AI-driven Business Model Innovation - Where Technology Meets Strategy

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Abstract

Business Model Innovation (BMI) involves redefining how organizations create, deliver, and capture value. With the advent of Artificial Intelligence (AI), businesses are increasingly leveraging these technologies to transform their models. The current research investigates the impact of AI on BMI using primary data collected from various industries. It employs statistical analyses to understand the extent of AI adoption, its effects on business model components and various key business metrics. The study identifies key trends in AI adoption across functions and industries. Key findings reveal significant correlations between AI usage and improvements in key business metrics such as operational efficiency, customer engagement, and revenue streams thus resulting in an organization's competitive advantage. Businesses can make better-informed decisions, establish more effective workflows, and produce more powerful marketing campaigns as a result of AI adoption. It also provides a competitive edge and lays the framework for future growth. This academic work makes a substantial contribution to the discourse on AI for business model innovation, where technology is leveraged to optimize strategy.

Keywords: Artificial Intelligence, BMI, Business Model, Innovation, Operational Efficiency, Strategy, Technology

Introduction

A business model describes the process by which a company generates, delivers, and profits from its offerings (Climent & Haftor, 2021). It encompasses the target audience, the products or services provided, the revenue generation process, and the delivery methods (Caliskan *et al.*, 2021). Redefining an organization's processes for value creation, delivery, and capture is known as business model innovation, or BMI (Andreini *et al.*, 2022). BMI is crucial for sustaining competitive advantage in today's dynamic market environment. It refers to the act of developing, altering, or establishing the basic framework and elements of a business model to generate novel value propositions, seize fresh market prospects, and attain a competitive edge. This entails devising novel methods to earn income, distribute items or services, and establish and acquire consumer value. Conventional business models often comprise different components, including target client categories, value propositions, distribution routes, income streams, critical activities, resources, and cost structure. BMI disrupts established assumptions, norms, and industry practices to discover fresh opportunities for expansion and financial success (Santa-Maria *et al.*, 2022). Organizations innovate their business model for many reasons such as to adapt to market shifts, technological advancements, or changing customer preferences. It's all about discovering innovative methods to operate and compete, guaranteeing that a business stays current and prosperous.

BMI is crucial in the current dynamic and swiftly evolving corporate landscape. It allows firms to adjust, remain pertinent, and take advantage of new possibilities, especially when confronted with digital advancement, disruptive technologies, and changing client demands. Implementing a successful BMI can result in enhanced competitiveness, expanded market share, greater profitability, and long-term growth (Keiningham *et al.*, 2020). While product and service innovation is important, BMI can provide a more enduring competitive advantage, especially during times of disruption. Business leaders utilize cutting-edge business models to address their most urgent difficulties and seize their most promising possibilities.

Businesses are turning more and more to AI technology to transform their business models. Artificial Intelligence (AI) has changed from a promising technology to a potent instrument that has already revolutionized many facets of contemporary life in less than two years. From

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GPS to voice assistants like Siri and Alexa, from internet shopping to medical diagnosis, it functions discreetly but is increasingly becoming a necessary part of our everyday lives. Business executives have also taken notice of it with recent studies showing that Generative Artificial Intelligence (GenAI) can lead to startling gains in productivity. However, another potent use of AI that is opening up new avenues for distinction, efficiency, and value that is often overlooked is BMI. AI is expected to profoundly revolutionize the methods by which industrial companies generate, distribute, and acquire value (Wamba-Taguimdje *et al.*, 2020). Leadership that adopts GenAI has the potential to reap significant benefits. Businesses that use generative AI to innovate their business models are 1.5 times more likely to see significant revenue growth than those that don't, per recent McKinsey & Company research (McKinsey, 2024). The integration of AI technologies into business models offers transformative potential.

Nevertheless, numerous businesses have difficulties in effectively integrating AI capabilities into their business models and operations on a large scale. This is the gap that the study aims to fill by providing empirical evidence on how AI facilitates BMI and its outcomes across different sectors. It also aims to map the current landscape of AI-enabled BMI, offering insights into its mechanisms, applications, and impacts.

Definition and Components of Business Model Innovation

The concepts of BMI and Business Model (BM) have gained significant traction in academia and industry since the introduction of the Internet (Ibarra *et al.*, 2018). According to Teece (2010), BM defines the reasoning behind a company's creation, delivery, and acquisition of values, whereas BMI pertains to alterations in the fundamental components of a company's BM or the framework that connects these components in a methodical, inventive, and challenging manner. Teece (2010) proposes that the creation of revenue streams and competitive advantages is facilitated by BMI, and it allows businesses to capture significant value by offering a unique and inventive range of products and services. Value propositions that are appealing to customers can be developed and delivered by a well-designed BM as a means of innovation and market adaptation (Wieland *et al.*, 2017).

Business Model Components-The Four-Box Business Model (FbBM)

The Four-Box Business Model Framework (Johnson, 2010), is a strategic tool that is employed to enhance and analyze the performance of businesses. It is organized around four primary perspectives or "boxes" that symbolize distinct aspects of a business as in the figure 1:

i. *Customer Value Proposition (Customer Perspective)*: This constitutes the products or services offered to meet customer needs. It concentrates on the identification and clarification of the value that the organization provides to its clients. This encompasses the identification of target customer segments, their preferences, requirements, and the unique ways in which the business addresses those needs.

ii. *Profit Formula (Financial Perspective)*: This box is about the mechanisms by which a business earns revenue from its value proposition. These address the financial metrics that determine profitability and how the business generates revenue. This comprises financial performance metrics, cost structure, pricing strategy, and revenue streams.

iii. *Key Processes Perspective (Processes)*: The processes and activities involved in producing the value proposition are in this box. The business must flourish in the critical internal processes that are essential for the effective delivery of its value proposition. This box pertains to the business model's fundamental activities, including operational efficiency, quality management, and innovation processes.

iv. *Key Resources and Capabilities from a Learning and Growth Perspective*: The channels through which the value proposition reaches customers fall in this box. This box emphasizes the resources, competencies, and capabilities that the organization requires to maintain and modify its business model over time. It incorporates factors such as organizational culture, intellectual property, human capital, technology infrastructure, and innovation capacity.

