


Implementation of the 5IR for efficient service delivery in the public sector, South Africa

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Background: The emergence of Fifth Industrial Revolution (5IR) alleviates the Fourth Industrial Revolution's (4IR) technocentric driven behaviour by promoting collaboration. The 5IR is based on the observation that 4IR focused less on the original principles of social fairness and sustainability and more on digitalisation and artificial intelligence-driven technologies to increase production efficiency and flexibility.

Aim: This study aimed at fostering the implementation of 5IR for efficient service delivery in the public sector, South Africa.

Setting: This study emanates from the view that the government of South Africa is hesitant, leading to retention of the ancient technology to provide improved services.

Methods: This study was conducted as a systematic literature review. Data were collected from the articles ranging between 2016 and 2024.

Results: The findings revealed that it is not easy to face the emerging technology without the adequate regulatory framework, basic cognitive and problem-solving skills, which show unpreparedness of the workforce.

Conclusion: The government has been forced into implementing the emerging technologies by the IT industry despite the lack of the regulatory framework; however, this can still be corrected retrospectively and prepare the way ahead with ongoing training and development of the public servants.

Contribution: The significance of this study is that it envisages the infusion of 5IR technologies for the betterment of the public service delivery.

Keywords: 4IR; 5IR; harmonisation; collaboration; human-machine; South Africa.

Introduction

The dawn of the Fifth Industrial Revolution (5IR) has brought relief to many organisations that experienced technocentric menace of the Fourth Industrial Revolution (4IR). The 4IR was intended to increase the innovative technology in various fields, which resulted in creating competition for jobs between humans and robots (Noble et al. 2022). Barrot (2019) opines that 4IR has posed danger to human workforce and is decried for being technocentric. The 4IR technologies have caused talent shortage, owing to many people not possessing appropriate skills to adapt to the incipient technology (Marwala 2020). The World Economic Forum (2016) reports that over 7 million jobs could be lost owing to digital transformation and innovation with administrative and office-oriented jobs constituting two-thirds. The 5IR advances collaboration between human and technologies. In the manufacturing industry, Almalghrabi et al. (2011) and Grewal et al. (2021) point out that the 5IR addresses concerns about the dominance of the robot, which is anticipated to rule the manufacturing process in specific sectors. Countries such as India, which are at the forefront of 5IR, have created digital public infrastructure to address the digital divide, financial inclusion, education, and access to healthcare on a large scale (Sharma 2023).

Hussain et al. (2023) point out that 5IR was introduced in Germany to pursue the concept of developing smart factories that could produce human-equipment interfaces and cyber-physical systems that generate environmental, economic and socially sustainable manufacturing systems. According to Pathak et al. (2019), 5IR's prominent objective is not only about collaboration but to develop the evolutionary and incremental advancement of the 4IR. Breque et al. (2021) add that the other objectives of 5IR are sustainability, governance and social impact. Fanoro, Božanić and Sinha (2021) argue that the 4IR and 5IR ensure the interoperability and interconnectivity across

device system sets, which promote possibility. Xu et al. (2021) accentuate that 5IR is based on the observation that 4IR focused less on the original principles of social fairness and sustainability and more on digitalisation and artificial intelligence-driven technologies to increase production efficiency and flexibility. The 5IR is doing away with the 'we have always done it this way' mentality. Buerkle et al. (2023) and Zhihan (2023) allude that in the manufacturing industry, human characteristics in the form of craftiness, power, imagination, among others, are superposed on the complex automation, consistency, productivity and speed of the collaborating robots. This implies that in the 5IR era, humans view machines as contributors to qualities that humans lack. Furthermore, Fraga-Lamas, Lopes and Fernandes-Caramés (2022) opine that 5IR strengthens the existing 4IR principles by accelerating the transition to a sustainable, human-centred and resilient industry. The key feature of 5IR is to ensure that humans work in a mutually beneficial manner while minimising the impact on earth (Sharma 2023).

