The role of information and communication technology (ICT) on the transformation of municipalities into smart cities for improved service delivery

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ABSTRACT

To improve the delivery of services, municipalities in South Africa are implementing information and communication technology (ICT) initiatives. The use of digitalization thus demands municipalities to introduce e-government services. With adequate resources and training, some municipalities also aim to advance their status as smart cities. However, not all municipalities are equipped to operate ICT-based services. The article aims to explore this situation in the City of Ekurhuleni Metropolitan Municipality (herein referred to as CoE). The article is qualitative in nature and the data collected is analyzed descriptively. The article utilizes the triangulation of data (document review, literature review, interview) to strengthen validity and reliability in the research process. The findings explore the challenges related to leadership in the municipality that requires a willingness to adopt, adapt and implement ICT initiatives for smart governance; ICT infrastructure that requires a municipality to allocate adequate budget to smart governance platforms, training of employees to equip them to operate digitalized processes, to state a few. Overall, the study considers the status and implementation levels of ICT and smart governance in the CoE to be unsatisfactory and requires policy recommendations for effective realization to become a smart city. The article offers policy recommendations emphasizing incorporating ICT in municipal budgets to invest in digital infrastructure.

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Introduction

The unsatisfactory levels of delivery of municipal services are recorded not only in South Africa but in the African continent. The reasons could be that various countries in the continent have been through to dictatorships, political unsettled environment, and civic unrests. It must be noted that many African countries still debating on devolutionary arrangements for local government to administer their own affairs. The countries “with highly centralised government processes” (see Vyas-Doorgapersad, 2011:238; Ncamphalala & Vyas-Doorgapersad, 2019:208–209; Kemp & Vyas-Doorgapersad, 2020:1) may restrict local governments to offer acceptable standards of services due to inadequate control over finances and processes. The associated problems are related to resources, processes and talent management issues that may include “shortage of qualified staff in district and local government; inadequate standards of training and poor coordination between central, district and local levels of government” (Maseko, 2018:29; Kemp & Vyas-Doorgapersad, 2020:1) resulting into inadequate standards of service delivery within their areas of jurisdiction.

The problem defined in this article is that South African municipalities (general context) and CoE (specific context) are facing several challenges related to the use of ICT, such as, computer illiteracy (Subban et al., 2007); risk of online transactions and fear of hacking (Chaterera, 2012); lack of skills or competence, the lack of an ICT policy, and the lack of proper planning for the adoption and diffusion of ICTs (Mbatha et al., 2011); poorly designed website (Paulo, 2016); accessibility to ICT remains a challenge (Chisango

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& Lesame, 2017); even with IT frameworks and directives mandated, implementation has proved to be challenging in most municipalities (Sibanda & von Solms, 2018:1); unavailability of free WIFI (Muridzi, 2019); lack of skilled professionals (Muridzi, 2019); to state a few. Shava & Vyas-Doorgapersad (2021:142) added that “some municipalities do not have enough resources to implement ICT/4IR measures to improve services. Some municipalities are on the road to becoming smart cities but encounter challenges like lack of training and awareness”. It is assumed that these challenges may hamper the improved service delivery in CoE as employees and community members are not equipped and trained to utilise ICT based e-services. A 2019 thesis by Muridzi on a framework to improve e-governance in South African municipalities is considered as a good start exploring the use of ICT for improved service delivery. The article advances the topic exploring the aspects of capacity-building (training, skills development) hence aims to fill the research gap. The rationale is that service delivery challenges exist in South Africa, especially at municipal level, hence there is a need for ICT training offered to personnel and community members for improved service delivery. The incorporation of ICT in municipal governance may assist municipalities to become smart cities to offer effective service delivery to citizens. This article discusses the service delivery challenges that compel municipalities to consider utilising ICT interventions to bring transformation into smart cities. The main research question addressed in this article is: To what extent can ICTs be used by South African municipalities to achieve the objective of a smart city, with reference to the CoE? To find answers, the article sought to explore the improvement of local governance using ICT. Data were collected through the study of existing secondary data (literature and documents), and primary data (interviews) to obtain a detailed understanding of the situation under study. The CoE was selected as the focus of this article as it is currently implementing various ICT-led initiatives aimed at becoming a smart city soon. Authors of this article published their findings of a similar study entitled, ‘The use of information and communication technology (ICT) for smart governance in the City of Ekurhuleni’ and based on findings highlighted that the lack of leadership support and willingness may impact on the municipal workforce to be involved in ICT-based practices. The lack of encouragement and motivation from strategic to lower levels, inadequate talent management, lack of performance management linking ICT to KPIs, and inefficient monitoring and evaluation processes may result in employees not dedicating to learn and be equipped with digitalised processes of service delivery. This study is a follow-up measure to continuously researching the significance of ICTs in municipalities, hence contributing towards the field and discipline of Public Management/Governance and Information Technology.