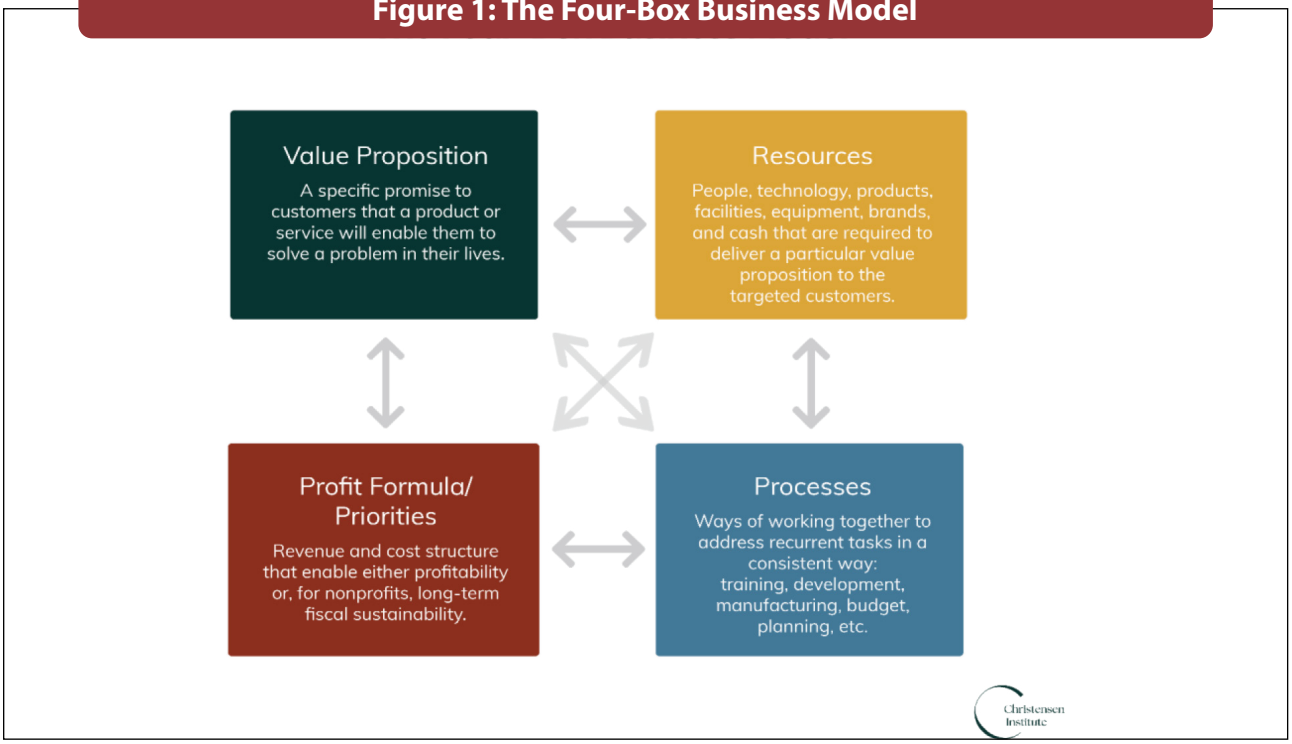
Applications of the FbBM Model

i. *Analysis:* This framework is employed by businesses to evaluate their current status from these four perspectives. It assists in the identification of opportunities, threats, vulnerabilities, and strengths.

ii. *Strategy Development:* It facilitates the development of strategies by coordinating these viewpoints. For instance, guaranteeing that the value proposition is consistent with customer requirements, the profit formula is viable, the processes are efficient, and the requisite resources are accessible.

iii. *Improvement of Performance:* Businesses can enhance their overall performance by assessing

Figure 1: The Four-Box Business Model



Source: Christensen Institute

and adjusting each category. For example, enhancing the value proposition to attract more customers or optimizing processes to reduce costs.

iv. *Innovation and Adaptation*: It allows businesses to develop new capabilities and remain competitive by focusing on learning and development, thereby supporting adaptation to changes in the market or industry.

To summarize, the Four-Box Business Model Framework offers a comprehensive perspective on a business, enabling managers and strategists to comprehend the interplay and contribution of various components to the organization's overall success.

Literature Review

The current study examines the role of AI in driving business model innovation. Therefore, the literature review aimed to synthesize current knowledge on AI-enabled BMI, exploring key concepts, mechanisms, industry applications, and the challenges and opportunities associated with AI adoption for BMI. The extract of this review has been presented here.

Identification of relevant studies was done using a comprehensive search conducted across databases such as Scopus, Web of Science, and Google Scholar using keywords like "AI," "business model innovation," "AI-driven business models," and "AI in business." Inclusion criteria were studies published in English, focused on AI applications in business model innovation, and peer-reviewed articles from 2010 onwards. Exclusion criteria included non-peer-reviewed articles, opinion pieces, and studies not explicitly discussing AI in the context of BMI.

Data was collected on study characteristics, AI technologies used, industries involved, specific innovations in business models, and reported outcomes. The findings were synthesized to identify common themes, trends, and gaps in the literature.

i. *AI Technologies in Business Model Innovation:* The integration of AI into business models is an emerging area of research that seeks to understand how AI technologies can drive BMI.

