Fostering digital innovations to accelerate service delivery in South African Local Government

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ABSTRACT

Service delivery protests in the recent past demonstrate the dire state of local government in South Africa. The absence of public sector innovation can be linked to service delivery backlogs hence embracing digital innovations (Internet of Things (IoT), Big data and analytics, cloud, Biometrics, computers, mobile applications, 3D machines) in the Fourth Industrial Revolution (4IR) is strategic for enhancing municipal service provision and uplifting the living standards of citizens in communities. The study utilised an explorative qualitative case study design premised on an extensive literature and document review analysis to examine the barriers facing the City of Tshwane from adopting digital innovations in the 4IR. The analysis of documents revealed digital hesitancy, leadership void, lack of innovative research culture, weak municipal preparedness, and digital divide in adopting digital innovations are barriers to digital innovation adoption to enhance service delivery. The paper observes further the lack of systematic and evaluative studies to inform public sector innovation, or growth in digital innovations often led to implementation challenges in the City of Tshwane. Conclusions drawn for the article revealed that adopting digital innovations can be the panacea to accelerating urban service delivery in the City of Tshwane; hence institutional readiness, improved revenue streams, including a stable regulatory and policy environment, are imperative in achieving a digitalised local government in the 4IR.

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INTRODUCTION

By 2050, it is projected that 70% of the global population will be residing in urban areas. This is attributed to rapid urbanisation that triggers severe pressure on basic services in receiving cities (Koppenjan & Enserink, 2009:284; Klopp & Petretta, 2017:92). Such challenges have leveraged the adoption of technological solutions in many African cities to mitigate social ills while managing and monitoring the provision of public goods and services (Ransbotham, Fichman, Gopal and Guta, 2016:834; Tachizawa, Alvarez-Gil and Montes-Sancho 2015:237). In Africa, local governments are under pressure to create employment opportunities and achieve economic growth while addressing multiple environmental and social problems that accelerated urban poverty (Baud, Scott, Pfeffer, Sydenstricker-Neto & Denis, 2014:501). Digital technologies that include forms of Information Communication Technology (ICT) have become popular in other African cities since they enable local governments to improve their communication with citizens while developing ICT and digital-related opportunities (Shava & Doorgapersad, 2021:141). According to Nambisan et al. (2017:223), digital innovations refer to “the use of technology during the process of innovating”. The aim is to radically change the service and product delivery landscape by creating and restructuring the systems using new value and appropriation methods. From the authors’ definition, digital innovation is viewed as a socio-technical phenomenon that enables changes in the market offering, business processes, models that are an outcome of digital technology. In the public sector, digital innovation includes doing things differently by developing new ideas, diffusing, and assimilating new concepts and technology in service provision (Nambisan et al. 2017:224). Considering the changes triggered by the COVID-19 pandemic, the public sector landscape is expected to become innovative in
rendering basic services; hence digital technologies are crucial in improving communication with citizens, including rendering quality services and goods to many urban residents.

Digital innovations can spearhead economic development and prosperity, although limited adoption and technical capacity adversely affect countries implementing modern ICT devices to influence change (Klievink et al. 2017:267; Shava 2022:129). The study of Martens et al. (2016:869) corroborates this view citing the absence of organisational readiness globally, as local governments struggle to utilise digital innovations and align them with employee capabilities to realise change. As noted by Moody, Plat and Bekkers (2019:271), municipalities are grappling with mitigating various obstacles (ethical, infrastructural, legal, information) that impact policymaking to support wide acceptance and adoption of digital technologies in public service provision. The proliferation of digital technology, and wide use of social media, has seen local governments across Africa increasing their engagement and interaction with citizens on service delivery issues. Many studies (Anthopoulos, Siozos & Tsoukalas, 2007:353; Jansen & Estevez, 2013:2) acknowledge that social media as a form of digital innovation can effectively harness public participation municipal decision making and policy formulation. Digital innovations have further enhanced the capacity of local government to foster and leverage technology-based participation, which is imperative for improving service delivery (Reddick, 2011:167). Digital technology has bridged the communication and interaction gap between citizens and service providers, although their effectiveness in delivering public goods and services must not be overemphasised.