After the introduction, the first section provides the conceptual overview of main concepts that are explored in the article. The second section discusses service delivery challenges in South African municipalities, highlighting the need of ICT. This information was advanced in the third section that explains the transformation of municipalities into smart cities through ICT. Section four discusses the research methodology utilised to gather primary and secondary data for the study. Fifth section contextually explores the use of ICT for smart city initiatives in the CoE and discusses findings. The last sections offer recommendations and conclusion whereby the study also acknowledges limitations and state direction for further studies.

Conceptual overview

This section clarifies the main concepts used in this article, such as ICT, smart city, smart governance, and service delivery.

According to Hafkin (2009:3), ICT “within a government perspective refers to e-Government reforms” (Hafkin, 2009:3). These technological reforms are embraced by governments at all levels (national, provincial, local) to deliver seamless services to enhance the operations of governance. The government in this technological and digital era is called e-government, which uses ICT “to support government operations, engage citizens” (Shailendra et al., 2015:1); and bureaucratic processes on a 24/7 basis. ICT as a technological system integrates telecommunications into government processes with the use of computer devices, wireless signals, and the necessary enterprise software. Smart cities, encompass different internal processes in an integrated manner through e-portal, e-administration, e-services to deliver smart operations and services to both internal and external customers “through augmented infrastructure, environment, and economy while ensuring mobility” (Das & Misra, 2017:1; Ncamphalala & Vyas-Doorgapersad, 2019:209). A smart city initiative is considered when a country is moving from a traditional government to a modern government; in simple terms, it means moving from a paperwork government to a paperless government. Moving from a traditional government to a modern government also aids in minimising bureaucracy in processes and improving the delivery of services. The smart governance is a transformed form of government that utilises advanced forms of communication and develop a digital communication platform to connect government and the governed. This re-engineered and re-defined role of government allows “governments rethink the role they must have in a knowledge-based society. This role has been referred to as ‘smart governance’” (Bolivar & Meijer, 2015:2). Service delivery is to offer basic services to community members that includes “water, electricity, sanitation infrastructure, land, and housing” (Chen et al., 2014:1; Maseko, 2018:16). Effective service delivery at the municipal level requires community members to consider their “participation, involvement” (Maseko, 2018:16), and representation in needs analysis, budget forums and development planning sessions to inform their municipal representatives regarding service delivery expectations to fulfil. The reason for South Africa’s emphasis on ICT is that “electronic government or e-Government entails the use of information and communication technologies in the public service to improve its internal functioning and to render services to the public” (Department of Public Service and Administration (DPSA), 2014; Peters et al., 2016:132). The overall objective of the public service is to offer effective, efficient, seamless, and smart services to citizens, and that is possible using ICT interventions. The South African government aims to deliver better services to citizens. It is for this reason that the use of ICT as a strategic enabler makes value-adding services seamless, convenient, and geographically reachable to citizens. The governance part of ICT, in the authors’ opinion,
is when government departments allow the public to access information using electronic devices and have Internet access to enable easy access to government websites. This opinion is based on the review of information that highlights various technological interventions and initiatives that have been established to advance the speed and efficiency of services delivered to community members and are aligned with the Batho Pele (‘people first’) principles (DPSA, 2014:1). Batho Pele, “a Sesotho word, which means ‘People First’, is an initiative that was launched in 1997 to transform the Public Service at all levels. Batho Pele was launched because democratic South Africa inherited a Public Service that was not people-friendly and lacked the skills and attitudes to meet the developmental challenges facing the country. Batho Pele is an approach to get public servants committed to serving people and to find ways to improve service delivery” (Education and Training Unit (ETU), n.d.:1). The South African government acknowledges the significant role of ICT “in the integration of services” (Department of Communications (DoC), 2011:6) linking various sectors, and bringing geographically scattered communities into the mainstream of government processes. The government has therefore implemented several legislative frameworks that are obligatory for municipalities to adhere to. Some of the significant frameworks include the Public Servie Act No. 103 of 1994, that “empowers the Minister of Public Service and Administration (MPSA) to develop and establish norms and standards related to, amongst others, information management and electronic government in the public service. The mandate of the Minister of Public Service and Administration therefore empowers the in full (DPSA) to provide direction on e-Government for the public service” (RSA Government Gazette 40772, 2017:11). The Electronic communication and transaction Act 89 of 2002 aims “to provide for the enabling and regulation of e-Government or smart government services and electronic communications and dealings with public and private bodies, institutions and citizens” (RSA, 2000). The Electronic Communications Act (ECA) No. 36 of 2005 endorses the principles of universal service and universal access. One of the objectives of the ECA is that “the government has to “provide the universal provision of electronic communication networks and electronic communications services, broadcasting services and connectivity for all” (Department of Communications, 2011:7). In South Africa, the e-government policy was drafted by the Department of Public Service and Administration (DPSA) in 2001. The South African e-government policy (2001) discussed in Vyasa-Doorgapersad (2009, cited in Maseko, 2018: 54), defines e-government as “the continuous optimization of government service delivery, constituency participation, and governance by transforming internal and external relationships through technology, the internet and the media”. The aim of all these frameworks to ensure implementation of ICT with an intended outcome of reducing service delivery challenges, discussed below. This arrangement is also more applicable in municipalities that are aiming to transform into smart cities.

