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## Article

# Implication of internet of things (IoT) on organisational performance for SMEs in emerging economies : a systematic review

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Gibson Muridzi

# IMPLICATION OF INTERNET OF THINGS (IoT) ON ORGANIZATIONAL PERFORMANCE FOR SMEs IN EMERGING ECONOMIES – A SYSTEMATIC REVIEW

*The object of this research is the implementation of Internet of Things (IoT) and its effect on organizational performance for Small and Medium Enterprises (SMEs) in emerging economies. SMEs in emerging economies are faced with low level of performance due to technological constraint, inadequate skilled human resource, lower entrepreneurial capabilities and management systems, the deficiency of available information, inadequate use of Information Technology, poor quality products and lack of strategic long-term plans. Systematic literature reviews approach was used to discover, assess and synthesize findings of all relevant individual research on fourth industrial revolution (4IR), IoT, organization performance and SMEs topics. 461 articles were found, and 60 articles were used as sample of this study. Findings of this study established that implementation of IoT positively affects performance for SMEs in emerging economies. Results also shows that financial, technological, and operational risks are major risks faced by SMEs in implementing IoT technologies in emerging economies. The essence of the results is to contribute to current body of knowledge by giving interesting insights in the form of a framework on how IoT technologies can be applied in enhancing SMEs performance in emerging economies. This is achieved by making SMEs aware of its potential benefit by providing some knowledge on securing financial resources, and ability to analyze external environment, and to shed more light on the benefits and opportunities that these new tools offer and how it can subsequently improve organization performance for SMEs. Most articles used systematic literature review were from developed economies as there was limited literature which speaks about IoT and SMEs performance in emerging economies. The study therefore focused on IoT and how it can improve SMEs' organizational performance in emerging economies.*

**Keywords:** Internet of Things, organization performance, small and medium enterprises, emerging economies.

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## 1. Introduction

*The purpose of this paper is to investigate how Internet of Things (IoT) affects organisational performance for Small and Medium Enterprises (SMEs) in emerging economies. SMEs are an essential pillar of economic growth in conjunction with the growth in their numbers [1, 2]. SMEs represent about 90 % of businesses and more than 50 % of employment worldwide. Amid today's disrupted business environment brought by 4IR, SMEs seek alternative and innovative ways to minimize wastage and increase operational efficiency for the survival and sustenance of their businesses [3] thereby increase their performance. In today's business competitive environment, SMEs are willing to transform their operation strategies and practices to achieve long-term goals through IoT advancements.*

*This research is important as it provides some solution which supports IoT on organisational performance in a form of a framework for SME owners and managers as*

*a strategic tool for competitive advantage in digital environment in their pursuit to improve SME performance. This topic is also important as SMEs plays an important role in uplifting economies. In developing countries, SMEs constitute as a main source of national income and create an important area for business activity [4]. Recently, IoT technologies become more popular to enhance performance of organizations using the combination of humans and information technology. SMEs have been proven to be main contributors to national and global economies, particularly in the emerging economies. The annual revenues generated from SMEs provide sustainable growth, development as well as several opportunities such as employment as compared to other industrial sector [5] and it is therefore important to understand how IoT can affect SMEs performance in emerging economies.*

*Despite the contributions from SMEs based sectors, many scholars identified that SMEs in emerging economies are faced with low level of performance due to technological*

constraint, inadequate skilled human resource, lower entrepreneurial capabilities and management systems, the deficiency of available information, inadequate use of IT, and poor-quality products [5]. There are many studies related to the adoption of IoT solutions by SMEs [6, 7]; these studies discussed some barriers faced by SMEs during the process of implementation of IoT solutions in developing economies. It is shown that SMEs cannot improve their business operations because they are unable to take advantage of the IoT [8] and this fact is detrimental to their performance. SMEs therefore must make well-conceived decisions regarding the adoption of new technologies, such as IoT applications [8].