The diffusion of digital innovations in the South African public sector has not yet gained much recognition due to numerous hesitations to abandon the status quo and venture into an entirely digitised public service (Boyle & Staines 2019; Shava & Hofisi 2017:205). As Attour & Chaupain-Guillot (2020:195) warn, the use of digital innovations requires local government to create an enabling platform where citizens can acquire feedback for their demands; hence, the two-way relationship is monumental to enhance service delivery through using digital technologies. The development of a digitalised public service through the diffusion of digital technologies was empirically recorded by Wirtz & Daizer (2016:1) & Arduini & Zanfei (2014:476). However, data is limited in South African literature regarding the efficacy of digital innovations in public service delivery. Most studies tend to include the ICT aspect to assess the effectiveness of e-governance which is a narrow-angle given the broadness of digital innovations that can be used within the public sector to enhance service provision. Two research gaps have been observed in extant literature. First, past research focused more on e-governance which is widely believed to include the broad usage of ICTs in various sectors (health, education, transportation) of the economy to improve service delivery. Most of these studies could not adequately capture the increased use of digital innovations, including sophisticated modern technologies ushered in the 4IR. The scanty literature led researchers to observe the second gap in the adoption of digital technologies in local municipalities. In South Africa, many local municipalities are not well capacitated to bridge the digital divide hence the article attempts to fill the void by advocating for the City of Tshwane to improve the implementation of digital technologies to improve service provision in various urban communities under its jurisdiction. The article uses the e-service delivery model to answer specific questions: Can digital innovations improve public service delivery and promote citizens’ participation in local government affairs? What are the challenges being by the City of Tshwane in implementing digital innovations?

To respond to these questions, the study utilised an explorative qualitative case study design premised on an extensive literature and document review analysis to examine the barriers facing the City of Tshwane from adopting digital innovations in the 4IR. Some of the documents used draw extensively from primary data captured by international scholars and lean on some official documents such as strategic documents, IDP Review 2017-2021 from City of Tshwane that inform the strategies adopted to embrace digital innovations to enhance service delivery. Peer-reviewed journal articles that inform the implementation of digital innovations in municipalities were utilised as they contain verified information that can ensure reliability in this article.

After the introduction follows a theoretical framework for this study. The second section contextualises digital innovations in public service delivery, followed by a discussion on digital innovations and efficiency in local government. The fourth section discusses the challenges affecting local government in implementing digital innovations with reference to the City of Tshwane. The last section concludes, offers recommendations and direction for further research.

**Theoretical framework- E-service delivery model**

The article draws from the work of Islam and Ahmed (2007:29), who regard an e-service delivery model as important in guiding the adoption of digital and ICT-based technologies in government departments. The model assumes that the government can actively disseminate information to citizens using various ICTs such as websites and portals directly linked to customers, which help improve citizen's state relations in service delivery. Nonetheless, Fang (2002) warns that e-governance does not only implies websites or digitisation of service delivery instead, it also broadens further into facilitating good governance for all stakeholders in service delivery matters. Through the e-service delivery model, Sithole (2015:74) argues that businesses, citizens, and service providers can engage the government, demanding accountability and transparency. Their close interaction allows for feedback; hence, it is a crucial two-way communication channel. The e-service delivery model was used in the study of Maseko in 2018 where he explores alternative service delivery mechanisms in the City of Johannesburg. Due to its versatility, the model is fundamental in this study. It helps understand how the City of Tshwane adopts digital innovations and related ICTs to accelerate service delivery in the 4IR. Further observations indicate that the model is vital as it proposes a network society with interlinked systems that integrate service
delivery needs for urban and rural populations. As a metropolitan municipality that serves many citizens, the City of Tshwane is positioned to adopt the model to ensure that citizens obtain many services online using various digital technologies.

**Contextualising digital innovations in public service delivery**

Competing definitions were proposed in the literature regarding the concept of digital innovation. Digital as a prefix is associated with many existing concepts, with various prominent scholars arguing against the universality of digital technology as a threat to existing assumptions on innovation (Avital et al. 2019; Majchrzak & Griffith, 2020:17). Innovation is defined by Sorensen (2012:4) as a dynamic process through which problems and challenges are defined, new creative ideas are developed, and new solutions are selected and implemented. The author further regards innovation as a complex process with many jumps and feedback loops; hence it requires strong leaders who can account for and observe ethics in rendering services to the public (Sorensen, 2012:1). Innovation in the South African public sector should be driven by ICT use or workforce motivation, organisational restructuring, and general management behaviours.

