International Journal of Social Sciences and Humanities Invention 10(05): 7890-7894, 2023
DOI: 10.18535/ijsshi/v10i05.05
ISSN: 2349-2031
https://valleyinternational.net/index.php/theijsshi

Embedding the Fourth Industrial Revolution (4IR) in South African Municipalities: Challenges and Prospects

Nokele Sonayena Kenneth[1], Karabo Makganya[2]

[1,2]Tshwane University of Technology Pretoria South Africa
Department of Public Management

Abstract
In South Africa, the current technology has brought multitudes of changes and transformations to the public sector and service delivery. The current state of technology allows municipalities to carry out their duties using ICT platforms successfully. E-participation, e-services, citizen portals, digital city services and goods, broadband fibre rollouts, CCTV networks, data center infrastructure, and private cloud solutions are just a few of these endeavours. The lack of integration of the smart city plan into the IDP, insufficient internal ability to support and sustain projects, and other issues may prohibit most municipalities from effectively adopting 4IR programs. limited support from a broader range of stakeholders, such as workers, communities, labourers, and businesses Among municipal departments, there is a lack of linked and coordinated thinking and activities. This study aims to assess how well the 4IR has worked to improve municipal service delivery. It is concluded that towns may be able to fully integrate modern technologies with the incorporation of 4IR technology into municipal IDP. In order to do this, a number of strategies are suggested, and a theoretical framework for the phenomena is investigated, with the goal of addressing the issues that prevent the proper application of 4IR technologies in South African Municipalities.

Keywords: Municipalities, the Fourth Industrial Revolution, Intergraded Development Plan (IDP), South Africa

1. Introduction

The 4IR inventiveness implementation is affecting all sectors locally. Municipalities in South Africa have elements of a smart city that are not just applicable to cities but also to smaller towns, villages, and larger municipal regions (Mhaka,2020). To improve the quality of life for their residents, improve the experience for businesses, and create an environment that is conducive to economic development, many municipalities are already involved in smart city transformation activities (Local Government Sector Education and Training Authority, 2020) [SETA]. e-services, citizen portals, digital city services, and products, broadband fibre rollouts, CCTV networks, data center facilities, and private cloud offerings are just a few of the smart technologies that South African municipalities have implemented concerning municipal governance. For example, most municipalities offer free internet access in libraries and public spaces for students (LGSETA,2020:40; Matthews & Landsberg, 2022). Additionally, municipalities have implemented electronic health records in clinics, and all municipal buildings have internet connectivity, including building management systems, estate security and access control, science and technology parks, and ICT upkeep (LGSETA,2020). It is for this reason that this paper makes the case that the majority of municipalities now require ICT experts to engage in and embrace 4IR initiatives and improve their delivery of digital services. This supports the claim made by Mudau and Mukonza (2021), who claims that "the 4IR continues to define the future through its impact on public and commercial sectors.

However, obstacles that might prevent South African municipalities from implementing smart city initiatives fully include, but are not limited to, a failure to integrate the smart city strategy into the IDP and a failure to recognize a smart city program as an overarching framework operation across city departments; a highly regulated environment that lacks the agile mechanisms needed to engage and procure innovative and smart systems; a lack of funding for conscientious city planning initiatives (LGSETA,2020, Mhaka,2020; &

Matthews et.al. 2022). Although the authors are aware of these difficulties, this article intends to is to assess the 4IR's performance in southern municipalities while taking into account the potential problems it has presented to local government. It is concluded that towns may be able to fully integrate modern technologies with the incorporation of 4IR technology into municipal IDP. To do this, a number of strategies are suggested, and a theoretical framework for the phenomena is investigated, to address the issues that prevent the proper application of 4IR technologies in South African Municipalities.

2. Research Techniques and Theoretical Support

This article was heavily influenced by the research ideologies of post-positivism and the critical paradigm. These two are employed by the researcher because they aim to investigate the structural, historical, and political facets of reality to comprehend change and transformation. The non-empirical research assesses the impact of the 4IR in South African municipalities through literary analysis. This paper is largely informed by the Technology Acceptance Model (TAM) to support its argument focused on the 4IR in South African municipalities. A critical scholarship review, which involved the review of books, journal articles, and official government documents within and outside South Africa, was used to gather insights.

