

# THE ADOPTION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) AS A SUSTAINABLE GROWTH STRATEGY FOR SMALL ENTERPRISES

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## Abstract

In the context of South Africa's economic environment, information communication technology integration appears to be a critical component in supporting small businesses' objectives for sustainable growth. The paper explores the deployment of Information Communication Technology and illustrates how it influences the distinctive structure of small businesses in South Africa. Data was collected from 374 manufacturing small and medium enterprises in KZN using convenience sampling and a positivist perspective. According to the results, there exist several barriers impeding manufacturing small and medium enterprise's ability to grow sustainably. These barriers encompassed lack of digital skills (81.6%), vulnerability associated with ICT (90%) and infrastructural challenges (93.4%). It is therefore, recommended that to foster sustainable growth, small businesses should implement a well-rounded plan that integrates different strategies, such as management skill development, cybersecurity support, and infrastructure improvement.

**Keywords:** SMEs, Growth Hindrance, Technical Skills, Sustainable Development, Entrepreneurship, 4IR Technologies, Implementation.

## INTRODUCTION

There have been ongoing debates about the ICT's explosive growth, which is presenting profound effects on many industries, including the manufacturing sector across developed nations. Leading to manufacturing SMEs in developing nations such as South Africa to embrace ICT solutions to improve their operational efficiency and maintain competitiveness. Despite its crucial role in their success, South African SMEs in the manufacturing sector encounter difficulties in effectively utilising ICT solutions. These hurdles that impact on manufacturing SME survival includes, lack of digital skills, managerial support, vulnerability associated with ICT and infrastructural challenges. Due to these oppressive challenges and limited resources, manufacturing SMEs continue to struggle to formulate innovative ideas in order to engage in economic activities. The persistent obstacles confronting small businesses in the manufacturing sector inspire us to ponder on means through which we can improve their technological proficiency. Furthermore, not only is it essential for the survival of manufacturing SMEs to address the digital gap and assist with the incorporation of ICT into their business strategy, but it is also essential for promoting economic growth and sustainability in the larger context of South Africa.

## LITERATURE REVIEW

The increasing relevance of ICT in small manufacturing business exemplifies its ability to reshape the operational landscape of modern businesses. Therefore, manufacturing small businesses that choose to incorporate ICT undergo a substantial shift in their operational dynamics, communication methods, and innovation mindset. The transition involves not only incorporating new technology but also exploring innovative approaches to tasks and effectively utilising ICT for survival in a competitive world (Nazir and Khan, 2022; Fornes and Altamira, 2023). The above can be achieved through conducting a feasibility study which will not only aid in identifying gaps or areas for development before implementing ICT but will help manufacturing SMEs in identifying the necessary actions that need to be taken (Mboniyane, 2022; Saruchera and Mpunzi, 2023). However, establishing an effective ICT utilization strategy for small enterprises in South Africa was hindered by the presence of multiple government agencies responsible for distinct sectors of the industry, complicating comprehension of their individual policies. (Donnelly, 2022; Smidt and Jokonya, 2022; Maluleke and Khoza-Shangase, 2023). This complexity makes it difficult for SMEs to stay updated on relevant legislation, leading to difficulties in developing practical plans for ICT use (Masocha and Fatoki 2018; Raj 2022; Singh et al. 2023). Additionally, unclear regulatory criteria for ICT adoption often leave SMEs uncertain about their expectations (Schoeman and Seymour, 2022; Peter et al., 2023). Moreover, understanding the intricate ICT applications becomes substantially more challenging for small manufacturing businesses in South Africa, amplified by the existing digital skill gap. As a result, this assertion is supported by Leboea (2017); Mkhathshwa and Mawela (2023); Siriwardhana and Moehler (2023) who established that the ongoing skills gap within the South African manufacturing sector continue to hinder SMEs ability to recruit staff with ICT skills. This further resulted in manufacturing SMEs from only leveraging a fraction of the potential of ICT solutions, further hampering SME competitiveness (Zide and Jokonya, 2022; Msimango, 2023). Therefore, addressing this skills gap was crucial for manufacturing SMEs' because it played a pivotal role in establishing a conducive setting for technology-driven small manufacturing businesses.

The awareness of the value of integrating ICT for sustainable growth is gradually spreading among small manufacturing businesses. This is especially true when it comes to protecting their digital security. Therefore, the usage of ICT becomes highly significant and obligatory for manufacturing SMEs. However, South African SMEs face challenges in utilising ICT as a sustainable development strategy due to inadequate access to digital infrastructure and vulnerability to data theft and hacking (Ndou, 2020; Aruleba and Jere, 2022). Moreover, the absence of effective cybersecurity and digital literacy strategies further threatens the seamless implementation of ICT by manufacturing SMEs (Moraka, 2021; Rollins, 2023; Santos, 2023). These deficiencies have been found to deter manufacturing SMEs from embracing ICT as a tool for sustainable development (Gwala and Mashau, 2023; Williams and Murphy, 2023; Mhlanga, 2023). The deployment of ICT as a sustainable development, was also found to be a crucial tool for providing timely and accurate information to SMEs (Jadhav et al., 2023). This is because ICT aided manufacturing SMEs in handling data efficiently, thereby enhancing decision-making and consumer engagement (Nunden et al., 2022). Moreover, Lokhande et al.

(2021) alluded to how manufacturing SMEs can better track their production processes, monitor their energy consumption, and develop efficient methods for producing their products through ICT adoption. Information Communication Technology is crucial when it comes to improving efficiency and innovation in the field of product creation. Therefore, SMEs without extensive technological resources face difficulties in engaging in research and development, which is an essential aspect in the creation of innovative and exclusive product for commercialisation (Ndlela 2022; Mohamed, 2023). Neglecting the issues faced by small manufacturing businesses could have dire consequences such as diminished competitiveness, heightened risk of cyber-attacks, less effective operations, insufficient innovation, economic stagnation, and social inequalities. The paper explores the deployment of Information Communication Technology and illustrates how it influences the distinctive structure of small businesses in South Africa. To achieve the above stated aim, the following objectives will be considered and addressed.

- To determine the variables that influence ICT adoption by SMEs as a sustainable development strategy.
- To explore the extent to which ICT adoption is used as a sustainable growth strategy for SMEs success.

## **METHODOLOGY**

The focus of this study was 374 manufacturing SMEs located in KZN, a region in South Africa. Convenience sampling and a positivist methodology were used in the study to gather primary data. A descriptive statistics and factor analysis were performed on the collected data utilising SPSS version 26.0. Pilot research was conducted to evaluate the instrument's usability before the main investigation. The inclusion criteria made sure that we looked at manufacturing SMEs in KZN with 50 to 250 employees who are considering using ICT. The Durban University of Technology Faculty Research Ethical Committee's clearance allowed for the upholding of ethical standards. In addition to receiving a comprehensive letter detailing the goals, methods, risks, rewards, compensation, and participant confidentiality of the study, participants gave their informed consent.

## **RESULTS DISCUSSION**

This section seeks to depict and discuss the findings from the quantitative analysis in relation to ICT adoption by manufacturing SMEs.