This study adopts the definition of Hund et al. (2021), which refers to digital innovations as the creation or adoption, and exploitation of an inherently unbounded, value-adding novelty (e.g., product, service, process, or business model) by incorporating digital technology. From this definition, the researchers argue that the identified metro can enhance public service delivery by implementing new business and service delivery models, new ideas, concepts, and technologies to help bridge poverty and communication gaps.

Many practitioners and scholars across various disciplines, including (Economics, Public Administration, Marketing, and Information Systems) have shown a great interest in the phenomenon of digital innovation (Autio et al. 2018:72; Bangani & Vyas- Doorgapersad, 2020; Beltagui et al. 2020; Hund et al. 2021; Konya-Baumback, Schuhmacher, Kuester and Kuharev, 2019:385). Lytyinen et al. (2016:47) argue that the pervasiveness of digital technology has not transformed how innovation is strategised and created; instead led to improved development through the combination of both physical and digital components to produce novel products (Yoo, Henfridsson & Lytyinen, 2010:725; Nambsan, Lytyinen & Yoo, 2020). Furthermore, as confirmed by Henfridsson et al. (2018:91), digital innovations embody organisations and industries and users and consumers who expect something purposeful to create out of pooling resources together to make an innovation successful. Groups, organizations, and individuals can collaborate and co-create applications and services they desire to serve their purposes based on their desirable qualities (Tilson, Lytyinen and Sorensen, 2010:752).

The proliferation of digital innovations in the 4IR can assist in re-engineering global employment and income worldwide (Mamdu & Pratikto, 2021). However, new technologies can impact the economy, business, market, labour force, and people’s livelihoods (Schwab, 2016). Insights drawn from the Oslo Manual concept inspire public officials to consider an innovative online delivery of services referred to as e-governance or digital governance (Barras, 1990:215). The rationale is to meet service delivery demands by increasing the adoption of digital innovations as catalysts for accelerating service delivery. Suire (2007:161) argues that the growth in digital innovations helps to promote digital governance that motivates government institutions to move towards e-democracy that relegates traditional governance in favour of NPM practices. The researchers argue that, although digital innovations are gaining prominence in Public Administration, their adoption in local government should be monitored as they can derail service delivery due to digital skills training and development of public officials. The constant connectivity to digital technologies and employee’s interaction with smartphones, tablets, etc. iPods, etcetera can delay service delivery in public institutions hence close monitoring from management may be required. Socially the excessive use of digital technologies may deprive people of the networking spirit while the threats of cyber invasion may impact on the privacy of individuals and organisations.

Notwithstanding the adverse effect, local government in South Africa can adopt digital innovations to grow the local economy and enhance citizen engagement while undertaking efforts to bridge the digital divide due to existing social ills such as poverty and unemployment in communities. Shava & Doorgapersad (2021:142) suggest that digital innovations can be adopted to accelerate service delivery within the local government sphere. However, institutional readiness and skills are vital to adequately utilise modern digital technologies to realise a change in the 4IR.