Results of this research will be able to support policymakers, in terms of policies for best managing organisation performance for SMEs during 4IR with regards to the benefits brought by IoT. This paper therefore contributes to the emerging literature on 4IR particularly the IoT and its implication on organisational performance for SMEs in emerging economies. This is achieved by addressing the research gap noted in this study. Its novelty lies in an expert-based investigation that identifies, validates, and prioritises [9] the risks associated with the implementation of IoT for SMEs in emerging economies, which will give birth to the development of a framework which integrates critical success factors of 4IR and organisation performance for SMEs in emerging economies.

This study contributes to current body of knowledge by giving interesting insights in the form of a framework on how IoT technologies can be applied in enhancing SMEs performance in emerging economies. This study also provides some insights on the adoption and integration of IoT brought by 4IR for SMEs. This is achieved by making SMEs aware of its potential benefit, and to provide some knowledge on securing financial resources, and ability to analyse external environment, and, to shed more light on the benefits and opportunities that these new tools offer and how it can subsequently improve organization performance for SMEs in emerging economies. Furthermore, the study improves on how SMEs perceive the competitive advantage that can be gained by a better knowledge and understanding of the needs and behaviours of various stakeholders brought by using IoT technologies. This study therefore seeks to achieve the following tasks:

- 1) to establish the benefits of IoT to SMEs in emerging economies;
- 2) to determine the implication of IoT on organisation performance for SMEs for emerging economies;
- 3) to develop a framework that integrate critical success factors of 4IR and organisation performance for SMEs in emerging economies.

## 2. Materials and Methods

4IR is regarded worldwide as the great challenge of the twenty-first century: it includes technologies, like Artificial Intelligence (AI), cloud computing, Internet-of-Things (IoT), Big Data (BD) and blockchain. Such innovations are radically changing human behavior and business processes in public and private organizations [10–13]. This study is therefore interested in IoT as one of the pillars of 4IR. The next section conceptualizes IoTs and organization performance.

### 2.1. Conceptualizing Internet of Things (IoT) and organization performance

**2.1.1. Internet of Things (IoT).** IoT has generated a lot of interest with respect to technology in recent years [14, 15].

IoT comprise of network of physical objects such as network of computers and all types of networks of device (e.g., smart phones) that are connected to the internet to bring about communication and information sharing founded on specified procedures to attain smart modifications, real-time online monitoring, online upgrade and process control and administration [16]. Therefore, IoT provides unprecedented opportunity to business organizations such as SMEs to use technology that allows them to interact with internet users across the globe through the application of analysed data [17]. However, IoT and AI technologies have its own challenges, and the fusion of both technologies for SMEs presents even more complex challenges such as data security; compatibility and complexity in combining and unifying devices; issues with AI systems and algorithms understanding and interpretation of data sets for accurate and meaning decision-making; lack of confidence about IoT device protection and integrity of data sets created; risk of data security, for example cloud attacks by harmful virus [18].

**2.1.2. Organizational performance.** Organizational performance refers to a concept that measures a firm's position in the marketplace and the firm's ability in meeting its stakeholders' needs [19, 20]. Previously, the concept of organizational performance normally referred to financial ratios such as profitability, return on assets (ROA), return on investments (ROI), and return on equity (ROE). Nevertheless, there is increasing criticism on the short-term thinking of traditional performance measurement systems that only employs financial measures [21]. Consequently, many researchers have employed a more balanced approach of performance measurement by including both financial performance and non-financial performance measures [22, 23]. Financial performance has been seen by many as the aim of any company and it reflects how well a company uses its assets to generate revenues [24]. On the other hand, non-financial performance measures refer to long-term operational objectives of a company or, in other words, future performance indicators that are not presentable by contemporary financial measures [25].

### 2.2. Theoretical framework

An organization's performance is an intricate and multi-layered phenomenon that consist of diverse perspective of the company, a unit or a task accomplishment. In [26] contend that it is not practicable to explicate performance accomplishment using just one perspective or single metric [18]. There are five ways of measuring SME performance; quality, time, finance, customer satisfaction and human resource. Accounting or finance measures such as sales growth, return on sales, return on assets, and return on equity are commonly used performance indicators in a range of fields such as entrepreneurship. A number of methods are applied in gauging the impact of 4IR in a business organization such as SMEs. They include «performance pyramid»; «results and determinants» framework; and most notably [27] Kaplan and Norton «balanced scorecard» approach.