Service delivery challenges in South African municipalities

Service delivery in the South African municipalities requires priority-based measures especially “to equalise previously excluded local communities” (Vyasa-Doorgapersad, 2009:91). These communities who are geographically spread out to far-distanced rural areas, are poor in economy and have inadequate resources to receive basic services require priorities in municipal development planning processes. This situation is substantiated by Vyas-Doorgapersad (2010:47) stressing that these communities face development challenges as they “are afflicted by unprecedented high levels of unemployment and poverty, historical backlogs in infrastructure services, and the uneven distribution of economic resources” (Vyasa-Doorgapersad, 2010:47). These challenges, coupled with service delivery blockages that demand municipalities to re-consider their service delivery processes. The processes are slow with red tape, not so easy to approach municipal representatives and personnel hence response rate is low, lack of batho pele applications hence no service value for money paid via taxes and levies, inadequate customer relationship, along with “limited and inconvenient hours offered by government institutions and long distances to reach government offices (particularly in rural areas)” (Nkosi & Mekuria, 2010, cited in Mawela, 2015; Ncamphalala, 2019:51). Joseph (2002, cited in Ncamphalala, 2019:51) added “because local government administrations are not structured like businesses, they are sometimes inefficient, wasteful, and unable to meet the new demands that confront them. To redress this, new ways of delivering services are required” (Joseph, 2002, cited in Ncamphalala, 2019:51). These challenges require technological reforms to introduce alternative modes of service delivery through ICT/e-government interventions. The technological platforms can speed up the bureaucratic processes, capture customers’ requests without limiting to geography and time. These new ways demand the transformation of municipalities into smart cities.

Governments, and specifically municipalities must deliver suitable services online to give their constituents easy access to developments in ICT; what citizens can expect in the way of services; plans to enhance service delivery; and how to cut costs and improve efficiency. In a changing world where new and innovative technologies are constantly being developed, it is essential that South Africa keeps up with the times by adopting electronic service delivery mechanism. Notably, a significant aspect in South African municipal governance is the low level of e-readiness of South Africans at large. Unless municipalities address this at grassroots level, community members will be unable to reap the benefits of seamless and improved delivery of services (Maseko & Vyasa-Doorgapersad, 2018:187).

Transformation of municipalities into smart cities through ICT

The notion of a smart city refers to using pervasive communication technologies and smart devices to accomplish urban environments and development (Kitchin, 2013, cited in Zhang 2017:17). The smart city as a concept intended to improve the quality of life of citizens has been gaining increasing impact on policymaking at a different level. With the immense numbers of interconnected citizens, businesses, and different means of transport, communication networks, services, and utilities, cities are becoming more complex than ever before (Neirotti et al., 2014, cited in Zhang, 2017:24-25). The increased urbanisation also causes various forms of challenges related to social, economic, environmental, technological, and organisational issues; hence the demand for cities to be
more sustainable and smarter is increasing. However, ICT measures are not embraced by all municipalities in their processes and by people.

