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The Impact of AI Based Decision Making, Market Intelligence, and Chatbot Integration on Business Performance in Indonesian Start-ups

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Abstract

With the fast-growing digital era, artificial intelligence (AI) has emerged as a principal catalyst for enhancing corporate performance, particularly for Indonesian start-ups. This study examines the effects of AI-driven decision-making, market intelligence, and chatbot implementation on Indonesian start-up business performance. Quantitative methods were employed to gather data from 250 participants, including founders, managers, and decision-makers of different start-up organizations. Structural Equation Modeling - Partial Least Squares (SEM-PLS) was employed to quantify the extent of association of independent variables with firm performance. The results demonstrate that all three AI dimensions have a significant positive effect on business performance, with market intelligence exerting the strongest influence on competitiveness and customer alignment. Artificial intelligence supports enhanced accuracy and efficiency in decision-making, market intelligence allows organizations to comprehend consumer expectations and trends, and chatbots support increased efficiency in client communication and interaction. These results have significant implications for start-ups and governments to strategically employ AI technologies to boost competitiveness and economic growth in Indonesia.

Keywords

AI-Based Decision-Making, Market Intelligence, Chatbot Integration, Business Performance, Indonesian Start-ups

INTRODUCTION

Artificial intelligence (AI) transforms Indonesian start-ups by improving decision-making, customer experience, and business efficiency. Its use provides a competitive edge through resource optimization, innovation, and strategic decision-making, which are critical in Indonesia's emerging start-up ecosystem. Research by (Arumugam & Manida, 2024), companies like Google and IBM Watson leverage AI for predictive analytics and scenario planning, enhancing operational efficiency. AI methodologies such as the AI Adaptive Three-Horizons Framework and AI Optimized Lean Startup Methodology also maximize decision-making and user-centric design. According to (Grabocka & Ndoka, 2025) the information and communication technology (ICT) sector, AI-driven innovation personalizes customers' experiences and minimizes adoption risks and AI into business efficiency (Kreines & Kreines, 2019). Additionally, AI technologies streamline manufacturing processes and revolutionize marketing initiatives, as evidenced by Jiangling Motors' strategic application of AI to remain competitive in the automobile industry (Zhu, 2025). Investment in technological infrastructure and enhancing data management systems is essential for small and medium-sized enterprises to leverage AI technologies to their optimum level (Pooe & Munyanyi, 2025).

AI significantly enhances decision-making in most industries, particularly for start-ups, by utilizing data-driven algorithms that

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provide timely information to maximize the efficiency of operations and reduce uncertainties. The applications scan large datasets to predict market trends and optimize resource allocation, which is critical for strategic decisions in dynamic environments. Predictive AI analytics enables companies to predict customer behavior and market shifts, making them competitive (Al-Surmi et al., 2022; Oraif, 2024). Artificial intelligence utilizes machine learning to process data, allowing companies to access risks and plan effectively (Cannas, 2023).

Artificial intelligence simplifies resource planning by streamlining operations by eliminating inefficiencies and enhancing asset availability, particularly for small start-ups with few resources (Dwivedi et al., 2021). Artificial intelligence has emerged as a stunning phenomenon in recent years. The view (Chen et al., 2019) says that AI analyzes trends, which has implications for an organization's certainty of being competitive in a dynamic world. AI is not immediately practiced across the board, one of the most common being the use of chatbots (Mydyti & Kadriu, 2021), which automate customer contact, offer immediate support, and improve user experience, thus creating trust. Chatbots are a way to save implications in an effort to improve customer service and relationships (Mydyti & Kadriu, 2021).

The research aims to examine the relationship of AI-based decision-making, market intelligence, and chatbot implementation to startup success in Indonesia, which remains a gap. AI is now associated with supporting facilitators of change amidst dynamic competition. Although several studies have been conducted in various countries, few studies still discuss their direct contribution to the performance of startups in Indonesia. With the rapid digitalization of businesses, startups must adapt to AI technologies to maintain a competitive advantage. Not adopting AI risks reducing business opportunities and customer satisfaction, so an in-depth analysis of the real impact of AI on business strategy is needed.

