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Artificial Intelligence Adoption, Competitive Pressure, and Their Influence on Business Sustainability: Empirical Evidence from Firms in Emerging Markets

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> Abstract: The increasing adoption of Artificial Intelligence (AI) and intensifying competitive pressure have reshaped business environments, particularly in emerging markets characterized by uncertainty and resource constraints. However, empirical evidence on the combined effects of AI adoption and competitive pressure on business sustainability remains limited. This study examines the impact of Artificial Intelligence Adoption and Competitive Pressure on Business Sustainability among firms operating in Kuala Lumpur, Malaysia. A quantitative approach was employed using survey data collected from 137 firms, which were analyzed using multiple linear regression. The results indicate that Artificial Intelligence Adoption has a positive and significant effect on Business Sustainability (β = 0.451, p < 0.001). Competitive Pressure also demonstrates a positive and significant influence on Business Sustainability (β = 0.331, p < 0.001). The regression model explains 53.6% of the variance in Business Sustainability, indicating strong explanatory power. These findings suggest that firms adopting AI technologies and effectively responding to competitive pressure are better positioned to achieve sustainable business outcomes. This study provides empirical evidence from an emerging market context and offers valuable insights for managers and policymakers in the digital transformation era.

> **Keywords:** Artificial Intelligence Adoption, Competitive Pressure, Business Sustainability, Emerging Markets, Digital Transformation.

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Introduction

The rapid advancement of digital technologies has fundamentally transformed the way businesses operate and compete in contemporary markets. Among these technologies, Artificial Intelligence has emerged as one of the most influential drivers of organizational transformation, enabling firms to automate processes, enhance decision-making accuracy, and generate new sources of value (Usman et al., 2024). As businesses increasingly face volatile market conditions, intensifying competition, and heightened stakeholder expectations, the ability to leverage AI has become critical not only for improving performance but also for ensuring long-term business sustainability (Alkan, 2020; Mondal et al., 2024). In this context, sustainability extends beyond short-term financial outcomes to encompass economic resilience, social responsibility, and environmental stewardship.

The growing adoption of AI is closely intertwined with the competitive dynamics faced by firms, particularly in emerging markets where resource constraints and institutional pressures coexist with rapid technological change. Competitive pressure compels businesses to continuously adapt their strategies, innovate their offerings, and optimize their operations in order to survive and grow (Abhulimen & Ejike, 2024). While prior studies have examined AI adoption as a determinant of efficiency and competitive advantage, relatively limited attention has been given to its role in fostering business sustainability, especially when considered alongside external pressures such as competition. This gap in the literature is notable given that firms in emerging markets often operate under heightened uncertainty, making sustainability a strategic imperative rather than a normative aspiration (Awonuga et al., 2024).

Emerging economies in Southeast Asia, including Malaysia, present a particularly relevant context for investigating these relationships. Kuala Lumpur, as a regional economic and technological hub, hosts a diverse range of businesses that are increasingly exposed to digital transformation initiatives and competitive forces at both regional and global levels. Firms operating in this environment are required to balance technological investments with sustainability-oriented strategies while responding to intense market competition. Despite this relevance, empirical evidence on how AI adoption and competitive pressure jointly influence business sustainability in this context remains scarce (Zameer et al., 2020). Existing research has predominantly focused on developed economies or has examined sustainability outcomes without explicitly integrating the role of advanced digital technologies such as AI.

The urgency of this research is further underscored by the growing emphasis on sustainable development goals and responsible business practices among policymakers, investors, and consumers. Businesses are no longer evaluated solely based on their financial performance, but also on their ability to contribute to social well-being and environmental protection. For firms in emerging markets, the challenge lies in aligning sustainability objectives with competitiveness in an increasingly digitalized economy (Halid et al., 2022; Wang, 2024). Understanding whether and how AI adoption can support sustainability efforts under competitive pressure is therefore crucial for both theory and practice.

