The Impact of Digital Technologies on Manufacturing SMEs Business Perfromance

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Abstract: Businesses' ecosystems are ever-changing. In this highly competitive era, manufacturing Small-Medium Enterprises (SMEs) are gradually transforming their business operations with state-of-the-art digital technology. This study has established how digital technologies, such as big data analytics, the Internet of Things, and chatbots technologies, affect the business performance of manufacturing SMEs. However, the business performance of manufacturing SMEs is greatly impacted by digital technologies. The purpose of this research is to investigate how digital technologies affect manufacturing SMEs in emerging nations. The goal of digital technology influence is to boost manufacturing SME productivity. In order to find pertinent materials on the topic, this study's technique, which focuses on document analysis, is qualitative. Nineteen empirical papers were used in arriving at the objective of the study through the database of Web of Science, Google Scholar, and Scopus through keyword search. It was discovered that digital technologies significantly enhance the business performance of manufacturing SMEs. The current study has provided new directions, insights and structure for future studies since there is little research on digital technology on manufacturing SMEs. Additionally, the research will assist leaders in their efforts to defend the expenditure of funds on the construction of technology infrastructure for their organizations.

Keywords: Digital technologies, Manufacturing SMEs, Business Performance

1. Introduction

The rapid development in digital technologies has led to in the rise of a fourth stage, described as industry 4.0. Basic information management is no longer the primary concern; alternatively, digital technologies is being used to build support that are fiercely competitive(Frank et al., 2019). The Internet is regarded as one of the most important large data providers. In today's global corporate environment, the integration of digital technologies in manufacturing SMEs becomes increasingly significant (Del Giudice et al., 2021a).

Over the past ten years, manufacturing SMEs have been looking at the potential applications of cutting-edge digital technologies, such as big data analytics, chatbot technologies and the Internet of Things, in their logistical operations and manufacturing systems(Kandarkar & Ravi, 2024). These digital technologies are seen as affirming tools to enhance inventory chain operations, such as ordering, administration, time management and making arrangements. Digital technologies are commonly employed in manufacturing SMEs as a means of transportation to track and trace distribution and storage activities, as well as to oversee the production cycle(Dutta et al., 2020a).

Many nations are transitioning from old production methods to digitalization in industry and services, especially in the field of manufacturing. Manufacturing SMEs must reconsider their corporate patterns as an outcome of technological creative thought. In multiple sectors, a few companies are demonstrating greater abilities to employ digital technologies to gain a competitive advantage(Sun et al., 2023). To remain viable, the manufacturing industry has to confront its organizational frameworks, learn from digital technology disruptors, and modify its structure and approach to a more digitalised structure, which will enhance business performance and profitability(Butt, 2020a). Digital technologies offer potential as well as challenges for the long-term growth of manufacturing SMEs. Technological developments, on the additional hand, could enhance the competitive environment in manufacturing SMEs performance while additionally imposing economic and sustainability responsibilities on SMEs in the manufacturing sector (Menne et al., 2022)

It should be noted that the influence of digital technologies on the business performance of manufacturing SMEs is still being studied(Dutta et al., 2020b).

According to this study, the impact of digital technologies on the business performance of manufacturing SMEs must be realized through a well-established digital platform. Prior studies have highlighted the significance of digital technologies on business performance in many business sectors; however, the impact of digital technologies on business performance in the manufacturing SMEs sector has been ignored. As a result, the purpose of this research is to fill that void.

2. Literature view and theoritical framework

2.1 Introduction

Digital technologies in business can be seen as information technologies that allow e-business structures to work more efficiently in the workplace(Landry et al., 2005). The implementation of digital technologies in manufacturing SMEs (creation, distribution, exchange, consumption, and subsequently utilization of products items and services) benefits the governments and individuals as well (Dutta et al., 2020c).

For decades, all industrial sectors have made extensive use of digital technology. Initially, it was a tense and unstructured process, but tremendous corporations and governments have understood that a defined structural solution to this issue is required (Markham et al., 2015).

2.2 Resource-Based View Theory

The perspective of resources-based Theory states that a team of resources' capability is what helps a firm to accomplish an objective or activity(Kim et al., 2015). It concludes that a firm's resources are what give it its skills and abilities, which are what give it a competitive advantage(Newbert, 2008). Digital technology is thus the most recent instrument used by manufacturing SMEs to manage resources for production and manufacturing in an efficient manner.