Although startups widely adopt AI, there is no empirical evidence measuring its impact on business performance. This study evaluates the impact of AI in three main aspects in its research objectives: (1) the effect of AI-based decision-making on operational and strategic performance, (2) the effect of AI market intelligence on competitiveness and customer loyalty, and (3) the effect of chatbot implementation on customer engagement and business performance.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Artificial Intelligence in Start-Ups

Artificial Intelligence (AI) primarily transforms business operations, especially for new companies seeking efficiency and competitiveness. AI programs, such as predictive analytics and decision algorithms, improve the quality of strategic decisions by efficiently processing large data sets (Molina et al., 2023). On the other hand, AI technology helps companies simplify daily business operations. AI can help companies identify markets. Some studies mention that the utilization of AI still has problems. Therefore, businesses must implement ethical protocols and reskill staff to address these challenges effectively (Sungkar et al., 2024).

AI-Based Decision-Making

Artificial intelligence (AI) facilitates business decision-making with machine learning and predictive analytics to identify patterns, predict trends, and optimize resources. Artificial intelligence technologies like natural language processing facilitate data analysis, process optimization, and market insight (Wang & Wang, 2021). Predictive analytics enables businesses to forecast customer behavior and market trends, enhancing competitiveness (Xiang et al., 2021). Startups leverage AI to enhance resource efficiency and address uncertainty in the market, driving innovation and uncertainty avoidance (Wirajovi Aulia et al., 2023). Still, issues such as data privacy, bias in algorithms, and the demand for expertise continue to be issues, necessitating businesses to uphold ethical and responsible application of AI (Artene et al., 2024).

Market Intelligence

Market intelligence powered by AI is essential for startups to ride through the competitive market and fulfill customer requirements by applying advanced data analytics to extract strategic insights, recognize new opportunities, and appropriately tailor products or services. Structured data collection and analysis enable businesses to grasp consumer behavior and tastes, which is crucial in product creation (Chochliouros et al., 2017; Mazur & Chukhray, 2023). Besides, market data create a reference point for organizations to evaluate performance

through the comparison with competitors' performances and refine approaches towards sustainable expansion (Şimşek et al., 2022).

Artificial intelligence enables real-time insights and, therefore, timely revision of marketing efforts and products accordingly (Chochliouros et al., 2017). While AI predictive analytics improve customer action and market trends forecasting capacity, decision-making becomes better informed (Rane, 2023). Besides, technologies like machine learning enable data processing, and startups can obtain insights quickly (Song & Thieme, 2009).

Role of Chatbots

Chatbots have proven to be an innovation driver for startups in enhancing customer experience and satisfaction by leveraging artificial intelligence (AI) and machine learning (ML) for real-time support, automated tasks, and personalized interaction. They lower costs of operation through the reduction of human manpower requirements (Samala et al., 2022) and facilitate faster response time and improved service (Samala et al., 2022). With natural language processing (NLP), chatbots read and quickly respond to customer inquiries (Jang et al., 2021), with sentiment analysis helping respond accordingly based on user emotions (Vergaray et al., 2023). Incorporating chatbots also improves customer satisfaction, loyalty, and conversions in online shopping by applying proactive engagement strategies to boost sales and customer retention (Eustaquio-Jiménez et al., 2024).

Theoretical Framework

This research was based on the Resource-Based View (RBV) hypothesis that describes competitive advantage to be achieved by exploiting resources like future technologies like artificial intelligence (Barney, 1991). AI-based decision-making, market analysis using AI, and chatbots have been recognized as strategic assets that enhance efficiency, responsiveness, and customer delight and thereby impact business performance.

These three elements have been integrated into this research design to study their influence on start-up performance in Indonesia.

H1: The application of AI to aid decision-making is positively and significantly correlated with the business performance of start-ups in Indonesia.

H2: A positive and significant correlation exists between market intelligence and Indonesian start-up company performance.

H3: Chatbot usage has a positive and significant effect on the performance of Indonesian start-ups.

METHODS

Research Design and Sampling

This research applied a quantitative method to examine the correlation of variables (Sekaran & Bougie, 2016). The primary data were gathered through a standard questionnaire, and structural correlations among variables were examined through SEM-PLS. The method allows both direct and indirect effects to be tested, thus providing robust evidence of how AI technology improves business performance.

The study sample consists of various start-ups in Indonesia in the technology, e-commerce, and services sectors. The 250 participants were chosen with a purposive sampling technique due to their exposure to AI technologies within their organizations. Purposive sampling was employed to ensure that participants held strategic roles with direct experience in AI adoption, thus enhancing data relevance. The sample comprises founders, managers, and key decision-makers directly engaged in business operations and technology adoption.