While there has been much debate about the importance of 5IR in the factories, there has been little academic interest in fostering it for efficient service delivery in the public sector in South Africa. Given the novelty of 5IR in South Africa, it is critical to conduct a study like this for efficient service delivery in the public sector. Therefore, from the foregoing discussion, this study synthesised the available research evidence in fostering 5IR towards efficient service delivery in the public sector. How can 5IR be fostered towards implementing efficient service delivery in the public sector, South Africa? The specific research questions intended to expand the study were: What are the environmental factors that affect the implementation of 5IR in the public sector? What are human factors that delay implementation of 5IR in the public sector? How can the technological factors affect fostering the 5IR in the public sector? These sub-questions are discussed in section four, literature review.

Conceptual framework

It is recommended to identify a relevant conceptual or theoretical framework that underpins a study. According to Booth and Carrol (2015), the researchers who fail to identify a relevant framework may be unable to explain how intervention, demonstrated to be effective, is believed to work. The conceptual framework of this study was derived from the Technological-Organisational-Environment-Economic-Human (TOEEH) theoretical framework where only three constructs were selected (Orji, Kusi-Sarpong & Gupta 2020; Tornatzky & Fleischer 1990). To summarise the constructs, the technology represents technological factors in digital adoption that are relevant to the relative advantage of the technology over competing technologies, as well as technological readiness and efficiency (Dora et al. 2022; Kiwelu & Ngonzi 2022). The organisational construct refers to factors such as organisational characteristics, resources and attributes (Zhang et al. 2020). According to Adnan et al. (2017), this is more about transparency of organisational culture towards new technology adoption. Sun et al. (2018)

add that this construct is responsible for adequate top management support and ownership and provision of sufficient resources and competencies of modern technology. Garousi and Mantyla (2016) argue that economic and human factors are critical when implementing technology in an organisation. The *environmental* factor concentrates in external factors that influence the adoption of technology such as legislative framework and policies related to new technology adoption (Duan et al. 2017; Hasibuan & Dantes 2012). The economic construct refers to financial health of the organisation affordability; ease of financing and return on investment are essential when adopting new technology (Frost 2020; Rijanto 2020; Wong et al. 2020). *Human* construct involves the skills set, attitude and behaviour that should be possessed when adopting new technology. This is in view that digital literate and competent employees adopt new technology easily (Nilashi et al. 2016). It also supports the need to attend training for re-skilling of employees on newly adopted technology because they are the primary users of technology in their respective organisations (Dora et al. 2022; Yadegaridehkordi et al. 2018).

Problem statement

This study emanates from the view that the government of South Africa is hesitant, leading to retention of the ancient technology to provide improved services. This is attributed to the vicious wave of the 4IR, which led to job cuts and competition for jobs, particularly in the private sector. As Marwala (2020) alluded, it has led to skills shortage. On the other hand, plethora of literature shows that old age has its share to delays in implementing the emerging technologies (Di Giacomo et al. 2019). Marwala (2020) and Shibambu (2024) added that the lack of legislation hinders the implementation of emerging technologies. This has in turn contributed to minimal trust in implementing 5IR technologies within the public sector. However, human living experiences created a deficit trust in emerging technology. In addition, lived experiences too have a share towards implementing technology. The retention of old technology leads to inefficient service delivery in a situation where the citizens would spend less than 30 min. However, with the implementation of 5IR, humans and machines would not see each other as rivals, but colleagues. Using the conceptual framework, 5IR can be implemented towards the benefit of the government and its citizens.

Literature review

Literature review endeavours to determine whether the topic is worth studying and provides insight into ways in which the research can limit the scope to a needed area of inquiry (Creswell 2014:57). In this study, literature is aligned to the objectives of the study.

Environmental factors that influence 5IR implementation

The research question that guided this section was 'how can the environmental factors affect the implementation of 5IR