### **Response Rate**

This study aimed to analyse 374 manufacturing SMEs in KwaZulu-Natal using 374 questionnaires. Out of 261 responses, a 70% response rate was obtained, indicating a satisfactory response rate above 65%, which is significant for analysis (Sekaran and Bougie 2010). The study's coverage and reliability were enhanced by the high response rate.

## Inferential Statistics

The study utilized inferential statistics to enhance understanding of the adoption of ICT as a catalyst for manufacturing SMEs, requiring in-depth analysis for conclusions. Descriptive analysis was performed to identify trends and relationships between variables, providing a better perspective on the relationship between ICT and sustainable growth in manufacturing SMEs.

## Reliability Test Scores (Cronbach Alpha)

The study used Cronbach's Alpha to calculate similarity between respondent replies, indicating higher consistency. Data triangulation and respondent validation improved reliability and validity. Cronbach's Alpha was tested at 0.65, yielding reliability scores (0.782) exceeding the recommended value, indicating acceptable, consistent scoring for the instrument.

## KMO and Bartlett's Test

**Table 1: KMO and Bartlett's Test**

	Section	Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
			Approx. Chi-Square	Df	Sig.
B	Range of ways in which 4 <sup>th</sup> industrial revolution technologies are used by manufacturing SME's in KZN	0.841	529.599	45	< 0.001
C	The strengths/benefits associated with the adopted 4ir technologies in the enhancement/success of manufacturing SME's in KZN	0.730	601.160	45	< 0.001
D	The limitations presented by the adoption of 4ir technology in the success of manufacturing SME's	0.805	983.058	66	< 0.001
E	The practical strategies for overcoming barriers to implementation of 4ir by SME's in KZN	0.843	843.434	55	< 0.001

The table demonstrates that all prerequisites for factor analysis are met, with Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin Measure of Sampling Adequacy values less than 0.05 and larger than 0.500, respectively. The findings show that sampling and all variables under four themes are sufficient and statistically significant. A 0.843 KMO measure of sampling adequacy indicates that practical strategies for overcoming barriers to implementation of 4IR by SME's in KZN significantly impact (0.001) on their capacity for innovation and sustainable growth.

## Measuring Instrument

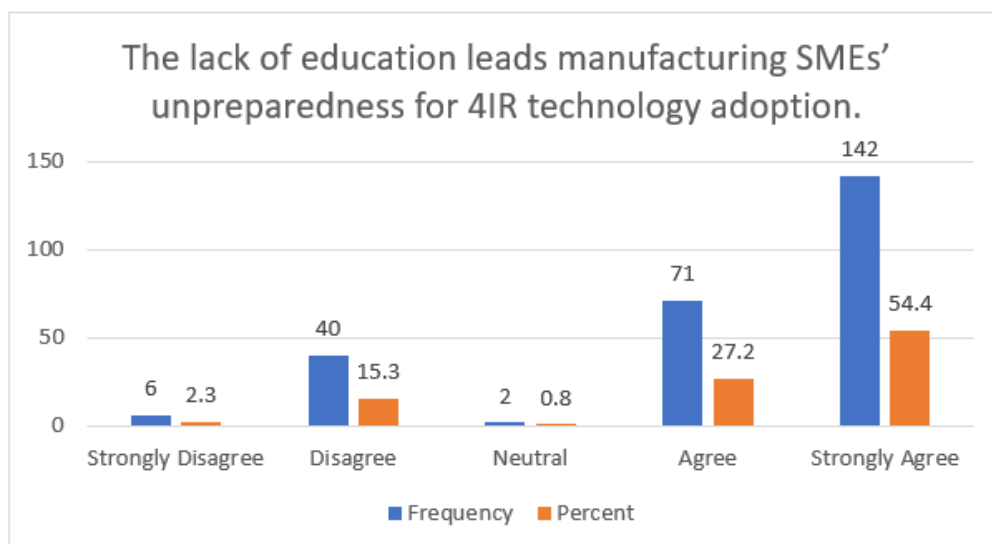
To accomplish the objectives of this study, a well-constructed research instrument was utilised to collect the relevant data. Summary on the tested statements of the questionnaire is reflected below.

**Table 2: Measuring instrument**

CATEGORIES	STATEMENTS
Factors that influence ICT adoption by manufacturing SMEs	<b>Alternative response: strongly agree; agree; neutral; disagree; strongly disagree</b>
	<i>The lack of education leads manufacturing SMEs' unpreparedness for 4IR technology adoption.</i>
	<i>The lack of managerial knowledge and skills on 4IR technologies slow down the adoption of ICT.</i>
	<i>Lack of infrastructure to support technology adoption limits the successful implementation of technology.</i>
	<i>The incompatibility and complexity of technology hinders the successful adoption of 4IR technology.</i>
	<i>The cost of keeping up with the latest technology limits the successful adoption of technology.</i>
	<i>The vulnerability associated with 4IR on security issues influence the resistance of technology adoption.</i>
ICT adoption as a sustainable growth strategy	<b>Alternative response: strongly agree; agree; neutral; disagree; strongly disagree</b>
	<i>4IR technology is utilised to provide more timely and accurate information for decision making.</i>
	<i>Technology reduces business costs, improve productivity, and strengthen growth possibilities.</i>
	<i>ICT adopted is used for the creation of products</i>
	<i>The adopted technology is a key driver in meeting customer needs and satisfaction.</i>

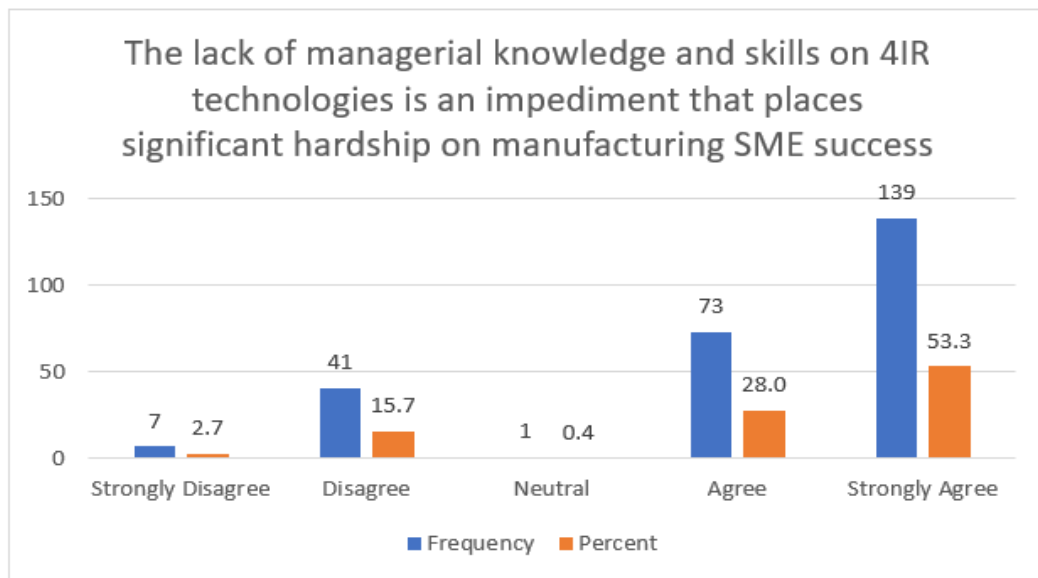
The empirical findings discussed below provides a clear picture of the various factors that influences ICT adoption as a sustainable tool by manufacturing SMEs. The discussions further expand to uncover the role of ICT as a sustainable tool for the success of manufacturing SMEs.