From a theoretical perspective, this study is grounded in the Resource-Based View and Dynamic Capability Theory, which emphasize the importance of firm-specific resources and adaptive capabilities in achieving sustainable competitive advantage. AI can be conceptualized as a strategic resource that enables firms to sense environmental changes, seize emerging opportunities, and reconfigure organizational processes (Vesco & Damke, 2024; Arokodare & Asikhia, 2020). At the same time, competitive pressure represents an external force that shapes strategic behavior and compels firms to develop and deploy such capabilities. By examining these factors together, this study seeks to provide a more integrated understanding of how internal technological capabilities and external competitive forces interact to influence business sustainability.

The primary objective of this research is to empirically examine the influence of Artificial Intelligence Adoption and Competitive Pressure on Business Sustainability among businesses operating in Kuala Lumpur, Malaysia. Specifically, this study aims to assess whether higher levels of AI adoption contribute to improved sustainability outcomes and whether competitive pressure serves as a significant driver of sustainability-oriented strategies. By employing a quantitative approach and analyzing data collected from 137 businesses, this research provides empirical evidence to support or challenge existing theoretical assumptions regarding the role of digital technologies and competitive dynamics in shaping sustainable business outcomes.

This study offers several advantages over prior research. First, it explicitly integrates AI adoption and competitive pressure within a single empirical framework, allowing for a more nuanced understanding of their combined effects on business sustainability. Second, by focusing on businesses in an emerging market context, this research addresses a significant gap in the literature that has been largely dominated by studies conducted in developed economies. Third, the study adopts a multidimensional view of business sustainability, capturing economic, social, and environmental aspects, thereby providing a more holistic assessment of sustainability outcomes.

The contributions of this research are threefold. Theoretically, it extends the application of Resource-Based View and Dynamic Capability Theory by empirically demonstrating the role of AI as a strategic capability that supports sustainability in a competitive environment. Empirically, it provides evidence from Kuala Lumpur, enriching the limited body of knowledge on AI adoption and sustainability in Southeast Asian emerging markets. Practically, the findings offer actionable insights for business leaders and policymakers by highlighting the importance of strategic AI adoption and proactive responses to competitive pressure in achieving long-term business sustainability.

In sum, this study responds to the growing need for empirical research that bridges digital transformation and sustainability in emerging markets. By examining the influence of Artificial Intelligence Adoption and Competitive Pressure on Business Sustainability, the research contributes to a deeper understanding of how businesses can navigate the challenges of digital competition while pursuing sustainable growth. The findings are expected to inform future research, guide managerial decision-making, and support policy initiatives aimed at fostering sustainable and competitive business ecosystems in the era of artificial intelligence.

Concept and Hypothesis

Artificial Intelligence has increasingly been recognized as a transformative technology that reshapes organizational processes, strategic decision-making, and competitive positioning. In the context of business management, AI adoption refers to the extent to which firms integrate AI-based applications, systems, and tools into their operational and strategic activities (Cruz & Valdivieso 2023). Prior studies suggest that AI enables organizations to process large volumes of data, automate routine tasks, and generate predictive insights that support more informed managerial decisions. As a result, AI adoption is often associated with improved efficiency, cost reduction, and enhanced organizational performance. However, beyond immediate performance outcomes, the strategic value of AI lies in its potential to support long-term business sustainability by enabling firms to adapt to environmental changes and align their operations with broader economic, social, and environmental objectives.

From the perspective of the Resource-Based View, AI can be conceptualized as a valuable and strategically important resource that contributes to sustainable competitive advantage when it is effectively deployed and embedded within organizational routines. AI systems are not easily imitable, particularly when they are supported by firm-specific data, employee expertise, and complementary organizational processes. This uniqueness allows firms to leverage AI in ways

that enhance their resilience and long-term viability. Dynamic Capability Theory further emphasizes the role of AI in enabling firms to sense market changes, seize emerging opportunities, and reconfigure resources in response to environmental uncertainty. Through these mechanisms, AI adoption is expected to play a critical role in fostering business sustainability, especially in dynamic and competitive markets (Torğul & Paksoy, 2023; Kim et al., 2021).

