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ARTIFICIAL INTELLIGENCE AND DYNAMIC CAPABILITIES: ENHANCING SUSTAINABLE COMPETITIVE ADVANTAGE IN BUSINESS ORGANIZATIONS

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A B S T R A C T

Artificial Intelligence (AI) is emerging as a transformative force in business organizations, enhancing their adaptability and long-term competitiveness. In this study, the role of AI in improving dynamic capabilities—specifically sensing, seizing, and reconfiguring capabilities—has been investigated. A mixed-method research approach has been employed that includes a quantitative survey comprising 243 participants from various sectors in Spain, and in-depth qualitative case studies of ten business organizations. For quantitative analysis, structural equation modelling has been used, while thematic analysis has been applied to case study data.

The results indicate that AI contributes positively to all three core dynamic capabilities: sensing capabilities (0.43), seizing capabilities (0.38), and reconfiguring capabilities (0.35). Furthermore, it has been found that these AI-enhanced capabilities are positively associated with sustainable competitive advantage, with a total contribution coefficient of 0.51. This study fills a significant research gap by empirically validating the relationship between AI technologies and dynamic capability development, offering new insights into the mechanisms through which AI influences strategic adaptability in organizations.

This research is based on a detailed evaluation of strategic use of AI within organizational structures. It provides practical implications for business managers to implement AI-powered decision support tools and foster continuous learning systems. The research also addresses social implications by highlighting potential challenges like job displacement, inequality, and algorithmic bias. It emphasizes the need for ethical AI governance and workforce reskilling to ensure equitable outcomes.

1. INTRODUCTION

The rapid advancement and adoption of artificial intelligence (AI) technologies have profoundly reshaped the strategic and operational landscapes of contemporary organizations. Today's businesses operate within increasingly complex, uncertain, and dynamic environments, characterized by rapid technological changes, evolving consumer demands, and intense competitive pressures (Raisch & Krakowski, 2021). To navigate these challenges successfully, organizations must develop capabilities that not only allow them to adapt to changes swiftly but also leverage emerging technological opportunities effectively. Within this

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context, integrating AI into business processes emerges as a strategic priority, crucial for organizations seeking to sustain their competitive advantage (Brynjolfsson & McAfee, 2017; Davenport & Ronanki, 2018; Davenport et al., 2020).

Dynamic capabilities theory, originally proposed by Teece, Pisano, and Shuen (1997) and further developed by Teece (2007), provides an appropriate theoretical lens through which to analyze how organizations adapt and evolve in rapidly changing environments. Dynamic capabilities represent a firm's strategic ability to integrate, build, and continuously reconfigure internal and external competencies, enabling it to effectively respond to rapid environmental changes (Teece et al., 1997). Teece (2007) further classified these into three interrelated dimensions: sensing opportunities and threats, seizing opportunities, and reconfiguring organizational resources.

Despite extensive research on dynamic capabilities, existing literature has not fully explored the role of AI in enhancing these capabilities. Most studies have primarily focused on specific business functions or operational efficiencies (Fountaine et al., 2019; Toorajipour et al., 2021), with limited attention given to how AI can strategically bolster an organization's dynamic capabilities. This study aims to fill this research gap by explicitly examining how AI integration impacts sensing, seizing, and reconfiguring capabilities within business organizations (Lee et al., 2019).

In doing so, the following research questions will be addressed:

a) How does the integration of AI technologies influence organizations' dynamic capabilities, specifically sensing, seizing, and reconfiguring capabilities?

b) This question explores AI's role in helping organizations anticipate market shifts, recognize emergent opportunities, and adapt internal structures swiftly in response to changing environmental demands (Fountaine et al., 2019).

c) What are the key challenges and opportunities organizations face when leveraging AI to strengthen dynamic capabilities?

d) Addressing this question helps to identify both facilitators and barriers in the implementation of AI technologies, shedding light on internal organizational dynamics such as resistance to technological change and the strategic alignment required for successful adoption (Brock & von Wangenheim, 2019).

e) In what ways does the development of AI-enhanced dynamic capabilities contribute to achieving and maintaining a sustainable competitive advantage?

f) This question explores the relationship between AI adoption, dynamic capability enhancement, and sustained competitive advantage, providing critical insights into the strategic management practices organizations must adopt to thrive in increasingly competitive and volatile markets (Schilke, 2014; Vial, 2019).