for improved service delivery in the public sector?' The environmental factors refer to the legislative frameworks and new technology adoption policies, which influence technology adoption (Duan et al. 2017; Hasibuan & Dantes 2012). These factors determine the legislation for effectiveness and efficiency towards any process or services they provide to the public (Shibambu & Ngoepe 2020). The role of technology in facilitating human activity cannot be overemphasised; it is essential that ethical and governance boundaries upon which technology can be used are established (Kassim 2023; Naranjo-Gil 2009). Schwab (2016) believes that the ability of government systems and public authorities to adapt is critical to their viability. The ripple effects of lacking legislation to regulate artificial intelligence were felt in the entertainment industry, leading to the protests by actors because of threat to talent, security, standards and safety it posed to the film industry. As a result, the US government responded by developing the guidelines that should be observed by both actors and IT industry. With relevant policies in place, the public servants can be confident that they are working within protective guidelines that help reduce confidence in emerging technologies (Shibambu & Ngoepe 2020). The current systems of the public policy and decision-making evolve alongside the 3IR, while the lawmakers had time to study a specific issue and develop the necessary response or appropriate regulating framework. Regulatory changes are influential in the adoption of new technologies. Shankar et al. (2021) highlight that the banking regulations have fostered transformation in retail banks adopting technologies, ranging from automatic teller machines to mobile payments. Schwab (2016) encourages the legislators to adapt to a new, rapidly changing environment by reinventing themselves, so that they can understand what they are regulating. This is achievable when governments and regulating agencies collaborate with business and civil society. The South African government has formed the Presidential Commission on 4IR to address the 4IR (Marwala 2020). The Government Gazette (2019) prescribes that the mandate of this commission is to coordinate the development of South Africa's national response action plan to deal with the 4IR. The commission identifies policies, strategies and plans that are needed to position South Africa as a leading country in the evolution and development of the 4IR. The formation of the commission could be attributed to the fact that the *Electronic Communications and Transactions Act* 25 of 2002 is silent on 4IR or 5IR and leans on the 3IR. Schofield and Abrahams (2015), Erasmus (2011) argue that the ECTA of 2002 has the potential to drive the 4IR elements such as cloud computing; however, it has noticeable challenges around trans-border jurisdiction and enforcement of judgement. Mohlameane and Ruxwana (2020) observe that while ECTA contains some provisions that are applicable to cloud computing, it is not aligned with international best practices. Stork, Calandro and Gillwald (2013) maintain that 4IR technologies such as cloud computing received more awareness in South Africa but received low adoption to some extent stifled by limitations, even though global cloud providers are fully operational in this market.

Human factor in implementing 5IR

The human factor involves the skills set, attitude and behaviour that should be possessed when adopting new technology (Dora et al. 2022). Campbell (2017) point out that the South African workforce is under-prepared for the complex transition of skills in a technologically driven work system. The emergence of 4IR has exposed the lack of skills that complement it. (Marwala 2020). This is likely to transcend to 5IR if it is not swiftly addressed and if it is not faced with adequate skills. According to Nilashi et al. (2016), when adopting new technology, humans need to have certain skills, attitudes and behaviours. Singapore has implemented proactive and sustainable skills development initiatives aimed at improving the global competitiveness of its organisations in the future (Samuel & Moagi 2021). Wickham (2019) concurs that the emerging technologies have increased the need for technical depth and competency in the existing workforce to meet the complex technological demands of the new work order. Furthermore, Samuel and Moagi (2021) and Kopalle et al. (2022) argue that in an emerging economy, it is critical for South Africa to initiate and accelerate skill development strategies that will prepare its entire workforce to function effectively in the new industrial revolution. According to the World Economic Forum (2016), some of the skill sets required are basic skills for emerging technologies, cognitive systems as well as problem-solving skills. To cultivate the rewards of 5IR, Kassim (2023) quoted Dzulkifli Abd Razak stating that 'leaders are expected to equip themselves with self-awareness, curiosity and empathy skills as they can expect more unprecedented things to take place given the trends exhibited in 4IR so far'. Van der Poll (2022) highlights that technical skills alone do not maximise the chances of successful technology adoption. In the same vein, Matli and Ngoepe (2020) assert that even if the nascent technologies were adopted, it would be futile in the absence of relevant skills. In the world of 5IR, digital interaction has moved from text to options of many languages (Sharma 2023). Regarding skills, Marwala (2020) opines that South Africa is on the catchup as noticed from the inception of the 4IR. Kolade and Owoseni (2022) suggest that the disruptive technologies require the future to embrace the ever-growing shifting of skills and leverage human and technology collaboration to address the challenges ahead.

Through the human skills, the machines are able to operate collaboratively. Wilson and Daugherty (2018) highlight the three roles that the human factor plays, such as training machines to perform selected tasks; explain the outcomes of those tasks as well as to sustain a responsible use of machines. This implies that the human factor enhances ethics on the machines in order to promote a healthy collaboration with human. As a result, smart machines are capable to help humans to expand in the form of cognitive strengths, interact with customers and employees as well as to embody human skills to extend the physical capabilities (Wilson & Daugherty (2018).