Empirical research has increasingly explored the relationship between AI adoption and organizational outcomes. Several studies have demonstrated that AI positively influences firm performance, innovation capability, and operational effectiveness. More recent research has begun to link AI adoption with sustainability-related outcomes, suggesting that AI can support environmentally responsible practices, optimize resource utilization, and enhance transparency and accountability in business operations (Liu, 2023; Jyoti & Khanna, 2021). For instance, AI-driven analytics can help firms reduce energy consumption, minimize waste, and improve supply chain sustainability. Despite these emerging insights, empirical evidence on the direct impact of AI adoption on business sustainability remains limited, particularly in the context of emerging markets where technological adoption patterns and institutional environments differ significantly from those in developed economies.

Based on these theoretical arguments and empirical findings, it is reasonable to expect that firms with higher levels of AI adoption are better positioned to achieve sustainable business outcomes. By enhancing operational efficiency, supporting strategic decision-making, and enabling more responsible resource management, AI adoption is likely to contribute positively to the economic, social, and environmental dimensions of business sustainability (Liu, 2023; Diez-Cañamero et al., 2020). Accordingly, the following hypothesis is proposed: Artificial Intelligence Adoption has a positive influence on Business Sustainability.

Competitive Pressure represents the intensity of competition faced by firms within their industry and market environment. It arises from factors such as the number of competitors, technological change, shifting customer preferences, and the threat of new entrants. In highly competitive environments, firms are compelled to continuously improve their offerings, reduce costs, and differentiate themselves in order to survive. While competitive pressure is often perceived as a challenge that strains organizational resources, it can also serve as a catalyst for innovation, learning, and strategic renewal.

Theoretical perspectives such as Contingency Theory and Institutional Theory suggest that external pressures play a significant role in shaping organizational behavior and strategic choices. Competitive pressure forces firms to align their strategies with market demands and stakeholder expectations, including those related to sustainability. In order to maintain legitimacy and competitiveness, firms may adopt more sustainable practices, invest in innovation, and pursue long-term value creation rather than short-term gains. In this sense, competitive pressure can act as an external driver that encourages firms to integrate sustainability into their core business strategies.

Empirical studies have produced mixed findings regarding the relationship between competitive pressure and sustainability outcomes. Some research indicates that intense competition may lead firms to prioritize short-term financial performance at the expense of sustainability initiatives. Other studies, however, suggest that competition motivates firms to innovate and adopt sustainable practices as a means of differentiation and long-term survival. In emerging markets, where competition is often intensified by globalization and digitalization, the latter perspective appears increasingly relevant. Firms facing strong competitive pressure may be more inclined to adopt sustainability-oriented strategies to enhance their reputation, efficiency, and resilience.

In the context of this study, competitive pressure is expected to have a positive influence

on business sustainability. Firms operating in competitive markets are likely to recognize sustainability as a strategic necessity that supports long-term competitiveness and stakeholder trust. By adopting sustainable practices, businesses can respond more effectively to market demands, regulatory expectations, and societal concerns, thereby strengthening their long-term viability. Based on this reasoning, the following hypothesis is proposed: Competitive Pressure has a positive influence on Business Sustainability.

Taken together, the literature suggests that both internal technological capabilities and external competitive forces play crucial roles in shaping business sustainability. While AI adoption equips firms with the tools and capabilities needed to enhance efficiency and adaptability, competitive pressure provides the impetus for strategic change and sustainability-oriented behavior. By examining these relationships empirically, this study seeks to contribute to a more integrated understanding of how firms in emerging markets can leverage digital technologies and respond to competitive dynamics to achieve sustainable business outcomes.

Method

This study adopts a quantitative research approach to empirically examine the influence of Artificial Intelligence Adoption and Competitive Pressure on Business Sustainability. A cross-sectional survey design was employed, as it allows for the systematic collection and analysis of data from a relatively large number of respondents within a specific time frame. The quantitative approach is appropriate for this study because it enables the testing of hypothesized relationships and the generalization of findings within the defined research context.

The target population of this study consists of businesses operating in Kuala Lumpur, Malaysia. Kuala Lumpur was selected as the research setting due to its role as a major economic and business hub in Southeast Asia, characterized by a high concentration of firms that are increasingly exposed to digital transformation and competitive pressures. The unit of analysis is the business entity, and the respondents were owners, managers, or senior executives who possess sufficient knowledge of their firms' technological adoption and sustainability practices. Data were collected from 137 businesses, which is considered adequate for regression-based analysis and consistent with sample sizes commonly used in empirical studies in management and sustainability research.