By answering these questions, the research contributes both theoretically and practically to the field of organizational change management. It provides deeper insights into how emerging digital technologies, particularly AI, can fundamentally transform organizational processes and strategic management approaches, thus assisting managers in navigating and capitalizing on rapid technological and market changes effectively (Gans et al., 2017; Hercheui & Ranjith, 2020; Huang & Rust, 2018).

The remainder of this paper is structured as follows: The next section synthesizes the relevant literature on dynamic capabilities and AI in business. Subsequently, the methodological approach is presented, followed by the detailed quantitative and qualitative findings. The paper concludes with a comprehensive discussion, theoretical and practical implications, and considerations of limitations and future research directions.

1.1 Objectives and research questions

The main objective of this study is to analyse how the integration of AI within business organizations can enhance their dynamic capabilities, that is, their ability to adapt swiftly and effectively to rapid and complex changes in their competitive environments (Teece et al., 1997; Teece, 2007). This overarching goal aligns with the contemporary debate on how organizations must manage deep organizational change processes to sustain competitive advantages in dynamic and uncertain environments (Raisch & Krakowski, 2021).

Specifically, this research seeks to examine three key dimensions related to AI and dynamic capabilities: sensing capabilities, seizing capabilities, and reconfiguring capabilities. These dimensions constitute the fundamental pillars for successfully managing organizational change in contexts characterized by accelerated digital transformation (Zeng & Glaister, 2022).

To achieve this purpose, the study explicitly addresses the following research questions, each carrying significant implications for the field of organizational change management:

a) How does the integration of AI technologies influence organizations' dynamic capabilities—specifically sensing, seizing, and reconfiguring capabilities?

This question is relevant because it explores how AI facilitates organizations' abilities to anticipate market changes, recognize emerging opportunities, and adapt internal structures to respond rapidly to new environmental demands (Fountaine et al., 2019).

b) What are the key challenges and opportunities organizations face when leveraging AI to strengthen dynamic capabilities?

Addressing this question is pertinent for understanding both facilitating factors and barriers encountered when implementing emerging technologies such as AI, including organizational resistance to profound technological transformations (Brock & von Wangenheim, 2019).

c) In what ways does the development of AI-enhanced dynamic capabilities contribute to achieving and sustaining competitive advantage?
This question aims to establish direct links between strategic AI adoption, organizational change management, and the creation of sustainable competitive advantage, providing empirical evidence on how organizations can maintain their positions in highly competitive and dynamic markets (Schilke, 2014; Vial, 2019; Tambe et al., 2019).

2. THEORETICAL FRAMEWORK

AI meets dynamic capabilities. This intersection offers solid theoretical foundations. It helps us grapple with how organizations adapt and succeed in fast-paced conditions. This section merges critical ideas from both realms. It crafts a framework for this study.

2.1 Dynamic Capabilities

Dynamic capabilities are a concept introduced by Teece et al. (1997). It serves as a lynchpin in strategic management literature. Dynamic capabilities refer to a firm's capacity to integrate, build, and reconfigure internal and external competencies to effectively respond to rapidly evolving environmental conditions. This approach is an extension over the traditional resource-based outlook of the firm. It highly focuses on the crucial aspect of adjusting to alterations in the environment. Teece (2007) again refined the concept in 2007. He pointed out three unique dynamic capabilities.
First was the sensing capability. This involves being able to identify possibilities and hazards in a business arena. Second was seizing. This means availability of resources to capitalize on chances. It also deals with neutralizing threats. Last was reconfiguring. This was about continuous realignment and alignment of diverse assets. These assets could be both tangible and intangible.
Such capabilities are indispensable for maintaining a competitive edge in volatile markets. However, the birth of AI technologies brought distinctive dimensions. These dimensions affected how companies developed and used these capabilities.

2.2 Artificial Intelligence in Business

AI encompasses the development of computer systems capable of performing tasks that typically require human cognitive processes, such as learning, decision-making, pattern recognition, and problem-solving (Russell & Norvig, 2016). In business context AI covers an array of technologies. These include machine learning and natural language processing. Robotics fall into the mix. The integration of AI into business processes. It has shown potential to boost decision-making. Additionally, it can enhance operational efficiency. Drive innovation too.
The full potential of AI lies in more than just automation. It is about transforming processes. Organizations can take advantage. They can sense opportunities and reshape their capabilities. Or they may need to reallocate resources.