Rapidly evolving ICTs and passed legislation that promotes paperless offices, a great number of governments, businesses, and citizens still prefer paper records, manuscript signatures, and traditional public services instead of their electronic alternatives. On the other hand, there are states known as ‘digital societies’ that conduct almost all public sector transactions digitally (Batty et al., 2012:482, cited in Zhang, 2017:25). Nevertheless, Zhang (2017:25) stated that “the common agreement about the smart city is the fact that it is characterised by the greater use of ICTs. In different urban settings, ICT seeks to make the best use of scarce resources”. ICT-based solutions are known to enhance resources planning and initiatives in urban planning and development to improve the sustainability of the economy, society, and environment in a city. A city with rich ICT infrastructure still needs to reflect transition towards a smarter city to enhance future possibilities (Zhang, 2017:25). The introduction of different ICT solutions by the governments might erupt controversial reactions within the respective societies. As a matter of fact, it is always important to characterise the society by its nature, cultural and social differences. Religious and political heritages also play a crucial role in this regard, as in traditional communities, whose history is shaped according to these features, general acceptance of innovation and globalisation is always law. (Kramers et al., 2014:50, cited in Zhang, 2017:26).

According to the Smart Cities Council (cited in Auriccombe & Vyas-Doorgapersad, 2019:13-4), the following are the most significant challenges that municipalities in general experience to become smart cities related to the lack of: “financing; ICT competence; integrated services; community participation and a smart city vision”. Neirotti et al. (2014:21) stated that, “according to preceding insights into the smart city, the distribution of ICT infrastructure should not be recognised without the standardisation of a smart city. The smart city approach does not only reflect technology changes, but also development in human capital and changes in urban living practices”. ICT, therefore, “is assisted as a general-purpose technology, where it helps to improve the quality of human and organisational capital. In other words, depending on political decisions and urban ecosystem (citizens, tech vendors, and local authorities), ICT helps to shape future of a city” (Neirotti et al., 2014:20, cited in Zhang, 2017:26-27). These understanding assists policymakers, statisticians, researchers, and scholar to conduct more advanced studies exploring varied aspects of smart city initiatives in municipalities.

**Research methodology**

The methodology used is qualitative research, that “concerns itself with an assessment of a situation experienced in the participants’ own words. The purpose of qualitative research is to examine human behaviour and the social, cultural, and political contexts in which it occurs (Luaran et al., 2016:14). The CoE is used as the case setting under study. The CoE has a long-term development strategy referred to as the Ekurhuleni Growth and Development Strategy (2017) 2055 (GDS, 2055), that systematically analyses Ekurhuleni’s history and its development challenges, and outlines the desired growth and development trajectory. It seeks to ensure that Ekurhuleni transitions from being a Fragmented City to being a Delivering City from 2012 to 2020, a Capable City from 2020 to 2030, and lastly, a Sustainable City from 2030 to 2055 (CoE, 2019b; also available at National Treasury’s website http://mfma.treasury.gov.za). A city that strives to promote sustainability through the reduction of greenhouse gas emissions and the carbon footprint, provides adequate clean water to all its residents, and monitors water wastage, is regarded a smart city (COJ Integrated Annual Report 2015/16, cited in Maseko, 2018:81). The vision of the CoE is to become “the Smart, Creative and Developmental City” (CoE, 2019a). This research used the CoE as a case study to determine the achievements and challenges that exist in the city regarding the use of ICT and factors that hamper it from transforming into a smart city. A comprehensive literature review was considered to compile conceptual information related to ICTs and smart cities. The document review was considered to obtain contextual information regarding the status of ICT in CoE.

Permission was obtained from the CoE to conduct interviews with the personnel of the Information Technology (IT) Unit to receive understanding regarding the challenges of implementing ICT initiatives to transform the municipality into a smart city. The purposive sampling method was utilised to approach personnel of the municipality. Sixteen IT personnel were interviewed to discuss varied aspects of ICT and smart city; however, all responses cannot be compiled in one publication. Only few responses that add value to the body of knowledge are stated in this article and others may form part of future publications. The respondents are given pseudonyms and are stated as R1-R16 in this article.