According to the resource-based view theory, manufacturing SMEs must manage their resources to produce goods and services for as profitable as possible(Quaye & Mensah, 2019). As a result, employees—who are portrayed as labor in the manufacturing process theory—must receive the appropriate education and skills to apply technological talents to the management of organizational resources(Sima et al., 2020). As a result, the adoption of digital technologies by the company boosts output and offers it a competitive edge over rivals in the market. However, the use of digital technologies also increases the need for capital for manufacturing SMEs. In addition to emphasizing that the company's human IT skills, IT infrastructure, and IT reconfiguration are its unique resources, the RBV of IT suggests that the company's technological assets be its competitive potential (Chepkole & Deya, 2019.). A firm's exceptional efficiency and excellent management abilities stem from the convergence of its technical resources. The present research investigates the impact of digital technologies on the business performance of small and medium-sized manufacturing enterprises in emerging economies, including chatbots, Internet of things, and Big Data Analytics.

2.3 Big data analytics

Big data analytics is typically shown in company performance studies to assist, appropriate choices, offer understanding that improve competitive edge, drive creativity and provide an avenue to manage organizational complexity(Mikalef et al., 2020) . Manufacturing SMEs are increasingly investing in big data analytics and incorporating them into their company's operations to enable them to take advantage of the advantages of useful information(Maroufkhani et al., 2020). As a result, manufacturing SMEs can gain from the use of Big Data Analytics due to unplanned asset interruptions can be significantly prevented, enabling firms to reduce block supplies, allowing the partners to sustain a more efficient distribution network while limiting the risk associated with supply of goods and services (Kache & Seuring, 2017). The use of big data analytics in manufacturing SMEs operations could enhance agility and business efficiency (Khalil et al., 2023).

The shift toward big data analytics-supported measurements of performance enables individuals with authority to employ further information while executing defined objectives and making future plans for corporate operations(Kitchens et al., 2018) . As a result of the importance of big data to manufacturing SMEs, an increasing number of organizations have chosen people with big data technical expertise and this technical ability encompasses employees' expertise and knowledge in exploiting big data analytics to get insight for company decision-making(Niebel et al., 2019). Employees at the upper, middle, and lower levels should base any business decision on knowledge gained from big data analytics rather than what they know personally(M. Gupta & George, 2016) .

2.3.1 P1: Big Data Analytics have a positive effect on manufacturing SMEs performance.

Chatbot Technologies

Communicating using natural language systems is incredibly enticing, and it has grown increasingly vital for industry. Natural language interfaces (NLI) provide a wide variety of diverse possibilities for people to engage and cooperate with users in the manufacturing industry(Affolter et al., 2019)

Chatbot technologies are a type of artificial intelligence tool designed for natural language conversation among humans and can be built using systems of rules or artificial brains to figure out the best response to the client's

query(M. Gupta & George, 2016). Unlike applications and websites, chatbots can foresee queries from customers, maintain active interaction with consumers, and show what precisely consumers have been seeking for(Rese et al., 2020). Consumers and other users would have to begin dialogue with human operators themselves or explore webpages for the necessary information in the lack of a chatbot technologies within manufacturing SMEs (Rapp et al., 2023). It also results in problematic, futile, and easily preventable inquiry methods.

Chatbots can start interactions according to an individual's context, including location or clickstreams, which makes the user feel like they are being directly addressed during the manufacturing SME operation(Calderon-Monge & Ribeiro-Soriano, 2024). Since conversations involving consumers and chatbots can be systematically looked at in order to better comprehend customer needs, chatbot also serve as useful tools for business analysis in manufacturing SMEs (Chen et al., 2023). As a result, products and services are improved. Chatbots technologies boost client loyalty by accelerating procedures and instantaneous responses in the manufacturing industry.

2.3.2 P2: Chatbots technologies have a positive effect on manufacturing SMEs performance.

Internet of Things

IoT has become known in recent years as the most significant subject spanning in manufacturing SMEs. IoT is not just an important buzzword in corporate circles; it is also a growing trend, a well-established strategy, and a revolutionary technology(Liguori et al., 2024). IoT is a system where devices have wireless connections via advanced sensors that interact with other objects despite a need for human involvement (B. B. Gupta & Quamara, 2020). A few early Internet of Things (IoT) applications have already been implemented in the health and transportation sectors, as well as home use and various self-propelled enterprises including the manufacturing sector(Mubarak et al., 2021) . We may thus comprehend the strength of the effective force that IoT competence can supply.