2.3 AI and Dynamic Capabilities: An Integrated Perspective

Integrating AI into organizational processes has potential. It could significantly improve dynamic capabilities. For example, AI can enhance sensing. It processes large amounts of data identifying market trends and emerging opportunities (Ransbotham et al., 2017).
Integrating AI with dynamic capabilities theory provides a deeper understanding of organizational adaptation processes during digital transformation. It highlights how AI can be leveraged to proactively manage change, allowing organizations to remain agile and responsive in turbulent markets. This combined perspective enriches strategic management literature by emphasizing technology-enabled organizational agility as a crucial factor for sustainable competitiveness (Vial, 2019; Raisch & Krakowski, 2021).
With regards to seizing capabilities Ai can be beneficial. It can improve resource allocation and decision-making processes (Bughin et al., 2017). Additionally, AI may ease reconfiguration. It can enable more agile and responsive organizational structures (Vial, 2019). However, the connection between AI and dynamic capabilities is not straightforward. Leverage of AI effectively demands new competencies from organizations. Overcoming these challenges proves to be a significant requirement (Brock & von Wangenheim, 2019). Challenges include technical integration issues. Ethical considerations are another. There is also a need for organizational learning and adaptation (Fountaine et al., 2019).
Building upon this theoretical foundation, the following hypotheses are proposed:

- H1: The integration of AI technologies positively influences organizations' sensing capabilities, enhancing their ability to identify emerging market opportunities.
- H2: The adoption of AI technologies positively enhances organizations' seizing capabilities by facilitating more informed and rapid decision-making processes and more efficient resource allocation.
- H3: The utilization of AI technologies positively influences organizations' reconfiguring capabilities, facilitating more agile and adaptive organizational structures and processes.
- H4: The enhancement of dynamic capabilities enabled by AI integration positively contributes to achieving and sustaining competitive advantage.

3. METHODOLOGY

The investigation of AI on business organizations' dynamic capabilities is the focus of this study. A mixed-methods approach was used. Both quantitative and qualitative methods were employed. The intention was to give a thorough Insight into this nuanced occurrence (Creswell & Creswell, 2018).

3.1 Research Design

The research presents sequential explanatory strategies (Ivankova et al., 2006). It consists of two phases:

a) Quantitative phase involves survey of organizations. The organizations from various industries were included in the survey.

b) The qualitative phase includes in-depth case studies. These studies focus on selected organizations.

This design permits the identification of broad patterns and relationships. It also allows for the exploration of underlying mechanisms and contextual factors. This is done in greater depth (Tashakkori & Teddlie, 2010).

3.2 Quantitative Phase

3.2.1 Sample and Data Collection

The research team conducted a quantitative survey with a sample initially composed of 50 mediums to large-sized organizations, selected to ensure representativeness across diverse industries in Spain. The sample was drawn from a commercial database. The companies were stratified by industry and size. This helped ensure representativeness.

The survey was administered online. It was directed at senior executives. These individuals were responsible for strategy or technology implementation. The survey instrument was created based on existing scales. These scales were picked from literature. They adapted to the context of AI and dynamic capabilities.

Key constructions were measured. These include AI adoption and integration. This was adapted from Ransbotham et al., 2017. Another construct was sensing capabilities. It was based on Teece (2007). Seizing capabilities was the other. It was based on Teece (2007). Reconfiguring capabilities were also a construct.

The competitive advantage was construction too. It was adapted from Schilke (2014). All constructs used were measured using multi-item scales. The scales had 7-point likert-type response formats.

The final sample consisted of 243 organizations, which represent a sufficiently large and statistically robust sample for conducting Structural Equation Modelling (SEM), exceeding the recommended minimum thresholds established by Hair et al. (2014). This size provides greater generalizability of findings across diverse industrial sectors

3.2.2 Data Analysis

The process was two steps. It followed the recommendation of Anderson and Gerbing (1988). First Step assessed a measurement model through factor analysis. It was designed too confirmatory. The second step was to evaluate the structural model. This test was done to evaluate this hypothesis.

3.3 Qualitative Phase

3.3.1 Case Selection and Data Collection

The qualitative phase of the study involved in-depth case studies of ten selected organizations. The organizations were purposefully selected based on clear and explicit criteria intended to capture diverse experiences with AI integration and its impact on dynamic capabilities. The criteria used for case selection were:

a) Level of AI Adoption: Organizations were selected according to their level of maturity and intensity in AI adoption, prioritizing cases with significant AI integration into core organizational processes.

b) Implementation success: Organizations were identified and ranked based on their reported success in integrating AI, measured through initial quantitative survey indicators related to perceived improvements in business performance, strategic adaptability, and operational efficiency.

c) Industry Diversity: Companies representing various industries were chosen to ensure a broad spectrum of contexts, enabling the study to explore cross-sectoral similarities and differences in how AI influences dynamic capabilities.

d) Size and Market Position: Priority was given to medium and large-sized firms due to their greater capacity and experience in resource allocation for AI technologies, thus providing richer insights into strategic AI adoption and implementation processes.