**2.2.1. The balanced scorecard.** The balanced scorecard enables management to see the business's performance in aggregate by the four perspectives of financial, customer, internal business process, learning and growth. The balanced scorecard forces managers for SMEs to prioritize these most

critical metrics in relation to IoT for their business performance. The balanced scorecard has been used by several companies and has benefited managers in two ways. Firstly, it streamlines the business's plan by combining customer orientation, reaction time, quality improvement, teamwork, product launch time reduction, and long-term management into a single management report. Second, it guards against suboptimization by requiring managers to analyze all four operational metrics concurrently. This enables them to discern whether gains in one critical area come at the expense of others. From the perspective of managers' and owners' perceptions of the new technology. The balanced scorecard is therefore used in this study to determine how IoT influences the SMEs performance [28, 29] in emerging economies. This study therefore used the BSC approach perspectives as it is a performance theory that uses both financial and non-financial metrics.

**2.2.2. Resource-based theory.** Resource-based theory (RBT) theory is a theory that analyses the internal resources and capabilities of a business organization, helping the generation of competitive advantage and performance [18]. Organizational performance has been frequently deliberately grounded on resource-based theory (RBT), including in the SME field for example [30–32]. RBT provides a theoretically fundamental way to discuss the contribution of resources and capabilities toward organizational performance. The theory clarifies that certain types of resources that comply with VRIN (valuable, rare, imperfectly imitable and non-substitutable) can generate competitive advantages. For that reason, RBT assesses the capabilities and resources of a SMEs and examines their attributes [33]. Also, RBT supports the view that achievement of a continuous competitive advantage and performance could be generated by the distinctive blend of resources and capabilities at the nucleus of the business organization [34]. Business organizations could attain continuous competitive advantage and performance provided they can leverage on their internal resources such as IoT with its associated determinants including AI-enabled, collaborative decision-making systems (CDMS), virtual and augmented reality (VAR) and personalization [18].

Similarly, IoT can be applied in business to generate optimum business performance and enhance customer delight. Therefore, IoT has substantial ability to generate revenue and increase the performance of business organiza-

tions [35]. This is where the RBT is beneficial in helping SMEs to analyze and interpret IoT as an internal resource and also stressing on the utilization of IoT resources and capabilities to generate competitive performance [36]. Therefore, the RBT analyses business organization's sustainable competitive advantage and performance through the business organization internal resource, such as IoT capability, that are not imitable.

However, RBT has been criticized, in that «rare» resources possessed by business organization such as SMEs may not necessarily bring about competitive advantage and performance [37]. Consequently, SMEs must develop performance metrics to consistently measure the effect of the operationalization of «rare» resources and capabilities on performance [38]. This study therefore adopts the RBT because it captures the interactions and associations of IoT as an important resource and capability that SMEs can own uniquely, to attain a competitive advantage over industry competitors and attain a superior performance [39]. To complement the BSC, the RBT has been proposed for this study to explain how emergent technologies like IoT can affect the performance of organizations [39].

### 2.3. Conceptual framework

Fig. 1 shows the constructs and variables which were used to carry out the literature review process. This conceptual framework demonstrates that 4IR, specifically IoT benefits SMEs items of the four perspectives of the balance scorecard as it increases financial performance of an organization. According to [40], in recent years, IoT has been progressively integrated into vital organizational operations, bringing about business growth and performance in different sectors. IoT lessens costs and improves organization output through the automation of data-driven task that personalize the experience of customers and increase revenue. In the present era, SMEs are looking for strategic decisions to achieve higher customer satisfaction with the proper selection of IoT tools and techniques designed to enhance the enterprise's effectiveness. These decisions are very much important for organization performance [41]. Additionally, connecting customers, partners, and developers via digital platforms creates a vast and efficient market with enormous economies of scale and cost-effectiveness. In addition to expanding and becoming more convenient, digital platforms have facilitated the dissemination of innovative knowledge and information [42].