2.1 Technology Acceptance Model (TAM)

Davis (1989) first proposed the TAM, which is an adaptation of the social psychology theory known as reasoned action, which seeks to simulate how users will embrace new information technologies. The "Perceived ease of Use" (PEOU) and the "Perceived Usefulness" are the two main constructions that the TAM takes into account (PU). PEOU is the degree to which a person believes a system will be free of effort to a big or smaller extent, whereas PU is the degree to which a person considers and believes that the usage of an information system will enhance task performance (Venkatesh, Moris & Davis, 2003:438). Because they have a big impact on how people feel about new information and communication technologies, the TAM model emphasizes the significance of perceived usefulness and perceived ease of use. Thus, attitude plays a key role in the model connecting perceived usefulness and simplicity of use with behavioural intentions and actual behaviour. The term "attitudes" is said to relate to "the general and relatively persistent judgments people have on numerous kinds of items, including products and ideas," according to Davis et al. (1989:989). In this paper, the relationship between perceived easiness, perceived usefulness, and official attitude regarding the usage of 4IR initiatives is examined using this model. The TAM directly affects whether or not 4IR technology is accepted, hence this article argues that a lack of ICT skills influences municipal officials' negative attitudes toward using and accepting current technology.

2.2 Municipal Planning and 4IR

Few municipalities, according to Mailane (2021), refer to the fourth industrial revolution in their medium- and long-term planning. This is understandable given that a number of towns have noted problems with the delivery of services, particularly power, without mentioning 4IR solutions. It's interesting to note that several towns have smart city strategies in place or run programs like offering free Wi-Fi at libraries and other locations, both of which are pertinent to 4IR projects. According to Mailane (2021), several municipal IDPs don't offer any insight into how the municipality plans to handle the 4IR. Unexpectedly, the cities have begun some 4IR-related agreements, specifically one with Google SA to promote digital skills training (LGSETA, 2020). According to Matthews et al. (2017), many district and local municipalities' IDPs fail to mention 4IR. The research by LGSETA (2020), which showed that municipalities, and particularly metros, frequently already have programs in place that address digitalization, industrialization, and technological growth, has reaffirmed this. However, researchers like Schwab (2018) contend that the designated municipalities' IDPs must be aware of the 4IR integration's broader strategies and goals. Unfortunately, proactive 4IR integration into IDPs is still lacking, and digitalization is still approached independently of other programs, initiatives, and services (LGSETA,2020). It may be time to take heed of Matthews et al. (2017), who contend that local government should take the lead in the 4IR transition to support the delivery of basic services. This government must also learn to be more responsive in incorporating these tactics. According to Manda and Dhaou (2019), delivering on 4IR is not about promoting new technologies but rather about fostering an environment, ethos, and culture that encourages the use of new ones.