Technological factors

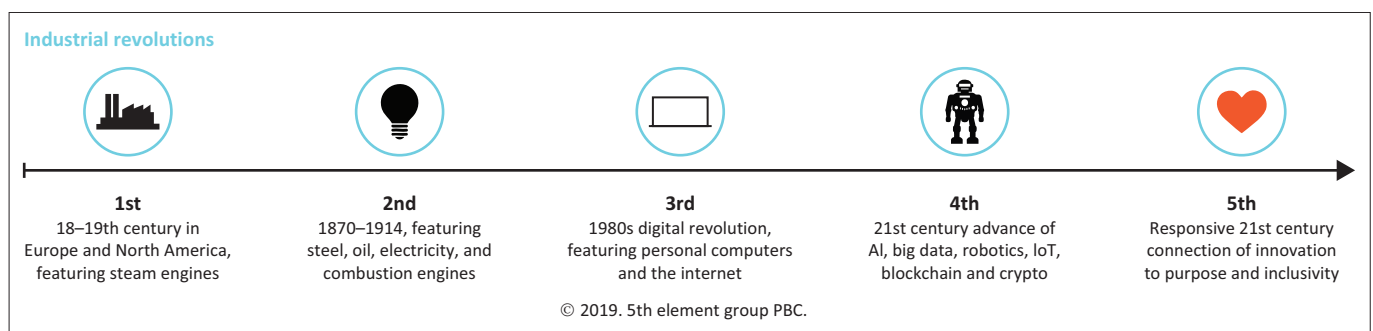
Technological factors relate to digital adoption relevant to the relative advantage of the technology over competing technologies, as well as technological readiness and efficiency (Dora et al. 2022; Kiwelu & Ngonzi 2022). Before discussing technological factors, it is imperative to know the journey of the industrial revolutions to comprehend the current technologies as indicated in Figure 1. The First Industrial Revolution introduced the steam engine for use in manufacturing in the 17th century (Schulze 2019). That was followed by the Second Industrial Revolution, which introduced electricity where electricity-powered engines were invented in the 18th century (Xu et al. 2021). The Third Industrial Revolution (3IR) started in the 1970s where information technology was introduced (Noble et al. 2022; Sarfraz et al. 2021). The 3IR paved way for the digital infrastructure, which has been perfected by the 4IR. The 21st century witnessed the dawn of the 4IR, which improvised a confluence of physical, cyber and biological technologies (Schwab 2016). According to Bayode, Van der Poll & Ramphal (2019), the 4IR is considered different from the preceding industrial revolutions due to its disruptive nature of the technologies that drive it and the potential scale of its impact across numerous industries, public and private. The 4IR is considered to have threatened human workforce for being technocentric (Barrot 2019; Golić 2019), which according to Odorčák (2020) refers to a value system that expresses absolute faith in and centres on technology and treats humans as separate from nature. The 4IR was short lived by the 5IR, which Noble et al. (2022) and Gauri and Van Eerden (2019) suggest that it is a harmonious acceptance of human-machine collaborations. Collaboration between human and machines refers to improved integration, faster and better automation with power of human brains (Pathak et al. 2019; Haesevoets et al. 2021). It has led to a metaphorical view that humans and technology are dancing together or hand-in-hand the human and machine shall work. Troisi, Visvizi and Grimaldi (2023) argue that the 5IR represents the latest iteration of industrial automation and refers to the integration of advanced technologies such as Internet of Things (IoT), Artificial Intelligence (AI), chatbots, robots, among others, to optimise the production process. On the other hand, these authors also argue that in the 5IR,

technology is not holding a driver's seat for the organisation, but the customers' aspirations are more crucial than technology. This infers that 5IR focuses on customers' aspirations and resolving barriers of business developing the products and services, which may comprise re-engineering business process (Pathak et al. 2019).