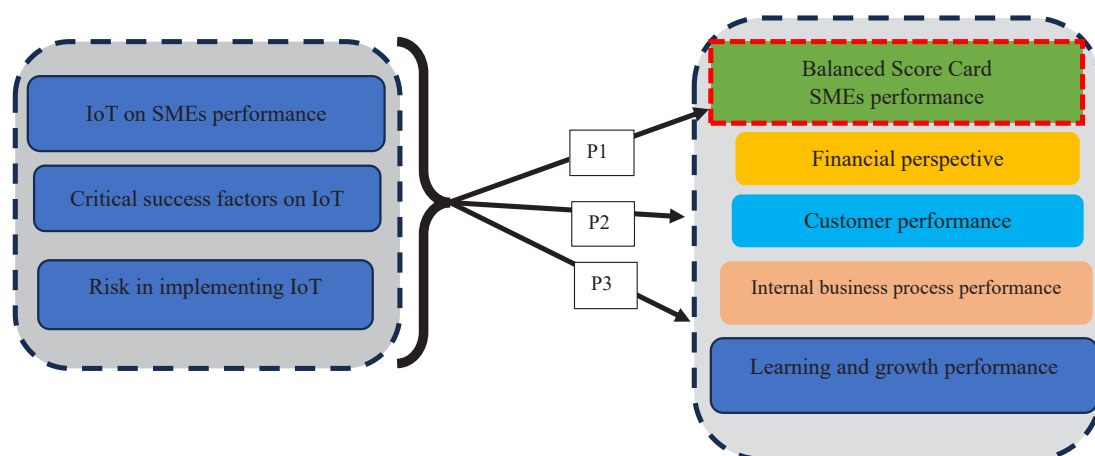


Fig. 1. Conceptual framework of 4IR on SMEs performance Source (author compilation)

In order to reach the research aim, the following three propositions were developed:

*Proposition 1.* IoT has a positive benefit on SME's performance.

*Proposition 2.* There is a relationship between critical success factors on IoT and SME's performance.

*Proposition 3.* There are some risks involved in implementing IoT on SME's performance.

## 2.4. Method

For this study, a systematic literature review approach was used to unpack issues pertaining to Internet of Things (IoT) on organizational performance for SMEs in emerging economies. PRISMA framework was therefore used to perform the systematic review analysis, which seek to discover, assess and synthesize the findings of all relevant individual research on 4IR, IoT, organization performance and SMEs topics. Scopus database was utilized to search for relevant journal sources which then was evaluated in relation to the study objectives. The definition of the search terms served as the basis for the research. The adopted strategy to search and select the articles included in the review was defined using the following queries: TITLE-ABS-KEY («Internet of Things» OR IoT OR «Information age» OR «Digital age» AND «Organizational Performance» AND «Small and Medium Enterprises» OR SMEs). The search string was restricted to Title, abstract and keywords.

## 3. Results and Discussion

This study decided to adopt some inclusion criteria to refine the sample. Only articles and reviews, papers written in English and only articles and reviews published between 2015 and 2023. The search was from all subject area documents of type- Article, review and article in the press were selected. Articles with no access to their full text were excluded. Initially, 461 articles were found in the Scopus database. The duplicate articles were removed, which led to only 85 articles left. Now 85 articles were screened thoroughly by the authors and left with 71 articles, and 60 papers were selected for the study, which aligns with the research questions.

### 3.1. Impact of IoT on SMEs performance

*Proposition 1.* IoT has a positive benefit on SME's performance.