**Digital innovations and efficiency in local government**

The debate regarding the sustainability of digital innovations in developing countries is raging as Economists, Social Scientists and Technocrats have varying views regarding each aspect of utilising digital technologies in developing economies. A study by Lucas & Goh (2009:46) revealed that digital innovations could generate highly complex innovation challenges due to their unintended consequences. Questions still illuminate in the public sector as to “How can digital innovation be managed? Or is it manageable at all? A considerable body of literature (Evans, Hagiu and Schmalensee, 2006; Tushman & Anderson, 1986:4389) examined the relationship between technological innovation and radical change. The review of literature revealed that new technologies could profoundly challenge existing markets. However, critical thinkers argue that some macro-level strategic models can be utilised to mitigate such challenges. Arundel et al. (2015:1271) argue that innovation in the public sector is imperative to navigate away from the traditional and bureaucratic processes that trigger various complexities. The idea was concurred by Attour & Chaupain-Gallot (2020:195), who argued that innovating in public organisations helps realise higher levels of output with minimal input as proposed in the New Public Management (NPM) reforms. To meet community needs and increase citizen engagement, local government is expected to embrace new innovative ideas and logic of co-design and co-production of new services. Although the NPM perceives a
dynamic and innovative public service provider unique from traditional and bureaucratic institutions, embracing change is still a challenge, especially at the local government level in South Africa (Shava & Doorgapersad, 2021:36). The reasons for this are many and Demircioglu (2017:1) cited diminished budgets and absence of relevant skills as impediments for local government to adopt digital innovations that help improve employee performance. The absence of skills negatively affects local government collaboration and the manner in which business is conducted resulting in poor implementation of meaningful innovations (Vyas-Doorgapersad, 2010).

In any thriving state, digital innovations can help enhance economic development and accelerate entrepreneurship and prosperity in various sectors of the economy. Modern digital innovations and social media platforms (WhatsApp, Twitter, Facebook, Instagram, websites) can be employed to effectively meet citizen demands for quality services in this digitalised 4IR era. Apart from enhancing service delivery, lessons learned from the World Economic Forum (2016) show the potential effects of digital technology in accelerating socio-economic development. With the need to embrace the 17 Sustainable Development Goals among countries that inform the need to curb poverty and hunger protect the planet, digital innovations can improve countries’ economies, while a shift in world policies is vital to address various service delivery demands using digital innovations (Meyers, 2016). Arguably, therefore, governments are increasingly under pressure to restructure and re-align their approaches to public interaction, and policymaking as demand for digitization grows.

**Challenges of fostering digital innovations in local government in South Africa**

Digital hesitancy has been identified as one of the causes of poor service provision in local government. In one of his speeches, Premier Makhura reemphasises the need to provide digital skills to 1 million young people while making Gauteng the Silicon Valley of Africa. This statement reiterates the demand by local municipalities to adopt modern digital technologies to revamp public service provision in the 4IR. While embracing new ICTs and digital technologies is a step further towards improving the socio-economic lives of citizens in South Africa, many challenges exist. The analysis of City of Tshwane IDP Review (2020/21) has shown a gap in technology adoption as funding was not dedicated to retraining municipal officials in ICT or purchasing new software and models to enhance service delivery. While the IDP might not reveal all the information regarding ICT use, it should stipulate the long-term plan of the municipality to foster digital technologies as a strategy for responding to service delivery demands. Like the City of Tshwane, digital hesitancy associated with risk aversion was also noted in Cape Town as the municipality adopted digital technologies at a risky calculated rate. Digital hesitancy, as Howlett (2012:539-555) holds, is associated with risk-averse behaviours that hinder public sector innovation as government ministers fear being judged on their abilities to innovate while in public office. In another study, Pollit (2011:39) suggests that adopting digital innovations in local government can help inefficient leaders to uphold accountability and exercising transparency in service provision matters.

In most cases, Clark, Good & Simmonds (2008:1) argue that the lack of systematic and evaluative studies to inform public sector innovation or growth in digital innovations degenerates into service delivery backlogs. The analysis of Boyle and Staines (2019:8) revealed that the absence of digital skills, infrastructure, accessibility, and connectivity affordability presently hinders municipalities from fostering digital innovations to enhance public service delivery. Another study by Amesho et al. (2021) corroborates these views, stating that, shortage of ICTs skills affects the implementation of digital innovations in municipalities. The growth in the digital divide is also rampant in the City of Tshwane, where digital inequalities are negatively impacting the City’s efforts to ensure communities obtain smart services promptly. The high cost of connecting to the internet hinders the City of Tshwane from reaching all citizens regarding service delivery matters.

The leadership void and absence of an innovative research culture affect the implementation of digital innovations in South African local government. Benyera (2022:6) argues that within the 4IR, African governments lack just and ethical leadership, which are critical determinants for embracing modern digital technologies. Embracing technological change in government departments requires visionary leaders who strive to ensure growth and sustainability beyond normal service delivery expectations (Hanna 2018:3). The formation of the Tshwane Interactive Digital Centre (IDC) in conjunction with the EON Reality of the USA shows the efforts of the metro in fostering innovation as a pillar for creating a localised digital economy with a vision for 2055. The projects bring high-end interactive 3D Digital Media, Virtual Reality (VR), and Augmented Reality (AR) technologies to Tshwane. Such a project is pivotal for supporting social-economic initiatives, including education and training within the City of Tshwane (City of Tshwane, 2022).