Data were collected through a closed online questionnaire distributed to Indonesian start-ups. The questionnaire used a 1-5 Likert scale to measure the respondents' views on AI-driven decision-making, market insight, chatbot adoption, and business performance. The questionnaire was pilot-tested with 30 respondents before it was widely distributed to test for clarity and reliability.

This study makes AI-driven decision-making, market intelligence, and integration with chatbots as independent variables and business performance as the dependent variable. AI improves operation efficiency and strategy, market intelligence provides competitive information, and chatbots improve customer interactions. Business performance is measured based on operation efficiency, market competitiveness, customer satisfaction, and growth in revenue.

Table 1. Operational Definition of Variables

Variable	Indicator	Question	Source
AI-Based Decision-Making	1. Real-time data analysis capability 2. Accuracy of AI-based decisions 3. Efficiency in decision-making	1. How often does your company use AI for real-time data analysis? 2. Do AI-based decisions improve decision accuracy? 3. How much efficiency is achieved in decision-making processes using AI?	(Chowdhury et al., 2023; Wirajovi Aulia et al., 2023; Xiang et al., 2021)
Market Intelligence	1. Market data collection 2. Consumer trend analysis 3. Understanding competitors	1. How often does your company collect data about the market? 2. Does consumer trend analysis help your business strategy? 3. How well does your company understand competitors' strategies?	(Lichtenthaler, 2020; Mazur & Chukhray, 2023; Şimşek et al., 2022)
Chatbot Integration	1. Chatbot responsiveness 2. Personalization of customer experience 3. Communication efficiency with customers	1. Is your company's chatbot responsive to customer needs? 2. How well does the chatbot personalize the customer experience? 3. Does the chatbot help improve communication efficiency with customers?	(Abdallah et al., 2022; Azzahra, 2024; Ricky Sanjaya et al., 2023)
Business Performance	1. Revenue growth 2. Customer satisfaction improvement 3. Operational efficiency	1. How much has your company's revenue increased in the past year? 2. Has customer satisfaction improved since adopting the technology? 3. Has your company's operational efficiency improved after implementing AI and chatbots?	(Alayón et al., 2022; NG'ORA et al., 2022)

Source: Literature mapping (2025)

Data Analysis

The analyses were run with Structural Equation Modeling - Partial Least Squares (SEM-PLS) in SmartPLS 3, chosen for its suitability to handle complex models with latent constructs and relatively small sample sizes (Hair et al., 2019). The analysis involved three steps: assessing the measurement model for reliability and validity, including convergent and discriminant validity; assessing the structural model to examine relationships between variables and to determine the significance of path coefficients; and hypothesis testing based on t-statistics and p-values with a significance level of 0.05.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics offer an overview of the sample demographics and responses for all the study variables, which are based on data collected from 250 respondents from various Indonesian start-ups. The sample includes founders (35%), managers (45%), and other decision-makers (20%), with industries represented being technology (40%), e-commerce (30%), services (20%), and others (10%). As for business age, 55% of the start-ups are in business for 1–3 years, 35% for 4–5 years, and 10% for more than 5 years. Descriptive statistics of study variables, which were assessed with a Likert scale of 1 (strongly disagree) to 5 (strongly agree), are presented in Table 2.

Table 2. Descriptive Statistics of Study Variables

Variable	Mean	Standard Deviation	Min	Max
AI-Based Decision-Making	4.12	0.62	2.80	5.00
Market Intelligence	4.08	0.68	2.60	5.00
Chatbot Integration	4.15	0.65	3.00	5.00
Business Performance	4.10	0.70	3.20	5.00

Source: Primary Data (2025)

The mean score interpretation reveals AI-based decision-making to possess a high mean of 4.12, demonstrating its prevalence and positive attitude among the respondents. Market intelligence tools are similarly well employed, with a mean of 4.08, indicating high consensus on their ability in start-ups. Chatbot integration possesses the highest mean of 4.15, indicating its perceived benefits of enhancing customer interactions. Business performance, with a mean of 4.10, implies that the respondents perceive the performance of their start-ups to be good, related to AI adoption. The values of the standard deviations imply moderate variation in response, indicating variations in levels of adoption and experiences among the respondents.

Measurement Model Evaluation

The measurement model was also used to test the reliability and validity of the constructs, i.e., factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE), and are shown in Table 3. Factor loadings should be higher than 0.70 to confirm indicator reliability, whereas Cronbach's alpha and CR should be higher than or equal to 0.70 to confirm internal and construct reliability, respectively. Also, AVE should be ≥ 0.50 in order to determine convergent validity, i.e., the constructs should adequately explain the variance in their indicators (Hair et al., 2019).