The chatbots are quintessential technologies brought by the 5IR and are useful in both private and public sectors. According to Przegalinska et al. (2019), chatbots are interactive, virtual agents that engage in verbal or text interactions with humans. This technology has reduced interaction between customers and service providers (Collins et al. 2019). Types of chatbots are menu based or button-based, rules-based and AI-based. Agnihotri and Bhattacharya (2024) point out that for customer services, chatbots provide services that are not limited by time. Castillo, Canhoto and Said (2021) suggest that the shortcoming of chatbots emanate from its failure. If chatbots technology fails, the matter is escalated to humans. According to Agnihotri and Bhattacharya (2024), chatbots must perform their job and depict relationship management with customers. The AI-chatbots excel in handling repetitive tasks without fatigue, while humans are good in addressing complex issues with empathy (Daughtery & Euchner 2020).

The 5IR in various sectors

The 5IR has proliferated various sectors such as health, manufacturing as well as the libraries. According to Pang, Lee and Murshed (2023), the 5IR has manifested itself in the health sector by enhancing patients' care and treatment through the use of connected medical devices and telemedicine that also promote remote monitoring and diagnosis of patients. It improves efficiency and effectiveness of healthcare system by automating administrative functions and enabling real-time data analysis to inform decision-making (Ngoepe & Marutha 2021). Smuck et al. (2021) opine that 5IR and digital health share a common goal of utilising advanced technologies to improve the efficiency and effectiveness of healthcare delivery while also ensuring patient safety and better outcomes. Pathak et al. (2019) and Hussain et al. (2023) allude that in the manufacturing industry, the manufacturers are faced with cost reduction, which can be achieved by zero waste production. While chatbots can be used in healthcare



Source: Noble, S.M., Mende, M., Grewal, D. & Parasuraman, A., 2022, 'The Fifth Industrial Revolution: How harmonious human-machine collaboration is triggering a retail and service [r]evolution', *Journal of Retailing* 98(2), 199–208

AI, artificial intelligence; IoT, internet of things.

FIGURE 1: Industrial revolution journey.

facilities to interact with patients, it can also be useful in interacting with students at the universities (Przegalinska et al. 2019).

It is believed that in a landscape characterised by information overload and the constant evolution of technology, libraries do not necessarily need reinvention but to redefine their purpose. The library services have been aligned with lifestyles and preferences of the patrons by developing intelligent libraries, which are capable to connect communities on a global scale (Ajani et al. 2024; Green 2023; Ijab et al. 2019). Adigun, Ajani and Enakrire (2024) point out that a notable example of integrating technology into library systems is the utilisation of meaningful labels to signify the enhanced service model. Singapore has introduced robots that work in the libraries that work side by side with humans. With the use of IoT devices, library patrons can easily and safely access resources using their smartphones than being physically in the library (Adigun et al. 2024). In academic institutions, the emergence of 5IR has nurtured the online classroom in some South African schools or institutions of higher learning by fostering the interaction between the learners and facilitators to promote learning (Ojetunde 2024).

Recognising the advanced technology and its limitations is a crucial aspect of successful digital health (Pang et al. 2023). According to Yao et al. (2018), it is crucial to move ahead from 4IR towards 5IR regarding societal impacts of 4IR where robots and human intelligence in collaboration.