Data collection was conducted using a structured questionnaire distributed to the selected respondents. The questionnaire was designed to capture respondents' perceptions of AI adoption, competitive pressure, and business sustainability within their organizations. To ensure clarity and content validity, the instrument was developed based on established scales from prior studies and adapted to the context of this research. A pilot test was conducted with a small group of business managers to refine the wording of the items and ensure that the questions were easily understood. The final questionnaire employed a five-point Likert scale ranging from strongly disagree to strongly agree.

Artificial Intelligence Adoption was measured using multiple items that assess the extent to which firms integrate AI-based systems into their operational and managerial processes. These items capture the use of AI for decision support, operational efficiency, and strategic investment. Competitive Pressure was measured through items that reflect the intensity of competition faced by firms, including technological change, customer demands, and competitive actions of rivals. Business Sustainability was operationalized as a multidimensional construct encompassing economic, social, and environmental aspects of long-term business viability. The use of multiple indicators for each construct enhances the reliability and validity of the measurement.

Prior to hypothesis testing, the data were screened to ensure accuracy, completeness, and suitability for analysis. Reliability analysis was conducted to assess the internal consistency of the

measurement scales, with Cronbach's Alpha values exceeding the recommended threshold, indicating acceptable reliability. Validity was evaluated through item-total correlations, confirming that all measurement items were valid indicators of their respective constructs. Descriptive statistics were used to summarize the characteristics of the sample and the

To test the proposed hypotheses, multiple linear regression analysis was employed. This analytical technique is appropriate for examining the influence of multiple independent variables on a single dependent variable and is widely used in quantitative management research. Business Sustainability was treated as the dependent variable, while Artificial Intelligence Adoption and Competitive Pressure were included as independent variables. The regression analysis enabled the estimation of the magnitude and significance of the relationships between the variables, providing empirical evidence to support or reject the proposed hypotheses.

In addition, standard diagnostic tests were conducted to ensure that the assumptions underlying regression analysis were met. These included assessments of normality, multicollinearity, and heteroscedasticity. The results of these tests indicated that the data met the required assumptions, thereby supporting the robustness of the regression findings. Statistical significance was evaluated at conventional levels, and the results were interpreted in relation to the theoretical framework and research objectives of the study.

Overall, the research methodology adopted in this study provides a rigorous and systematic approach to examining the relationship between AI adoption, competitive pressure, and business sustainability. By employing a quantitative survey design and appropriate statistical analysis, the study ensures the reliability and validity of its findings and offers a solid empirical foundation for the discussion and conclusions presented in subsequent sections.

Result and Discussion

distribution of the study variables.

1. Research Variable Measurement Instruments

The research instrument was developed based on a review of previous literature relevant to technology adoption, competitive pressures, and business sustainability. All indicators were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Respondents were business owners or managers operating in Kuala Lumpur, Malaysia, with a total sample of 137 businesses.

Table 1. Variable Measurement Instruments

Variables	Code	Statement
Artificial Intelligence Adoption	AIA1	Our business has integrated AI-based systems into daily operational processes.
	AIA2	AI technologies are used to support managerial decision-making in our firm.
	AIA3	The adoption of AI has improved operational efficiency in our business.
	AIA4	Our firm actively invests in AI technologies to enhance business performance.
Competitive Pressure	CP1	Our business faces intense competition from firms offering similar products or services.
	CP2	Rapid technological changes increase competitive pressure in our industry.

Variables	Code	Statement		
	CP3	Customer expectations force our firm to continuously improve its offerings.		
	CP4	Competitive actions of rivals significantly influence our business strategies.		
Business Sustainability	BS1	Our firm is able to maintain long-term economic performance.		
	BS2	The business adopts environmentally responsible practices in its operations.		
	BS3	Social responsibility is an integral part of our business strategy.		
	BS4	Our firm is confident in sustaining its business over the long term.		

2. Reliability and Validity Test Results

Reliability testing was conducted using Cronbach's Alpha to ensure the internal consistency of each construct. The analysis results showed that all variables had Cronbach's Alpha values above the threshold of 0.70, indicating a good level of reliability. Item validity testing was conducted using corrected item-total correlations, where all indicators showed correlation values above 0.30 and were statistically significant. Thus, all indicators were declared valid and reliable for use in further analysis.