Table 3. Measurement Model

Construct	Indicator	Loading Factor	CA	CR	AVE
AI-Based Decision-Making	AI1	0.824	0.888	0.912	0.671
	AI2	0.856			
	AI3	0.782			
Market Intelligence	MI1	0.817	0.878	0.902	0.657
	MI2	0.801			
	MI3	0.823			
Chatbot Integration	CB1	0.836	0.892	0.928	0.682
	CB2	0.841			
	CB3	0.815			
Business Performance	BP1	0.857	0.912	0.933	0.716
	BP2	0.861			
	BP3	0.825			

Source: Primary Data (2025)

Table 3 tests the validity and reliability of the AI-Based Decision-Making, Market Intelligence, Chatbot Integration, and Business Performance measurement model based on indicator loadings, Cronbach's Alpha (CA), Composite Reliability (CR), and Average Variance Extracted (AVE). All loading factors (0.782–0.861) above the 0.70 threshold (Hair et al., 2019), thus affirming strong indicator contributions.

The reliability is high, with CA measures above 0.85 and CR above 0.90. Convergent validity is reflected in AVE values (0.657–0.716), meaning the indicators account for over 50% of the variance. AI-Based Decision-Making (AVE = 0.671, CR = 0.912) facilitates decision-making; Market Intelligence (AVE = 0.657, CR = 0.902) facilitates market trend analysis; Chatbot Integration (AVE = 0.682, CR = 0.928) facilitates customer engagement; and Business Performance (AVE = 0.716, CR = 0.933) reflects the most impact. Discriminant validity, which is calculated by Fornell-Larcker and the Heterotrait-Monotrait Ratio (HTMT) (Henseler et al., 2015), establishes construct distinctiveness by ensuring that the square root of the Average Variance Extracted (AVE) is greater than construct correlations and HTMT < 0.90 for similar constructs and < 0.85 for different constructs.

Table 4. Discriminant Validity

Fornell-Larcker Criterion				
	AI	MI	CI	BP
AI-Based Decision-Making	0.821			
Market Intelligence	0.656	0.812		
Chatbot Integration	0.622	0.661	0.831	
Business Performance	0.684	0.718	0.697	0.841
Heterotrait-Monotrait Ratio				
	AI	MI	CI	BP
AI-Based Decision-Making				
Market Intelligence	0.761			
Chatbot Integration	0.783	0.681		
Business Performance	0.615	0.817	0.601	

Source: Primary Data (2025)

The discriminant validity results for Table 4 show that the Fornell-Larcker criterion value is greater than the construct-to-construct correlation, thus establishing discriminant validity. In addition, HTMT values at all times are less than 0.90, confirming the uniqueness of each of the constructs since it is in line with the discriminant validity standard

Model Fit Evaluation

Model fit was established using a battery of indices from Structural Equation Modeling - Partial Least Squares (SEM-PLS) to check whether the model and data are compatible and whether the model is valid and reliable. SRMR of 0.06 confirms a good model fit since it is less than 0.08, and an NFI value of 0.92 exceeds the threshold for an acceptable fit of ≥ 0.90. Further, the chi-square (χ^2) to degrees of freedom (df) ratio stands at 2.32, proving there is a good fit since it is lower than the cutoff point of 3.00.

The structural model was confirmed using the Coefficient of Determination (R^2) and Predictive Relevance (Q^2) to quantify its explanatory power and prediction accuracy. The R^2 value of 0.68 indicates that 68% of the variance in business performance is accounted for by AI-driven decision-making, market insight, and chatbot integration, which indicates a comparatively high explanatory power. In addition, a Q^2 of 0.45 confirms that the model enjoys high predictive relevance and is apt to explain and forecast business performance.

Structural Model Results

Table 5. Structural Model Results

	Path	Original Sample	t-Value	p-Value
H1	AI-Based Decision-Making → Business Performance	0.323	4.127	0.000
H2	Market Intelligence → Business Performance	0.407	5.353	0.000
H3	Chatbot Integration → Business Performance	0.289	3.761	0.000

Source: Primary Data (2025)

The structural model checked the path coefficients, t-values, and p-values from SEM-PLS analysis. Hypotheses are significant if t-value ≥ 1.96 (95% confidence level) and p-value ≤ 0.05.