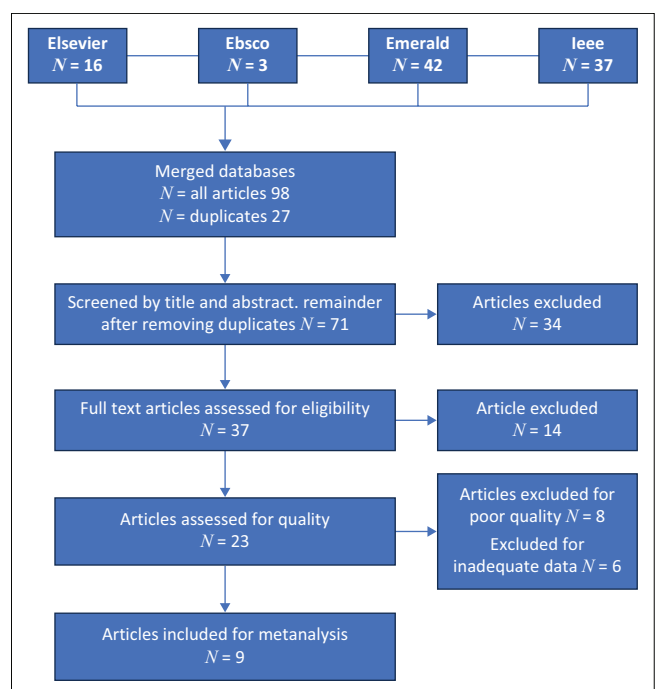
Research methods and design

This study was conducted as a systematic literature review underpinned to the original guidelines of Kitchenham, Mendes and Travassos (2006). According to Pollock and Berge (2018), systematic reviews answer pre-defined research questions using explicit, reproducible methods to identify, critically appraise and combine results of primary research. Numerous scholars such as Munn et al. (2018) and Dewey and Drahota (2016) add that systematic review can be conducted to confirm or refute whether current practice is based on relevant evidence, to establish the quality of that evidence and to address any uncertainty or variation in practice may be occurring. Systematic review was preferable for its focused and well-defined research questions over the traditional review, which uses broad research questions whose findings are not reproducible (Knoll et al. 2018). The retrieved literature was reviewed in line with systematic literature approach. The systematic research was used to initiate the review process. The search was conducted from four purposively selected scholarly databases as indicated in Figure 2. The key words used were 'Fifth Industrial Revolution', '5IR AND 4IR', '5IR in public', '5IR in private sector', '5IR in libraries', '5IR in healthcare' and '5IR skills'. Following the retrieval of literature, a detailed review was executed. The findings were presented in the flow diagram as indicated in Figure 2. The articles were narrowed through exclusion criteria by removing books, book chapters, conference proceedings and web pages. The results were

limited to peer-reviewed research articles from 2016. This date was informed by the emergence and popularity of the 5IR. In the inclusion and exclusion criteria, only the articles that discussed 5IR or elements of 5IR were included. It did not really matter whether 5IR was implemented in the private or public sector, if it demonstrated collaborative behaviour, the researcher considered it. All the articles that were not written in English were excluded because of lack of translators. All this was done in consideration that systematic review that does not find and include relevant studies is referred an empty review (Pollock & Berge 2018). To answer the research questions, the following steps, which are also presentenced graphically were used: formulating three clear well-designed research questions, writing a systematic review protocol, literature search, abstract screening, full-text screening, data extraction from included studies including risk of bias assessment, data analysis, assess quality of evidence and systematic research report (Knoll et al. 2018).

Discussion

The first research question was designed to address environmental factors such as legislation and policies that can affect fostering and implementation of the 5IR. Working within legislative parameters is believed to instil confidence and governance on which users can rely on. The study revealed that the current legislation, ECTA 2002 is leaning on the 3IR and it is not aligned to the international best practices because it lacks trans-border jurisdiction and enforcement of judgement (Mohlameane & Ruxwana 2020). Kassim (2023) agrees that it is crucial to establish ethical and governance boundaries over technology use. Some



Source: Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G. & Prisma Group, 2010, 'Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement', *International journal of surgery* 8(5), 336–341

FIGURE 2: Flowchart of manually selected eligible articles.

technologies have been fostered by default because the major players in technology such as Microsoft and Cisco have phased out the outdated technologies in favour of the ones that are convenient to use remotely; Office 365, MS Teams, Zoom, Webex, Google Meet, to mention a few. As a result, the government and other state enterprises were left with no option but to work with the emerging technology without a policy in place. This again implies that the government is on the backfoot regarding legislations that support the 5IR technologies. The findings are supported by the literature that showed that the government of South Africa has reacted to the lack of legislation by forming the Presidential Commission on 4IR to identify policies needed to position South Africa as a leading country in the evolution of emerging technologies (Marwala 2020). This commission is reacting to the technology that has already emerged and implemented without the supporting legislative framework. According to the findings, lawmakers who are inexperienced with the environmental factors may delay the creation of policies. Supported by Schwab (2016), the lawmakers must rapidly adjust to the changing environment by reinventing themselves, so that they can understand what they are regulating. If policies are not developed, the prevailing attitude witnessed in the development of cloud will recur, where the government was not sure whether to adopt cloud storage or not because of a lack of clear policies. This finding resonates with Stork et al. (2013) by indicating the awareness of cloud that lacks adoption.