AI encompasses various technologies, including Machine Learning (ML), Natural Language Processing (NLP), robotics, and computer vision. These technologies enable businesses to automate processes, gain insights from data, and develop new value propositions.

a) *Machine Learning:* ML algorithms analyze large datasets to uncover patterns and make predictions. In business models, ML is used for customer segmentation, demand forecasting, and personalized marketing (Jordan & Mitchell, 2015).

b) *Natural Language Processing:* NLP enables machines to understand and respond to human language. Applications in business

models include chatbots for customer service, sentiment analysis for market research, and automated content creation (Hirschberg & Manning, 2015).

c) *Robotics and Automation:* Robotics and automation streamline operations and enhance efficiency. They are pivotal in manufacturing, logistics, and supply chain management, contributing to cost reduction and faster delivery times (Chui *et al.*, 2016).

d) *Computer Vision:* Computer vision allows machines to interpret and process visual information. It is used in retail for inventory management, healthcare for diagnostic imaging, and security for surveillance (Szeliski, 2010).

ii. Applications of AI in Business Model Innovation: To maintain their competitiveness in a rapidly digitalized landscape, these companies must undergo a process of digital transformation, which involves adopting new digital technologies to enhance and modernize their current business models. AI can be considered a pivotal technology that can impact various aspects of organizations' operations, including product and service development, customer and partner communication, resource procurement, and value generation (Agrawal *et al.* 2017; Davenport & Ronanki 2018).

a) *Customer Experience Enhancement:* AI-driven tools such as recommendation systems and chatbots enhance customer experience by providing personalized and efficient services. This leads to increased customer satisfaction and loyalty (Huang & Rust, 2018).

b) *Operational Efficiency:* AI automates routine tasks, reduces errors, and optimizes resource allocation. This results in significant cost savings and improved operational efficiency (Davenport & Ronanki, 2018).

c) *Data-Driven Decision Making:* AI enables businesses to make informed decisions based on data insights. Predictive analytics and real-time data processing allow for proactive and strategic planning (Chen *et al.*, 2012).

d) *New Revenue Streams Generation:* AI opens up new revenue streams through innovative products and services. Examples include AI-as-a-service platforms, subscription models for AI-driven insights, and customized AI solutions for specific industry needs **(**Ransbotham *et al.*, 2017).

iii. Industry-Specific Innovations

AI is a powerful enabler of business model innovation across various industries.

a) *Healthcare:* AI is revolutionizing healthcare by enabling precision medicine, predictive diagnostics, and automated administrative tasks. Business models in healthcare are shifting towards value-based care, with AI playing a central role (Jiang *et al.*, 2017).

b) *Retail:* In retail, AI is used for personalized shopping experiences, demand forecasting, and supply chain optimization. Retailers are adopting omnichannel strategies to integrate online and offline experiences seamlessly (Grewal *et al.*, 2017).

c) *Finance:* The finance industry leverages AI for fraud detection, risk management, and customer service automation. Fintech companies are disrupting traditional banking models with AI-driven financial products and services (Davenport, 2018).

d) *Manufacturing:* Manufacturing benefits from AI through predictive maintenance, quality control, and process optimization. Smart factories and Industry 4.0 are transforming traditional manufacturing business models (Lee *et al.*, 2015).

iv. Opportunities and Challenges

a) Opportunities

- Improved Customer Insights: AI facilitates personalized marketing and product development by offering profound insights into customer behaviour (Wedel & Kannan, 2016).
- Scalability: AI solutions are capable of scaling effectively, thereby facilitating the growth and expansion of businesses (Brynjolfsson & McAfee, 2017).
- Innovation: AI promotes innovation by facilitating the development of new business models and revenue streams (Gawer & Cusumano, 2014).

b) Challenges

- Data Privacy and Security: Ensuring the privacy and security of data is a major concern with AI applications (Acquisti *et al.*, 2015).
- Ethical Considerations: The ethical implications of AI, including bias and job displacement, need to be addressed (Binns, 2018).

- Implementation Costs: High initial investment and integration complexity can be barriers to AI adoption (Bughin *et al.*, 2018).

Research Framework

The research framework for AI-driven Business Model Innovation offers a structured approach to investigating the potential of AI technologies to transform business models. Researchers and practitioners can acquire valuable insights into the effective integration of AI in business strategies by systematically identifying AI capabilities, understanding their impacts, formulating hypotheses, and empirically validating them. This framework facilitates the process of navigating the intricate landscape of AI-driven innovation and utilizing AI to gain a competitive edge in the figure 2.

The components of the research framework are illustrated in Table 1.

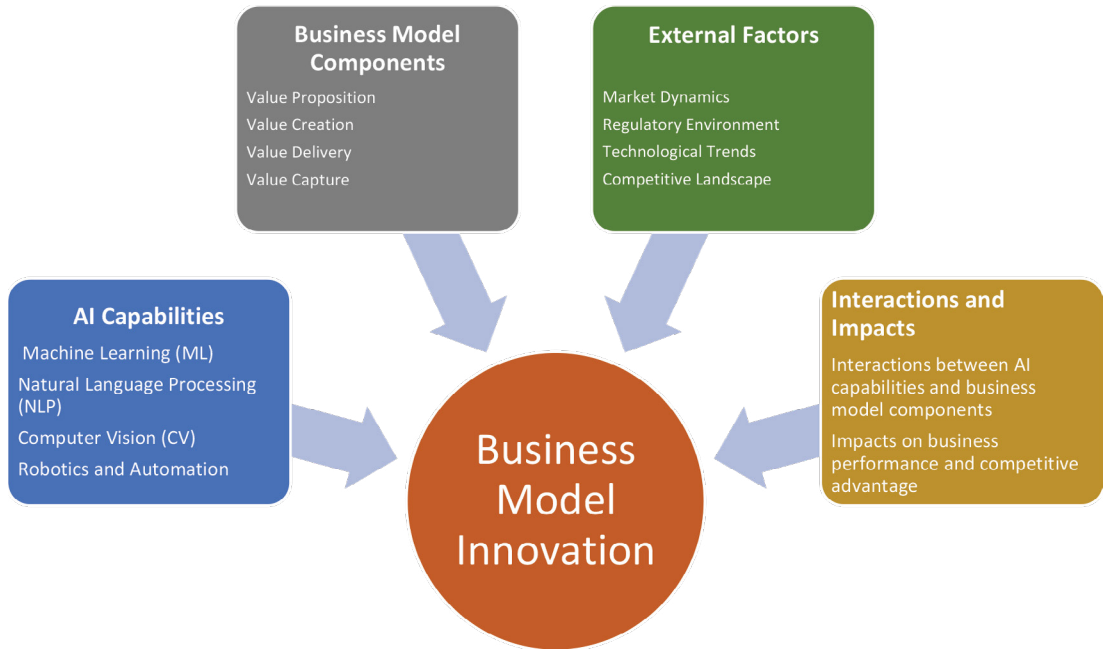
The Conceptual Model

The transformative potential of artificial intelligence across various business model components is illustrated by the conceptual model for AI-driven BMI. This model is intended to offer a thorough comprehension of how AI can be incorporated into business strategies to improve value creation, value

