MODERATING ROLE OF ARTIFICIAL INTELLIGENCE ON THE RELATIONSHIP BETWEEN ENTREPRENEURIAL INNOVATION AND BUSINESS PERFORMANCE OF SMES IN KANO

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Abstract

In an era of rapid technological advancement, businesses increasingly seek innovative approaches to streamline operations, reduce costs and respond to needs and wants of their customers and enhance competitiveness and performance through automation, Over the last decade, the increasing awareness of entrepreneurs and the improving understanding of their role in business life is attributed to the growing number of studies on entrepreneurial Innovation (EI). This study aims to conceptually discuss the moderating role of Artificial intelligence on the relationship between Entrepreneurial innovation and Business performance based on resource based theory. The model developed in this study consists of three independent variables (product innovation, process innovation and market innovation), one dependent variable (Business performance), and one moderating variable (Artificial Intelligence).The study adopts a quantitative approach through a comprehensive review of literature and case studies, the study demonstrates that the integration of AI into entrepreneurial ventures not only

accelerates business performance but also enables more innovative, flexible, and resilient business models, This study contributes to the fields of entrepreneurship, AI, and business performance by elucidating how AI can serve as a strategic tool for entrepreneurs to better harness innovation in the performance process. The findings further underscore the importance of integrating AI into innovation-driven business models and offer recommendations for firms aiming to leverage AI to achieve competitive advantages to enhance their performance.

Keywords: *Entrepreneurial innovation, Business performance, Artificial Intelligence,*

1.0 Introduction

For a firm to succeed in today's uncertain business environment it must achieve competitive advantage over its competitors. In addition, firms are encouraged to adapt to its environmental needs so as to achieve and sustain competitive advantage (Alguezaui & Filier, 2010). Business performance is a reflection of organizational success. A business organization that can maintain and increase its performance is more likely to have a positive growth rate and they tend to win over the competition in the industry. The better their business performance is, the more successful the business will be. Innovation has been recognized widely as the antecedent of business performance. In recent years, an increasing number of studies have explored the impact of innovation on business performance. Despite the amount of research, there exist several aspects that demand further studies. First, the nature of innovation and its links with performance have been studied by comparing incremental versus radical innovations, continuous versus discontinuous innovations or evolutionary versus revolutionary innovations. Previous studies have indicated mixed results, some positive, some negative, and some have indicated no relationship. Another aspect is the type of innovation and its links with performance. For example, new product and service innovations have been associated with the growth of sales while the process innovations have been linked with productivity (Cainelli et al., 2022). Higgins (1995) states that the key to success in terms of competitive advantage is innovation. Innovation can be differentiated into product innovation (Bakar & Ahmad, 2010; Zhang & Duan, 2010), process innovation, and market innovation (Medina & Rufin, 2009; Murat & Baki, 2011). Hogan and Coote (2014) defined innovation as one of the functions that companies need to make to create a new dimension of performance. Innovation can be triggered by changes in the company's internal and external environment, which will then provide an opportunity for the company to create a new procedure or systematic process to improve the overall performance of the company. Scholars have argued that in addition to the examination of the certain types of innovations, attention should be also paid to the diversity of developed innovations. For

example, Avermaete et al. (2003) found that two out of three small enterprises had developed more than one type of innovation (see also Forsman and Annala, 2011). This is supported by Amara et al. (2009), who recognized high complementarities between different innovation types and suggested that the outputs of certain types of innovations may become the inputs of other innovation types. de Jong and Marsili (2006) emphasise that the diversity of innovation types increases especially if an enterprise is active in different markets. Damanpour et al. (2009) add to this that the synergy achieved from innovating across types affects the ability of an enterprise to introduce and deliver services to its customers. Thus the diversity of innovations has an impact on the value created through innovations.