The second research question was *'What are human factors that delay implementation of 5IR in the public sector?'* According to the findings, the emerging technology should be met with appropriate skills, attitude and behaviour to make use of it. Literature revealed that the emerging technology has exposed the lack of complementary skills (Marwala 2020). The new technology should be embraced with relevant skills. This study demonstrates that various industries were underprepared for the complex transition of skills in a technologically driven work system (Campbell 2017). Some of the critical skills required are basic skills for emerging technologies, cognitive skills and problem-solving skills. The findings revealed that because of a lack of relevant skills and unpreparedness to face emerging technology, the public sector is still predominantly utilising the legacy systems. In the absence of the required skills, Samuel and Moagi (2021) demonstrate the necessity to create strategies that prepare the workforce to function effectively in emerging technologies. The 5IR does not just require computer literacy but digital and technical skills.

How can the technological factors affect fostering the 5IR in the public sector? It is essential to be technologically ready and efficient to adopt the emerging technologies. Most of the evidence revealed supports that 4IR paved a way for the 5IR, which was well received in the private sector. Pang et al. (2023) concur that health sector has improved its healthcare provision to another level. It has been demonstrated that healthcare can be improved in view that

there are 5IR technological devices that are useful to diagnose and track patients' progress even if they are not physically in hospital. Telemedicine can reduce the demand for space or wards in hospitals because it promotes remote monitoring of patients. Based on the findings, communication has been improved using chatbots (Daughtery & Euchner 2020). This implies that the customers, clients, public, among others, can communicate with their service providers telephonically or through short message services (SMS). Generative chatbots allow users to ask questions and receive answers instantly without human intervention. In the event that the machine runs out of responses, the matter is escalated to the human beings for further assistance. The findings confirm that the 5IR technologies have transcended to the academic space. According to Ojetunde (2024), with the use of 5IR technologies, teaching and learning can be achieved seamlessly without the use of a traditional face-to-face approach. This type of teaching and learning model became popular during the height of coronavirus disease 2019 (COVID-19) and those who implemented it have not considered looking back. The findings showed that 5IR encroached into the libraries where the need to physically visit the library has become unnecessary because the patrons can access the resources virtually. Professionally, the companies that have successfully fostered and implemented 5IR have seen a drastic improvement in cost-saving because only minimal workforce is office-based. Manufacturing companies have also seen improved profit through the collaborative behaviour demonstrated by human and machine. The use of 5IR has promoted a situation where human and technologies are partners that complement each other as opposed to the previous revolutions where technology was becoming superior to human because of efficiency and precision in executing tasks. Service provision should not be a once-office event but must go beyond normal working hours. Contextually, the government departments and state enterprises should be informed by the type of services they provide to determine the 5IR technology that can be implemented. The South African Revenue Services has set examples on how to exploit 5IR. The 5IR can auto-file for taxpayers and only intervene when there is an objection brought forward by the taxpayers. The departments such as the Department of Higher Education and Training should promote effective communication with the broader community of students using chatbots. This would save the department from dealing with queries that would be easily handled by the machines. However, the chatbots should be implemented in a way that it covers a scope pertaining financial aid and bogus institutions. The Department of Home Affairs has so far demonstrated efforts to handle immigration matters with the inclusion of identity documents differently from the old days when only at the offices can one make an application. Collins et al. (2019) concur that this 5IR product reduces interaction between customers and service providers.

Recommendations

The study suggests the following recommendations:

- The lawmakers must expedite the development of the progressive legislative framework that fosters the implementation of the 5IR.
- The lawmakers must work closely with ICT committees and Presidential Commission on 4IR as a way of getting to understand the progressive technologies and required laws to instil confidence.
- The lawmakers should be able to understand technology in order to avoid developing what is misunderstood.
- Every technology attracts training. Therefore, training should not be conducted in ad hoc basis, but continuously because technology is moving non-stop. This also calls for the trainers to undergo training because the emerging technology is new to everyone.
- The government departments should expect changes in their financial planning when new technology is implemented because the infrastructure needs to be developed or upgraded; however, going forward, expenditure will change because only maintenance will be required. For instance, many organisations have been forced into online-based applications and the infrastructure had to be reviewed and changed in a short space of time. It is well understood that technology is not a 'one-size-fits-all'; hence it is necessary for each department to evaluate its services in order to determine the 5IR technologies suitable to implement.