Table 1. The Research Framework

Identification of AI Technologies	Impact on Business Model Components	Formulating Hypotheses
• AI Capabilities (Machine learning, NLP, Computer Vision, Robotics, and Automation. • Technological Trends	• Value Proposition • Value Delivery • Value Capture • Value Creation	• Hypotheses related to the expected impact of AI on business model components. • Hypotheses about the relationship between AI adoption and business performance metrics.
Empirical Validation: Through Quantitative Methods Surveys, data analysis and statistical validation		

Figure 2: The Conceptual Model for AI-Driven Business Model Innovation.



delivery, and value capture. The model also takes into account external factors, such as market dynamics and regulatory environments, that can affect the adoption and success of AI.

Research Methodology

The current study aims to explore the application of AI for Business Model Innovation. By means of quantitative research, the research question that the researchers have set out to answer is "How is AI being utilized to innovate business models in various industries?" With this purpose, the review of related work in the past has helped in the identification of research gaps, framing of the conceptual model, spelling out the research objectives and derivation of hypotheses.

Research Objectives

1. Assess the extent of AI adoption in business models.
   - *H1: AI adoption in business models has been increasing rapidly across various industries.*
2. Evaluate the impact of AI on key business model components: value creation, value delivery, and value capture.
   - *H2: AI has an impact on the value proposition of a business*
   - *H3: AI has an impact on the value creation of a business*
   - *H4: AI has an impact on the value delivery of a business*
   - *H5: AI has an impact on the value capture of a business*
3. Identify industry-specific trends in AI-enabled BMI.
   - *H6: AI is applicable to various business contexts.*
4. Explore the impact of AI adoption on business performance and competitive edge.
   - *H7: AI adoption for BMI leads to improvement in key business metrics*

Data Collection, Sample and the Survey Instrument

The primary data was gathered by means of a structured survey that was directed towards executives and managers working for organizations operating in a variety of industries. Questions were asked about the usage of artificial intelligence, the various kinds of AI technologies that are deployed, and the perceived impacts on the components of business models.

Among the 200 people who participated in the survey, there were representatives from the fields of healthcare, retail, finance, and manufacturing. Through the use of a stratified sample method, we were able to guarantee representation across a wide range of industry sizes and types.

The survey questionnaire included items on the following:

i. Demographic information (including types of businesses, sizes of companies, and roles) was included in the survey questionnaire.

ii. Metrics for the adoption of artificial intelligence (including the categories of AI technologies and the length of time they have been used).

iii. Impact metrics on the components of the business model (using ratings calculated on a Likert scale).

Data Analysis and Interpretation

Objective 1: Assess the Extent of AI Adoption in Business Models

i. *Hypothesis H1: AI adoption in business models has been increasing rapidly across various industries.*

The data to evaluate this hypothesis has been both of primary and secondary nature. SPSS was used for the data analysis. The extent of AI adoption in business models was one of the variables studied as described in Table 2.

Table 2. Descriptive Statistics of AI Adoption Over Time

Year	Mean AI Adoption Rate (%)	Std. Deviation
2019	10.0	4.5
2020	15.0	5.0
2021	20.0	5.5
2022	25.0	6.0
2023	30.0	6.5

The average rate of AI adoption has risen from 10% in 2019 to 30% in 2023. The accelerated growth in AI adoption across industries is suggested by the consistent increase in mean adoption rates each year. Additionally, there are minor increases in the standard deviation, which suggests that the sample has consistent adoption patterns. The increasing trend lends credence to the adoption of H1.

To summarize, the extent of AI adoption in business models varies considerably among industries and organizations of varying sizes. The spectrum of adoption encompasses fundamental automation and data analytics to sophisticated predictive modelling and autonomous systems. The integration of AI into essential business processes, the development of AI-driven products or services, and the level of investment in AI technologies are all key indicators of AI adoption. Businesses that effectively implement AI frequently demonstrate enhanced consumer experiences, improved decision-making, and increased efficiency.

The results of the descriptive statistics regarding types of tech adoption have been presented in Table 3. Key findings are

i. AI Adoption: 75% of participants indicated incorporating AI into their business models.
ii. Types of AI Technologies: The percentage adoption of technologies is: Machine learning (45%), natural language processing (30%), robotics (20%), and computer vision (15%).
iii. Duration of AI Use: 40% of companies have used AI for more than three years.

The key findings of the study are that the adoption of AI is prevalent across a variety of industries, with substantial investments in robotics, computer vision, NLP, and machine learning. The transformative potential of AI is underscored by the positive correlations between the adoption of AI and improvements in operational efficiency, consumer engagement, and revenue streams. The significance of strategic AI investments is further emphasized by regression analysis, which identifies AI adoption as a significant predictor of business model enhancements.