This study established that in today's business competitive environment, SMEs in emerging economies are willing to transform their operation strategies and practices to achieve long-term goals on IoT [43]. IoT is recognized as one of the most efficient technologies to enhance performances through the identification of value-added activities and avoiding wastes [44]. Findings from prior studies revealed that the effects of IoT adoption on the performance of SMEs is either negative or positive hence the results are inconclusive [45], where a positive significant association between IoT usage and organizational performance was reported by prior researchers [46]. Conversely, other researchers have found a negative correlation between IoT usage and firms' performance. The contradictory results on the impact of IoT initiative usage on organizational performance call for researchers to perform more in-depth research to examine the relationship between IoT usage and organizational performance in emerging economies

or different context. Therefore, this study investigates the implication of IoT on SMEs performance by exploring the efficient use of technologies in emerging economies by increasing the overall financial and non-financial organizational performance as indicated in the balanced scorecard. In [47] stated that IoT adoption can positively impact organization non-financial performance by enhancing clients' satisfaction, through gaining a competitive edge, producing new products, and getting accurate data. Likewise, findings from prior studies suggested that the impact of IoT adoption on the organizations' financial performance can lead to sales growth rate, increase the profitability, productivity and lessen operational costs and therefore SMEs must capitalize on these benefits of IoT.

The study by [48] shows that the implementation of an IoT strategy positively affects performance. However, [49] are of the view that investment in IoT resources and capability can be duplicated by competitors without difficulty. In [50] emphasize that organizational investment into IoT resources and capabilities does not necessarily bring about competitive advantage and performance. Instead, it is how business enterprises take advantage of their investments in IoT to develop distinct IoT resources and competences that establish the general accomplishment of an organization. According to [21], IoT competences (i. e. CDMS, VAR and personalization) are rare and can be peculiar to a particular business organization, which can bring about continuous competitive advantage and performance. Digitally driven SMEs are accepting intelligent alternatives to develop a demanding customer experience. Operational Artificial Intelligence (AI)-enabled alternatives present considerably strong stage for SMEs to manage huge amount of customer data sets acquired and increase SMEs insight into target markets. As a result, the precept of IoT is not solely targeted at financial variables such as revenue, profits, return on capital employed and return on investment (ROI) but also at non-financial variables such as enterprise endurance, internal business process and continuous learning and innovation [48].

### 3.2. Critical success factors of IoT and SMEs performance

*Proposition 2.* There is a relationship between critical success factors on IoT and SME's performance.

The study established that recently, IoT technologies become more popular to enhance the performance of the organizations using the combination of humans and information technology as critical factors [50]. The process of transforming of SMEs performance has been speeded recently due to cheaper hardware and software systems and various developments in the field of automation and artificial intelligence [51]. Critical success factors (CSFs) are a management term that is needed for an organization to attain its goals. CSFs are the focused areas which are important to deal properly for effective implementation of IoT technologies for SMEs [41]. This study established that there are 12 CSFs which are categorized into 4 dimensions namely management, technological, organizational and economical which focus more on the internal factors within the organization (Table 1).

This established that the various CSFs linked with performance of SMEs and industry 4.0 have been identified and ranked. The «Technological» dimensions identified as the most important criteria with 0.48 global weight and rank one among all main dimensions [41]. Findings also

established that technology orientation is significantly and positively related to both non-financial performance and financial performance. As evidenced by previous research, firms that are technology-oriented have better chance to achieve superior performance [52, 53]. This is because technology orientation can provide SMEs with capability to acquire rich technological information and new technologies that are useful for firms to come out with new solutions that are difficult to be imitated by their competitors [54].

Management with 0.30 global weight is the second on the ranking [41] as top management support is significantly and positively related to financial performance. Consistent with previous findings, financial performance could be improved if top management emphasizes communicating the mission and vision throughout the entire organization, providing direction for employees to achieve and increase their level of performance [55, 56]. However, the findings of the present study have determined that top management support was not significant. CSFs for further action plan and implement are therefore lean with IoT in SMEs. These findings are therefore used as input in the proposed framework that integrate critical success factors of Fourth Industrial Revolution (4IR) and organization performance for SMEs in emerging economies [41].

can significantly advance their competitiveness [57, 64, 65]. The results demonstrate that financial, technological, and operational risks are the most significant risks facing SMEs in implementing IoT technologies in emerging economies. These research gaps underscore the need to validate and prioritize critical risks in implementing IoT for SMEs in emerging economies. This paper therefore contributes to the emerging literature on IoT and 4IR by developing a framework that integrate critical success factors of IoT and organization performance for SMEs in emerging economies.