The structural model's results confirm the significant impacts of AI-Based Decision-Making, Market Intelligence, and Chatbot Integration on Business Performance. AI-Based Decision-Making's path coefficient (OS = 0.323) indicates a moderately positive impact warranted by a t-value of 4.127 and a p-value of 0.000, qualifying as statistically significant. Market Intelligence has the strongest effect (OS = 0.407), with t-value = 5.353 and p-value = 0.000, creating a strong positive relationship. Chatbot Integration also has a moderate positive effect (OS = 0.289), with t-value = 3.761 and p-value = 0.000, showing statistical significance. All three hypotheses (H1, H2, and H3) are true, but Market Intelligence has the greatest extent of influence on Business Performance.

Discussion

The findings of this study are useful in understanding the impact of AI-Based Decision-Making, Market Intelligence, and Chatbot Integration on Business Performance in Indonesian start-ups. The findings underscore the central role of innovative technologies and market-focused strategies in shaping modern businesses' operational and strategic performance. Indonesia's unique economic and technological context presents a fertile ground for adopting AI-based solutions and digital tools. Start-ups operating in Indonesia face the issues of high competition, less resource availability, and high customer preference volatility. This research proves that the implementation of AI and customer-centric strategies can be a catalyst to facilitate the mitigation of the issues mentioned above for sustainable business performance and growth that is more competitive.

This research provides new evidence for computer-based AI decision-making to improve and boost business performance. These findings reinforce previous research (Rozi et al., 2023; Wang & Wang, 2021) and are in line with this study that found AI's capacity to sift through large amounts of data, eliminate decision-making biases, and optimize resource allocation; this will have a high impact with the use of big data. In Indonesia, nascent AI applications enabling rapid action in response to market trends and customer demand, improving efficiency and competitiveness, are still very limited. In addition, market intelligence significantly contributes to the company's direction. This research provides new evidence that market trends, customer demand, and competitive actions are key contributors to business excellence, which is in line with [1]. Start-up companies must have access to market intelligence in order to increase revenue.

Chatbot Integration significantly contributes to Business Performance. This is due to the widespread application of chatbots to enhance customer engagement, accelerate communications, and reduce business costs. Indonesian start-ups benefit from chatbot technologies by providing 24/7 customer support, individualized user experiences, and increased sales conversion. The findings are in agreement with research (Azzahra, 2024; Eustaquio-Jiménez et al., 2024; Meduri, 2024), which highlights the revolutionary nature of chatbots in modern business processes.

These findings gain particular significance within Indonesia's fragmented digital infrastructure and the limited AI adoption among SMEs.

Theory and Practice Implications

The study contributes to the existing literature by establishing the role of AI technologies and market intelligence in improving business performance and providing empirical proof for implementing digital tools and approaches in resource-constrained environments such as start-ups.

Theoretical Implications

This study enriches the existing literature by demonstrating how AI technologies and market intelligence function as valuable, rare, and inimitable resources that enhance business performance, particularly in resource-constrained environments like start-ups, thereby offering empirical support aligned with the Resource-Based View (RBV) for the strategic implementation of digital tools.

Practical Implications

To start-ups and entrepreneurs, the research focuses on investing in AI technologies and market intelligence software as a necessary factor to stay ahead in the game, yet appeals to start-ups to adopt chatbot technologies to improve customer interaction and quality of service at no or minimal costs.

CONCLUSION

This research highlights the strategic significance of AI-Based Decision-Making, Market Intelligence, and Chatbot Integration in enhancing business performance among Indonesian start-ups. AI-Based Decision-Making enables start-ups to allocate resources more effectively by facilitating informed, data-driven decisions and minimizing cognitive bias. Market Intelligence emerges as the most influential driver, reinforcing its critical role in strategic planning, understanding customer behavior, and monitoring competitors. Meanwhile, Chatbot Integration supports performance by enhancing customer engagement, streamlining communication, and elevating the overall user experience, each aligning with resource-based advantages essential for start-up success.

This study adds to the literature theoretically as it provides empirical evidence on using digital tools and strategies to guarantee start-up success. It offers valuable insights for start-up managers and entrepreneurs to invest more in AI systems, market intelligence tools, and chatbot technologies to remain competitive in Indonesia's dynamic business climate. Future research should investigate the interaction of the factors with organizational culture, leadership, and long-term sustainability to better understand their influence on business success.

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