

ARTIFICIAL INTELLIGENCE AND AGILITY IN PAINT MANUFACTURING FIRMS IN RIVERS STATE

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ABSTRACT

This study examined the relationship between artificial intelligence and agility in Paint manufacturing firms in Rivers State. The study was guided by the Dynamic Capabilities Theory (DCT) and Resource-Based View Theory (RBV). The study adopted a correlational survey design. The population of the study comprised of fifteen (15) paint manufacturing firms in Rivers State, while the entire populations were studied as sample size using census method of sampling. Data for the study was generated through primary source. The main data collection instrument for this study was a structured questionnaire. To ensure the validity of the instruments for this study, the content and face validity was adopted. The reliability for the study was determined using the Cronbach alpha coefficient. The bivariate analysis was carried out using Spearman's Rank Order Correlation Statistics. The findings revealed amongst others that there is a positive and significant relationship between artificial intelligence and measures of agility (responsiveness, adaptability) in paint manufacturing firms in Rivers State. It was concluded that artificial intelligence influences agility positively and significantly. Based on the findings and conclusion, it was recommended that management of paint manufacturing firms in Rivers State should take advantage of artificial intelligence as this will build confidence in the employees on all organizational processes, and this in turn will enable the workers share common understanding that will aid agility and flexibility in all their work endeavors.

Keywords: Artificial intelligence, organizational agility, responsiveness, adaptability

INTRODUCTION

In today's rapidly changing business environment, organizations are frequently confronted with challenges and uncertainties that can significantly impact their performance and survival. According to Lengnick-Hall, Tammy and Mark (2011), to survive in the uncertain environments and to foster future success, organizations must be able to handle all of these manifestations of the unexpected. Firms need to be agile so as to enable them adequately respond to unexpected events and to capitalize on events that could potentially threaten an organization's survival. Organizational agility is a firm's ability to sense opportunities and threats and respond by assembling the needed organizational resources with rapidity (Overby, Bharadwaj & Sambamurthy, 2006).

Artificial Intelligence (AI) plays an important role in fostering organization's agility, improving job performance of employees in an organization (Lawler & Mohrman, 2003; Ulrich & Dulebohn, 2015). Artificial intelligence (AI) is a field of algorithm-based applications that can simulate humans' mental processes and intellectual activity and enable machines to solve problems with knowledge. Artificial Intelligence (AI) has significantly impacted various industries, including human resource (HR) procurement, revolutionizing traditional recruitment processes. This critical analysis explores the complex relationship between

artificial intelligence and human resource procurement, examining both the potential benefits and drawbacks. Artificial Intelligence technologies offer numerous advantages in human resource procurement, primarily by enhancing efficiency and streamlining processes. Artificial Intelligence powered recruitment tools can automate various tasks such as resume screening, candidate shortlisting, and interview scheduling, saving significant time and effort for human resource professionals (Strohmeier, 2019). By leveraging machine learning algorithms, artificial Intelligence systems can quickly analyze large volumes of data, identifying patterns and matching candidates to job requirements more accurately (Marler & Parry, 2016). Consequently, artificial intelligence enables human resource teams to focus on higher-value activities, such as candidate assessment and strategic decision-making, leading to enhanced efficiency in the recruitment process.

Although many studies (Davison & Burke, 2000; Ding & Stillman, 2005; Correll et al., 2007; Gordon & Arvey, 2004; Bertrand & Mullainathan, 2004) have been conducted on Artificial Intelligence. It is evidence that these studies focused on a different context, variables and methodology from what the current study seeks to cover. The impact of artificial intelligence on organizational agility has not been studied using Nigeria organization. Furthermore, studies linking artificial intelligence to organizational agility are scarce, leaving a huge gap to be filled by the current study. Thus, this study examined the relationship between artificial intelligence and agility of paint manufacturing firms in Rivers State.

Specific objectives included to:

- i. Examine the relationship between artificial intelligence and responsiveness in paint manufacturing firms in Rivers State.
- ii. Determine the relationship between artificial intelligence and adaptability in paint manufacturing firms in Rivers State.