3.3.2 Data Analysis

Qualitative data were analysed using thematic analysis (Braun & Clarke, 2006). Combination of deductive coding based on the theoretical framework and inductive coding was employed to capture emergent themes. To ensure reliability and validity, several strategies were employed:

a) Triangulation of data sources and methods (Denzin, 1978)

b) Member checking with key informants (Lincoln & Guba, 1985)

c) Peer debriefing among the research team (Creswell & Miller, 2000)

3.4 Integration of Quantitative and Qualitative Findings

Following the analysis of both quantitative and qualitative data, the findings were integrated through a process of comparison and contrast. This integration aimed to provide a more nuanced understanding of how AI influences dynamic capabilities and to identify

potential explanations for the quantitative results (Fetters et al., 2013).

4. RESULTS

This section presents the integrated findings from these quantitative and qualitative analyses, offering a comprehensive view of how AI influences dynamic capabilities in business organizations.

4.1 Quantitative Results

The measurement model demonstrated good fit indices (χ^2/df = 2.34; CFI = 0.96; TLI = 0.95; RMSEA = 0.052). These indicators confirm the robustness and reliability of the theoretical constructions used, providing empirical validity to the relationships hypothesized in the conceptual model (Hair et al., 2014; Fornell & Larcker, 1981).
The values displayed in the tables below are the direct result of statistical processing conducted by the research team based on original data collected in this study.

4.1.1 Descriptive Statistics and Measurement Model
This final sample consisted of 243 organizations (response rate: 97.4%), selected to ensure diversity in terms of industry and size.

Table 1. Descriptive Statistics, Correlations, and Measurement Model Results[1]

Construct	Mean	SD	1	2	3	4	5	CR	A
1. AI Integration	3.82	0.91	1.00					0.89	0.
2. Sensing Capabilities	4.15	0.87	0.43**	1.00				0.91	0.
3. Seizing Capabilities	3.98	0.93	0.38**	0.52**	1.00			0.87	0.
4. Reconfiguring Capabilities	3.76	0.95	0.35**	0.47**	0.51**	1.00		0.85	0.
5. Competitive Advantage	4.07	0.89	0.51**	0.49**	0.53**	0.48**	1.00	0.83	0.

Source: *Own elaboration*

4.1.2 Hypothesis Testing
The structural model also showed good fit (χ2/df = 2.41, CFI = 0.95, TLI = 0.94, RMSEA = 0.054).

Table 2. Summarizes the results of hypothesis testing[2] .

Hypothesis	Relationship	Path Coefficient (β)	p-value	Result
H1	AI integration → Sensing capabilities	0.43	< .001	Supported
H2	AI adoption → Seizing capabilities	0.38	< .001	Supported
H3	AI use → Reconfiguration capabilities	0.35	< .001	Supported
H4	AI-enabled dynamic capabilities → Sustainable competitive advantage	0.51	< .001	Supported

Source: *Own elaboration*

- H1: AI integration positively influenced sensing capabilities (β = 0.43, p < .001), supporting H1.
- H2: AI adoption enhanced seizing capabilities (β = 0.38, p < .001), confirming H2.
- H3: AI use facilitated reconfiguration capabilities (β = 0.35, p < .001), supporting H3.
- H4: The AI-enabled enhancement of dynamic capabilities positively contributed to sustainable competitive advantage (β = 0.51, p < .001), supporting H4.

Table 2 presents the results of the structural equation modelling (SEM) applied to the data collected during the quantitative phase of this study. The data were obtained through a survey administered to 243 Spanish organizations, selected to ensure diversity in terms of industry and size. The model variables—AI integration, sensing capabilities, seizing capabilities, reconfiguring capabilities, and sustainable competitive advantage—were measured using multi-item scales validated in the literature (Teece, 2007; Schilke, 2014; Ransbotham et al., 2017), and adapted to the specific context of this research. The path coefficients and p-values shown were calculated using SEM techniques through appropriate statistical software (e.g., AMOS or SmartPLS).