The most stunning IT application today is still Artificial Intelligence (AI), a technology that has advanced inimitably over the past few decades (Asif, Asad, Kashif, & Haq, 2021). It is described as a collection of "theories and methodologies used to build artificial intelligence capable robots" (Ghandour, 2021). AI, as a generic phrase, explains it as the utilizing of computers to imitate responses of high intelligence, while involving minimum aid from humans (Alahakoon, et al., 2020). AI is changing how businesses operate and how they deliver their products and services. The need for automation in company operations during a crisis like COVID-19 (Asad & Kashif, 2021) has been further illustrated by the pressure to use artificial intelligence (AI) to compete in a highly competitive market (Fadhel, Aljalahma, Almuhanadi, Asad, & Sheikh, 2022). Problem Statement Despite the recognized importance of innovation for business performance and competitive advantage, existing literature reveals three critical gaps. First, previous studies on the relationship between innovation and performance have produced inconsistent findings, with some showing positive effects, others negative, and some indicating no relationship at all. Second, while research has examined individual innovation types (product, process, and market innovation) separately, limited attention has been given to understanding how the diversity and combination of multiple innovation types simultaneously impact business performance. Third, although Artificial Intelligence (AI) is increasingly transforming business operations and service delivery, particularly in the post-COVID-19 era, there is insufficient empirical evidence on how AI adoption influences innovation diversity and its subsequent effect on business performance. Therefore, the problem this study addresses is the unclear understanding of how innovation diversity, particularly when enhanced by AI adoption, affects business performance in contemporary competitive environments.

Research Objectives The main objective of this study is to examine the relationship between innovation diversity, AI adoption, and business performance.
Specifically, the study aims to:

1. To investigate the direct effect of innovation diversity (product, process, and market innovation) on business performance.
2. To examine the role of Artificial Intelligence (AI) adoption in facilitating innovation diversity within business organizations.
3. To assess the impact of AI-enabled innovation diversity on competitive advantage and business performance.
4. To identify the synergistic effects of combining multiple innovation types on organizational value creation. Research Questions
5. Based on the objectives outlined above, this study seeks to answer the following research questions:
    a. What is the relationship between innovation diversity and business performance?
    b. How does Artificial Intelligence (AI) adoption influence the development of diverse innovation types within organizations?
6. To what extent does AI-enabled innovation diversity contribute to competitive advantage and enhanced business performance?
7. What synergistic effects emerge when organizations implement multiple types of innovations simultaneously

2.0 Literature Review

Jansen, Van den Bosch, and Volberda (2005) suggested that innovation is divided into exploratory and exploitative innovation. Exploratory innovation is about innovation that explores resources from the outside organization while the exploitative innovation tries to maximize its internal resources to do innovation, the study of Lestari, Leon, Widyastuti, Brabo, and Putra (2020) suggested that innovation has a positive significant effect on Indonesia's Business performance. Similar to this study, Hoang and Ngoc (2019) suggested that Vietnam's electronic commerce industry performance was affected by innovation. While these studies have shown the essential roles of innovation in enhancing business performance, published studies have explored the effects of innovation in Indonesian businesses especially in the manufacturing sector.
Jansen, Van Den Bosch, and Volberda (2006) further suggested that two types of innovations which will enhance business performance are exploratory innovation and exploitative innovation. Exploratory innovation is by business organizations by exploring resources from outside the organization. Exploitative innovation is achieved by exploiting resources owned by the organization. Previous studies have

found that both these innovations have an effect on the business performance (Jansen et al., 2005, Li, Zhou, & Si, 2010; Mueller, Rosenbusch, & Bausch, 2013). The relationship between innovation and business performance might be explained by R-A Theory (Hunt & Morgan, 2005), and resource based theory According to R-A Theory, the comparative advantage goes to the firm which creates a competitive advantage. Hence, as a unique resource, the entrepreneurial intensity will create innovation as the competitive advantage for small businesses.

Furthermore, Research studies related to innovation capability on performance has been carried out by Atalay et al. (2013), Bowen et al. (2010), Saunila et al. (2014), Allred and Swan (2005), Wang and Wang (2012) and Aini et al. (2013) Regarding the effects of innovation on business performance in the Malaysian SME's market, Spain, Finland and Nigeria. The results of these research studies show that the potential for innovation has a positive impact on business performance, however, this study aims to investigate the relationship between entrepreneurial innovation and business performance and to further scrutinize the moderating role of AI on the relationship between Entrepreneurial innovation and business performance in the context of the SMEs in Kano.

2.1 Entrepreneurial Innovation and SMEs performance

Product innovation is defined as the development and radical change in the performance attributes of the supplied product or service. The concept dominated most discussions on innovation; since it has the strategic importance to satisfy the customer's needs and enter into new markets, innovation literature suggests that product innovation affects company performance, Despite SMEs' flexibility and ability to rapidly respond to market needs, the tendency for product innovation is higher in larger firms than is the case in smaller enterprises Equally, while analyzing the SMEs associated with the development of product innovation and the relationship between product innovation and firms' performance, a study reveals that the product innovation has a positive relationship with a firm's performance (varies 2018)