Figure 3 depicts the recommendations as discussed above. Despite the pervasive 5IR technologies in various fields such as libraries, health, manufacturing, to mention a few, there is a need to move swiftly towards finalising the Presidential 4IR Commission, which is considered a stepping stone to paving way for supporting policy of the emerging technologies. This in turn would ensure readiness for the implementation of 5IR. On the other hand, the people should brace themselves for new skills that complement 5IR. Fostering the implementation of 5IR requires a relook on environmental, human and technological factors for successful implementation.

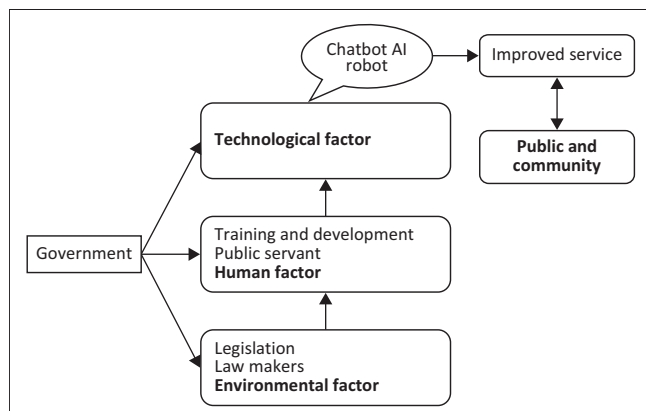


FIGURE 3: Framework for implementing 5IR services.

Implications of this study

In response to 5IR, this study might be a starting point for the public sector to comprehend the collaboration that could be formed between humans and machines for the benefit of public sector in South Africa. Finally, whether the 5IR encourages an ongoing evolution in improving service is yet to be determined, because, to date, the 4IR has not been fully embraced. It is also envisaged that 5IR technologies can be infused for the betterment of the public service.

Conclusion

This study aimed at fostering the implementation of 5IR for efficient service delivery in the public sector, South Africa. In relation to the environmental factors, it is evident that the current legislation, ECTA 2002 does not support the 5IR. This leaves South Africa without a relevant legislation that regulates the use and governance of the nascent technologies. The formation of a Presidential 4IR Commission, which is still at the development stages, is already overtaken by the 5IR. This implies that if there is no proactive approach that is put into place, South Africa will remain on the catch up because of the speed in which technology evolves. This is also likely to create vulnerability to litigation because employees or public might be exposed to unwarranted behaviour. The lawmakers need to become actively and proactively involved in developing the legislations that regulate the 5IR.

Regarding the human factors, it is significant to face new technology with relevant skills. The 4IR and 5IR have evidently proven that South Africa does not have adequate skills to operate within these industrial revolutions. Many people have adopted ways to equip themselves through the personal computer devices that they purchase for themselves. Being under-prepared delays to work effectively even when the technology has been presented to the organisation. Technology consumers must go beyond computer literacy in order to seamlessly navigate the new technologies. It is a necessity to create strategies that prepare the workforce to function effectively in the emerging technologies.

The last section focused on technological factors. Based on the study, it is clear that the 5IR was well received in the private sector than in the public sector. This can be attributed to the fact that the private sector is motivated by profit while government is a non-profit institution. It is necessary for the government to foster the implementation of 5IR to enhance efficient service delivery. As pointed out, with the use of 5IR, the academic institutions can attract a huge number without concern of space. More so, the libraries can be able to purchase a minimal number of resources but still assist a number of patrons larger than the one determined by the furniture in a physical environment. Currently, admission and shortage of facilities in hospital is another concern. With the use 5IR technological devices, it is not necessary for the outside patients to physically visit the hospital because they can be monitored remotely. Most

of the time, government services are accessible on premises, with the use of chatbots the public can interact with the public department of their choice without interruptions or time limit. The public sector can again deviate tasks deemed to cause fatigue to the machines and only intervene. For instance, during the peak hours (registration), which normally take place around January and February of each year, the use of 5IR can be helpful in dealing with queries such as illegal higher learning institutions and progress of the application for financial aid.

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Competing interest

The author declares that he has no financial or personal relationships that may have inappropriately influenced them in writing this article.

Author's contributions

A.S., is the sole author of this research article.

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The data supporting the findings of this study cannot be shared as it is sensitive government information and could compromise the privacy of research participants.

Disclaimer

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