**FACTORS INFLUENCING ICT ADOPTION AS A SUSTAINABLE TOOL**



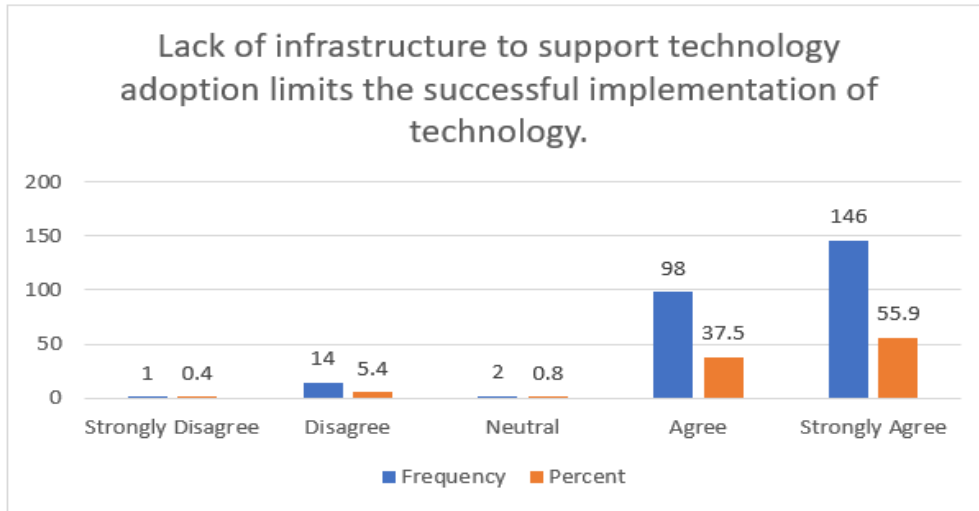
**Figure 1: The lack of education leads manufacturing SMEs' unpreparedness for 4IR technology adoption**

The findings clearly demonstrates that 213 (81.6%) of the respondents agreed that lack of education leads manufacturing SMEs' unpreparedness for 4IR technology adoption. Less than 20% (46) of the respondents disagreed with the statement, while only 2 (0.8%) respondents were neutral to the statement. Based on the findings, it is evident that lack of education and understanding of emerging technologies under the 4IR is a major barrier to effectively adopting ICT as a sustainable tool. This might be due to South African manufacturing SME owners and employees' inabilities to comprehend technical aspects of ICT and the utilization of these technologies to supplement their operations (Telukdarie, Dube, Matjuta and Philbin 2023). These findings are supported by a Chi-square test which depicts that  $X^2= 253.272$ ;  $df = 4$ ;  $P = 0,001$ , which strongly emphasise the strong significant relationship that lack of education has on manufacturing SMEs ability to adopt ICT.



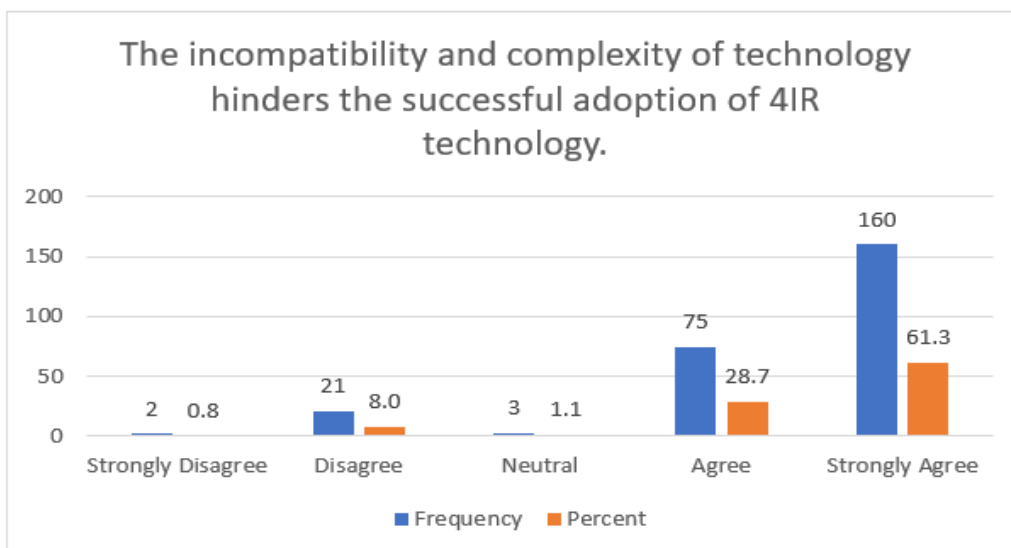
**Figure 2: The lack of managerial knowledge and skills on 4IR technologies is an impediment that places significant hardship on manufacturing SME success**

The findings clearly demonstrate that 212 (81.3) of the respondents agreed that lack of managerial knowledge and skills on 4IR technologies is an impediment that places significant hardship on manufacturing SMEs success. These findings were found to be significant based on the Chi-square test ( $X^2= 244.383$ ;  $df = 4$ ;  $P = 0,001$ ) which reflected the significance levels of the tested variables. It was also gathered that other respondents 48 (18.4) disagreed that lack of managerial knowledge and skills on 4IR technologies slowed down the adoption of ICT. An insignificant number of the respondents 1(0.4) was neutral to the statement. The management skills deficiency, especially those that are technical, are halting ICT adoption as management is not comprehensively clued about ICT. This means that manufacturing SMEs will continue to find the adoption and implementation of 4IR technologies a challenge as inadequate knowledge could result in manufacturing SMEs losing interest on the benefits of ICT.



**Figure 3: Lack of infrastructure to support technology adoption limits the successful implementation of technology**

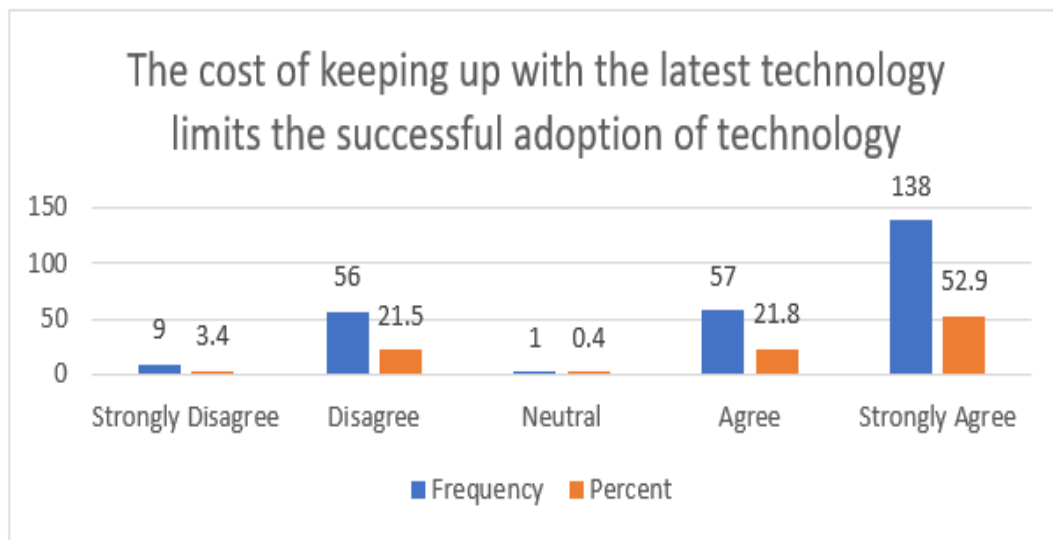
The findings in *figure 3* illustrate that a significant number of the respondents 244 (93.4%) strong agreed that Lack of infrastructure to support technology adoption limits the successful implementation of technology. Only 15 (5.8%) disagreed and 2 (0.8%) were neutral to the statement. These findings clearly indicates that the cost of purchasing and maintaining IT infrastructure can be a heavy burden for manufacturing SMEs in South Africa, especially those with limited resources (Kativhu, Iwara and Mwale 2021). The findings are also supplemented by a Chi-square test ( $X^2= 335.188$ ;  $df= 4$ ;  $P= 0,001$ ) which indicated that lack of infrastructure significantly contributes to manufacturing SMEs inability to adopt ICT.