Conceptual Framework

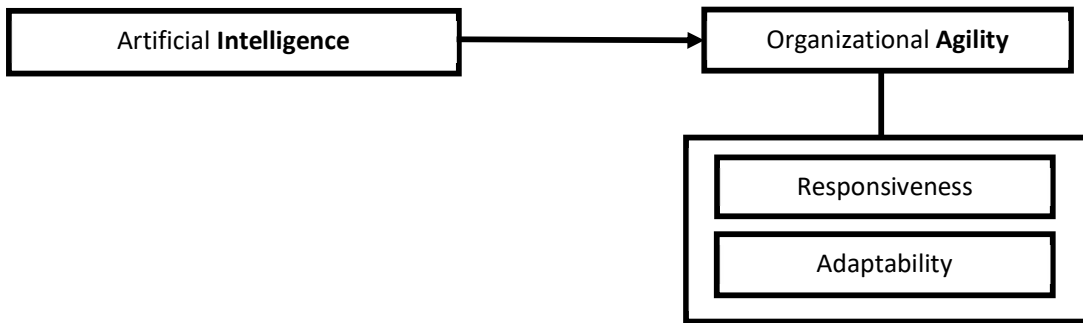


Figure 1: The relationship between artificial intelligence and organizational agility

Source: Desk Research, (2025), with measures adapted from the work of Sharifi and Zhang (1999).

Research Questions

Based on the research objectives, the following research questions guided the researcher:

- i. What is the relationship between artificial intelligence and responsiveness in paint manufacturing firms in Rivers State?

- ii. What is the relationship between artificial intelligence and adaptability in paint manufacturing firms in Rivers State?

Statement of Hypotheses

The following hypotheses were given in null form so as to arrive at a logical conclusion and to achieve its stated objectives.

Ho:1 There is no significant relationship between artificial intelligence and responsiveness in paint manufacturing firms in Rivers State.

Ho:2 There is no significant relationship between artificial intelligence and adaptability in paint manufacturing firms in Rivers State.

LITERATURE REVIEW

Theoretical Foundation

The underpinning theory for this study was Dynamic Capabilities Theory (DCT) and Resource-Based View Theory (RBV).

Dynamic Capabilities Theory

Dynamic capabilities theory as proposed by Teece and Pisano (1994) is the extension from resource-based view (RBV) of the firm (Barney, 1991). The DCT sets out to explain how competitive advantage is achieved. It is that firms must possess the ability to integrate, build, and reconfigure internal and external competences to adapt to and thrive in dynamic environments. The core proposition of Dynamic Capabilities Theory, pioneered by Teece, Pisano, and Shuen (1997), is that firms must possess the ability to integrate, build, and reconfigure internal and external competences to adapt to and thrive in dynamic environments.

Teece (2007) made a major contribution to DC theory by writing about the micro-foundations for each of the three following dimensions: sensing (identification and assessment of an opportunity), seizing (mobilization of resources to address an opportunity and to capture value) and transforming (continued renewal “reconfiguring the business firm’s intangible and tangible assets”). Nevertheless, intense criticisms have been levelled against the theory, such as the nature of the term itself and difficulties in determining the merits of the outcomes of the theory (Zahra, Sapienza & Davidson, 2006), difficulty in understanding the nature of DCs and the absence of clear models to measure these capabilities and how they affect the performance of organizations (Zott, 2003). Despite the intense growth of studies discussing the idea of DCs (Ambrosini & Bowman, 2009), the progress of the theory still requires further collective efforts from researchers to illustrate concepts related to the theory and how to link them to empirical practices within organizations (Wang & Ahmed, 2007).

This theory is highly relevant to the study of artificial intelligence and organizational agility because it provides a framework for understanding how organizations can adapt to changing environments and leverage analytics for competitive advantage by sensing, seizing, and transforming.