Table 2. Results of Construct Reliability Test

Variables	Number of Items	Cronbach's Alpha
Artificial Intelligence Adoption	4	0.872
Competitive Pressure	4	0.845
Business Sustainability	4	0.889

3. Descriptive Analysis Results

Descriptive statistical analysis shows that the level of AI adoption among businesses in Kuala Lumpur is moderate to high, reflecting growing awareness among businesses of AI's strategic role in supporting competitiveness. Respondents also perceived high competitive pressure, particularly due to technological change and increasingly dynamic customer demands. Meanwhile, perceptions of business sustainability showed a relatively high average score, indicating that most businesses have a long-term orientation toward economic, social, and environmental aspects.

Table 3. Descriptive Statistics of Research Variables

Variables	Mean	Standard Deviation
Artificial Intelligence Adoption	3.78	0.64
Competitive Pressure	3.92	0.59
Business Sustainability	3.85	0.61

4. Results of Multiple Linear Regression Analysis

Multiple linear regression analysis was conducted to examine the effect of Artificial Intelligence Adoption and Competitive Pressure on Business Sustainability. The test results showed that Artificial Intelligence Adoption has a positive and significant effect on Business Sustainability. This finding indicates that the higher the level of AI adoption, the greater the business's ability to maintain long-term sustainability. Competitive pressure was also shown to have a positive and significant effect on Business Sustainability, indicating that competitive pressure drives businesses to adapt, innovate, and develop sustainable strategies.

The resulting regression model has a coefficient of determination indicating that the two independent variables are able to explain a substantial proportion of the variation in Business Sustainability. This confirms the importance of technological factors and the competitive environment in shaping business sustainability in emerging markets like Malaysia.

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Independent Variables	В	Std. Error	Beta	t-value	Sig.
Artificial Intelligence Adoption	0.412	0.072	0.451	5,722	0.000
Competitive Pressure	0.287	0.068	0.331	4,221	0.000
R ²					0.536
Adjusted R ²					0.527

Interpretation of Results

The results of this study provide empirical evidence that AI adoption is a key factor in enhancing business sustainability, particularly through improved operational efficiency and decision-making quality. Furthermore, competitive pressures not only pose a challenge but also act as a driving force for businesses to adopt more innovative and sustainable practices. In the business context of Kuala Lumpur, these findings confirm that the ability to respond to competitive dynamics and strategically leverage AI technology is a critical determinant of business sustainability in an increasingly competitive market.

Discussion

The findings of this study make a significant contribution to the strategic management and technology literature by demonstrating that Artificial Intelligence adoption and competitive pressures are significant determinants of business sustainability in emerging markets. Empirical results obtained from businesses operating in Kuala Lumpur, Malaysia, confirm that the use of AI technology serves not only as an operational tool but also as a strategic capability that can strengthen long-term business resilience.

From a theoretical perspective, the positive impact of AI adoption on business sustainability can be explained through the Resource-Based View and Dynamic Capability Theory. AI serves as a valuable, difficult-to-imitate, and increasingly crucial strategic resource in creating sustainable competitive advantage. A business's ability to integrate AI into decisionmaking processes, data analysis, and operational efficiency reflects a dynamic capability in responding to changes in the business environment. This finding extends previous literature that tends to focus on the impact of AI on short-term performance, by confirming that AI adoption also contributes to the economic, social, and environmental dimensions of sustainability simultaneously.

The significant influence of competitive pressure on business sustainability also provides relevant theoretical implications, particularly within the context of contingency theory and institutional theory. Competitive pressure drives businesses to adapt their structures, strategies, and operational practices to align with market demands and stakeholder expectations. In a competitive business environment, sustainability is no longer a normative choice but rather a strategic necessity to maintain legitimacy and business continuity. These findings confirm that external pressure can serve as a triggering mechanism for innovation and the adoption of sustainable business practices, particularly in emerging markets undergoing rapid digital transformation.