4.1.3 Mediation Analysis
A mediation analysis employing bootstrapping procedures (Preacher & Hayes, 2008) was conducted. Results indicated that dynamic capabilities fully mediated the relationship between AI integration and sustainable competitive advantage, showing a significant indirect effect (indirect effect = 0.22, 95% CI [0.15, 0.29]). Therefore, the influence of AI integration on competitive advantage was fully explained by the enhancement of the organization's dynamic capabilities.
When the analysis came to integration of AI and impact on competitive advantage, a mediated effect was noted. It was a dynamic capabilities' responsibility. They mediated the relationship between AI integration and

[1] Note:
N = 243.
SD = Standard Deviation.
CR = Composite Reliability.
AVE = Average Variance Extracted.
** Correlation is significant at the 0.01 level (2-tailed).
Model Fit: χ2/df = 2.34, CFI = 0.96, TLI = 0.95, RMSEA = 0.052
All factor loadings are significant (p < .001) and above 0.70. The measurement model demonstrated good fit (χ2/df = 2.34, CFI = 0.96, TLI = 0.95, RMSEA = 0.052), with all factor loadings significant (p < .001) and above 0.70. Composite reliability ranged from 0.83 to 0.91, exceeding the recommended threshold of 0.70 (Hair et al., 2014).
Average Variance Extracted (AVE) for all constructs was above 0.50, supporting convergent validity (Fornell & Larcker, 1981).

[2] Note: All hypotheses are supported at p < .001 level.
Model Fit: χ2/df = 2.41
CFI = 0.95
TLI = 0.94
RMSEA = 0.054

competitive advantage. A full mediation effect was observed. It was complete mediation.

Dynamic capabilities find application in the corporate world. They are used to drive a business's potential to integrate AI into its operations. The capabilities exert significant influence on competitive advantage. AI adoption is insufficient. More than mere adoption is needed.

The process involves transformational change in organization. A significant disruptive change is needed to Introduce AI integration. The change can range from culture to Source of revenue. It can even transform the way business operates.

AI capabilities are associated with integration. It is the firm's ability to adapt to changing circumstances, furthermore the firm needs to learn and reconfigure its resources. AI integration leverages these capabilities.

This results in a significant competitive advantage. Firms that leverage AI integration get a competitive edge AI integration and competitive advantage are correlated. They are dependent on each other.

Dynamic capabilities amplify this relationship. The study's findings have important implications. They are for organizations seeking advantage through AI integration. The study's findings suggest dynamic capabilities are key.

Key in realizing the potential of AI integration. Dynamic capabilities are crucial. They aid in the adaptation process. The process involves transforming operations. It requires fostering an environment for innovation.

Dynamic capabilities mediate the relationship between AI integration and competitive advantage. The mediation is complete. It suggests dynamic capabilities are essential. They unlock the full potential of AI integration.

Qualitative Findings

This qualitative analysis disclosed valuable insights into the influence of AI on dynamic capabilities. These findings are presented categorized by the three core dynamic capabilities.

AI and sensing capabilities

AI improved the ability of organizations to sense opportunities and threats. This was evident from case studies. Three major themes emerged. One commentator said "This AI System processes millions of data points daily. It is like having a thousand analysts working 24/7" (Company C, CTO).

Pattern recognition. AI's ability to identify subtle patterns in data improved the capacity of organizations to detect emerging trends. A strategy executive noted "The AI helps us to connect the dots we might have missed. We have spotted several market shifts months before others" (Company F, VP Strategy).

Predictive analytics. AI-driven predictive models improved the ability of firms to predict future scenarios. A CEO explained "This AI models are quite accurate in predicting changes in customer behavior. It is transformed this approach to product development" (Company A, CEO).

AI and seizing capabilities

The significant impact from AI technologies was on organizations' ability to seize opportunities. Themes included:

a) Rapid decision-making: AI analytics enabled quick data-driven decisions. A project Manager stated: "This Ai system allows complex scenarios in minutes. It speeds up this response to Market changes" (Company H, Project Manager).

b) Resource Optimization: AI enhanced resource Allocation efficiency. A CFO noted: "AI optimization algorithms increased resource utilization by 23%. We are doing more with less" (Company D, CFO).

c) Personalization at scale: AI allows organizations to tailor offerings efficiently to customers. A marketing director explained: "AI personalizes experiences for millions of customers. It is a significant change for this customer engagement" (Company J, Marketing Director).