**Figure 4: The incompatibility and complexity of technology hinders the successful adoption of 4IR technology**

The findings in *figure 4* illustrate that a significant number of the respondents 235 (90%) strongly believed that the incompatibility and complexity of technology hinders the successful adoption of 4IR technology. Only 23 (8.8%) disagreed and 3 (1.1%) were neutral to the statement. These findings clearly indicates that manufacturing SMEs in KwaZulu-Natal are using outdated technology which is failing to align with 4IR technologies.

Furthermore, the results from a Chi-square test ( $X^2= 345.877$ ;  $df = 4$ ;  $P = 0,001$ ) revealed that there is a strong relationship between incompatibility and complexity of technology and successful adoption of 4IR technologies. Without the right technical support, manufacturing SMEs may struggle to maintain compatibility between different systems, leading to inefficiencies or even a complete failure to integrate (Ogwu and Naicker 2023).

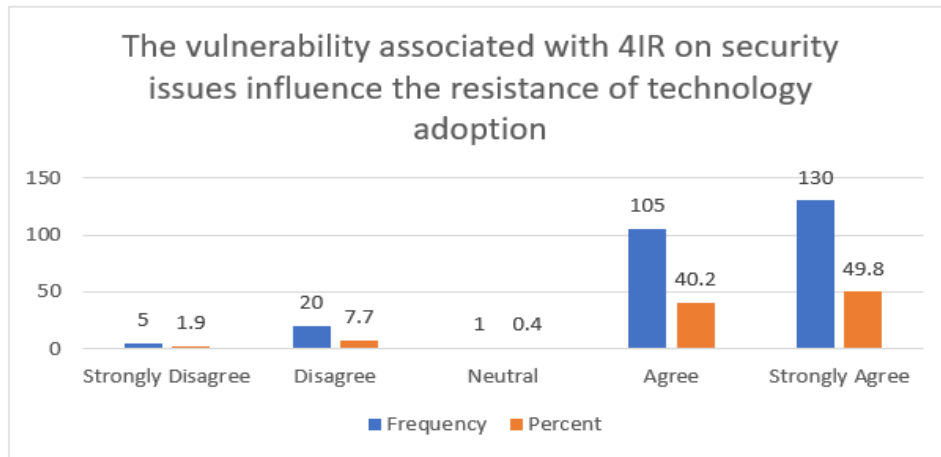


**Figure 5: The cost of keeping up with the latest technology limits the successful adoption of technology**

As depicted in *figure 5*, a significant number of respondents 195 (74.7%) strongly believed that the cost of keeping up with the latest technology limits the successful adoption of modern technologies.

To prove and supported these findings, a Chi-square test was performed, where it was discovered that  $X^2=227.716$ ;  $df = 4$ ;  $P = 0,001$ , which indicates that there is a strong relationship between costs and ICT adoption. These findings are supplementary to each other as it was earlier discovered that lack of education, and managerial knowledge and skills influence the adoption of ICT.



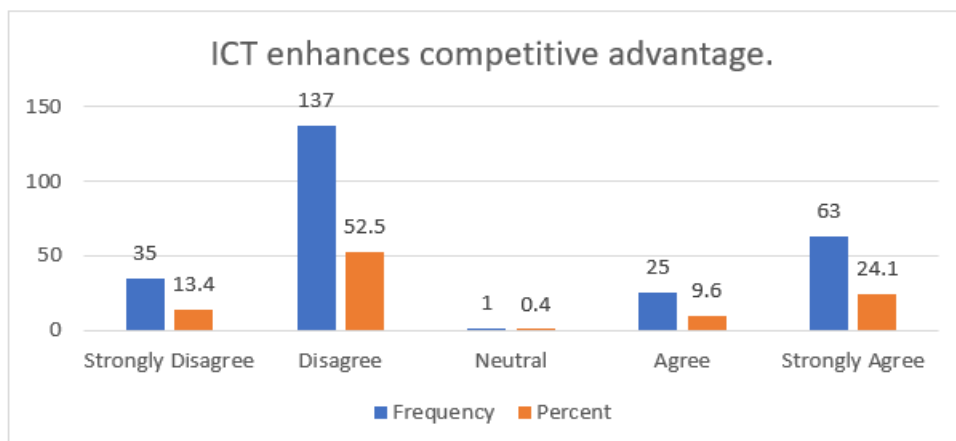


**Figure 6: The vulnerability associated with 4IR on security issues influence the resistance of technology adoption**

The findings illustrate (figure 6) that a significant number of the respondents 235 (90%) strongly believed that the vulnerability associated with 4IR on security issues influence the resistance of technology adoption. A lesser number of the respondents disagreed 25 (9.6%) and 1 (0.4%) were neutral to the statement. These findings were found to be significant as per the Chi-square test results ( $X^2=282.123$ ;  $df = 4$ ;  $P = 0,001$ ), which reflected that the increased improbability around security levels of 4IR technology is one of the robust factors contributing to manufacturing SMEs failure to adopt ICT. The urgency is now to consider education and skills development to ensure the safe and proper use of new technologies in manufacturing.

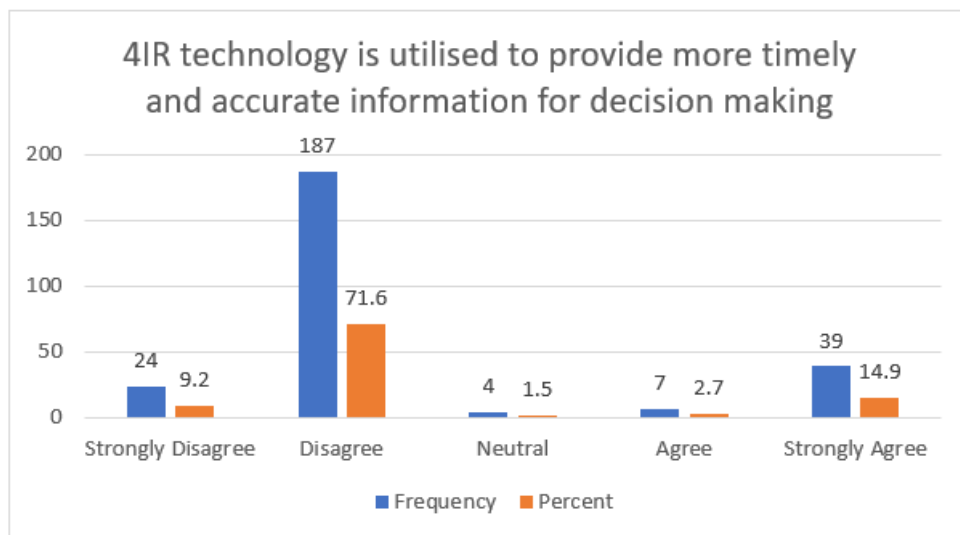
The following findings and discussions focused on the role of ICT as a sustainable tool for manufacturing SMEs.