Furthermore, between 2016/17, more than 800 wifi hotspots were rolled out in communities around the metro, which was essential in ensuring that communities are digitally connected through the provision of 500Mega bytes per day of wifi. The City of Tshwane improved communities, where citizens would have 1GB free access through the Wi-Fi app across 1100 hotspots. Further improvement among Grade 10, 11 up to 12 were noted as students through the TshWi-Fi could access digitise study materials to improve literacy levels (City of Tshwane 2022). Although good practises were pointed out in the City of Tshwane regarding preparing a platform for adopting digital innovation, some loopholes in municipal leadership were noted as the research culture was not fully instituted to allow public officials to become innovative and eager to embrace new technologies in service delivery. This can be attributed to coalition politics in the metro, as many political parties govern the innovation and development landscape. Bason and Hollander (2013:5) argue that the growth in new technologies in developing countries is hindered by unfavorable framework conditions or weak enabling factors. The European Commission (2013:9) discusses that limited knowledge and absence of innovative
leadership and failure to apply innovation processes, methods including the inadequately precise, systematic use of measurement, data and resource constraints affect the implementation of digital innovations.

In contrast, in Europe, public sector innovation is discouraged by a shortage of quantitative data evidence, which require public institutions to obtain more and quality data. Osborne and Brown (2011) argue that lack of accountability, policy hierarchy, staff resistance, sustaining innovation, lack of champion and reluctance to let go of status quo affect adoption of digital innovations. The above example shows some impediments to adopting digital technologies in other countries’ public sectors, resembling some of the challenges affecting the City of Tshwane. To promote the adoption of digital innovations, Attour & Chaupain-Guillot (2020) propose clear directives regarding innovation policies at the national government. To ensure that digital innovations are fully embraced in the City of Tshwane, new policy frameworks for adopting modern technologies must be implemented to promote institutional innovation for effective urban service delivery.

Weak municipal preparedness in embracing digital innovations can adversely affect municipal service provision. The analysis of extant literature has revealed that the absence of institutional readiness in the City of Tshwane, can adversely affect the adoption of digital technologies. For instance, the Innovation Strategy for the City of Tshwane proposed four pillars: strategic intent, organisational capabilities, innovation sustainability, and stakeholder engagement (Ncunyana, 2016). These pillars enable the metro to develop a conducive environment to foster digital innovation to enhance sustainability through collaboration with various stakeholders. Nevertheless, as Boyle & Staines (2019:12) noted, achieving a digital government is being constrained by the absence of the other pillars such as limited digital infrastructure, which exacerbates digital exclusion and widens the digital divide gap among communities. Although the City of Tshwane is digitally excellent in contrast to other municipalities in South Africa, institutional readiness is still a deterrent that may affect the adoption of digital innovations to elevate the metro to become the ‘beacon’ of digitalised public services in South Africa. This is in stark contrast with Agostino et al. (2020:1), who argues that digital innovations help reshape the relations between state and citizen in service delivery issues. In his study, Mergel et al. (2019:1) concur that transforming public service delivery operations through digital innovations can enable local government to withstand service delivery pressures from the citizens and stakeholders. The City of Tshwane established Kusile Mobile Science Labs as a strategic and innovative, cost-effective measure to address the deficit of science laboratories in primary and secondary schools (The Innovation Hub, 2014). Also, through the TshWi-Fi app, free internet access was provided to youth as they accessed the IBM Digital-Nation Africa (D-NA) programme that links entrepreneurs and communities, providing knowledge and skill sharing in finding innovative digital solutions (City of Tshwane, 2022). This innovative gesture is applauded on the metro’s efforts to ensure that modern technology is utilised in communities towards ensuring educational excellence in the 4IR era. In their study, Maseko & Vyas-Doorgapersad (2018:172) support innovation and ICT-based solutions as critical for enhancing municipal service delivery in the 4IR.