**ICT for smart city initiatives in the City of Ekurhuleni**

To assess the level of ICT in the CoE, the interviews were conducted, and hence empirical findings is considered as a primary data. The secondary data used include literature and document reviews supplement the information gained though primary sources. These findings are discussed below.

**Expectations from smart city initiatives in the municipality**

The general perception amongst respondents was that ICT can be a useful tool for resolving all pressing service delivery, community participation, communication, leadership, and efficiency challenges that the municipality currently faces. Respondents 1 and 5 voiced their opinions by saying that they expected ICT to ensure that there is more transparency, accountability, and responsive governance in the municipality, and R2 emphasised that “this will result in good governance giving effect to quicker public service delivery for
community development and less service delivery protests”. It was also noted that respondents expected ICT to be a driving force behind infrastructural development. Thus, smart city initiatives can improve on current level of infrastructural development in the municipality, especially the provision of roads and social amenities in some areas, as stated by R6 accentuating that, “I expect fibre network or base towers as the back-bone infrastructure, seamless services from municipal platforms, declaration of municipal key points and remote observation of such facilities...[.] Smart governance should bring us good healthcare for improving living standards, especially in the township areas”.

It is inferred that respondents expected that ICT can bring the kind of community transformation that they want. Furthermore, participants hoped that ICT in their municipality would improve service quality; create employment; bridge the current communication gaps between the municipality and its residents; improve community safety (through CCTV cameras) and community education initiatives; gain more access to public service; improve community participation and involvement; improve feedback generation and information exchange and improve technology penetration amongst residents. The authors believe that smart governance can indeed be the tool to attain these expectations. Country-specific national document entitled ‘National e-government strategy and roadmap’ (2017) emphasise that “smart governance and e-governance provides opportunities to use ICTs for promoting greater accountability of the government, increase efficiency and cost-effectiveness and create a greater constituency participation” (Republic of South Africa (RSA), 2017). The literature review also confirms that smart governance comes with smart solutions for the citizens through offering of ICT/e-services.

Perceived levels of improvement through smart governance

Respondents’ perceptions on the levels of improvement through smart governance indicated a high degree of perceived benefits of ICT. This is credited to the fact that technology has numerous advantages linked to improved service delivery efficiency. ICTs have a cross-cutting effect in the local sphere of government in several ways. As seen from the collected data, ICTs can transform municipal governance with improved solutions to billing systems, problem diagnosis, elimination of queues, and improved interface between officials and the communities. The article quotes the opinions of R8 who contemplated that “a high level of transformation is expected because there is detailed information regarding rates and levies, municipal budget, and all other services are available”. These services and related information are available on municipal webpages and their e-portals.

ICTs were seen to have a huge potential of transforming Ekurhuleni in the sense that vital pieces of communication can be disseminated more quickly and with greater convenience. R9 and R11 indicated that issues such as impending load shedding, disease outbreaks like Listeriosis or Swine flu, disruption on railway lines, or weather hazards, can help save lives since there will be early warning systems and prompt announcements. Furthermore, ICTs can be the conduit through which community perceptions about their government will be improved thereby leading to close, harmonious working relations between the officials and their residents. This was echoed by R10 stressing that, “Usually the relations between residents and their municipality are based on attitudes and perceptions of the effectiveness of the municipality, so having a caring and compassionate municipality can be key to advancing community development. R11 added that community members, “can send queries or complaints electronically and minimise travel distance. Now that is a 21st century smart governance initiative that will make me perceive my municipality as being modern and people-centred”. Therefore, smart solutions can improve the manner of service delivery, minimise the cost of providing those services and generate gainful employment for residents.

Training programmes available for ICT personnel

The study explored the issue of training and development of ICT staff as a move to entrench smart governance in the CoE. Like any other organisation that values human capital development, the study established that the municipality has working training programmes although there were questions on the attitude of the ICT personnel towards training. Furthermore, R7 and R14 indicated that while training and development is in the municipality’s plans and programmes, the dedication of top management to effectively utilise training and development to achieve rapid changes in service delivery was questionable. Furthermore, the commitment in terms of finances for ICT personal training has not been forthcoming, showing that smart governance appears not to be prioritised by those managers tasked with transforming the city.