### 3.4. Practical relevance

The findings present several practical implications for managers of SMEs and policymakers. This study finds that understanding a framework that integrates critical success factors of 4IR and organization performance for SMEs can perform a distinguished mediating role in the process of IoT adoption. The authorities or the management should understand the positive vibe in the IoT adoption in increasing the efficiency of the SMEs and the service level for the customers. Hence, the resources can cooperate within the system and contribute to the organization's increasing smoothness and efficiency. IoT adoption was shown to be significantly connected with

organizational performance when seen through the lens of the owner's and managers' perceptions. The mediating role of 4IR and the effect of adopting IoT on the organizational performance of the organization as measured by the balanced scorecard are among the most noteworthy findings [66].

**3.4.1. Recommendations.** SMEs in emerging economies can still embrace and leverage massive potential by the opportunities provided from digital transformation [67–70] in improving their performance. Emerging technologies, as diverse as they are, offer a range of applications for them to improve performance and overcome the size-related limitations they face in doing business. However, SMEs must be better prepared, and stakes are high [71].

SMEs should develop quicker to compete and survive in the current highly competitive environment, enhancing the cruciality of creativity and IoT [72]. The increased digital presence, innovation in internet-connected devices globally, technically informed, and universally interconnected consumers, and the emergence of new industries made the IoT in business even more. SMEs should therefore rethink how they design their business processes that will have the potential to reach the next level of operational efficiency [73, 74]. This can be achieved by leveraging 4IR technology which include IoT in order to increase real-time visibility across the value chain and SMEs can proactively identify potential risk areas and can respond more quickly [74]. SMEs in emerging economies should therefore capitalize on these technological developments.

This study therefore proposes a framework in Fig. 2 as part of its recommendations that provide a basis that integrate critical success factors of 4IR and organization performance for SMEs in emerging economies. This framework

Dimensions of Critical Success Factors

No.	Dimension	Global weight	Rank	CSFs	Local weight	Global weight	Rank
1	Management	0.30	2	Top Management support	0.51	0.153	2
				Long-term strategy	0.38	0.114	4
				Policy Management	0.10	0.030	8
2	Technology	0.48	1	Digital technology	0.63	0.302	1
				Improved layout and configuration	0.26	0.125	3
				Standardization of procedures	0.11	0.053	7
3	Organization	0.12	3	Employee involvement	0.21	0.025	9
				Culture for change	–	0.083	5
				Training and education	0.69	0.012	11
4	Environment	0.10	4	Cost of transition	0.10	0.011	12
				Financial plan	0.70	0.070	6
				Stable economic situation	0.18	0.018	10

**Note:** the table is based on the data [42]

### 3.3. Risks in implementing IoT for SMEs

*Proposition 3.* There are some risks involved in implementing IoT on SME's performance.

While IoT has multiple benefits, this study established that these benefits are associated with high investments, personnel costs, unclear economic benefits, and long and uncertain amortization periods [57–60]. The study also found out that IoT involves technological risks that arise from technical complexity, the lack of maturity of IoT technologies, device integration, and infrastructure deficiencies/network congestion [57, 60, 61], and operational/social risks arising from job losses, internal resistance, inadequate qualifications, the shift in competencies, and lack of expertise [59, 62]. Notably, it also leads to unprecedented challenges for SMEs [57, 63]. Large manufacturing firms can configure advanced processes and digital technologies to create smart working environments and transition to IoT [37]. By contrast, most SMEs find imposing barriers impeding the adoption of IoT technologies, although they