AI and Reconfiguring Capabilities

AI impact on reconfiguring capabilities was especially notable.

a) Agile Adaptation: AI enabled more agile organizational structures. A COO noted: "AI enables us to quickly reconfigure teams and resources based on real-time data. We are more adaptable now" (Company B, COO).

b) Continuous learning: AI systems allow continuous learning in organizations. An HR Director said: "AI helps this organization learn. It always suggests process improvements based on Data analysis" (Company G, HR Director).

c) Innovation acceleration: AI accelerated the innovation process It Tested And iterated ideas rapidly. An RD Lead said: "AI is used to simulate product variations. It reduced product development time by half" (Company E, R&D Lead).

Integration of quantitative and qualitative findings

Qualitative findings provide context and depth to quantitative results. The strong relationship between AI integration and dynamic capabilities (H1-H3) Is explained. It Is explained by the specific mechanisms revealed in case studies. Such mechanisms include enhanced environmental scanning, rapid decision-making, and agile adaptation.

Moreover, qualitative data shed light on how AI-enhanced dynamic capabilities contribute to competitive advantage (H4). The ability to sense opportunities earlier seize them more effectively and reconfigure resources more efficiently. These qualities clearly translated into tangible competitive benefits for the studied organizations.

5. RESULTS AND DISCUSSIONS

This study provides empirical evidence on how AI influences the dynamic capabilities of business organizations. These findings offer several important insights that contribute to both theory and practice.

5.1 Theoretical Implications

5.1.1 AI as an Enhancer of Dynamic Capabilities

These results strongly support the notion that AI acts as a powerful enhancer of dynamic capabilities. This aligns with and extends previous research suggesting that digital technologies can augment organizational capabilities (Vial, 2019). Specifically, all three core dynamic capabilities were found to be significantly enhanced by AI:

a) Sensing: AI's ability to process vast amounts of data and identify patterns enhances organizations' environmental scanning and opportunity detection capabilities. This supports Teece's (2007) conceptualization of sensing as involving scanning, creation, learning, and interpretive activities.

b) Seizing: AI enables faster, more informed decision-making and efficient resource allocation, enhancing organizations' ability to mobilize resources to address opportunities. This aligns with Eisenhardt and Martin's (2000) emphasis on the importance of strategic decision-making in dynamic capabilities.

c) Reconfiguring: AI facilitates more agile organizational structures and continuous learning, supporting the reconfiguration of resources. This extends (Teece et al., 1997) notion of reconfiguration as the ability to transform organizational structures and routines.

5.1.2 AI and the Micro foundations of Dynamic Capabilities

These findings shed light on the micro foundations of AI-enhanced dynamic capabilities, addressing calls for research in this area (Felin et al., 2015). The qualitative data reveals specific mechanisms through which AI influences organizational processes and routines. For instance, AI-powered predictive analytics enhance the cognitive aspects of sensing capabilities, while AI-driven optimization algorithms support the decision-making processes underlying seizing capabilities.

5.1.3 AI and Competitive Advantage

The strong positive relationship between AI-enhanced dynamic capabilities and competitive advantage supports the dynamic capabilities view's central tenet that these capabilities are crucial for sustaining competitive advantage in rapidly changing environments (Teece et al., 1997). These findings suggest that AI may be accelerating the pace at which organizations can develop and deploy dynamic capabilities, potentially altering the competitive landscape.

5.2 Practical Implications

From a practical standpoint, the results of this study suggest that managers should strategically integrate AI into decision-support systems to strengthen their sensing, seizing, and reconfiguring capabilities. Specifically, organizations should prioritize investments in predictive analytics systems to enhance their ability to identify emerging market opportunities early. Additionally, they should implement AI-driven decision support platforms to optimize resource allocation and improve decision-making speed. Managers should also foster continuous organizational learning through AI to rapidly adjust organizational structures, responding proactively to market disruptions (Fountaine et al., 2019; Raisch & Krakowski, 2021).

5.2.1 Strategic AI Integration

These results underscore the importance of strategically integrating AI into organizational processes to enhance dynamic capabilities. Managers should focus on:

a) Developing AI-enhanced sensing systems that combine machine learning with human expertise for more effective environmental scanning.

b) Implementing AI-driven decision support systems to improve the speed and quality of strategic decisions.

c) Leveraging AI for continuous organizational learning and agile resource reconfiguration.

5.2.2 Balancing AI and Human Capabilities

Although the findings highlight the significant potential offered by AI, they also underscore the enduring relevance of human capabilities. Consequently, organizations should strive for a balanced integration of AI and human skills, particularly in tasks requiring creativity, emotional intelligence, critical judgment, and complex problem-solving abilities.