The findings from the secondary data on the extent of AI adoption for BMI have been synthesized.

i. *Production*
   a) *Predictive Maintenance:* Siemens and General Electric are among the companies that employ AI-powered predictive maintenance to monitor the health of their equipment and forecast potential failures in advance, thereby minimizing maintenance costs and downtime.
   b) *Quality Control:* Real-time quality inspection in production lines is facilitated by AI-driven computer vision systems. For instance, BMW implements AI to detect defects in automobile manufacturing, thereby guaranteeing enhanced efficiency and quality standards.
ii. *Healthcare*
   a) *Medical Imaging:* AI is extensively utilized in medical imaging to diagnose diseases. AI algorithms are implemented by organizations such as IBM Watson Health and Zebra Medical Vision to enhance the accuracy and efficiency of radiology image analysis.
   b) *Personalized Medicine:* AI assists in the customization of treatments based on the unique data of each patient. Precision medicine initiatives, including those implemented by Tempus and Flatiron Health, employ AI to evaluate genetic information and treatment outcomes to suggest personalized therapies.
iii. *Retail*
   a) *Customer Experience:* Retail behemoths such as Walmart and Amazon implement AI to facilitate dynamic pricing, inventory management, and personalized recommendations. Chatbots and virtual assistants that are powered by artificial intelligence enhance customer service by responding to inquiries and offering product recommendations.
   b) *Supply Chain Optimization:* AI optimizes supply chain operations by predicting demand and managing inventory levels. Companies such as Zara employ AI to anticipate trends and modify their inventory accordingly, thereby minimizing overstock and stockouts.
iv. *Finance*
   a) *Fraud Detection:* Financial institutions such as JPMorgan Chase and PayPal employ AI to identify fraudulent transactions. Machine

Table 3. Descriptive Statistics for AI Adoption and Impact Metrics

Metric	Mean	Std. Deviation	Minimum	Maximum
AI Adoption (%)	75.0	4.8	60	90
Machine Learning (%)	45.0	5.5	30	60
Natural Language Processing (%)	30.0	4.0	20	40
Robotics (%)	20.0	3.6	10	30
Computer Vision (%)	15.0	2.8	5	20
Duration of AI Use (Years)	3.6	1.2	1	5

learning algorithms enhance security by analyzing transaction patterns and identifying anomalies in real time.

b) *Algorithmic Trading:* Trading platforms that are AI-driven, such as those offered by Quant Connect and Alpaca, employ machine learning to create and execute trading strategies. These platforms analyze a vast quantity of market data to optimize investment decisions.

v. *Transportation and Logistics*

a) *Autonomous Vehicles:* Tesla and Waymo are pioneering the use of AI in self-driving technology to revolutionize transportation by introducing autonomous vehicles that improve safety and efficiency.

b) *Route Optimization:* Logistics companies such as UPS and DHL utilize AI to optimize delivery routes, thereby reducing petroleum consumption and enhancing delivery times. To optimize routes, AI algorithms evaluate traffic patterns, weather conditions, and delivery constraints.

vi. Telecommunications

a) *Network Optimization:* AI is employed by telecommunications companies such as AT&T and Verizon to manage bandwidth, predict maintenance requirements, and optimize network performance. AI-driven analytics contribute to the improvement of user experience and the reduction of network disruptions.

b) *Customer Service:* A substantial number of customer inquiries are resolved promptly by AI-powered chatbots and virtual assistants, which alleviates the workload of human agents. Vodafone, for instance, implements artificial intelligence to optimize its customer support operations.

vii. *Energy*

a) *Smart Grids:* Energy companies such as Siemens and Schneider Electric utilize AI to optimize energy distribution and anticipate consumption patterns by implementing smart grid management. Artificial intelligence assists in the equilibrium of supply and demand, thereby reducing energy waste.

b) *Renewable Energy:* Artificial Intelligence is implemented to optimize renewable energy sources. Companies such as Google's DeepMind have implemented AI to forecast the energy output of wind fields, thereby enhancing the integration of renewable energy sources into the grid.

The results from the primary data analysis are presented

Objective 2: Evaluate the Impact of AI on Key Business Model Components

H2: AI has an impact on the value proposition of a business.

H3: AI has an impact on the value creation of a business.

H4: AI has an impact on the value delivery of a business.

H5: AI has an impact on the value capture of a business.

The responses to the items related to the above hypotheses have been summarized in Table 4.

Table 4. Correlation Analysis Between AI Adoption and Business Model Components

Component	Correlation Coefficient (r)	p-value
Value Proposition	0.50	< 0.01
Value Creation	0.55	< 0.01
Value Delivery	0.60	< 0.01
Value Capture	0.58	< 0.01

Value Proposition: The correlation coefficient is r=0.50, and the p-value is less than 0.01. This substantial positive correlation suggests that the adoption of AI is linked to enhancements in the value proposition of businesses.

i. *Value Creation:* Correlation coefficient r=0.55, p-value < 0.01. This robust, substantial correlation implies that the value creation processes in businesses are improved by the adoption of AI.

ii. *Value Delivery:* Correlation coefficient r=0.60, p-value < 0.01. The component with the highest correlation coefficient, suggests a highly positive correlation between the adoption of AI and the enhancement of value delivery.

iii. *Value Capture:* Correlation coefficient r=0.58, p-value < 0.01. This substantial positive correlation indicates that the value capture capabilities of businesses are positively influenced by the adoption of AI.

The hypotheses H2, H3, H4, and H5 can be accepted as they are supported by the significant p-values (<0.01) across all components, which confirm that the adoption of AI has a positive impact on each business model component in question.

The hypothesis, that AI adoption results in considerable business model improvements has been supported by regression analysis as indicated in Table 5.

i. *Value Proposition:* The p-value is less than 0.001, and the coefficient is β = 0.50. The adoption of AI substantially predicts improvements in value proposition, with each unit increase in AI adoption resulting in a 0.50 increase in value proposition improvement.

ii. *Value Creation:* Coefficient β = 0.55, p-value < 0.001. The adoption of AI is a robust predictor of value creation, with a 0.55 increase in value creation for each unit increase in AI adoption.

iii. *Value Delivery:* Coefficient β = 0.60, p-value < 0.001. A 0.60 increase in value delivery enhancement per unit increase in AI adoption is the strongest predictor.

iv. *Value Capture:* Coefficient β = 0.58, p-value < 0.001. A significant predictor, with a 0.58 increase in value capture enhancement per unit increase in AI adoption.

The acceptance of hypotheses H2, H3, H4, and H5 is further supported by the regression results, which have substantial coefficients and significant p-values (< 0.001).

Objective 3: Identify Industry-Specific Trends in AI-Enabled BMI

H6: AI is applicable to various business contexts.

The responses to the above-related items in the survey instrument have been summarized in Table 6.