In addition, the positive relationship between new product development and performance is also supported. Product innovations are much better suited to companies entering a market, because successful product innovation generates profits, increases market share, and has a positive impact on market performance. Although the literature indicates that a greater degree of product innovation could increase market performance, results failed to support this connection. However, the link between product innovation and performance outcomes is supported (Gupta 2020). Product innovation offers superior value to customers, therefore, leads to a growth in firms' market performance

A large body of research within the new product literature ascribes tremendous importance to product innovativeness (PI), a concept reflecting the degree of

changes related to product innovations. Creativity is essential for successful product innovation (Guo et al., 2017). A challenging task in the innovation process is to effectively transform novel and useful ideas that arise from business creativity into new products or services (An et al., 2018). The improvement of creativity in the workplace results in more innovation (Ouakouak & Ouedraogo, 2017). Successful companies learn through creativity and generate their innovations faster and more efficiently (Giampaoli et al., 2017), and creativity therefore plays an important role in the development of new products (Zocche et al., 2018). Previous studies have found a positive relationship between creativity and innovation (Ahlin et al., 2014; Baron & Tang, 2011; Sozo & Ogliari, 2019).

2.2 Frm Innovation and SMEs performance

Marketing adds value to the sales interface and to the innovation performance of the company [Wiersema 2020]. Market innovation focuses on developing the mix of a target market, while determining how companies can serve the target markets best [G. Shirokova 2013]. It is also described as a progress in marketing mix [R. F. Hurley 1998]. Nevertheless, innovation and marketing must go hand in hand. Innovation reveals the buyer's needs beyond the product, while marketing innovation has to evaluate customer value perceptions and generate opportunities for unmet customer needs, based on which companies may provide new innovative products [A. Johne,et al 1996]. Product innovation is significant in the marketing context because it attracts new customers by promising superior value and by enlarging market segments and product lines Many studies support the positive relationship between marketing innovation and product innovation. For example, some indicate that marketing innovation has a positive effect on product innovation [Calantone 1998]. Additionally, marketing innovation empowers the offer of cheaper and better quality products [Langerak,2004]. Marketing innovations produce a higher diversification of products, which helps companies expand their offerings, while acting as one of the important sources of competitive advantage. As such, firms should use new methods and innovative marketing ideas to promote their products that are not well known in the market [Malhotra et all 2016]. In the same regard, an important number of studies conceptually claim that marketing innovation generates excellent product innovation and product innovation performance. Thus, SMEs should have the ability to build differences in their products such as to make differentiate them from those of their competitors, and introduce superior customer value by using marketing innovation.

The marketing capability and innovation performance of companies are strongly related [D. Shah, R. Rust 2006]. Innovation is also a significant function of marketing, as it is linked to firm performance. Thus, the remarkable interest on the part of researchers towards the ability of marketing innovation to increase firm performance is reasoned [Y. Chen et all 2009]. Equally, marketing innovation has

a positive effect on firm performance and an ability to improve, strengthen, and maintain the firm's competitive advantage [V. Naidoo 201] As mentioned above, the positive relationship between marketing innovation and market performance is supported by a vast literature, starting from the idea that marketing innovation is an integral component of companies' success Also, SMEs' marketing performance places an emphasis on marketing innovation as the key to competitiveness [N. Halpern 2010]. SMEs adopt marketing within a competitive environment. Considering their size, innovation is the most critical factor that can be used by SMEs to remedy any disadvantages. When SMEs continue developing their current products and services, in order to best meet their customers' needs, and focus on market performance, they run into market-based innovation. As such, SMEs should introduce marketing innovation strategies to perform better. Thus, one can observe the existence of a positive effect of marketing innovation on SME market performance