Resource-Based View Theory

The resource-based view (RBV) theory was postulated in 1984 by Wernerfelt as a major philosophy that has been embraced to investigate the matter (Hogler, 2016). The argument in the theory is that a firm consists of a collection of productive resources’ and these resources may only contribute to a firm’s competitive position to the extent that they are exploited in

such a manner that their potentially valuable services are made available to the firm. In the resource-based view, strategists select the strategy or competitive position that best exploits the internal resources and capabilities relative to external opportunities. Given that strategic resources represent a complex network of inter-related assets and capabilities, organizations can adopt many possible competitive positions.

The resource-based theory has caused a change in strategic management thinking from an outside-in approach to an inside-out approach. In this 'new' stream of thought, internal resources form the starting point of determining organizational success, in contrast to the 'old' paradigm of outside-in thinking. Authors like Kamoche (1996), Boxall (2008) and Wright et al. (2009) applied this theory to the field of human resource management and state that it is people that encompass the properties assumptions of value, rareness, inimitability, and non-substitution, – which according to Barney (2001) are the necessary conditions for organizational success. The theory is relevant to the present study because it emphasizes the importance of internal resources and capabilities as drivers of competitive advantage and performance, which aligns with the need for organizations to leverage data and analytics for agility and innovation.

Conceptual Review

Artificial Intelligence

Artificial intelligence (AI) is a field of algorithm-based applications that can simulate humans' mental processes and intellectual activity and enable machines to solve problems with knowledge. In the information age, AI is widely used in the medical field and can promote therapeutic development. AI may optimize the care trajectory of patients with chronic disease, suggest precision therapies for complex illnesses, and reduce medical errors (Rigla et al 2018). There are currently two common types of AI.

Artificial Intelligence (AI) has significantly impacted various industries, including human resource (HR) procurement, revolutionizing traditional recruitment processes. This critical analysis explores the complex relationship between artificial intelligence and human resource procurement, examining both the potential benefits and drawbacks. Artificial Intelligence technologies offer numerous advantages in human resource procurement, primarily by enhancing efficiency and streamlining processes. Artificial Intelligence powered recruitment tools can automate various tasks such as resume screening, candidate shortlisting, and interview scheduling, saving significant time and effort for human resource professionals (Strohmeier, 2019). By leveraging machine learning algorithms, artificial Intelligence systems can quickly analyze large volumes of data, identifying patterns and matching candidates to job requirements more accurately (Marler & Parry, 2016). Organizations must establish robust data protection policies and adhere to legal and ethical guidelines to safeguard candidate privacy and prevent potential misuse of personal data (Zhang, 2020). Moreover, organizations must ensure transparency and accountability in artificial intelligence algorithms, making them explainable and auditable to mitigate potential biases and discrimination (Schermerhorn, 2019). Ethical guidelines and regulatory frameworks should be developed to guide the responsible use of artificial intelligence in human resource procurement.

Organizational Agility

Organizational agility is a complex and multidimensional concept. One of the challenges in researching organizational agility is its unified definition and concept. Organizational agility refers to firm's ability to sense opportunities and threats and respond by assembling the needed organizational resources with rapidity (Overby, Bharadwaj & Sambamurthy, 2006).

Agility, as a business concept, was coined in a manufacturing context – particularly in relation to flexible manufacturing systems (Del Giudice, et al. 2021). Agile organization has the ability to survive and prosper in a competitive environment of continuous and unpredictable change by reacting quickly and effectively to changing markets, driven by customer-defined products and services. The agility of an organization is the ability to excel simultaneously on operations capabilities of quality, delivery, flexibility, and cost in a coordinated fashion (Menor, Roth & Mason, 2001). It is more of a customer focused or respond to the environment. Agility works best in the volatile environment when there is a high variety of services that must be produced. “Agility is the ability to do so quickly and in variety of situations” (Pipe, *et al.*, 2012).