**The Role of ICT as a Sustainable Tool For The Success of SMEs**



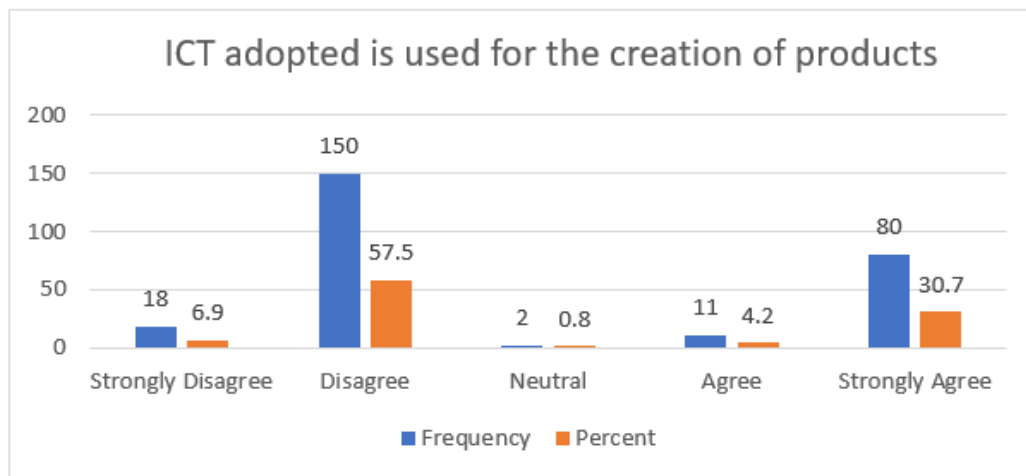
**Figure 7: ICT enhances competitive advantage**

The findings illustrate (figure 7) that a significant number of the respondents 172 (65.9%) strongly believed that ICT does not enhance competitive advantage, while 88 (33.7%) respondents agreed that technology plays a starring role in enhancing competitive advantage. An insignificant number (0.4%) of respondents were neutral to the statement. These findings contradict Francke and Alexander (2019) which found that ICT as a sustainable development strategy can help enhance SME competitiveness in a few ways. These findings were found to be significant as per the Chi-square test results ( $X^2=210.054$ ;  $df = 4$ ;  $P = 0,000$ ), which reflected that ICT does not enhance competitive advantage. Therefore, the empirical findings reflect that due to lack of awareness and robust adoption of emerging technologies, manufacturing SMEs are not seeing the benefits of ICT.



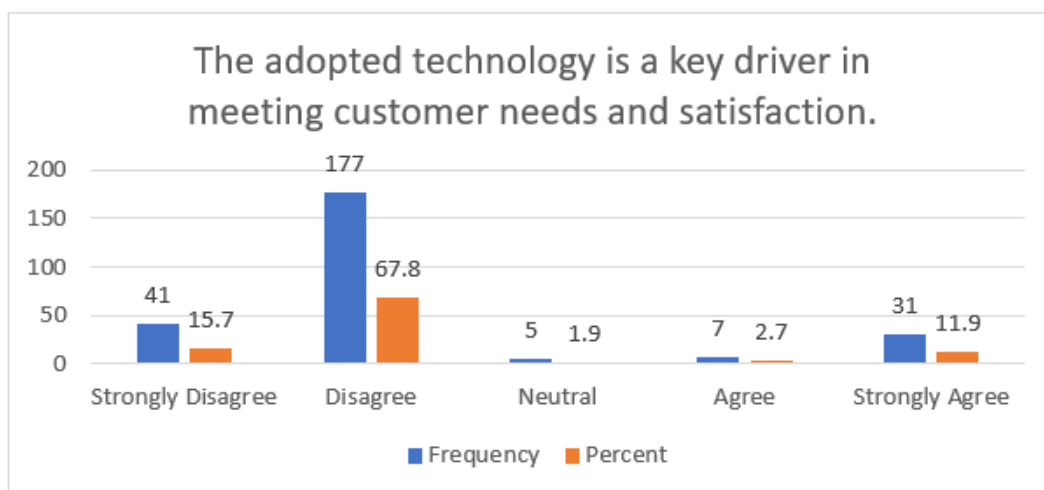
**Figure 8: 4IR technology is utilised to provide more timely and accurate information for decision making**

The findings illustrate (figure 8) that a significant number of the respondents 211 (80.8%) disagreed that 4IR technology is utilised to provide more timely and accurate information for decision making. However, 46 (17.6%) respondents agreed, with 4 (1.5%) being neutral to the statement. These findings were found to be significant as per the Chi-square test results ( $X^2=450.322$ ;  $df = 4$ ;  $P = 0,001$ ), which reflected that 4IR technologies had little contribution on providing more timely and accurate information for decision-making. Even though literature (Mosweu, Mosweu and Luthuli, 2019; Zangara, Cosma and Filice 2023) lauds ICT for its ability to provide timely and accurate information which improves decision making, the contrasting findings are a concern. Therefore, these findings reflect the deficiency in knowledge and skills of manufacturing SMEs in using technologies that improve decision making. Also, what is prevalent is that manufacturing SMEs seem to be in outdated with the latest technologies.



**Figure 9: ICT adopted is used for the creation of products**

As depicted in *figure 9*, a significant number of respondents 168 (64.4%) disagreed that the ICT adopted is used for the creation of products. However, 91 (34.9%) and 2(0.8%) respondents agreed and were also neutral to the statement respectively. These findings are supplemented by a Chi-square Test ( $X^2= 301.47; df = 4; P = 0,001$ ) which reflects that manufacturing SME’s adopted ICT does not have any influence on creation of products. These results show that the use of technology adoption and application is limited among KZN manufacturing SMEs. This is because the literature (Mavimbela and Dube 2016; Rathore 2023) advocates that ICT can help SMEs explore new markets and growth opportunities to identify them so that they can enter new and emerging markets while developing products that enable them to do so more sustainably.



**Figure 10: The adopted technology is a key driver in meeting customer needs and satisfaction**

As depicted in *figure 10*, a significant number of respondents 218(83.5%) disagreed that the adopted technology played a starring role in meeting customer needs and satisfaction. Only 38(14.6%) and 5(1.9%) of the respondents agreed and were neutral to the statement respectively.

These findings are supplemented by a Chi-square Test ( $X^2= 391$ ;  $df = 4$ ;  $P = 0,000$ ) which reflects that the adopted technologies by manufacturing SMEs fail to establish themselves as key drivers in meeting customer needs and satisfaction.