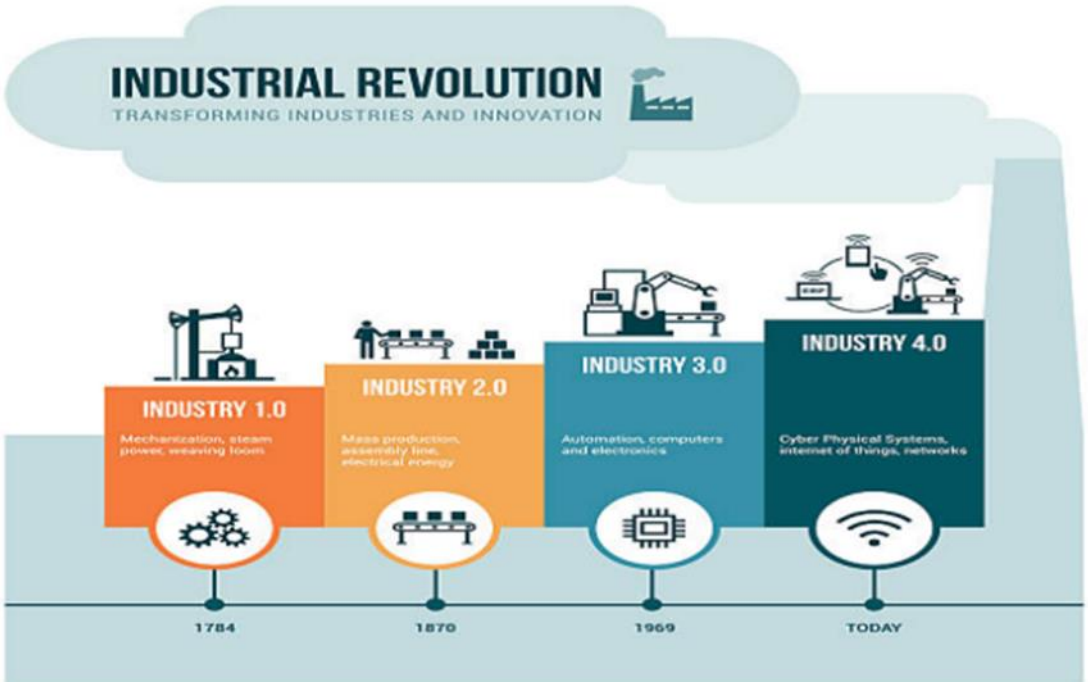
2.3 Needs for 4IR and municipal skills

The government may play a significant role in fostering the skills required for a successful transition to 4IR (LGSETA,2020). It's interesting to note that in South Africa, the national government is principally responsible for many of these efforts in terms of education and ICT legislation and policy (Matthews & Landsberg, 2022). According to Mawela et al. (2017: 149), municipalities are essential to advancing e-Government initiatives for all stakeholder participation, including, but not limited to, businesses, local communities, non-governmental organizations, and traditional leadership institutions. Following the argument made by Mawela et al. (2017), this article claims that, in the context of South Africa, municipalities can take proactive measures to address skills gaps, frequently serving as a facilitator of national policy and programs. Numerous towns across South Africa and the rest of the world lack the essential skill sets to adopt 4IR technology, according to recent research on the technology undertaken by LGSETA and others. The paper makes the case that for local government to fully participate in the 4IR initiatives, skills policies must be strengthened to better support initial learning, foresee and address changing skill needs, maximize the use of workers' skills, and enhance incentives for continued learning. This perspective is compatible with Mailane's (2021) claim that for countries to fully profit from the 4IR, they must create policies that assist employees in adapting to changes and acquiring the necessary skills to succeed in the digital world. Since cities "are at the epicentre of the structural transformation occurring around the fourth industrial revolution where access to information and communication technology (ICT) plays an important role, many scholars who have opined about the 4IR are primarily concerned with kills mismatch and the need for retraining particularly impact at the local level.

3. Overview of 4IR: Opportunities and Challenges

The 4IR is more advanced than the preceding revolution, and its cutting-edge technological advancements are what is most upsetting. The stages of the industrial revolution from 1784 to the present are depicted in Figure 1.1 below.

Figure 1.2 Industrial Revolution Stages



Source: iStockphoto (2016).

Around 1784, the First Industrial Revolution revolutionized how work was performed in communities by introducing railroad construction and mechanical production. Mass production during the Second Industrial Revolution led to the elimination of some jobs while greatly increasing the number of jobs in other fields. The "electronic age," which the Third Industrial Revolution brought about, was characterized by a greater emphasis

on technological system improvements, the fusion of various networks, and the "interoperability of ecosystems" (Mbatha, 2019: 5). The 4IR is making enormous gains in developing technologies, according to Schwab (2016: 37), from "gene sequencing to nanotechnology, and from renewables to quantum computing." these political and economic systems coming together. knowing the organizational effects and disruptions that the 4IR's drastic changes will cause. At the local level, the government must create the proper legislative and regulatory framework and develop a strong digital infrastructure, particularly broadband connectivity, enduring alliances, and workable finance strategies for 4IR solutions. Smart solutions have the potential to create just as many issues as they aim to solve if poorly conceived or managed. As of now, it can be highlighted that properly managed 4IR technologies can assist municipalities in addressing pressing issues, enhancing service delivery, enhancing safety and security, and fostering social inclusion (Matthews & Landsberg, 2022; Shcwab, 2016 & Jessop, 2016; Nokele & Mukonza, 2021).

Opportunities related to advanced technology include, but are not limited to, the following, says LGSETA (2020):

• Creating cities that are smart, connected, and resilient while maximizing value chain efficiency and the interconnection of the built environment and urban system (including small towns and the rural economy).
• encouraging community participation in sustainable, healthy, and eco-friendly construction
• Communities, modernizing governance, keeping in touch with one another through technology advancement, and linking individuals to their ecosystems, institutions, and services.
• Rethinking public-private partnerships, infrastructure investment, innovative financing, and community-building; improving resource efficiency and transparency through solution-based and open (e-) procurement; and addressing revenue generation and financial management in a changing economic environment.

The report also identifies several obstacles, including but not limited to the following, which may prohibit South African towns from fully adopting 4IR initiatives:

• The smart city strategy was not integrated into the IDP, and a smart city program was not seen as an overall framework but rather as an individual project.
• Ineffective integration and coordination of planning and execution among city departments
• The absence of a highly regulated environment with the flexible procedures required to engage with and purchase novel and intelligent technology; Given the many competing needs and the low level of support from a wider range of stakeholders, such as workers, communities, labour, and industry, there is insufficient money for the development of conscious smart cities.