In the recent past, there has been increased activity in trying to comprehend the concept of agility. The changing nature of global competition necessitates a comprehensive understanding of what factors make an organization agile. “We are experiencing not merely another turn of the business cycle, but restructuring of the business order” (Davis, 2009). Because of the customer-centric nature of agility, in which agility and customer-focus become inherently interrelated, changing customer demands have a significant impact on an organization’s operations and must be accounted for when evaluating the external pressures that influence an organization’s overall agility (Doz & Kosonen, 2008). Beyond the shifting nature of consumer preference, changes in technology contribute to uncertainty, globalized competition and competitive intensity.

Measures of Organizational Agility

Responsiveness

Responsiveness is the ability of a firm to respond to customers’ needs in terms of quality, speed and flexibility and it is characterized by combined goals such as time, quality and flexibility (Asree, Zain, & Razalli, 2010). An organization’s performance is often determined by its ability to respond quickly to changes in the business environment. Responsiveness enables organizations to detect market changes quickly, reconfigure their processes to meet new market requirements, share information across organizational units, take maximum advantage of information processing systems, and adopt new product and process technologies ahead of competitors (Hoyt, Huq, & Kreiser, 2007). The level of uncertainty in the operating environment of firms supports the assertion that responsiveness is a key determinant of competitiveness. It is an essential condition that allows firms to develop competitive advantage. Furthermore, organizational responsiveness includes employee response, response time, response speed, information integration and procedural response. Employee response: service personnel must have sufficient responsibility, flexibility and willingness to help customers.

Furthermore, Ekweozor and Obara (2020) opine that organizational responsiveness includes employee response, response time, response speed, information integration and procedural response. Employee response: service personnel must have sufficient responsibility, flexibility and willingness to help; response time has to do with ability of the organization to meet their needs on time; response speed refers to the ability of an organization’s systems to respond to heterogeneous needs instantly and in real-time; information integration represents the degree to which the organization offers excellent service information system to receive, analyze, record and track employee needs; procedural response indicates a standard operational procedure to connect, deliver and record and a different process to cope with varying needs.

Adaptability

Adaptability is the degree to which an organization has the ability to alter behavior, structures; and systems in order to survive in the wake of the environmental change (Denison, 2007). Adaptability entails translating the demands of business environment into action. Organizations as open systems exist in environment that is complex and uncertain. To survive and make profit, organizations need to adapt continuously to the different levels of environmental uncertainty (Amah & Baridam, 2012). Adaptation is defined as the modification and alterations in the organizations or its components in order to adjust to changes in the environment (Cameron, 2014).

Denison (2017) define adaptability as translating the demand of business environment into action. To survive and make profit, organizations and their employees need to continuously adapt to the different levels of environment uncertainty (Amah & Baridam, 2012) and Daft, (2018) puts it that environmental complexity is a vital contingency for organizational structure and internal policies. Leaning on these postulates, it therefore, means that organization most have internal behaviours or policies imbedded in its core culture that encourages adaptive behaviour in the event of any adversity emanating from the environment.

Empirical Review

Bedoor, *et al.* (2023) studied artificial intelligence in procurement: An overview and case study of Qatar Foundation. Although artificial intelligence (AI) has been reluctant to gain attraction in the procurement segment of a company, many organizations have started to see its potential in the supply chain activities since it enables numerous sectors in the evolution of their business models. Although artificial intelligence refers to intelligent algorithms or apparatuses that are capable of autonomously and systematically performing activities or cognitions without human intervention or mental decisions. In procurement and supply chain applications, AI can enhance design and operational frameworks, data visibility and analytics, opportunity assessment, accurate report generation and contract management, etc. This paper presents opportunities and applications of AI in procurement with particular emphasis on the procurement process carried out by Qatar Foundation (QF). QF is a non-profit organization which has a unique system as it involves over 50 entities with different activities related to education, research, and community development. This one-of-a-kind ecosystem comprises a unique and complex supply chain model. As a result, procuring different materials and services to cope with all entities' requirement is a challenge due to the tremendous amount of data and purchases. The use of AI methodologies is anticipated to provide multiple benefits towards achieving improvements over diverse areas.