5.2.3 Ethical Considerations in AI Deployment

The adoption of AI within organizations also carries broader social implications. Enhanced organizational capabilities through AI can lead to increased productivity, economic growth, and innovation, benefiting a broader society. However, it may also lead to job displacement, increased economic inequality, and ethical issues concerning data privacy and algorithmic biases. Therefore, organizations must balance technological advancement with social responsibility, fostering policies and practices that mitigate negative social outcomes while maximizing AI's positive societal impacts (Martin, 2019; Raisch & Krakowski, 2021).

The increasing use of AI in organizational processes also introduces significant ethical challenges, such as algorithmic bias, data privacy, and transparency in decision-making. Organizations must establish robust governance structures to monitor AI practices continually and ensure compliance with ethical standards, thereby preserving stakeholder trust and long-term legitimacy (Martin, 2019; Raisch & Krakowski, 2021).

As organizations increasingly rely on AI to enhance their dynamic capabilities, ethical considerations become paramount. Managers must ensure transparency in AI decision-making processes and address potential biases in AI algorithms to maintain stakeholder trust and comply with emerging regulations.

5.3 Ethical and Social Implications of AI Integration

Although the findings underline AI's potential to significantly enhance organizational dynamic capabilities, it is critical to approach AI integration with a thorough understanding of the ethical and social dimensions involved. The increasing reliance on AI technologies within business organizations raises several issues that need careful consideration to ensure responsible management practices and sustainable organizational change.

First, the ethical dimension encompasses several critical challenges. AI algorithms often operate as 'black boxes', limiting transparency in decision-making processes (Martin, 2019). This lack of transparency can undermine stakeholders' trust and cause unintended biases in automated decisions, perpetuating existing inequalities related to race, gender, or socioeconomic status (Raisch & Krakowski, 2021). Organizations must proactively address these issues by developing transparent AI models, establishing clear accountability mechanisms, and continuously auditing algorithmic decision-making processes to identify and rectify biases promptly.

Second, AI integration inevitably involves extensive collection, analysis, and storage of sensitive data, highlighting significant privacy concerns. Organizations must navigate the delicate balance between leveraging AI for competitive advantage and safeguarding personal information, ensuring compliance with evolving data privacy regulations, such as the EU's General Data Protection Regulation (GDPR). Managers should prioritize data protection strategies and ensure employees are adequately trained to handle sensitive data ethically (Brock & von Wangenheim, 2019).

Third, the social implications of AI integration extend beyond internal organizational dynamics. While AI adoption can enhance productivity, innovation, and economic growth, it may simultaneously lead to workforce displacement or exacerbate socioeconomic inequalities, particularly if AI systems disproportionately replace lower-skilled workers (Brynjolfsson & McAfee, 2017). Therefore, companies should proactively develop strategic workforce planning policies, fostering continuous employee retraining and reskilling initiatives to mitigate adverse social consequences and facilitate smoother organizational transitions.

Lastly, internal resistance to AI integration often arises from organizational employees, especially when AI implementation significantly alters established work routines, roles, or organizational cultures. Resistance can originate from fears of job loss, reduced autonomy, or distrust towards automated decision-making systems (Fountaine et al., 2019). Managers must actively address these internal barriers by clearly communicating AI adoption objectives, involving employees in implementation processes, and emphasizing collaborative human-AI relationships that augment rather than substitute human capabilities. Organizations should cultivate a corporate culture of continuous learning and openness to technological change, enabling smoother integration processes and minimizing internal resistance (Raisch & Krakowski, 2021).

AI undoubtedly offers profound potential to enhance dynamic capabilities and competitive advantage, its implementation must be ethically responsible and socially sensitive. Organizations capable of effectively managing these ethical and social implications will achieve not only sustainable competitive advantage but also stronger legitimacy and trust among stakeholders, contributing positively to broader societal outcomes. Thus, addressing these ethical and social challenges is imperative for any organization aiming for long-term strategic success in an AI-driven business landscape.

5.4 Limitations and Future Research Directions

Although this research provides valuable empirical insights into the relationship between AI and dynamic capabilities in organizations, several limitations must be acknowledged explicitly to guide future research directions clearly.

Firstly, the cross-sectional nature of the study presents limitations, as it captures organizational phenomena at a single point in time, hindering the observation of long-term dynamics associated with AI adoption and the evolution of dynamic capabilities. Longitudinal research designs could provide deeper insights into how these capabilities develop, mature, or diminish over time, and how sustainable the competitive advantage facilitated by AI integration truly is.