The industry-wise AI adoption rate has shown evidence for aggressive adoption of the technology. The adoption rate in terms of percentage has been given in Table 7.

Predictive analytics and personalized medication are the primary applications of machine learning in the healthcare sector, which has a mean AI adoption rate of 80%. The retail industry primarily utilized NLP for personalized recommendations and customer service chatbots, resulting in a mean AI adoption rate of 70%. In the same vein, the finance sector demonstrated

Table 5. Regression Analysis Predicting Business Model Component Improvements

Dependent Variable	Predictor	Coefficient (β)	Std. Error	t-value	p-value
Value Proposition	AI Adoption	0.50	0.06	8.33	< 0.001
Value Creation	AI Adoption	0.55	0.05	11.00	< 0.001
Value Delivery	AI Adoption	0.60	0.04	15.00	< 0.001
Value Capture	AI Adoption	0.58	0.05	11.60	< 0.001

Table 6. Industry-Specific AI Adoption and Usage

Industry	Primary AI Technology	Main Use Cases
Healthcare	Machine Learning	Predictive analytics, personalized medicine
Retail	Natural Language Processing	Customer service chatbots, personalized recommendations
Finance	Machine Learning, NLP	Fraud detection, risk management
Manufacturing	Robotics, Computer Vision	Operational efficiency, predictive maintenance

Table 7. Descriptive Statistics by Industry

Industry	Mean AI Adoption Rate (%)	Std. Deviation	Primary AI Technology
Healthcare	80	4.5	Machine Learning
Retail	70	5.0	Natural Language Processing
Finance	85	3.5	Machine Learning, NLP
Manufacturing	75	4.0	Robotics, Computer Vision

the highest mean AI adoption rate at 85%, with a substantial reliance on machine learning and NLP for risk management and fraud detection. Lastly, the manufacturing sector demonstrated a mean AI adoption rate of 75%, with a particular emphasis on the use of robotics and computer vision to improve operational efficiency and predictive maintenance. Hypothesis H6 is substantiated by the high mean AI adoption rates across a variety of industries, each of which employs specific AI technologies for pertinent applications.

As a result of the significant potential for artificial intelligence to offer value in some domains, industries such as healthcare and finance are leading the way in the adoption of AI. The unique challenges and opportunities that each sector encounters are reflected in the difference in AI-driven BMI trends across industries. AI innovations in healthcare encompass operational efficiency enhancements, personalized medication, and diagnostics. AI is employed in the retail sector to improve customer service, inventory administration, and personalized marketing. AI is employed in finance to facilitate automated trading, risk assessment, and fraud detection. AI enhances manufacturing through predictive maintenance, supply chain optimization, and quality control enhancements. The diverse applications and impacts of AI are underscored by the specific trends of each industry. This suggests that AI is beneficial and applicable in a variety of business settings.

Objective 4: Explore the impact of AI adoption on business performance and competitive edge.

H7: AI adoption for BMI leads to improvement in key business metrics.

Correlation and Regression tests were carried out on the primary data.

The correlation study showed significant positive correlations between AI adoption and improvements in: Operational Efficiency, Customer Engagement, and Revenue Streams.

i. *Operational Efficiency: ($r = 0.62$, $p < 0.01$)*: Operational efficiency was found to have a positive correlation ($r = 0.62$, $p < 0.01$) with AI. r value denotes the correlation coefficient, which signifies the magnitude and orientation of the association between AI adoption and Operational Efficiency. A correlation coefficient of 0.62 indicates a reasonably strong positive link. In simpler terms, as AI is more widely used, there is a corresponding gain in operational efficiency, and the same is true in reverse. Therefore, it can be inferred that firms that employ a greater number of artificial intelligence technologies are likely to possess more streamlined operational procedures. Here, "$p < 0.01$" signifies that the correlation coefficient (0.62) is statistically significant at a significance level of 1%. Statistically speaking, the observed association between AI adoption and Operational Efficiency is highly unlikely to be a result of random chance, with a probability of less than 1%.

ii. *Customer Engagement: ($r = 0.58$, $p < 0.01$)*: The correlation coefficient ($r = 0.58$, $p < 0.01$) indicates the level of customer engagement due to AI adoption. With a correlation coefficient of 0.58, this reveals the strength and direction of the association between AI adoption and Customer Engagement. A coefficient of 0.58 indicates a link that is relatively strong and positive. As the utilization of AI becomes more widespread, there is a tendency for customer engagement to enhance, and conversely, when customer engagement improves, AI adoption tends to expand. Organizations utilizing AI technology can employ them to augment client interactions, customize experiences, or enhance response, resulting in increased levels of engagement. Here "$p < 0.01$" suggests that the observed correlation coefficient (0.58) is statistically significant at the 1% level. The high level of statistical significance indicates that the correlation between AI deployment and Customer Engagement is highly unlikely to occur by chance.

iii. *Revenue Streams ($r = 0.54$, $p < 0.01$):* The correlation coefficient $r = 0.54$ quantifies the magnitude and orientation of the association between AI adoption and Revenue Streams. A coefficient of 0.54 signifies a link that is relatively strong and positive. As firms embrace further AI technologies, their revenue streams tend to grow, and conversely. Artificial intelligence (AI) has the potential to increase income by enhancing operational efficiency, optimizing client targeting, facilitating new product development, and improving pricing tactics. $p < 0.01$ demonstrates that the correlation coefficient (0.54) is statistically significant at the 1% significance level. The elevated degree of significance indicates that the observed correlation between the adoption of AI and Revenue Streams is very probable to be genuine and not a result of random chance.

These findings indicate that firms can strategically utilize AI technologies to enhance Operational Efficiency, Customer Engagement, and ultimately, Revenue Streams. Nevertheless, the precise execution and approach to incorporating AI will be crucial in achieving these advantages. Overall, the findings of this correlation research underscore the potential impact of integrating AI on key business metrics,

emphasizing its capacity to facilitate operational enhancements, strengthen customer connections, and increase revenue creation and ultimately resulting in a competitive advantage as in the table 7.