2.3 Entrepreneurial Process Innovation and SMEs Performance

According to Reichstein and Salter (2006), process innovation is something which occurs with the use of new capital equipment (Marquis 1969; Salter 1960), and through the practices of learning by doing and learning by using (Cabral and Leiblein 2001; Hollander 1965). More specifically, technological process innovation is associated with the incorporation of new capital equipment such as processing machines, industrial robots or IT equipment (Edquist, Hommen, and McKelvey 2001; Heidenreich 2009; Organisation for Economic Co-operation and Development 2005), or embodied technology (Hervas-Oliver, SempereRipoll, and Boronat-Moll 2014; Rouvinen 2002), usually obtained through the purchase of advanced machinery or computer hardware and software (Organisation for Economic Cooperation and Development 2005). The aforesaid is in line with the embodied knowledge hypothesis which says that firms wishing to carry out process innovation proceed by incorporating physical capital, rather than, say, by making intangible investments in R&D (Rouvinen 2002). In this line of thought, (Parisi, Schiantarelli, and Sembenelli 2006), show that R&D spending is greatly and positively associated with the introduction of new products, whereas fixed capital spending (on embodied knowledge) increases the likelihood of firms introducing process innovations. David and Foray (1995) posit that the combining of known practices is an innovation pattern employed by SMEs that do not carry out R&D. This combining works by integrating existing knowledge in new ways (Evangelista et al. 2002), possibly while engaging in imitation or reverse engineering (Kim and Nelson 2000), or by employing engineering knowledge in order to carry out incremental changes (Kline and Rosenberg 1986). Consequently, there is a positive relationship between investment in embodied technical knowledge and the occurrence of process innovations, as argued by INNO-Metrics (2007), whereas

R&D activities are not expected to induce or characterize process innovation. To understand issues related to process innovators and their innovative activities we need to also take into account organizational innovation capabilities (Clausen et al. 2012; Damanpour 2014; Hervas-Oliver, Sempere-Ripoll, and Boronat-Moll 2014; Hollen, Van Den Bosch, and Volberda 2013). By organizational innovation we mean "the implementation of a new organizational method in a firm's business practices, workplace organization or external relations" (Organisation for Economic Co-operation and Development 2005, p. 51). Process innovation goes hand in hand with organizational innovation. This is because the two modes of innovation have overlapping objectives (Edquist, Hommen, and McKelvey 2001). In fact, in the study of Edquist, Hommen, and McKelvey (2001) it is argued that the occurrence of process innovation includes two different but related activities: "technological process innovation" and "organizational process innovation." Technological process innovations occur when new investment goods and intermediate goods, such as processing machines, industrial robots and IT equipment, are used in the process of production. Such technological process innovations must be accompanied by organizational process innovations, defined as new ways to organize business activities. They do not have technological dimensions but, rather, involve the coordination of human resources and work practices, such as just-in-time production, total quality management, or lean manufacturing. Traditionally, technology strategy (Ettlie 1988; Ettlie and Reza 1992) and operations management (Georgantzas and Shapiro 1993; Womack, Jones, and Roos 1990) have both emphasized how process and organizational innovation are concurrently combined during the innovation process.

2.4 Firm Performance

Performance is a relative concept/term used in many areas to describe how processes/actions realize their objective Murtala (2018), SMEs' performance can be seen from an entrepreneurial point of view as how well the firm is managed and what the firm provides for its customers and owners (Moullin, 2007). Gomes and Yasin (2011) opine that SMEs performance is the amount of stakeholders' needs met by the firms and the extent to which firms utilize the resources to meet those needs. However, in line with Murtala (2018) this study defines performance of SMEs as the ability to survive, grow and contribute to the creation of employment and alleviate poverty, firm performance can be measured by combining financial and non-financial components. The financial component includes profit growth, while the non-financial component is measured through sales, employee growth, market share, and business owner satisfaction (Fairoz et al., 2010; Shehu & Mahmood, 2014).

Business performance is a result that is shown through a comparison between targets and achievements by a business unit within a certain period of time. Semrau

et al. (2016) explains the measurement of a company's performance can be measured through two dimensions, namely the financial dimension and non-financial dimensions. Financial measurements can be done through comparison of changes in value in financial statements issued by companies. Non-financial measurements can be done through stakeholder satisfaction and organizational structure growth. Measuring company performance is subjective, meaning that performance measurement is very dependent on the subject that performs and the measurement tools used. Fairoz et al. (2010)

2.5 Entrepreneurial Innovation

The innovation process is described as the path of translating existing and new knowledge into marketable solutions (Lead, 2020). Paschen et al. (2020) argue that AI restructures the firm's innovation process dimensions, such as the innovation boundaries (product-facing & process facing innovation) and the firm's competencies (firm's competency-enhancing or competency destroying). 20 Verganti et al. (2020) define design as the "decision-making side of the innovation process Scholars also analyzed the role of AI in the innovation process of specific types of businesses, such as online platforms, online communities, service incumbent firms, and AI service providers. Hwang et al. (2019) analyzed and confirmed the positive role of data and information in improving the innovation process and idea generation in online crowd sourcing community platforms. Kim and Park (2017) also examined and confirmed that online user innovation communities refer to "'distributed groups of individuals focused on solving a general problem and developing a new solution supported by computer-mediated communication" (Dahlander & Wallin, 2006), enhancing the innovation process. Another example is Müller and Daschle (2018), who analyzed the effect of Industry 4.0 solution provider firms on the innovation process of their customers. They confirm that Industry 4.0 solution providers positively influence the innovativeness and productivity of their customers