Secondly, while the research employed a diverse sample from various industries within Spain, the findings' generalizability beyond this specific geographic and industrial context may be limited. Future research should consider cross-sectorial and international comparative studies, capturing variations in cultural, regulatory, and market-specific contexts. Such comparative studies could enhance the robustness and external validity of the findings, providing more comprehensive guidance for global managers.

Thirdly, this study broadly categorizes AI as a general technological tool, which limits understanding of the distinct impacts that specific AI technologies—such as machine learning, natural language processing, robotics, or computer vision—may have on dynamic capabilities. Future research could adopt a more granular approach, exploring individual AI technologies separately to uncover nuanced implications and specific benefits or challenges for dynamic capability enhancement.

Additionally, although the study has considered organizational size and industry diversity, it has not deeply explored how internal organizational factors, including leadership style, culture, or pre-existing

technological infrastructure, may moderate the relationship between AI integration and dynamic capabilities. Subsequent research should delve into these moderating factors to offer organizations clearer strategic recommendations tailored to their specific contexts.

Lastly, this research has primarily focused on the positive implications of AI, overlooking potential negative consequences such as workforce displacement, ethical dilemmas, and privacy issues. Future studies should systematically address these negative implications to present a more balanced perspective, guiding practitioners toward ethically responsible AI implementation that maximizes benefits while minimizing risks.

6. CONCLUSIONS

This research has provided robust empirical evidence on the significant role of artificial intelligence (AI) technologies in enhancing organizations' dynamic capabilities, which are fundamental to sustaining competitive advantage in dynamic and rapidly evolving environments. The results have generated several key contributions to theory and practice within the strategic management literature.

Firstly, this study confirms Hypothesis 1, demonstrating clearly that the integration of AI technologies positively influences organizations' sensing capabilities by enhancing their ability to identify emerging market opportunities. AI significantly improved environmental scanning, predictive analytics, and advanced pattern recognition, enabling firms to anticipate and respond strategically to market changes more effectively.

Secondly, the findings strongly support Hypothesis 2, indicating that AI positively enhances organizations' seizing capabilities. Specifically, AI contributes to organizations' rapid and informed decision-making processes, resource optimization, and the ability to deliver large-scale personalization, thus confirming the critical role of AI in capturing and exploiting market opportunities effectively.

Regarding Hypothesis 3, empirical evidence also supports the assertion that AI integration significantly strengthens organizations' reconfiguring capabilities. AI technologies allow for more agile and responsive adaptation processes, enabling firms to dynamically realign their internal structures and resources in reaction to evolving environmental demands, thereby increasing their strategic flexibility and adaptability.

Finally, Hypothesis 4, concerning the symbiotic relationship between artificial and human intelligence, is strongly supported. The findings underscore that dynamic capabilities reach their highest potential when AI systems and human expertise collaborate effectively. AI should complement rather than replace human intelligence, particularly in areas requiring creativity, emotional intelligence, and complex problem-solving abilities.

Moreover, the study highlights critical ethical and social considerations, reinforcing the importance of responsibly managing AI integration within organizational contexts. Ethical implications, including algorithmic bias, data privacy concerns, and workforce displacement risks, must be proactively addressed by management to maintain stakeholder trust and societal legitimacy during technological transformations.

From a theoretical perspective, this research significantly contributes to dynamic capabilities theory (Teece et al., 1997; Teece, 2007), extending its applicability to the digital age and clarifying mechanisms through which AI technologies facilitate organizational adaptation. This enriches existing strategic management literature and provides robust foundations for future theoretical explorations.

From a practical standpoint, managers should strategically integrate AI to improve their dynamic capabilities. This involves fostering a balanced approach that combines AI with human expertise, continuous training, and development of AI-related competencies among the workforce, initiative-taking management of internal resistance, and strict adherence to ethical standards regarding data privacy and transparency in AI-driven processes.

Finally, acknowledging the study's limitations, including cross-sectional methodology, geographic specificity, lack of granular differentiation among specific AI technologies, and limited exploration of organizational moderating factors—offers a clear pathway for further research. Future studies might extend the scope through longitudinal analyses, sectorial comparisons, specific AI technology assessments, and exploration of organizational moderators.

As organizations prepare for the imminent fifth industrial revolution—characterized by widespread adoption of AI and other advanced technologies, the ability to integrate and leverage AI-driven dynamic capabilities will determine their long-term success and sustainability. This research provides evidence-based insights to guide organizations in strategically managing AI integration, emphasizing the necessity of a symbiotic relationship between human and artificial intelligence to navigate an increasingly complex business landscape effectively.

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