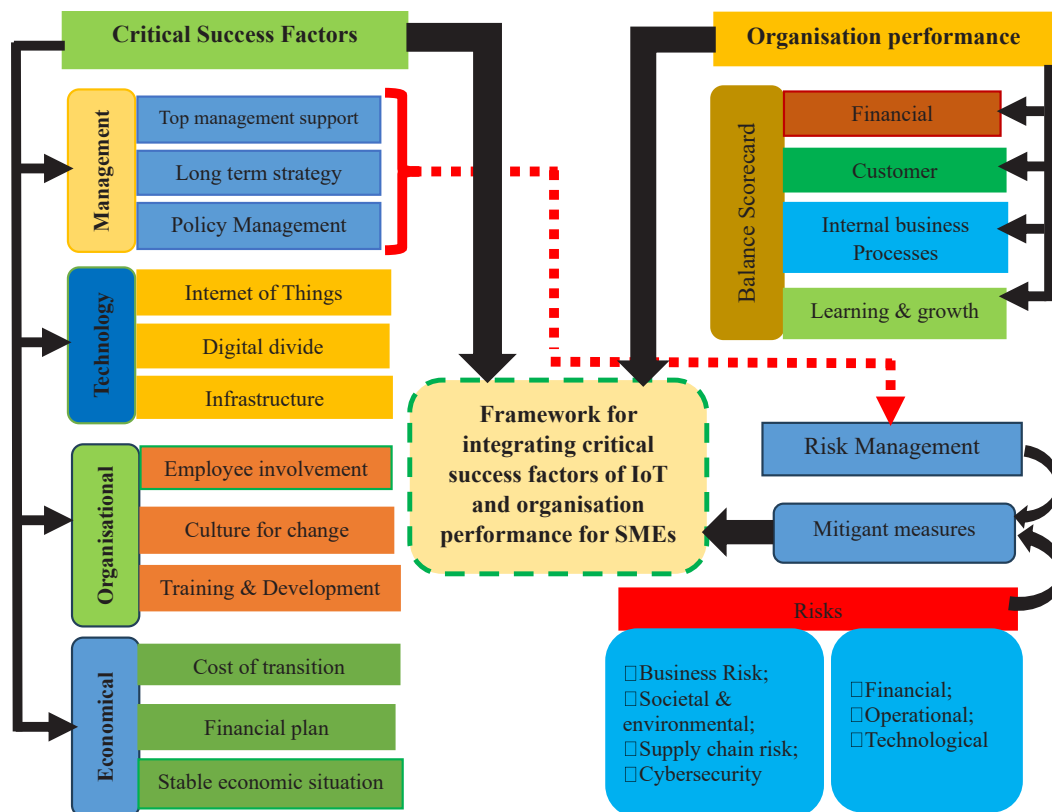
therefore provides a new potential to define and take advantage of new business development opportunities for SMEs in the digital age.

This study is proposing to integrate a framework by [21] who proposed viewing a business's performance through four lenses: financial, customer, internal process, and learning and growth with critical success factors and being mindful of some risks which are associated with implementation of IoT and its mitigant measures through policies. These are the important pillars that can improve SMEs performance in emerging economies as illustrated in Fig. 2. Adoption of IoT generally has a positive effect on the organizational performance of the business [29, 75]. The balanced scorecard, developed by [21], should be used to assess SME performance. This study is therefore recommending that IoT adoption by SMEs should enable them to improve customer satisfaction while promoting the business's image and reputation [28]. Financially, IoT adoption should increase SME's return on investment, assets, profit margins, and market share. Adopting IoT should also assist SMEs in optimizing their internal operational and workflow procedures.

However, there are some risks associated with the introduction of IoT, these risks involve high investment in technologies which SMEs should shoulder. In emerging economies, there is unclear economic benefit as the cost of embracing IoT in emerging economies is still high. There is also long and uncertain amortization and risk of false investments. There is also a risk of what to invest and when as well as a risk of obsolescence of an investment in technology. Any new technology requires that SMEs should transform their business models otherwise they might be loss of core competencies which can ultimately affect the organization performance. It is the recommendation of this paper that

management for SMEs in emerging economies should therefore be aware of these risks and their financial performance cannot be affected. Under operational risk, this risk affects the internal business processes performance of the organization.