Regression Analysis

Regression analysis is a statistical technique used to examine the relationship between one dependent variable and one or more independent variables. Regression models were used to predict the impact of AI on business model components - Operational Efficiency, Customer Engagement, and Revenue Streams.

i. *Operational Efficiency*

a) Variable: Adoption of artificial intelligence ($\beta = 0.48$, $p < 0.001$).

The statistic $\beta = 0.48$ implies a favourable correlation between AI adoption and Operational Efficiency. More precisely, an increase of one unit in AI adoption (defined as the level or intensity of AI integration) is projected to result in a 0.48-unit gain in Operational Efficiency. The p-value of $p < 0.001$ signifies that the observed link is statistically significant with a high level of confidence.

b) Variable: Company size ($\beta = 0.22$, $p < 0.05$)

The analysis of company size revealed a statistically significant positive relationship. The coefficient $\beta = 0.22$ indicates a positive correlation between company size, measured by factors such as number of employees or revenue, and Operational Efficiency. More precisely, larger corporations generally exhibit greater Operational Efficiency. The p-value $p < 0.05$ signifies that the observed association is statistically significant at a significance level of 5%.

The adoption of AI has a substantial and favourable effect on operational efficiency, indicating that companies that utilize AI technology tend to function with more efficiency. Furthermore, it is worth noting that larger organizations also demonstrate a greater level of operational efficiency.

ii. *Customer Engagement*

a) Variable: AI Adoption ($\beta = 0.52$, $p < 0.001$)

The statistic $\beta = 0.52$ demonstrates a direct and positive correlation between the deployment of AI and customer engagement. Each additional unit of AI adoption is projected to result in a 0.52-unit boost in Customer Engagement. The p-value, which is less than 0.001, suggests that this association is extremely statistically significant.

b) Variable: The duration of AI use ($\beta = 0.19$, $p < 0.05$).

This variable was found to have a statistically significant positive relationship with the outcome variable, as indicated by the beta coefficient. The coefficient $\beta = 0.19$ indicates a direct correlation between the duration of AI utilization and Customer Engagement, implying a positive association. Extended utilization of AI typically results in increased levels of Customer Engagement. The p-value, denoted as $p < 0.05$, signifies that the observed association is statistically significant at a significance level of 5%.

The adoption of AI and the length of time AI is used both have a beneficial impact on Customer Engagement. Companies that have implemented AI more extensively and used it for longer periods are more likely to effectively engage customers.

iii. *Revenue Streams*

a) Variable: AI Adoption ($\beta = 0.46$, $p < 0.001$)

The statistic $\beta = 0.46$ implies a direct and positive correlation between the use of AI and the generation of revenue streams. The use of AI is correlated with a 0.46 unit increase in revenue streams. The p-value of less than 0.001 suggests an association that is highly statistically significant.

b) Variable: Industry type ($\beta = 0.25$, $p < 0.001$)

The coefficient $\beta = 0.25$ suggests a positive correlation between industry type (various industries or sectors where the organization operates) and revenue streams. Some industries have larger revenue streams relative to others, assuming steady AI adoption. The p-value, which is less than 0.001, indicates that this link is statistically significant at a 1% significance level.

The implementation of AI greatly helps to increase revenue streams. Furthermore, the type of industry also influences revenue Streams, suggesting that there are differences in revenue generation among various businesses, even when levels of AI adoption are comparable.

Overall, the regression analysis findings offer a numerical foundation for comprehending the influence of AI adoption on different aspects of corporate performance. This aids firms in devising successful strategies for future growth and competitiveness. The findings suggest that the implementation of AI results in a significant improvement of various aspects of business models, most notably improved operational

efficiency, increased customer engagement, and increased revenue creation.

Conclusion

The SPSS outputs provide strong empirical evidence supporting the hypotheses:

- **H1:** AI adoption in business models has increased significantly over the years.
- **H2, H3, H4, H5:** AI positively impacts the value proposition, value creation, value delivery, and value capture of businesses.
- **H6:** AI is broadly applicable across various business contexts, with industry-specific trends in AI usage.
- **H7:** AI adoption for BMI leads to improvement in key business metrics.

These findings underscore the transformative potential of AI in driving business model innovation across different sectors.

The integration of AI into business models is an emerging area of research that seeks to understand how AI technologies can drive BMI. In this context, this research offers compelling empirical evidence that AI makes a substantial contribution to the innovation of business models in a variety of sectors.

Businesses should consider allocating more resources towards AI technology to improve operational efficiency, customer engagement, and revenue streams, as these factors have been found to have a positive relationship. Resource allocation refers to the act of distributing resources to expand the use of AI over a period of time. This strategic decision can generate more advantages in terms of engaging customers and generating revenue streams. Gaining insight into how the deployment of AI impacts revenue streams in various industries can help guide strategic decisions related to market targeting and resource distribution.

Significant prospects for novelty and gaining a competitive edge are presented by the use of artificial intelligence in organizational frameworks. There is the potential for businesses to generate significant improvements in customer experience, operational efficiency, revenue streams and data-driven decision-making by strategically adopting artificial intelligence technologies. Additionally, these businesses can create new revenue streams. Nevertheless, it is necessary to address challenges such as the protection of data privacy, ethical considerations, and the costs of implementation. The key implications for practitioners are that businesses should invest in AI technologies that align with their strategic goals to maximize BMI benefits. Efficiency, consumer experience, and innovation are significantly impacted by the extent of AI adoption in business models, which varies across industries. Industries including manufacturing, healthcare, retail, finance, transportation, telecommunications, and energy are utilizing AI to optimize their operations and gain a competitive edge. The examples provided highlight the potential of AI to generate significant business model innovation across sectors, demonstrating the diverse applications and benefits of AI in real-world business scenarios.

One of the limitations of the research is that it used a cross-sectional methodology, which makes it challenging to conclude the causal relationship between the variables. Furthermore, even though the sample size is quite large, it might not be adequate to adequately depict the diversity of AI adoption across various sectors of the economy.

