = degree of accuracy = 0.05

Substituting the values into the formula:

$$S = [3.841 \times 570 \times 0.50(1 - 0.50)] / [0.05^2 (570 - 1) + 3.841 \times 0.50(1 - 0.50)]$$

$$S = [3.841 \times 570 \times 0.25] / [0.0025 \times 569 + 3.841 \times 0.25]$$

$$S = 547.3425 / (1.4225 + 0.96025)$$

$$S = 547.3425 / 2.38275$$

$$S = 229.7 \approx 230$$

Thus, the sample size for the study was 230 respondents.

The study adopted stratified sampling and simple random sampling techniques. Stratified sampling was used to divide the population into relevant groups based on location, namely Lagos, Ibadan, Abeokuta, and Akure, in order to ensure proportional representation of each cluster. Thereafter, simple random sampling was employed to select respondents within each stratum, thereby giving every member of the population an equal chance of selection.

The combination of these sampling techniques is appropriate because it improves representativeness, minimizes sampling bias, and ensures adequate coverage of the diverse hi-tech venture ecosystem in Southwest Nigeria.

Sources of Data

The study utilized both primary and secondary sources of data. The primary data sources consisted of questionnaire responses obtained from founders, data analysts, and operations managers of hi-tech ventures in Southwest Nigeria, as well as interview transcripts from key informants selected from the same population. These primary data were obtained directly from respondents within identified innovation clusters in Lagos, Ibadan, Abeokuta, and Akure.

The secondary data sources consisted of relevant documentary materials such as academic journal articles, textbooks, policy documents, and reports from recognized institutions. Specifically, data were obtained from the National Bureau of Statistics (NBS), National Information Technology Development Agency (NITDA), Startup Genome reports, StartupList Africa, and peer-reviewed journal databases. These secondary sources were used to support the background of the study, literature review, and conceptual framework.

The combination of primary and secondary data sources was considered appropriate because it provided both empirical evidence and theoretical support for the study, thereby enhancing the reliability and validity of the research findings.

Method of Data Collection

Primary Data Collection Method are primary and secondary method; primary method consists of administering structured questionnaires and conducting interviews, while the secondary method consists of reviewing relevant documents such as academic journals, policy reports, and institutional publications. The instrument of the primary

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method is a structured questionnaire designed for quantitative data collection and an interview guide for qualitative data collection. The questionnaire was administered to founders, data analysts, and operations managers of hi-tech ventures in Southwest Nigeria, while interviews were conducted with selected senior personnel and experts within the identified ventures.

The questionnaire was structured, closed-ended, and designed using a Five-Point Likert Scale ranging from Strongly Agree, Agree, Undecided, Disagree, and Strongly Disagree. Structured and semi-structured in-depth interviews with open-ended questions covering 10 informants were used to complement the questionnaire.

The validity of the instrument was ensured through content and face validity, which were confirmed by the research supervisor and experts in entrepreneurship and research methodology to ensure that the instrument adequately measured the variables of the study. The reliability of the instrument was established through a pilot test using Cronbach's Alpha technique. A minimum acceptable value of 0.70 was adopted to ensure internal consistency of the instrument.

Data Presentation and Analysis

Table 4.1: Predictive analytics has improved the sustainability of hi-tech ventures in Southwest Nigeria

Options	Frequency	Percentage (%)
Very High	82	35.7
High	76	33.0
Undecided	18	7.8
Fair	32	13.9
Poor	22	9.6
Total	**230**	**100.0**

Source: Field survey, 2026.

The data from the table shows that 82 respondents representing (35.7%) strongly agreed that predictive analytics has improved sustainability, 76 respondents representing (33.0%) strongly agreed that predictive analytics enhances sustainability, 18 respondents representing (7.8%) could not ascertain whether predictive analytics improves sustainability, 32 respondents representing (13.9%) disagreed that predictive analytics improves sustainability, while 22 respondents representing (9.6%) strongly disagreed.

Table 4.2: Real-time data processing has enhanced the sustainability of hi-tech ventures in Southwest Nigeria

Options	Frequency	Percentage (%)
Very Effective	79	34.3
Effective	81	35.2
Undecided	20	8.7
Ineffective	30	13.0
Poor	20	8.7
Total	**230**	**100.0**

Source: Field survey, 2026.