The advent of IoT can bring the risk of inadequate qualified employees which can subsequently affect the performance of SMEs. To mitigate this type of risk, this study is therefore recommending the re-designing of the facility layout, shift of competencies, removal of internal resistance and improve on corporate culture, have adequate expertise, increase awareness on the benefits of using IoT in improving organization performance. Once addressed, all these can improve SMEs performance. To benefit from the IoT, SMEs should be aware of the associated risk which comes with it. Societal and environmental risk is associated with job losses because of new technology. This negative aspect cannot be accepted by society as they leave its citizens in poverty. Mental stress can also rise because of artificial intelligence which will be replacing human being. This study therefore recommends that management should train their employees on the new technologies brought by IoT. Cybersecurity risk is another issue because SMEs in emerging economies are reluctant to use IoT. This risk come in the form of data breach, theft, tampering and spoofing, hacking, repudiation attack, malware attack, IT security, manipulation of data, outdated hardware and software, cloud abuse, IoT security and manipulation of security. Above all, this study is suggesting that management should develop policies which manages such risks which are business risks, societal and environmental risk, supply chain risk, cybersecurity risk, financial risk, operational risk, and technological risk which can subsequently affect their performance. The mitigant measures which management come up with should feed into the proposed framework.



**Fig. 2.** Framework for integrating critical success factors of 4IR and organization performance for SMEs in emerging economies (authors own compilation)

**3.4.2. Limitations.** The 4IR implementation particularly IoT in SMEs is in the initial phase in emerging economies. Most of the articles used in this literature review were from developed economies as there were limited literature available which speaks about IoT and SMEs performance in emerging economies. The proposed framework might have some challenges in fitting very well in emerging economies as it uses the literature from developed economies. Emerging economies is still lagging in IoT because of digital divide, cost of data, poor infrastructure, cybersecurity risks and other related risks identified in the framework [9]. These limitations therefore need to be addressed in future research.

The study was focused only on improving SMEs' organizational performance, which can be extended to other sectors. Besides systematic literature review approach, other approaches such as qualitative, quantitative, or mixed method can be used in future research. The study was meant for emerging economies and future studies can be extended to developed economies, and the results can be compared. This study used balance scorecard and resource-based theory (RBT). In future studies other theories can also be used to determine the adoption of IoT in SMEs for improving performance in emerging economies.

**3.4.3. Further research.** Future research is recommended to apply a longitudinal study to better capture the IoT and its implication on SMEs in emerging economies. Using mixed methods research rather than a systematic literature review would yield better validated results. Conducting a replication study with random sample selection can improve the methodological rigor of the study and support its external validity. Also, conducting a comparative analysis for SMEs and their uptake and usage of IoT as part of 4IR in different region and this can give a better insight of IoT on SMEs performance. Furthermore, examining the developed framework can provide a holistic and comprehensive insights in the subject area.

## 4. Conclusions

This study proved that IoT are very important for SME performance. IoT practices will lead to the different level of organizational performance. SMEs are willing to integrate technological advancements into their processes with well strategy and planning. But there are many challenges for adopting 4IR with latest IoTs like infrastructure, capital, and technology [41]. Top management should show responsibility for encouraging the uptake and usage of technology brought IoT as can be seen as a potential source of sustainable competitive advantage by managing some risk associated with IoT. According to the study, a framework was developed which helps SMEs understand the risks associated with implementation of IoT and how these risks can influence organization performance. However, there were still some SMEs in emerging economies which are still lagging in applying IoT tools making them to be in lower to moderate level of organizational performance. It can be summarized that with the right implementing framework for IoT, SMEs can improve their performance and sustain in a technological development environment. This research identified the aspects that can impact the adoption of IoT to improve SMEs' organizational per-

formance for emerging economies. Balance scorecard and resource-based theory (RBT) was adopted as it stated that adopting the latest technology can improve operational excellence in the firm [76].

## Conflict of interest

The author declares that he has no conflict of interest in relation to this study, including financial, personal, authorship, or any other, that could affect the study and its results presented in this article.

## Financing

The research was performed without financial support.

## Data availability

The manuscript has no associated data.

## Use of artificial intelligence

The author confirms that he did not use artificial intelligence technologies when creating the current work.

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