Digital based service delivery is crucial in accelerating service provision in the 4IR.

Digital divide is a ‘stubborn’ phenomenon in adopting digital innovations in South African local government. A recent study conducted by Shava & Doorgapersad (2021:144) in South Africa confirms that the digital divide is affecting the adoption of digital technologies in local municipalities. Ramakgopa (2014) affirms further that digital divide in the City of Tshwane creates unequal opportunities and exacerbate socio-economic disparities in communities. The absence of digital skills predominantly affects the metros’ capacity to respond to citizen demands for service providers’ accountability promptly. Compounded by the effects of COVID-19, many local municipalities in South Africa are failing to align the existing legal frameworks such as the National Integrated ICT Policy White Paper (1996) with their plans for adopting digital innovations. This is because digital innovations and other ICT-related technologies ushered by the 4IR are regarded as a ‘borrowed’ phenomenon incompatible with traditional bureaucratic systems by which many South African municipalities operate. In the City of Tshwane digital divide is a serious concern affecting the municipal efforts to roll out ICT projects in communities. These assertions were confirmed by the Innovation Hub (2014), which indicates that young entrepreneurs in the City of Tshwane are failing to access the facilities and services provided by the Hub due to their dispersed geographical location, which makes transportation difficult. This widens the digital divide gap as the Innovation hubs are meant to foster the development of talent in digital skills to uplift the youth to have their innovations that may be adopted by the local metro. The City of Tshwane IDP Review Report (2020/21) indicates that the digital divide associated with existing social ills negatively affects the implementation of digital innovations in public service delivery. Coleman (2016) argues that digital innovations negatively impact businesses and societies due to the digital transformation in various economic sectors such as the manufacturing sector. The use of robotics and artificial intelligence, quantum computers, sensors, and nanotechnology reduce human labour, disrupting household income. Artificial intelligence in the local government can result in skills shortage due to limited specialists implementing exponential technologies. To improve public service delivery in the metro, McLean Sibanda, CEO of the Innovation Hub, advocates for a culture of innovation and entrepreneurial activities that will enhance the lives of the community and create wealth. The City of Tshwane, in collaboration, could ensure that many Innovation Hubs are established throughout the communities to improve digital capacities and create opportunities for many urban youths in South Africa. As Hanna (2018:4) posits, collaborations help municipalities promote a dynamic ICT ecosystem based on highly networked systems and platforms that foster growth in the digital economy.
Conclusion

The article adopts an e-service delivery model to help understand the factors affecting local government to improve service delivery using modern digital technologies and ICTs in South Africa. The extensive literature review has shown that digital innovations can transform service delivery processes in local government by using various digital technologies (cell phones, cameras, biometric systems, computers, social network systems, etc.) that can positively transform local economy in the 4IR. Insights generated from the review indicate that adopting digital innovations in various economic sectors, such as manufacturing and mining, may generate employment, which is vital for socio-economic development in local municipalities. However, one cannot turn a blind eye to the potential effects of digital innovations on the functioning of societies and governments. The researchers deduced that new technologies shift the status quo in local municipalities as some officials do not have the needed digital skills to exploit the latest innovations. Therefore, the City of Tshwane should provide skills training and development programmes to cater for the evolving technological environment that requires a competent skillset to drive public service delivery. Creating an enabling platform that supports public sector innovation is crucial for improving services provision and realising the digital dividends offered by digital technologies. Given the technology adoption barriers noted in the City of Tshwane, the policy-making institutions must promulgate legislation that integrates the function of authority, which is crucial for maintaining control and not relegating state authority to new technologies. An oversight role needs to be played by the metro to ensure that there is no abuse of new technologies to push other entrepreneurial agendas that do not align with the service provision mandates of the metro.

The study utilises a case study design drawn from a literature review and document analysis to assess the factors hindering the City of Tshwane from implementing digital innovations to accelerate service delivery. The study has shown that, there is still a massive ground for future researchers in public sector innovation and urban service delivery to conduct quantitative and qualitative research. This helps determine the number of digital innovations adopted in local municipalities in South Africa and other countries to improve public service delivery.

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