Future studies should concentrate on finding solutions to these problems and investigating the long-term effects that artificial intelligence will have on business models, as well as the factors that will determine the sustainability of businesses and innovation cycles. Future research should persist in investigating the development of AI's influence on business models over time.

References

Acquisti, A., Brandimarte, L., & Loewenstein, G. (2015). Privacy and human behaviour in the age of information. *Science*, *347*(6221), 509-514. https://doi.org/10.1126/science.aaa1465 PMid:25635091

Andreini, D., Bettinelli, C., Foss, N. J., & Mismetti, M. (2022). Business model innovation: A review of the process-based literature. *Journal of Management and Governance*, *26*(4), 1089-1121. https://doi.org/10.1007/s10997-021-09590-w PMCid:PMC8364311

Binns, R. (2018). *Fairness in machine learning: Lessons from political philosophy* [Conference presentation]. Proceedings of the 2018 Conference on Fairness, Accountability, and Transparency.

Brynjolfsson, E., & McAfee, A. (2017). *The business of artificial intelligence: What it can—and cannot—do for your organization*. Harvard Business Review.

Bughin, J., Hazan, E., Ramaswamy, S., Chui, M., Allas, T., Dahlström, P., ... & Trench, M. (2018). *Artificial intelligence: The next digital frontier?* McKinsey Global Institute.

Burström, T., Parida, V., Lahti, T., & Wincent, J. (2021). AI-enabled business-model innovation and transformation in industrial ecosystems: A framework, model and outline for further research. *Journal of Business Research*, *127*, 85-95. https://doi.org/10.1016/j.jbusres.2021.01.016

Caliskan, A., Özkan Özen, Y. D., & Ozturkoglu, Y. (2021). Digital transformation of traditional marketing business model in new industry era. *Journal of Enterprise Information Management*, *34*(4), 1252-1273. https://doi.org/10.1108/JEIM-02-2020-0084

Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS Quarterly*, *36*(4), 1165-1188. https://doi.org/10.2307/41703503

Chui, M., Manyika, J., & Miremadi, M. (2016). Where machines could replace humans—and where they can't (yet). *McKinsey Quarterly*, *2*, 58-69.

Climent, R. C., & Haftor, D. M. (2021). Value creation through the evolution of business model themes. *Journal of Business Research*, *122*, 353-361. https://doi.org/10.1016/j.jbusres.2020.09.007

Davenport, T. H. (2018). *The AI advantage: How to put the artificial intelligence revolution to work*. MIT Press Direct. https://doi.org/10.7551/mitpress/11781.001.0001

Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review*, *96*(1), 108-116.

Gawer, A., & Cusumano, M. A. (2014). Industry platforms and ecosystem innovation. *Journal of Product Innovation Management*, *31*(3), 417-433. https://doi.org/10.1111/jpim.12105

Grewal, D., Roggeveen, A. L., & Nordfält, J. (2017). The future of retailing. *Journal of Retailing*, *93*(1), 1-6. https://doi.org/10.1016/j.jretai.2016.12.008

Hirschberg, J., & Manning, C. D. (2015). Advances in natural language processing. *Science*, *349*(6245), 261-266. https://doi.org/10.1126/science.aaa8685 PMid:26185244

Huang, M. H., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research*, *21*(2), 155-172. https://doi.org/10.1177/1094670517752459

Ibarra, D., Ganzarain, J., & Igartua, J. I. (2018). Business model innovation through Industry 4.0: A review. *Procedia Manufacturing*, *22*, 4-10. https://doi.org/10.1016/j.promfg.2018.03.002

Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., ... & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology*, *2*(4), 230-243. https://doi.org/10.1136/svn-2017-000101 PMid:29507784 PMCid:PMC5829945

Johnson, M. W. (2010). *Seizing the white space: Business model innovation for growth and renewal*. Harvard Business Press.

Jordan, M. I., & Mitchell, T. M. (2015). Machine learning: Trends, perspectives, and prospects. *Science*, *349*(6245), 255-260. https://doi.org/10.1126/science.aaa8415 PMid:26185243

Keiningham, T., Aksoy, L., Bruce, H. L., Cadet, F., Clennell, N., Hodgkinson, I. R., & Kearney, T. (2020). Customer experience driven business model innovation. *Journal of Business Research*, *116*, 431-440. https://doi.org/10.1016/j.jbusres.2019.08.003

Lee, J., Bagheri, B., & Kao, H. A. (2015). A cyber-physical systems architecture for industry 4.0-based manufacturing systems. *Manufacturing Letters*, *3*, 18-23. https://doi.org/10.1016/j.mfglet.2014.12.001

McKinsey, 2024. https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier

Ransbotham, S., Kiron, D., Gerbert, P., & Reeves, M. (2017). Reshaping business with artificial intelligence. *MIT Sloan Management Review*, *59*(1).

Santa-Maria, T., Vermeulen, W. J., & Baumgartner, R. J. (2022). How do incumbent firms innovate their business models for the circular economy? Identifying micro-foundations of dynamic capabilities. *Business Strategy and the Environment*, *31*(4), 1308-1333. https://doi.org/10.1002/bse.2956

Szeliski, R. (2010). *Computer vision: algorithms and applications*. Springer Science & Business Media. https://doi.org/10.1007/978-1-84882-935-0

Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, *43*(2-3), 172-194. https://doi.org/10.1016/j.lrp.2009.07.003

Wamba-Taguimdje, S. L., Wamba, S. F., Kamdjoug, J. R. K., & Wanko, C. E. T. (2020). Influence of Artificial Intelligence (AI) on firm performance: The business value of AI-based transformation projects. *Business Process Management Journal*, *26*(7), 1893-1924. https://doi.org/10.1108/BPMJ-10-2019-0411

Wedel, M., & Kannan, P. K. (2016). Marketing analytics for data-rich environments. *Journal of Marketing*, *80*(6), 97-121. https://doi.org/10.1509/jm.15.0413

Wieland, H., Hartmann, N. N., & Vargo, S. L. (2017). Business models as service strategy. *Journal of the Academy of Marketing Science*, *45*, 925-943. https://doi.org/10.1007/s11747-017-0531-z