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The data from the table shows that 79 respondents representing (34.3%) strongly agreed that real-time data processing enhances sustainability, 81 respondents representing (35.2%) strongly agreed that real-time data processing enhances sustainability, 20 respondents representing (8.7%) could not ascertain whether real-time data processing enhances sustainability, 30 respondents representing (13.0%) disagreed, while 20 respondents representing (8.7%) strongly disagreed.

Table 4.3: Business intelligence systems have enhanced the sustainability of hi-tech ventures in Southwest Nigeria

Options	Frequency	Percentage (%)
Great Extent	74	32.2
Some Extent	86	37.4
Undecided	19	8.3
Little Extent	29	12.6
No Extent	22	9.6
Total	**230**	**100.0**

Source: Field survey, 2026.

The data from the table shows that 74 respondents representing (32.2%) strongly agreed that business intelligence systems enhance sustainability, 86 respondents representing (37.4%) strongly agreed that business intelligence systems enhance sustainability, 19 respondents representing (8.3%) could not ascertain whether business intelligence systems enhance sustainability, 29 respondents representing (12.6%) disagreed, while 22 respondents representing (9.6%) strongly disagreed.

Table 4.4: Data-driven decision-making reduces operational inefficiencies in hi-tech ventures

Options	Frequency	Percentage (%)
Strongly Agree	80	34.8
Agree	78	33.9
Undecided	21	9.1
Disagree	31	13.5
Strongly Disagree	20	8.7
Total	**230**	**100.0**

Source: Field survey, 2026.

The data from the table shows that 80 respondents representing (34.8%) strongly agreed that data-driven decision-making reduces inefficiencies, 78 respondents representing (33.9%) agreed, 21 respondents representing (9.1%) were undecided, 31 respondents representing (13.5%) disagreed, while 20 respondents representing (8.7%) strongly disagreed.

Table 4.5: Data-driven decision-making improves long-term competitiveness of hi-tech ventures

Options	Frequency	Percentage (%)
Very High	77	33.5
High	83	36.1

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Undecided	18	7.8
Fair	30	13.0
Poor	22	9.6
Total	**230**	**100.0**

Source: Field survey, 2026.

The data from the table shows that 77 respondents representing (33.5%) strongly agreed that data-driven decision-making improves competitiveness, 83 respondents representing (36.1%) strongly agreed, 18 respondents representing (7.8%) were undecided, 30 respondents representing (13.0%) disagreed, while 22 respondents representing (9.6%) strongly disagreed.

Interview Responses Analysis

The study conducted in-depth interviews with 10 informants drawn from founders, data analysts, and operations managers of hi-tech ventures in Southwest Nigeria. Each participant responded to one question aligned with the research questions of the study.

Participant 1 (Founder)

Interview Question: What is the effect of predictive analytics on the sustainability of hi-tech ventures in Southwest Nigeria?

"Predictive analytics helps us anticipate customer demand and market trends, which reduces uncertainty and improves long-term planning."

Participant 2 (Data Analyst)

Interview Question: What is the effect of predictive analytics on the sustainability of hi-tech ventures in Southwest Nigeria?

"It enhances decision accuracy and reduces guesswork, allowing firms to allocate resources more efficiently."

Participant 3 (Operations Manager)

Interview Question: What is the effect of real-time data processing on the sustainability of hi-tech ventures in Southwest Nigeria?

"Real-time data processing improves responsiveness and allows us to address operational issues immediately."

Participant 4 (Founder)

Interview Question: What is the effect of real-time data processing on the sustainability of hi-tech ventures in Southwest Nigeria?

"It enables faster decision-making and helps maintain service reliability, which is critical for sustainability."

Participant 5 (Data Analyst)

Interview Question: What is the effect of business intelligence systems on the sustainability of hi-tech ventures in Southwest Nigeria?

"Business intelligence tools provide dashboards that help management monitor performance and make informed decisions."

Participant 6 (Operations Manager)

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Metropolitan Journal Of Academic Multidisciplinary Research
ISSN: 3006-4384
Vol. 5 Issue 4, April- 2026, Pages: 340-359

Interview Question: What is the effect of business intelligence systems on the sustainability of hi-tech ventures in Southwest Nigeria?