Zeb-Obipi and Kalio (2018) studied employee information systems and human resource procurement in the oil and gas sector in Nigeria. This study ascertained the relationship between employee information systems (EIS) and human resource procurement in the oil and gas sector in Rivers State, Nigeria. The systems theory was considered as a theoretical framework for this paper with prospects viewing the interaction between the organization and its external environment. Globalization and technological advancement in the last decade, has birthed a new dawn for organizations: the use of information systems in various functions and capacities, of which human resources management is one of the arms of the organization that uses information systems to support activities such as identifying employees and managing their data. Conclusively, the findings show a strong, direct and positive interaction between the independent and dependent variable.

The study of Harrison, Nichol and Gold (2020) helps find answers, and to what extent do practitioners of learning and development (LD) reflect the education of both humans and

machines within the scope of their responsibilities? First, we review several important ideas about the 4IR on Talent Development (human resource development (HRD))/LD. We report the findings of five themes shared and investigated in a series of interviews with advanced HRD practitioners: new perceptions, responses, the distinction between information technology (IT) and HRD, and the role and ethical implications of HRD. In this chapter, ML and AI are still like HRD/LD recorders, and through this investigation, new perceptions of the need to engage and develop more coordinated responses are born, with conjectures and possibilities. HRD/LD asserts that it is essential to number, continuity of work, relevance, and survival.

The study of Barile *et al.* (2018) discusses advances in AI that pose significant challenges for businesses, employees, consumers, and policy-makers. The research team predicts that intelligent machines will out task humans in various activities within the next decade. Their aim is to re-establish the role of AI technology and its relationships with people by rethinking the concept of AI which is intelligence augmentation, which is the interaction of AI technologies with others. This leads to cognitive changes that greatly amplify human abilities. This transformation provides new tools for optimizing interpretive schemas that change human thinking structures and help study important worlds by altering people's cognitive processes. New rules for creating synergistic and collaborative processes between humans (people) and machines that style smarter service systems should be established in line with the need to define new directions for the science of the Commission for extended collaborative intelligence.

Ezekiel, *et al.* (2024) examined the direct influence of marketing innovation on SME performance and also investigated the mediating role of research & development in the relationship between marketing innovation and SME performance. The study adopted a survey research design and data. A structured questionnaire was used to collect data from 175 small-medium enterprises in Oyo township using a convenient sampling technique. Two hypotheses were tested with the IBM-SPSS version 25. The study found that there is a positive relationship between perceived product innovation and perceived performance. The study found that perceived collaboration innovation exhibited a positive relationship with perceived performance. The study found that perceived distribution channel innovation also showed a positive association with perceived performance. The study found that there was a joint influence of (product innovation, digital marketing technologies, collaboration innovation, and distribution channel innovation) on perceived performance. The study found that research & development mediated the relationship between perceived workload and life satisfaction. The study concluded that marketing innovation influences SMEs' performance and research & development also mediated the link between marketing innovation and SMEs performance.

METHODOLOGY

This study adopted correlational survey design to investigate the relationship between the study variables. The population of this study focused on fifteen (15) paint manufacturing firms in Rivers State. The entire population was studied as sample size using census method of sampling. Data for the study was generated through primary sources. The main data collection instrument for this study was a structured questionnaire. To ensure the validity of the instruments for this study, the content and face validity was adopted in ascertaining the extent to which the instrument can be said to be accurate and precise in the measurement of the variables under investigation. The reliability for the study was determined using the Cronbach alpha coefficient. The bivariate analysis was carried out using Spearman's Rank Order Correlation Statistics.

DATA ANALYSIS AND DISCUSSION OF FINDINGS

This section is concerned with the analysis and discussion of the findings for the empirical assessment of the relationship between artificial intelligence and organizational agility in paint manufacturing firms in Rivers State.