A clear pattern through the empirical findings has been established; as it is demonstrated here, the ICT adopted by manufacturing SMEs seem to be improperly utilized or inadequately adopted to cater for the unique operations of the firm.

For instance, literature (Goga, Paelo and Nyamwena 2019; Kampani and Jhamb 2020; Rajagopaul, Magwentshu and Kalidas 2020) advocates that ICT can be used to create a more efficient customer service system using automated chat bots, online ordering systems, and customer relationship management software.

## DISCUSSION OF RESULTS

The study reveals that ICT adoption in manufacturing SMEs in KwaZulu-Natal is lower than expected, highlighting the lack of sustainable use of ICT. The results obtained show that manufacturing SMEs still lack the ability to identify and use the appropriate ICT as a sustainable tool to increase their business performance.

While 18.4% of the respondents believed that lack of managerial ICT skill did not impede that successful adoption of ICT, majority of respondents 83.3% strongly believed that their ability to embrace ICT was clouded by lack of managerial skill.

The smaller fraction above could act as exemplars for other manufacturing SMEs, by exhibiting how deploying ICT effectively can result in a competitive advantage. Moreover, the inability of small manufacturing businesses to embrace and implement advanced technologies like 4IR was primarily caused by the challenges they encountered.

Although a study conducted by Bag, Rahman, Gupta and Wood (2022), praised the ability of the adopted ICT to transform an organisation in developed countries, this was not the case for manufacturing SMEs in KZN, with a sizeable majority (90%) citing compatibility and complexity associated with ICT adoption as a contributing factor to the inability to successfully deploy ICT.

Comparatively, it was also discovered that the ability to seamlessly deploy ICT by manufacturing SMEs in developed countries was due to the availability of digital infrastructure (Fornes and Altamira, 2023).

These findings were divergent to those of the current paper which reflected a staggering (93.4%) of manufacturing SME managers who strongly revealed that the lack of digital infrastructure is a major hurdle preventing manufacturing SMEs from successfully adopting and implementing ICT. In addition, (74.7%) of the respondents considered the cost of

maintaining the latest technology as a relevant constraint to the successful adoption of new technologies. The above findings posed a threat to the capacity of KZN manufacturing SMEs for sustainable growth and innovation.

Contrarily, Grabowska and Saniuk's (2022) findings highlighted that advanced technologies were found to be central to business models in developed countries. The current paper proposed that future research should consider conducting an in-depth study to analyse the influence of digital skills training programs, ICT security measures, and infrastructure upgrades on the enduring prosperity and expansion of small businesses.

## CONCLUSIONS

The study investigated the levels of ICT adoption by manufacturing SMEs in KZN as a sustainable growth strategy. The conclusions of the study therefore focussed on the main objectives of the work. The research revealed a significant lag in technology adoption, hampering SME operations. Internal and external factors, including education, managerial skills, and maintenance costs, were found to hinder the incorporation of these strategic technologies, essential for sustainable growth. The paper underscored the urgency for improved ICT adoption strategies, emphasizing 4IR technologies' relevance for SMEs in the digital era. The paper further highlighted lack of digital skills and understanding of technology benefits among KZN manufacturing SMEs, as leading to outsourcing and reduced productivity.

The paper recommended immediate action to support technology adoption, stressing the potential for improved operations and contributions to South Africa's economic growth. Furthermore, the manufacturing industry should consider introducing 4IR technologies into its processes to make profitable and sustainable contributions. This required using models like TOE, TAM, and DOI to understand technology diffusion principles in a resistant environment. Education is not enough to improve technology adoption.

Manufacturing SMEs must understand how to strategically integrate technology into their processes and choose the technology that best fits their operations. This can be achieved through a critical assessment of the theoretical framework mentioned above. Moreover, it is advised that SMEs should seek support from government incubators offering workshops and seminars on digital marketing, data security, and e-commerce to develop a comprehensive understanding of 4IR technologies.

The researchers also recommended that SMEs in the manufacturing industry should identify new technologies that are comparatively cheaper and safer to use and maximize those technologies so that they can maintain and sustain their use. The researchers suggested that manufacturing SMEs in KZN and South Africa should prioritize ICT adoption for sustainable business growth.

This can be achieved through ICT implementation models, improving management and employee ICT knowledge, investing in ICT infrastructure, networking with other companies, and hiring IT specialists as leaders. Failure to adopt 4IR technologies could lead to the premature closure or liquidation of these crucial companies, which are considered the backbone

of any country. By embracing these technologies, manufacturing SMEs can improve their operations, profit margins, contribution to GDP, growth, internationalization, and competitive advantage.

#### Author Contributions

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Methodology: Luyanda Loraine Bingwa.

Project administration: Luyanda Loraine Bingwa.

Supervision: Musawenkosi Ngibe.

Visualisation: Musawenkosi Ngibe.

Writing – original draft: Musawenkosi Ngibe and Luyanda Loraine Bingwa.

Writing – review & editing: Musawenkosi Ngibe and Luyanda Loraine Bingwa.

#### Reference

- 1) Ahmetoglu, S., Che Cob, Z. and Ali, N.A. (2023) 'Internet of Things Adoption in the Manufacturing Sector: A Conceptual Model from a Multi-Theoretical Perspective', *Applied Sciences*, Vol. 13 No. 6, p.3856.
- 2) Akoh, E.I. and Lekhanya, L.M., (2023) Critical Environmental Factors Affecting Social Entrepreneurship as a Tool for Sustainable Development in the Townships in KwaZulu-Natal Province. In *Re-engineering Business Processes in the New Normal-The Business and Economic Development Post COVID-19 and the Restructuring of the Global Economy: Proceedings of 8th International Conference on Business and Management Dynamics*. May 2023 (pp. 223-252).
- 3) Alenda-Demoutiez, J and Mügge, D. (2020) 'The lure of ill-fitting unemployment statistics: How South Africa's discouraged work seekers disappeared from the unemployment rate', *New Political Economy*, Vol. 25 No. 4, pp.590-606.
- 4) Alexander, R. (2022) Key opportunities and challenges for 4IR in South Africa. sarchi-wp-2021-08d-alexander-october-2022.pdf (uj.ac.za) (Accessed 1 September 2023)
- 5) Amusan, L., Motswaledi, T. and Afolabi, O. (2023) 'Flooding in KwaZulu Natal and its Impacts on Food Security Between 2021 and 2022 Among Women in Rural Areas', *Gender and Behaviour*, Vol. 21 No. 1, pp.21020-21031.
- 6) Aruleba, K. and Jere, N. (2022) 'Exploring digital transforming challenges in rural areas of South Africa through a systematic review of empirical studies', *Scientific African*, p.e01190.
- 7) Barnes, J. and Sachs, W. (2023) Inertia or Progress? Digital Technology Adoption Within a Group of South African Manufacturing SMEs. <https://www.uj.ac.za/wp-content/uploads/2021/10/sarchi-wp-2023-05-barnes-j--and-sachs-w-may-2023.pdf> (Accessed 1 September 2023)
- 8) Chertchom, P. (2023) 'Exploring the use of ICT in business: benefits, challenges, and opportunities (the city of Songkhla)', *Economic and Social Development: Book of Proceedings*, pp.321-331.