2.6 Entrepreneurial Innovation and SMEs performance

Innovation is described as "the introduction of new or improved processes, products or services based on new scientific or technology knowledge and/or organizational know-how" (OECD 2015). An invention is the first occurrence of an idea for a new product or process whereas innovation is the act of putting it into practice. There are different types of innovation in business (Trott. P 2008); however it can be related to new products or services, new production processes, new marketing techniques, and new organizational or managerial structures (Rebound 2008). Innovation may also involve technology, intellectual property, business, or physical activity (Sundbo J 2003).It is generally posited that the product innovation becomes

the most important source of structural change in an economy because it alerts the mix of products, industry and jobs, which make up an economy.

A process innovation on the other hand refers to the new procedures, policies, organizational forms and knowledge embodied in the distribution channels, products, applications, as well as customer expectations, preferences, and needs coupled with the implementation of a new or significantly improved production or delivery method.

Most studies speak of product innovation and process innovation and all these are important towards development being at country or organizational level. Product innovation is the introduction of a good or service that is new or significantly improved regarding its characteristics or intended uses;

This includes significant changes in techniques, equipment and/or software. It can substantially lead to a decreased unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products. Fagerberg stressed that while the introduction of new products is commonly assumed to have a clear, positive effect on the growth of income and employment, process innovation, due to its cost-cutting nature, can have a more hazy effect on performance.

3.0 Artificial Intelligence

In a rapidly transforming and increasingly digitalized society, interest in artificial intelligence (AI) is growing. Artificial intelligence (AI) has received increasing attention from various areas of society, industry, and business (Ho, L.T.et al 2022). AI is referred to as the Fourth Industrial Revolution [2]. AI is a field that combines computer science with large datasets to improve the quality of business decision making. Artificial intelligence is the simulation of human intelligence by machines (programs) using technologies such as machine learning, deep learning, data mining, natural language processing, image recognition, and more (Khalid, N. 2020). AI and big data empower people to systematize disaggregated information in a system and transform data into actionable business decisions, thus accelerating company-wide decision making (Sestino, A. et al 2022);. Several studies have examined AI adoption and its influence on business performance by reducing costs and enhancing forecasting (Agarwal, V.; et al 2021), improving business operations, delivering increased productivity by substituting typical human everyday jobs with automation, enhancing product innovation, and fostering firm growth. Hence, businesses are focusing more on AI, and there is tremendous potential for AI to enhance the performance of firms.

Recently, a few studies have investigated AI adoption in the context of SMEs to examine AI technology's applicability in different situations such as AI-based Business-to-Business (B2B) practices and accounting automation. Moreover, a study examined the determinants of performance in the adoption of artificial

intelligence within the hospitality industry during the COVID-19 pandemic, shedding light on factors influencing the successful integration of AI technologies. A foundational study conducted in the realm of Saudi Arabian SMEs and AI explored the precursors and outcomes of AI practices in B2B firms, prompting further investigation into AI adoption. Additionally, another study employed the integrated technology acceptance model (TAM)‐TOE model to comprehend the factors shaping AI adoption within organizations. For SMEs, AI produces several relative benefits: reduced costs, quick decision making, and forecasting. In a highly competitive market, these benefits are essential for SMEs. Further, a study indicates that relative advantage strongly influences AI adoption. Firms that adopt AI technology can experience an increase in revenue, as AI can help firms to better understand their customers and make more accurate predictions about their behavior. AI adoption has clearly reduced the cost of production and allowed for efficiency in decision making that adds to increase profitability and improved financial performance. According to a study by the McKinsey Global Institute, AI adoption can increase global GDP by up to 1.2% annually by 2030. Furthermore, AI can help firms to reduce costs by automating repetitive tasks and optimizing processes.

Additionally, SMEs' adoption of innovative manufacturing-related information and digital technologies (SMIDT) depends on technological, organizational, and environmental factors (Ghobakhloo & Ching, 2019). Trust, management style, technological innovation, risk analysis, and perceived IT security risk are the factor that leads firms to adopt AI in their innovation structure (Raut et al., 2018). The scholars conclude that AI adoption in firm innovation depends on several organizational, individual, and natural factors.