Furthermore, this study contributes to the emerging markets literature by providing empirical evidence from the Southeast Asian context, which remains relatively underrepresented in studies on AI and business sustainability. Market characteristics characterized by resource constraints, regulatory uncertainty, and high competitive intensity make the role of AI and competitive pressures increasingly crucial. Thus, the results of this study enrich the theoretical understanding of how internal and external factors interact to shape business sustainability in emerging economies.

In terms of practical implications, the findings of this study provide clear strategic direction for business owners and managers. AI adoption should not be treated solely as a technology investment, but as an integral part of a long-term sustainability strategy. Businesses need to ensure that AI implementation is accompanied by human resource competency development, organizational process adjustments, and the integration of AI into strategic decision-making. This approach enables businesses to maximize the value of AI in improving efficiency, innovation, and business resilience.

High competitive pressures require managers to adopt a proactive approach to sustainability. Rather than reactively responding to competition, businesses need to leverage these pressures as opportunities for differentiation based on innovation and sustainable practices. The application of AI can be a crucial tool for understanding customer behavior, monitoring market dynamics, and anticipating competitor strategies, enabling businesses to make more adaptive and data-driven decisions.

For policymakers and business support institutions, this research highlights the importance of creating a conducive ecosystem for AI adoption, particularly for small and medium-sized enterprises. Support in the form of incentives, training, and digital infrastructure can accelerate AI adoption while simultaneously strengthening collective business sustainability. In the context of Kuala Lumpur as a regional economic and business hub, policies that encourage sustainable digital transformation can positively impact not only individual companies but also economic stability and national competitiveness.

Overall, this discussion confirmed that business sustainability in the era of digital competition is heavily influenced by internal capabilities in adopting AI technology and external pressures from the competitive environment. Integrating these two factors is key for businesses in emerging markets to achieve long-term sustainability and maintain relevance in an increasingly dynamic global marketplace.

Conclusion

This study aims to examine the influence of Artificial Intelligence Adoption and Competitive Pressure on Business Sustainability using empirical evidence from 137 businesses operating in Kuala Lumpur, Malaysia. The results show that both variables have a positive and significant influence on business sustainability. These findings confirm that AI adoption acts as a strategic capability that can improve operational efficiency, decision-making quality, and business resilience in the face of market dynamics. Furthermore, competitive pressure has been shown not only to be an external challenge but also serves as a driver for businesses to innovate

and adopt sustainable practices.

Conceptually, this research contributes to the management and sustainability literature by broadening the understanding of the role of digital technology in emerging markets. This study emphasizes that business sustainability is not solely determined by internal or external factors in isolation, but rather by the interaction between a company's internal capabilities in adopting advanced technologies and the competitive pressures it faces. Thus, this research enriches the Resource-Based View and Dynamic Capability Theory perspectives by incorporating Artificial Intelligence as a strategic resource relevant to long-term sustainability.

Despite its significant theoretical and empirical contributions, this study has several limitations that offer opportunities for further research. First, the cross-sectional design limits its ability to capture the dynamics of AI adoption and changes in business sustainability over time. Future research is recommended to employ a longitudinal approach to understand how AI's impact on business sustainability evolves with increasing technological maturity and organizational experience. Second, this study focuses on a single geographic context, so generalizing the findings to other countries or industries requires caution. Comparative studies across countries or industry sectors could provide a more comprehensive understanding of the varying impacts of AI and competitive pressures on business sustainability.

Future research could also explore the role of mediating and moderating variables in the relationship between AI adoption, competitive pressure, and business sustainability. Factors such as digital capability, organizational learning, innovation capability, or regulatory support could potentially strengthen or weaken the influence observed in this study. Furthermore, the measurement of business sustainability could be further enhanced by integrating objective indicators, such as financial performance, energy efficiency, or social impact, to complement respondents' subjective perceptions.

Finally, future research is expected to combine quantitative approaches with qualitative methods to gain a deeper understanding of the AI adoption process and sustainability strategies implemented by businesses. A mixed-methods approach will enable researchers to capture the complexities of managerial decision-making and organizational contexts that are not fully captured through survey data. By broadening the methodological and contextual scope, future research can further enrich the literature on Artificial Intelligence, competitive dynamics, and business sustainability in the era of digital transformation

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