- 9) Davis, F.D. (1985) *A technology acceptance model for empirically testing new end-user information systems: Theory and results*. PhD thesis, Massachusetts Institute of Technology.
- 10) Donnelly, D.L. (2022) First do no harm: legal principles regulating the future of artificial intelligence in health care in South Africa. *Potchefstroom Electronic Law Journal/Potchefstroomse Elektroniese Regsblad*, Vol. 25 No. 1, pp. 2-43
- 11) Fornes, G. and Altamira, M. (2023) Internationalization, Digitalization, and Exponential Growth. In *Digitalization, Technology and Global Business: How Technology is Shaping Value Creation Across Borders* (pp. 29-51). Cham: Springer International Publishing.
- 12) Garatsa, C. and Dlamini, B.I. (2021) 'Factors Influencing the Adoption and Implementation of Customer Relationship Management Strategies by Small and Medium Enterprises in KwaZulu-Natal', *International Journal of Entrepreneurship*, No 25, pp.1-18.
- 13) Geza, W., Ngidi, M.S.C., Slotow, R. and Mabhaudhi, T. (2022) 'The dynamics of youth employment and empowerment in agriculture and rural development in South Africa: A scoping review', *Sustainability*, Vol. 14 No. 9, p.5041.
- 14) Gupta, P. and Yadav, S. (2022) July. A TAM-based Study on the ICT Usage by the Academicians in Higher Educational Institutions of Delhi NCR. In *Congress on Intelligent Systems: Proceedings of CIS July 2021, Volume 2* (pp. 329-353). Singapore: Springer Nature Singapore.  
[https://link.springer.com/chapter/10.1007/978-981-16-9113-3\\_25](https://link.springer.com/chapter/10.1007/978-981-16-9113-3_25) (Accessed 1 September 2023)
- 15) Gwala, R.S. and Mashau, P. (2023) COVID-19 and SME Adoption of Social Media in Developing Economies in Africa. In *Strengthening SME Performance Through Social Media Adoption and Usage* (pp. 133-152). IGI Global.
- 16) Hlangwani, E., Mpye, K.L., Matsuro, L. and Dlamini, B. (2023) 'The use of technological innovation in bio-based industries to foster growth in the bioeconomy: a South African perspective', *Sustainability: Science, Practice and Policy*, Vol. 19 No. 1, p.2200300.
- 17) Jadhav, G.G., Gaikwad, S.V. and Bapat, D. (2023) 'A systematic literature review: digital marketing and its impact on SMEs', *Journal of Indian Business Research*, Vol. 15 No. 1, pp.76-91.
- 18) Kativhu, S., Iwara, I.O. and Mwale, M. (2021) Exploring threats to youth enterprise resilience in selected areas in Thulamela Local Municipality, South Africa. *African Journal of Development Studies (formerly AFFRIKA Journal of Politics, Economics and Society)*, 2021(si1), pp.119-144.
- 19) Lamola, K.X. (2022) 'Employees' aptitudes and trepidations for the adoption of enterprise application architecture for supply chain management in small and medium enterprises: A case of Capricorn District Municipality', *Journal of Transport and Supply Chain Management*, Vol. 16 No. 0, p.708.
- 20) Leboea, S.T., (2017) The factors influencing SME failure in South Africa (Master's thesis, University of Cape Town).
- 21) Lokhande, D.A., Venkateswaran, D.C., Ramachandran, D.M., Vidhya, C. and Kurinjimalar, R. (2021) 'A Study on Various Implications on Reusing in Manufacturing', *REST Journal on Emerging trends in Modelling and Manufacturing*, Vol. 7 No. 2, pp.63-69.
- 22) Makhaye, A.C. and Subban, M. (2022) SSIRC 2022-205 Building Resilience: Small Business Development Post-Looting And Chaos In South Africa. *Technical Editing*, p.1502.
- 23) Maphosa, V. and Maphosa, M. (2022) 'Factors influencing the adoption of ICT for remote work among Zimbabwean SMEs: A case study of Bulawayo Metropolitan province', *International Journal of Advanced and Applied Sciences*, Vol. 9 No. 3, pp.150-158.

- 24) Masocha, R. and Fatoki, O. (2018) 'The role of mimicry isomorphism in sustainable development operationalisation by SMEs in South Africa', *Sustainability*, Vol. 10 No. 4, p.1264.
- 25) Mbandlwa, D.Z., (2023) 'Cause of the Economic Decline in South Africa. What to Expect in the Next 10 Years from now?', *Journal of Survey in Fisheries Sciences*, Vol. 10 No. 2S, pp.1397-1407.
- 26) Mboniyane, B.L. (2022) *Application of physical and technological capital efficiency factors for the growth of Small and Medium Enterprises in the Gauteng Region of South Africa*. PhD thesis, University of Johannesburg, South Africa.
- 27) Mhlanga, D., Shava, E. and Dzingirai, M. (2023) Harnessing State Capability in Embracing the Fourth Industrial Revolution: Is Zimbabwe Prepared?. In *The Fourth Industrial Revolution in Africa: Exploring the Development Implications of Smart Technologies in Africa* (pp. 239-254). Cham: Springer Nature Switzerland.
- 28) Mishi, S., Tshabalala, N., Anakpo, G. and Matekenya, W. (2023) 'COVID-19 Experiences and Coping Strategies: The Case of Differently Sized Businesses in South Africa', *Sustainability*, Vol.15 No. 10, p.8016.
- 29) Mkhathshwa, B. and Mawela, T. (2023) 'Cloud Computing Adoption in the South African Public Sector', *Indonesian Journal of Electrical Engineering and Informatics (IJEI)*, 11(2), pp.537-552.
- 30) Mkhize, D.M., (2022) *Factors influencing the competitiveness of small and medium clothing manufacturing enterprises in the eThekweni Municipal District in KwaZulu-Natal*. Master dissertation, Durban University of Technology, South Africa.
- 31) Mlambo, N., 2022. *The adoption of robotic process automation in a financial institution in South Africa*. Master's dissertation, Cape Peninsula University of Technology, South Africa.
- 32) Moeti, M.N., Langa, M.R. and Sigama, K. (2022), Information Security Framework Adoption for South African Small and Medium Enterprise. In *International Development Informatics Association Conference* (pp. 218-233). November 2022. Cham: Springer Nature Switzerland.
- 33) Mohamed, M.H.H. (2023) Review of Research on Benefits and Challenges Associated with Cloud ERP in SMEs.
- 34) Moraka, L.I. (2021) *The compliance framework for the 7th POPIA condition in the SME ICT sector*. Master's dissertation, University of KwaZulu-Natal, South Africa.
- 35) Msimango, T. (2023) Assessment of the Causes of Business Process Failure at Authorised Financial Service Providers in South Africa and Implementation of Strategy Results.
- 36) Muladi, A.E., (2023) *Micro, Small, and Medium Enterprises and public procurement participation: the nexus of supply chain finance, digitalization and barriers in Nairobi County*. Master dissertation, Strathmore University.
- 37) Nazir, M.A. and Khan, R.S. (2022) The Impact and Factors Affecting Information and Communication Technology Adoption in Small and Medium-Sized Enterprises: A Perspective from Pakistan. *Journal of Organisational Studies & Innovation*, Vol. 9 No. 1, pp. 20-46
- 38) Ndebele, N.C., Ndlovu, S.G., Mlambo, V.H and Thusi, X. (2022) 'The Challenges of Youth Entrepreneurship from a Local Government Perspective in South Africa', *International Journal of Management, Entrepreneurship, Social Science and Humanities*, Vol. 5 No. 2, pp 17-32.
- 39) Ndlela, W.H.Z. (2022) *Dynamic Challenges Facing SME Consulting Firms in the Built Environment Sector in KwaZulu-Natal Province–The Entrepreneurial Approach*. PhD thesis, The University of Liverpool, United Kingdom.