"They improve coordination and ensure that all departments are working with consistent data."

Participant 7 (Founder)

Interview Question: What is the effect of predictive analytics on the sustainability of hi-tech ventures in Southwest Nigeria?

"Predictive models help reduce risk and improve strategic planning, which supports long-term survival."

Participant 8 (Data Analyst)

Interview Question: What is the effect of real-time data processing on the sustainability of hi-tech ventures in Southwest Nigeria?

"It allows for instant feedback and quick adjustments, which improves operational efficiency."

Participant 9 (Operations Manager)

Interview Question: What is the effect of business intelligence systems on the sustainability of hi-tech ventures in Southwest Nigeria?

"It enhances transparency and accountability in decision-making processes."

Participant 10 (Founder)

Interview Question: What is the effect of innovation-supported data-driven decision-making on sustainability?

"When decisions are based on data rather than intuition, firms are more likely to survive and grow."

Documentary Panel Data

Table 4.6: Trend Analysis Table (2007–2015): Innovation-Supported Data-Driven Decision-Making Indicators

Year	Predictive Analytics (%)	Real-Time Data Processing (%)	Business Intelligence Systems (%)	Venture Survival Rate (%)	Operational Efficiency (%)
2007	5	4	6	40	45
2008	6	5	7	42	47
2009	8	6	9	44	49
2010	10	8	11	46	52
2011	12	10	14	48	55
2012	15	12	17	50	58
2013	18	15	20	52	61
2014	20	18	23	54	64
2015	22	20	26	56	67

Source: NBS & NITDA Reports (2025).

The table shows the trend performance analysis before the study period: In 2010, predictive analytics adoption stood at 10%, real-time data processing at 8%, and business intelligence systems at 11%, with venture survival

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rate at 46% and operational efficiency at 52%. In 2011, these indicators improved slightly, reflecting gradual adoption of data-driven systems. By 2012 and 2013, the growth became more noticeable as predictive analytics increased to 15% and 18% respectively, while operational efficiency rose to 58% and 61%. In 2014, further improvement was recorded with predictive analytics at 20% and survival rate at 54%. By 2015, adoption levels had increased significantly, with predictive analytics at 22%, real-time data processing at 20%, and business intelligence systems at 26%, while venture survival rate improved to 56% and operational efficiency to 67%. This trend indicates that increasing adoption of innovation-supported data-driven decision-making tools was associated with improved operational performance and venture sustainability even before the main study period.

Table 4.7: Panel Data Analysis Table (2016–2024) of Performance Indicators

Year	Predictive Analytics (%)	Real-Time Data Processing (%)	Business Intelligence Systems (%)	Venture Sustainability (%)	Operational Efficiency (%)
2016	25	23	28	58	69
2017	28	26	32	60	72
2018	32	30	36	63	75
2019	36	34	40	66	78
2020	40	38	44	68	80
2021	45	42	48	70	83
2022	50	47	52	73	86
2023	55	52	57	76	89
2024	60	58	63	80	92

Source: NBS & Startup Genome Reports (2025).

The table shows the trend analysis within the study period: For instance, in 2016, predictive analytics adoption was 25%, real-time data processing 23%, and business intelligence systems 28%, with sustainability at 58%. But in 2017, it rose to 28%, 26%, and 32% respectively due to increased digital transformation initiatives. In 2018 and 2019, adoption continued to increase steadily, leading to improved sustainability and operational efficiency. By 2020, predictive analytics reached 40%, reflecting increased reliance on data-driven systems during periods of uncertainty. In 2021 and 2022, further growth was observed, with sustainability rising to 70% and 73% respectively, indicating improved resilience of hi-tech ventures. In 2023, adoption levels increased significantly, with predictive analytics at 55% and sustainability at 76%. By 2024, predictive analytics reached 60%, real-time data processing 58%, and business intelligence systems 63%, while sustainability improved to 80% and operational efficiency to 92%. This trend suggests that increased adoption of innovation-supported data-driven decision-making tools has contributed significantly to improved sustainability and operational efficiency of hi-tech ventures in Southwest Nigeria.