Relationship between Artificial Intelligence and the Measures of Organizational agility

Table 1: Correlations Artificial Intelligence and Responsiveness

		Artificial Intelligence	Responsiveness
Spearman's rho	Artificial Intelligence	Correlation Coefficient	1.000
		Sig. (2-tailed)	.063
		N	40
	Responsiveness	Correlation Coefficient	.796**
		Sig. (2-tailed)	.063
		N	40

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2025

The result on Table 1 shows the result of Spearman's analysis on the relationship between artificial intelligence and responsiveness. The result shows that the Spearman's Correlation coefficient (r) is .796**. This means that a strong and positive relationship exists between artificial intelligence and responsiveness of paint manufacturing firms in Rivers State at 0.05 level of significance. Based on this result, the null hypothesis which states that there is no significant relationship between artificial intelligence and responsiveness of paint manufacturing firms in Rivers State is hereby rejected and the alternate hypothesis accepted. It is therefore concluded that, there is a significant relationship between artificial intelligence and responsiveness of paint manufacturing firms in Rivers State.

Table 2: Test for correlation between artificial intelligence and adaptability

		Artificial Intelligence	Adaptability
Spearman's rho	Artificial Intelligence	Correlation Coefficient	1.000
		Sig. (2-tailed)	.661**
		N	.000
	Adaptability	Correlation Coefficient	40
		Sig. (2-tailed)	40
		N	.661**
		Sig. (2-tailed)	.000
		N	40

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output, 2025

The result on Table 2 shows the result of Spearman's analysis on the relationship between artificial intelligence and adaptability. The result shows that the Spearman's Correlation coefficient (r) is .661**. This means that a strong and positive relationship exists between artificial intelligence and adaptability of paint manufacturing firms in Rivers State at 0.05 level of significance. Based on this result, the null hypothesis which states that there is no significant relationship between artificial intelligence and adaptability of paint manufacturing firms in Rivers State is hereby rejected and the alternate hypothesis accepted. It is therefore concluded that, there is a significant relationship between artificial intelligence and adaptability of paint manufacturing firms in Rivers State.

Discussion of Findings

The results from table 1 and 2 show that there is a strong and positive relationship between artificial intelligence and measures of organizational agility (responsiveness and adaptability) in paint manufacturing firms in Rivers State. This result is in line with the study of Aweidah (2024) who examined the impact of artificial intelligence on organizational agility in industrial companies through the moderating role of dynamic capabilities. The results shows that Artificial Intelligence with it dimension (Expert Systems, Artificial Neural Networks, Algorithms, Machine Learning) has an impact on Organizational Agility in industrial companies. The results also confirm the significant role of the moderate variable (Dynamic Capabilities) in improving the impact of artificial intelligence on Organizational Agility. Artificial intelligence (AI) is crucial for organizations to stay ahead of the curve in the rapidly evolving technology landscape. It is essential to develop an organization's ability to understand, sustainably maintain, build, and deliver business results enhanced by AI, especially in industrial organizations.

Similarly, the finding also concurs with Olomi and Uranta (2020) study on how artificial intelligence predicts organizational agility of head of departments (HODs) of tertiary institutions in River's state. The findings indicated that artificial intelligence influences competence and flexibility positively and significantly. The study concluded that artificial intelligence can act as a tool in attaining organizational agility. Artificial intelligence (AI) has

radically changed companies' vision of business development, based on its widespread assimilation in key organisational processes. The main results indicate that the more digital capabilities organisations have, the more agile they become in relation to internal processes and changes in the external environment.

CONCLUSION AND RECOMMENDATIONS

Based on the above findings, the study therefore concluded that artificial intelligence influences agility positively and significantly. The study concluded that artificial intelligence can act as a tool in attaining organizational agility. Artificial intelligence (AI) has radically changed companies' vision of business development, based on its widespread assimilation in key organisational processes.

It is therefore recommended that management of paint manufacturing firms in Rivers State should take advantage of artificial intelligence as this will build confidence in the employees on all organizational processes, and this in turn will enable the workers share common understanding that will aid agility and flexibility in all their work endeavors.

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