4. Conclusion

Many municipalities "are engaging in 4IR transformation efforts to improve the quality of life of their inhabitants, improve the experience of enterprises, and provide a climate that is favourable to economic development," as it has been discussed in this paper. The delivery of public services in all government institutions is being disrupted by current technologies, in addition to economic models and numerous regulations. With a mandate to identify opportunities given by the fourth industrial revolution and develop the required policies, strategies, and action plans that will position South Africa as a competitive nation, president Cyril Ramaphosa played a crucial role from the standpoint of South Africa. The problems and opportunities that the 4IR have presented to local government in South Africa were examined in this study. This indicates that once the difficulties outlined in this paper are overcome, municipalities, who are at the forefront of understanding citizen requirements, can participate and adopt advanced technology to successfully meet the needs of their communities. Important structures are in place in South Africa to assess the country's readiness for 4IR inclusion. These frameworks indicate that it is not prepared in terms of competence, society, and infrastructure. There is a lot of potential and possibility to more actively incorporate 4IR inside the municipal government. Municipalities, it has been found, are not effectively incorporating larger 4IR initiatives into their IDPs. This raises concerns because it is still apart from important municipal strategies and disciplines.

5. Recommendations

Due to the widespread use of smartphones, cameras, and sensors that add "a layer of digital intelligence over a cityscape to capture streams of real-time data and opening up opportunities for more transparent, people-

centred, and accountable governance," many 4IR innovations rely on data. As a result, opportunities for data collection have increased exponentially (LGSETA,2020). The TAM model's discussion emphasizes the significance of perceived utility and perceived usability, primarily due to the part they play in shaping people's attitudes toward new information and communication technologies and improving service delivery in the public sector. As a means of resolving some of the 4IR implementation issues that are present in many municipalities, this study suggests the following:

- Municipalities must improve and reposition their infrastructure to take full advantage of the scale economies that the Fourth Industrial Revolution has to offer.
- Municipalities should think about and integrate their IDP with initiatives for the Fourth Industrial Revolution.
- They need to position the talents they need and train their staff accordingly, rather than looking for talent outside in a market where digital skills may be in short supply.
- Increasing the ICT department's visibility within the municipal organizational structure so that it is seen as a strategic component supporting the goals of the municipality.
- To successfully implement the 4IR programs and activities, the ruling political parties in the relevant municipalities must foster a feeling of political will. Rethinking public-private partnerships, infrastructure investment, innovative financing, and creating communities of purpose, as well as improving resource efficiency and transparency through solution-based and open (e-) procurement, may help with revenue generation and financial management in a changing economic environment.
- Municipalities must also raise awareness of this issue, assist their workforce in appreciating its benefits, and determine how to adapt to stay relevant. To support the organization in the digital age, they must interact with authorities from various municipal departments about the future capabilities needed.

References

1. Davis, F.D. (1989). Perceived usefulness, Ease of use, and User Acceptance of Information Technology. MIS Quarterly, 13 (3), 319-339.
2. LGSETA (Local Government Sector Education and Training Authority). (2020). 'Research on the 4th Industrial Revolution: Implications for Local Government in the Context of Skills Development.' City Insight [online]. Available at: www.cityinsight.co.z
3. Mailane, L. (2021). 'Gauteng Introduces Innovation Centre, 4IR Strategy - 27 August 2021.' Gauteng Provincial Government [online]. Available at: www.gauteng.gov.za.
4. Mamphiswana, R. (2020). The Fourth Industrial Revolution: Prospects and Challenges for Africa. Addis Ababa: Ethiopian Academy of Sciences.
5. Matthews, S.L., & Landsberg, C. (2022). The Fourth Industrial Revolution (4IR) and its Effects on Public Service Delivery in South Africa. SciELO [online].
6. Mawela, T., Munganda-Ochara, N., & Twinomurinzi, H. (2017). 'E-Government implementation: A Reflection of South African Municipalities.' SciELO [online].
7. Mbatha, B. (2019). 'A Discussion on the Industrial Revolution in South Africa: Focus on Policy Formulation.' Academia.edu [online]. Available at: www.academia.edu.
8. Mhaka, S. (2019) Perceptions on the fourth industrial revolution and agricultural economics-the case of University of Pretoria alumni. Unpublished Masters Dissertation. Pretoria: University of Pretoria.
9. Mudau, J., & Mukonza, R.M. (2021). Scant penetration of women in the fourth industrial revolution: An old problem in a new context. African Journal of Gender, Society and Development,10(1): 85-102.
10. Nokele, S.K., & Mukonza, R.M. (2021). The Adoption of E-Government in the Department of Home Affairs – Unpacking the Underlying Factors Affecting Adoption of E-Government within the Selected Service Centres in Limpopo Province, South Africa. African Journal of Governance and Development |10(1): 98-117.
11. Schwab, K. (2016). The Fourth Industrial Revolution. New York: Crown Publishing Group.
12. Schwab, K. (2018). Shaping the Future of the Fourth Industrial Revolution. New York: Crown Publishing Group.
13. Venkatesh. Morris, M.G., & Davis, G.B. (2003). User Acceptance of information Technology: Towards unified View.,27 (3):425-478. Academia.edu [online]. Available at: www.academia.edu.