IoT technologies are also widely used in several enterprises; for instance, by administering details that is more accurate and relevant, IoT can increase transportation and distribution management in manufacturing SMEs(Ben-Daya et al., 2019) . Startups have been actively entering the IoT market to develop new services or products from a business perspective (Gimpel et al., 2018). In view of the IoT market's capability to protect the manufacturing SMEs potential for sustained growth while improving the prevailing ICT environment, it is gaining significant focus(Peter et al., 2022) . The implementation of an accountancy-based (monetary) technique to evaluate financial efficiency, particularly revenue, sales rise pace, profit margins, inventory turnover, and customer share, is additionally an essential step for the implementation of the Internet of Thing(Tang et al., 2018). By considering the manufacturing SMEs long-term performance, this approach can show how well it has operated in past times.

2.3.3 P3: Internet of Things have a positive effect on manufacturing SMEs performance.

Manufacturing SMEs

Many manufacturing SMEs are striving extensively to use technological advancement to increase the viability of their productivity(Del Giudice et al., 2021b). Implementing digital technology and improved information to make the manufacturing procedure more efficient, they may reduce fluctuation, boost production efficiency and value, and reduce the occurrence of malfunctions and delays(Ivanov et al., 2019). However, there are significant distinctions amongst entities in the depth and extent of such efforts.

Manufacturing SMEs also engage in an array of other tasks made possible by digital technology. For instance, computer visualisation systems that detect manufacturing errors using artificial intelligence strategies eliminate the need of manually inspecting products or components after they are taken away from the assembly line(Schlosser et al., 2022; Sundaram & Zeid, 2023). Research shows that manufacturing SMEs are putting resources into digital manufacturing facilities in anticipation of boosting productivity and lowering manufacturing expenses by producing superior goods at more affordable prices(Butt, 2020b; Yu et al., 2021). A smaller workforce will be required for manufacturing SMEs, so the work can be planned carefully without attention for devote expenses. This is another significant effect of digital technologies on manufacturing SMEs that has not yet come to pass(Bouwman et al., 2019). Relocating manufacturing plants to a region where there already exists labour with digital abilities can be beneficial(Attaran, 2017).

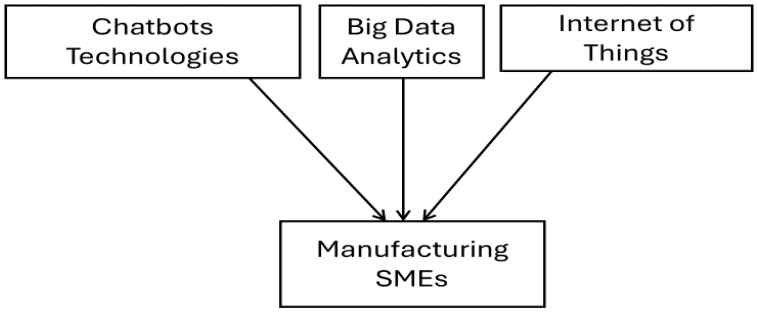

Fig. 1 – Conceptual framework sourced by authors own construct depicting the various propositions made. Source: own research

3. Methodology

For this paper, the key tactic employed was the qualitative method. Document assessment was a key technique used in this study. Document assessment involves the technique of investigating and assessing materials using physical and digital information for the purpose to generate appropriate outcomes(Bowen, 2009) . It was also beneficial for the current research because the usage of document examination yielded sufficient evidence for significant data and sources of information. Recent scholars like have employed document assessment as a type of qualitative research technique(Bluhm et al., 2011; Busetto et al., 2020).

Examining how digital technologies affect the performance of manufacturing SMEs in developing nations was the main aim of this study. The years 2017–2023 were addressed by the data inquiry. Digital technologies were chosen as the study's key components, and the unearthed linked domains were associated with the awareness garnered from additional resources and evaluation of the information in question. Furthermore, as an outcome of a variety of literature on the broader subject of digital technologies. Because it offers an extensive viewpoint to evaluate the distinctions of the study's focus event, document scrutiny is a suitable approach. The issues of the study were primarily drawn from the manufacturing SMEs business performance plan, notably the idea of digital technologies impacts in developing nations. Overall, a great deal of important information has been arranged by the writers in a document that they could use. Developing a conceptual mode was the notion's goal. The Scopus, Web of Science, and Google Scholar databases were mined for relevant information using the keywords "manufacturing SMEs performance" and "digital technologies impacts." A large number of articles on the topic were obtained in accordance with the defined intent. A total of seventeen items were carefully employed. Each paper that was downloaded and utilized in this study was prepared in English. Certain information retrieved from relevant supplementary sources were examined as well as part of the study approach (Tambe et al., 2019). A comprehensive review of the research that dealt with subjects that were brought about as a result of the used technique is refuted by investigators.