Data Analysis

Model Summary

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Vol. 5 Issue 4, April- 2026, Pages: 340-359

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	0.826	0.682	0.677	0.401	1.912

a. Predictors: (Constant), Predictive Analytics, Real-Time Data Processing, Business Intelligence Systems
b. Dependent Variable: Sustainability of Hi-Tech Ventures

The model shows a strong correlation (0.826) between the predictors and sustainability of hi-tech ventures. About 68.2% of the variance in sustainability is explained by the model (R Square = 0.682). The adjusted R^2 of 0.677 confirms a good model fit and the Durbin-Watson statistic of 1.912 suggests no autocorrelation in the residuals.

ANOVA

Table 4.9: ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	82.456	3	27.485	156.342	0.000
Residual	38.789	226	0.172		
Total	121.245	229			

a. Dependent Variable: Sustainability of Hi-Tech Ventures
b. Predictors: (Constant), Predictive Analytics, Real-Time Data Processing, Business Intelligence Systems

The overall ANOVA model is statistically significant, Sum of Squares value of 82.456, df (degree of freedom) of 3, Mean Square value of 27.485, F (factor) value of 156.342, Sig. value of 0.000.

Coefficients

Table 4.10: Coefficients

Model	B	Std. Error	Beta	t	Sig.
(Constant)	0.521	0.182		2.863	0.005
Predictive Analytics	0.294	0.051	0.318	5.765	0.000
Real-Time Data Processing	0.336	0.056	0.352	6.000	0.000
Business Intelligence Systems	0.251	0.048	0.297	5.229	0.000

a. Dependent Variable: Sustainability of Hi-Tech Ventures

The Constant shows the Unstandardized Coefficients of 0.521, Std. Error of 0.182, Standardized Coefficients (Beta) not applicable.

The result of the hypothesis one shows the unstandardized coefficient for predictive analytics is 0.294 with a standard error of 0.051. The standardized Beta coefficient is 0.318, with a t-value of 5.765 and a statistically significant p-value of 0.000. The null hypothesis is therefore rejected because the calculated p-value of 0.000 is less than the estimated value of 0.05. The result of the hypothesis therefore revealed that there is significant relationship between predictive analytics and sustainability of hi-tech ventures. It is concluded that predictive analytics significantly enhances sustainability.

The result of the hypothesis two shows the unstandardized coefficient for real-time data processing is 0.336 with a standard error of 0.056. The standardized Beta coefficient is 0.352, with a t-value of 6.000 and a statistically

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significant p-value of 0.000. The null hypothesis is therefore rejected because the calculated p-value of 0.000 is less than the estimated value of 0.05. The result of the hypothesis therefore revealed that there is significant relationship between real-time data processing and sustainability of hi-tech ventures. It is concluded that real-time data processing significantly enhances sustainability.

The result of the hypothesis three shows the unstandardized coefficient for business intelligence systems is 0.251 with a standard error of 0.048. The standardized Beta coefficient is 0.297, with a t-value of 5.229 and a statistically significant p-value of 0.000. The null hypothesis is therefore rejected because the calculated p-value of 0.000 is less than the estimated value of 0.05. The result of the hypothesis therefore revealed that there is significant relationship between business intelligence systems and sustainability of hi-tech ventures. It is concluded that business intelligence systems significantly enhance sustainability.

Discussion of Findings

Finding of hypothesis one indicated that t-value 5.765 and p-value 0.000, which is lower than the estimated threshold of 0.05. The result shows that predictive analytics has significantly influenced the sustainability of hi-tech ventures in Southwest Nigeria. This suggests that the use of predictive models enhances decision accuracy, reduces uncertainty, and improves strategic planning, thereby supporting long-term venture survival. This finding aligned with the study conducted by Wamba et al. (2022), which also revealed that data analytics capability significantly influenced firm performance. This finding also aligned with the theory of Dynamic Capabilities (Teece et al., 1997), who believed that firms sustain performance when they are able to anticipate changes and reconfigure internal processes accordingly.

Finding of hypothesis two indicated that t-value 6.000 and p-value 0.000, which is lower than the estimated threshold of 0.05. The result shows that real-time data processing has significantly influenced the sustainability of hi-tech ventures in Southwest Nigeria. This implies that real-time data enables firms to respond quickly to operational challenges, improve efficiency, and maintain service reliability. This finding aligned with the study conducted by Talukder et al. (2025), which study also revealed that data-driven innovation has influenced organizational performance. This finding also aligned with the theory of Dynamic Capabilities (Teece et al., 1997), who also believed that firms remain competitive through continuous adaptation and responsiveness to environmental changes.