Recent empirical studies have shown that small companies are much less innovative than large companies, Love, J.H. (2020). The reason for this is that, even though large companies may benefit from technological and learning economies of scale, organizational differences in size may outweigh these, As a result, small businesses are more likely to be subject to resource and material constraints in innovation than large companies, while large companies are more likely to be subject to behavioral constraints in innovation. In this study, within the SME’s context, Artificial intelligence has been taken as a moderator to check whether there are significant differences and influences on AI adoption and firm performance.

Researchers in academia consider the influence and implications of AI technology to be the most important research area (Sun TQ et al 2019), as acceptance of AI practices also impacts the financial and non-financial performance of SMEs. Studying the mechanisms and key factors of the impact of AI on firm performance has significant theoretical and practical value. Consequently, there is a compelling

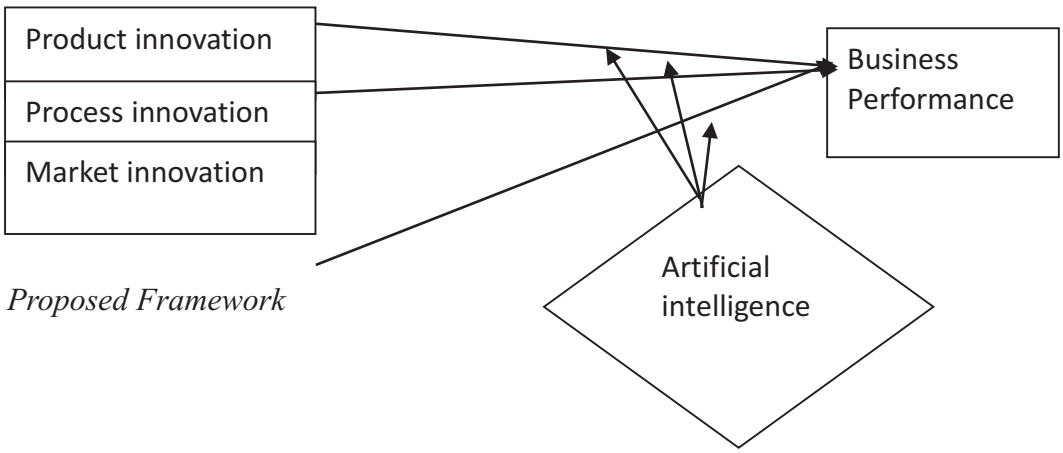
need to investigate the multidimensional factors that influence the adoption of AI within SMEs.

This article makes a dual contribution. Firstly, it delves into both the direct and indirect impacts on AI adoption. Secondly, it provides a more comprehensive evaluation of the factors influencing AI adoption compared to previous studies and further investigates how AI adoption decisions will affect SMEs performance in the context of tech based SMEs in Kano. Therefore, this study proposed the following propositions.

Proposition

1. Artificial intelligence moderates the relationship between product innovation and business performance among technology based SMEs in Kano
2. Artificial intelligence moderates the relationship between process innovation and business performance among technology based SMEs in Kano
3. Artificial intelligence moderates the relationship between market innovation and business performance among technology based SMEs in Kano
4. Product innovations has a positive relationship with Business Performance among technology based SMEs in Kano
5. Process innovations has a positive relationship with Business Performance among technology based SMEs in Kano
6. Market innovations has a positive relationship with Business Performance among technology based SMEs in Kano

Conceptual framework



Proposed Framework

4.0 Conclusion and Recommendation

Understanding the role of Artificial intelligence as a contingent variable on the relationship between Entrepreneurial innovation and technology base SMEs performance is paramount as such the importance of well performing tech SMEs to a country cannot be over be emphasized. Subsequently, The proposed research model integrates four individual related independent variables as predictors of SMEs performance and Artificial intelligence as a moderator. Similarly, the variables are selected with a review of past literature and very strong theoretical background. The uniqueness of this proposed framework is combining theoretically well-established and most important entrepreneurial innovation variables in a single research model in the context of SMEs in Kano. In addition, it is distinctive as Artificial Intelligence is considered as unidimensional moderating variable. Consequently, this paper posits that Artificial Intelligence moderates the substantial influence of these four Entrepreneurial innovations on SMEs performance. This is due to the fact that most of the previous empirical studies examine little Entrepreneurial innovation and concentrate on single dimension of Artificial Intelligence. Finally, the investigation of the proposed model will also open many research avenues for testing the moderating role of Artificial Intelligence that give more light in the context of SMEs research. Therefore, it is recommended for an empirical finding that will hugely assist entrepreneurs and SMEs in improving their enterprise performance.

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