4. Results

As a matter of fact, the majority of policymakers of developed countries are anticipating a significant strategic contribution of digital technologies in the whole business. The findings of this study are in alignment with the ones in (Chowdhury et al., 2022; Hanifah et al., 2022) which they also reported positive effects of these factors on performance of manufacturing SMEs in developed economies. However, the influence of these digital technologies on manufacturing performance was revealed significant in the current study, which is in alignment with the results of on the SMEs of developed economies (AL-Shboul, 2023; Zahoor & Lew, 2023).

The potential reasons for these consistent results can be the issue of the similarities in business environment of developed and developing economies. Reportedly, developed economies happens to have adopted advanced technology earlier than developing economies, which has reasonably enhanced the absorptive capacity of its manufacturing SMEs. Gone are the days of mere reading such innovation discourses to find the corroboration of such technologies, it is rather the time to embrace it in order to attain competitive advantage and to sustain in the increasingly challenging marketplace. Therefore, the managers need to balance the exploration and exploitation of their companies to atttain agility which is a pre-requisite to evolve the business settings in modern times. Consequently, digital technologies including big data, chatbot technologies and internet of things

are needed to balance such a situation in order to enhance productivity and performance while achieving competing advantage.

5. Conclusion

According to earlier research in the academic field of technology management, the implementation of digital technologies will improve the outcomes for tasks within the organization. There is little of study on the benefits of digital technologies in other emerging economies. This study aims to address the key concerns on digital technologies that affect the performance of manufacturing SMEs by examining their impact on manufacturing SMEs' performance in developing economies. The literature analysed for this study indicates that chatbots, the Internet of Things, and big data analytics have an impact on the performance of manufacturing SMEs in developing nations. The study will have a significant influence, especially on those who work in the manufacturing sector. It is the responsibility of individuals and management to create an atmosphere in their organizations where digital technologies are effectively adopted. Without a strong digital technologies system, the company will not be able to reach its intended level of efficiency and effectiveness.

An organization's capacity to integrate digital technologies into its daily operations is one of the major determinants of its success. Innovation and fresh ideas are embraced more slowly by organizations that struggle with technology adoption. Thus, there is proof that chatbot technologies significantly impair the productivity of manufacturing SMEs inside a company. Successful organizational performance and productivity typically demand an effective digital technology system. Furthermore, an organization cannot reach the level of effectiveness it desires without considering an atmosphere that is conducive to the adoption of various digital technologies, regardless of the advantages offered by the digital tool. For most organizations, the lack of diversity in digital technologies is a problem. To ensure a high degree of productivity inside the organization, people should be provided with regular training and direction regarding the techniques they use to complete their tasks.

5.1 Limitation of the Paper

This study may have been strengthened by incorporating a number of other well-known online databases that publish on the performance of manufacturing SMEs in order to give a wider foundation and a general awareness of the main issues highlighted and explored in this research. Additionally, the results of the study should not be generalized without careful consideration as they are not supported by actual data.

5.2 Theoretical and Managerial Implications

On the other hand, digital technology appears to be a key factor affecting how well a company performs. The company's executive team makes the decision to improve the effective adoption of digital technology across the enterprise. This is useful in enlightening individuals operating in developing economies about the core concepts and values that could spur national growth**.** It also aids in the development of a better understanding of the idea of digital technology and the channels that are accessible inside a company. The research findings will contribute to the theoretical and empirical foundation in the field of digital technology initiatives.

The present study's analysis can serve as a continuous basis for managers to monitor the productivity and production levels within the firm. As soon as these effects of technology are recognized, managers will provide pre-service and in-service training to enable staff members and supervisors consider how they relate to people from different cultural backgrounds and introduce them to the culture of their clients. The adoption of digital technologies will improve the state of the economy by helping managers and representatives create an atmosphere that will foster economic expansion and the development of the country.

5.3 Suggestion for Further Research

Finding out the barriers posed by digital technologies in developing economies and the best strategies that managers and owners of businesses should use to deal with the situation at hand could be interesting.

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