Finding of hypothesis three indicated that t-value 5.229 and p-value 0.000, which is lower than the estimated threshold of 0.05. The result shows that business intelligence systems have significantly influenced the sustainability of hi-tech ventures in Southwest Nigeria. This indicates that the use of dashboards, reporting tools, and integrated data systems enhances transparency, coordination, and informed decision-making, thereby improving sustainability outcomes. This finding aligned with the study conducted by Bindeeba et al. (2025), which study also revealed that digital integration has influenced sustainability. This finding also aligned with the theory of Dynamic Capabilities (Teece et al., 1997), who also believed that firms achieve sustainability by integrating and reconfiguring internal capabilities.

Conclusion

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The study concluded that predictive analytics significantly enhanced the sustainability of hi-tech ventures in Southwest Nigeria by improving decision accuracy and reducing uncertainty. The study also concluded that real-time data processing significantly improved the sustainability of hi-tech ventures through faster response to operational changes and improved efficiency. The study further concluded that business intelligence systems significantly influenced the sustainability of hi-tech ventures by enhancing information flow, coordination, and strategic decision-making

Recommendations

From the above findings, the study recommended that;

1. Hi-tech ventures in Southwest Nigeria should intensify the adoption of predictive analytics to improve strategic planning and reduce uncertainty in decision-making processes.
2. Hi-tech ventures should strengthen the implementation of real-time data processing systems to enhance operational responsiveness and efficiency.
3. Hi-tech ventures should invest in robust business intelligence systems to improve data integration, information sharing, and informed decision-making for long-term sustainability.

Contribution to Knowledge and Practical Implications

This study contributes to knowledge by extending the existing literature on innovation and venture sustainability through a focused examination of innovation-supported data-driven decision-making as a multidimensional construct. While prior studies have broadly examined digital innovation or technology adoption, this study disaggregated the concept into predictive analytics, real-time data processing, and business intelligence systems, thereby offering a more precise empirical understanding of how data-driven capabilities influence the sustainability of hi-tech ventures. It also provides context-specific evidence from Southwest Nigeria, a major innovation hub, where empirical research on data-driven decision-making remains relatively limited. The study further reinforces the relevance of Dynamic Capabilities Theory by demonstrating how firms can achieve sustainability through adaptive, data-enabled decision processes.

Practically, the findings imply that sustainability in hi-tech ventures is not solely dependent on innovation or funding, but significantly influenced by the quality of decision-making processes supported by data systems. The study highlights the need for venture managers to prioritize investment in analytics tools, real-time data infrastructure, and business intelligence platforms. For policymakers and innovation support institutions, the findings suggest that strengthening digital capacity and data governance frameworks is essential for enhancing the sustainability of the startup ecosystem in Southwest Nigeria.

Limitations of the Study

This study encountered several limitations that may have influenced the scope and interpretation of the findings. One major limitation was access to respondents, as some founders and key personnel of hi-tech ventures were not readily available due to tight operational schedules and confidentiality concerns. This was mitigated by assuring respondents of anonymity and confidentiality, which improved participation rates.

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Another limitation was reliance on self-reported data, which may be subject to response bias, particularly where respondents provided socially desirable answers. To address this, the questionnaire was carefully structured and complemented with interview data to enhance credibility through triangulation.

The study was also limited geographically to Southwest Nigeria, which may restrict the generalization of the findings to other regions with different technological and economic conditions. Additionally, the use of a cross-sectional design limited the ability to capture dynamic changes over time. This was partially mitigated through the inclusion of documentary panel data to provide longitudinal insight.

Ethical Consideration

Ethical standards were strictly observed throughout the study. Participation was voluntary, informed consent was obtained, and respondents were free to withdraw at any stage without consequence. Confidentiality and anonymity were maintained by excluding personal identifiers and securing all data for academic use only. Data were handled with integrity, with no fabrication, falsification, or misrepresentation, while all secondary sources were properly acknowledged to avoid plagiarism. The instrument was also designed to avoid intrusive questions, and findings were reported objectively and without bias, thereby protecting participants and enhancing the credibility of the study.

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