- 40) Ndou, A.T., Madonsela, N.S. and Twala, B. (2020) 'The era of digital technology: Analysis of factors contributing to economic growth and sustainability', In *Proceedings of the 2nd African International Conference on Industrial Engineering and Operations Management, IEOM*.
- 41) Ngobe, A. (2023) *Challenges in the adoption of information and communication technology at selected schools in the Mpumalanga Province. Master dissertation, University of South Africa, South Africa.*
- 42) Ntuli, L.S. (2022) *The influence of emerging technologies on small and medium manufacturing enterprises in eThekweni District Municipality of KwaZulu-Natal. Masters dissertation, Durban University of Technology, South Africa.*
- 43) Nunden, N., Abbana, S., Marimuthu, F. and Sentoo, N. (2022) 'An assessment of management skills on capital budgeting planning and practices: evidence from the small and medium enterprise sector', *Cogent Business & Management*, Vol. 9 No. 1, p.2136481.
- 44) Nwankwo, C.A and Kanyangale, M.I. (2023) 'Customer Relationship Management and Survival of Manufacturing Small and Medium Enterprises in Nigeria', *Journal of Economic and Social Development (JESD)–Resilient Society*, Vol. 10 No. 2, pp. 30-40
- 45) Onu, P. and Mbohwa, C., (2021) 'Industry 4.0 opportunities in manufacturing SMEs: Sustainability outlook', *Materials Today: Proceedings*, No. 44, pp.1925-1930.
- 46) Putilo, N.V., Volkova, N.S., Kashevarova, Y.N and Antonova, N.V. (2020) 'Constitutional Bases of Social Rights in South African States and Their Compliance with Generally Accepted International Standards', *Supporting Inclusive Growth and Sustainable Development in Africa-Volume I: Sustainability in Infrastructure Development*, pp.51-65.
- 47) Raj, M. (2022) 'Effective Management Strategies for Small Businesses', *Journal of Management and Administration Provision*, Vol. 2 No.1, pp.9-14.
- 48) Ramachandran, R., Babu, V. and Murugesan, V.P. (2023) Human resource analytics revisited: a systematic literature review of its adoption, global acceptance and implementation. *Benchmarking: An International Journal*. <https://doi.org/10.1108/BIJ-04-2022-0272> (Accessed 1 September 2023)
- 49) Rambaruth, A., Adam, J.K. and Krishna, S.B.N. (2022) 'Contributing elements and issues to strategic management in the construction industry among small and medium enterprises: a case study in South Africa's eThekweni region', *Journal of Construction Business and Management*; Vol. 5, No. 2, pp. 20-28
- 50) Saleh, S.S., Nat, M. and Aqel, M., (2022) Sustainable adoption of e-learning from the TAM perspective. *Sustainability*, Vol.14 No. 6, p.3690.
- 51) Samkange, F., Chipumuro, J., Chipfuva, T. and Ramkissoon, H. (2023) 'Gender and power in hospitality and tourism entrepreneurship: a case of the Eastern Cape province of South Africa', *Gender and Entrepreneurship in Tourism: No 0*, p.167.
- 52) Santos, S.P.D. (2023) *Assessing cybersecurity at an industrial unit 4.0*. Master's thesis, institute Polit'ecnico de Viana do Castelo.
- 53) Saruchera, F. and Mpunzi, S., (2023) 'Digital capital and food agricultural SMEs: Examining the effects on SME performance, inequalities and government role', *Cogent Business & Management*, Vol. 10 No. 1, p.2191304.
- 54) Singh, S. and Pruthi, N. (2023) SME Survival During the COVID-19 Pandemic: An Outlook of Threats and Digital Transformation. In *Strengthening SME Performance Through Social Media Adoption and Usage* (pp. 201-212). IGI Global.
- 55) Siriwardhana, S. and Moehler, R. (2023) Mastering the skills of Construction 4.0: a review of the literature using science mapping *Smart and Sustainable Built Environment*.

- 56) Smidt, H.J. and Jokonya, O. (2022) 'Factors affecting digital technology adoption by small-scale farmers in agriculture value chains (AVCs) in South Africa', *Information Technology for Development*, Vol. 28 No. 3, pp.558-584.
- 57) Talwar, S., Dhir, A., Islam, N., Kaur, P. and Almusharraf, A. (2023) 'Resistance of multiple stakeholders to e-health innovations: Integration of fundamental insights and guiding research paths', *Journal of Business Research*, No. 166, p.114135.
- 58) Tornatzky, L.G and Fleischer, M. (1990) *The processes of technological innovation*. Lexington, Mass.: Lexington Books, 1990.
- 59) van Niekerk, A.J. (2020) 'Inclusive economic sustainability: SDGs and global inequality', *Sustainability*, 12(13), p.5427.
- 60) Wentzel, L., Fapohunda, J.A. and Haldenwang, R. (2022) 'The relationship between the integration of CSR and sustainable business performance: Perceptions of SMEs in the South African construction industry', *Sustainability*, Vol. 14 No. 3, p.1049.
- 61) Williams, S. and Murphy, D.F. (2023) 'Earning from each other: UK global businesses, SMEs, CSR and the Sustainable Development Goals (SDGs)', *Sustainability*, Vol. 15 No. 5, p.4151.
- 62) Zamani, S.Z. (2022) 'Small and Medium Enterprises (SMEs) facing an evolving technological era: a systematic literature review on the adoption of technologies in SMEs', *European Journal of Innovation Management*, Vol. 25 No. 6, pp.735-757.
- 63) Zide, O. and Jokonya, O. (2022) 'Factors affecting the adoption of data management as a service (DMaaS) in small and medium enterprises (SMEs). *Procedia Computer Science*, No. 196, pp.340-347.
- 64) Zikhali, N.X. and Mofokeng, N.R. (2022) Socioeconomic Development Endeavors by Akehlulwalutho Cooperatives in KwaNibela Area. In *Message from the Conference Chair* (p. 166). [https://www.mycce.com/\\_files/ugd/a0366e\\_506856b9ef454d6bab324669a8884f79.pdf#page=166](https://www.mycce.com/_files/ugd/a0366e_506856b9ef454d6bab324669a8884f79.pdf#page=166) (Accessed 2 September 2023)
- 65) Zondo, W.N.S. and Ndoro, J.T. (2023) 'Attributes of Diffusion of Innovation's Influence on Smallholder Farmers' Social Media Adoption in Mpumalanga Province, South Africa', *Sustainability*, Vol. 15 No. 5, p.4017.