The responses show that the municipality is fully committed to ICT staff training. R12 indicated that there are benefits in the training programmes they provide in the CoE and supported by R13 indicated that they prefer to learn new skills to improve their individual competencies, and in turn contribute towards the improved organisational productivity. This intention resonates with the vision of many emerging companies that are offering talent management courses to municipal employees. These respondents were aware of one such organisation that is Applied Technology Research Centre (ATRC) who informs and assists clints with new competencies for improved employee performance. This is done through training sessions to develop skills regarding customer service and relationship. The competent staff profile improves productivity and organisations then ensure investing in staff retention (see ATRC 2018:1). Opinions of R12 and R13 was supported by R16 who advanced the discussion stating that, “these are ICT related skills especially considering that we are in a digitalised 21st century world”. Other respondents added their similar opinions emphasising that retention of skilled personnel is a saving to the municipality.

It can be understood that training programmes are provided to the people but that the issues of ignorance and willingness, which is the poor attitude from the employees, cannot be overlooked. Training programmes are very helpful in terms of equipping employees
and helping new employees to settle in the organisation. It is a complicated field in the organisation as each department within the municipality is dependent on the ICT unit for daily operations. In addition, the CoE has committed enough resources to ensuring that it organises seminars and marathon training sessions for their employees to always stay abreast of emerging trends in technology, as echoed by Respondent 16 in the study. Another dimension of training is explored in the next theme.

**Availability of training initiatives for residents and service consumers**

The study explored the issue of the municipality to ensure that its tailor-made services are user-friendly or that service users have the knowledge on how to get the best out of available smart governance initiatives. Respondents’ perceptions on the measures in place for the ICT unit to provide training to the consumers to use technology through smart governance indicated a high degree of perceived benefits of ICT. This is credited to the expectations of the people within the city on ICT in transforming the city into a smart city. R4 indicated that the people of Ekurhuleni are happy with the Ekurhuleni app, Business Process Mapping, free Wi-Fi in places, electricity larger power user metering, displayed and the web vehicle tracking. All these are simple but technical ICT tools that, for a service consumer who falls into a category of beings less-literature, using becomes an immense challenge. Thus, there is the need for awareness programmes to train and ensure a smooth tool-user interface.

However, on the other hand R13 and R15 indicated that some people are unhappy with the communication infrastructure such as Wi-Fi, and cellular phone applications such as ‘My Ekurhuleni’ for core of communication within the local communities. The respondents suggested that they need to help each department to do everything from old systems and budget tools for the departments and sensitising the end-user of those ICT initiatives on how best to interact with such systems. Improving transportation to commuters and free access of the Ekurhuleni application through digital training is necessary. R6 stated that, “The CoE has put measures in place for the IT unit to train service consumers to use technology. We value the ability of our service consumers (residents) and visitors to be able to interact with us through technology, for example, for a resident to be able to report a road damage freely and swiftly within our municipality, we offer training on how to best use out ICT offering. What is the purpose of having an ICT solution that is not user-friendly?”.

The study infers that the CoE has clear goals and objectives of becoming a smart city and they are working towards achieving their goal of becoming smart. The study commends these initiatives and their customer focus since the goal of public service delivery is to ensure that the public service consumers are satisfied. To augment these arguments, the study cites the opinions of R1 who emphasised that, “One of our goals is to make sure that we develop simplified, secure and effective smart solution for our service consumers. Every day, we are working on how to ensure that we come-up with working solutions and continuously improve our current scope of apps for our consumers. We also provide easy-to-understand manual and instructions on how best our consumers can interact with us through our apps”.

The role of ICT is to make sure that the smart city and technology through smart digital is easily accessible to the people, the CoE has taken measures to ensure that proper equipment is available. For instance, feedback generation is being done through mobile devices which are always connected to the smart apps to ensure that the link between the people and their government stays alive and lively. In this regard, the study argues that the success of smart governance and smart initiatives is not only dependent on the availing of infrastructure supporting them, but also on the user-friendliness of such programmes. The CoE seems to be on the right path as far as consumer training and support is concerned.

**Willingness of the municipality to become a smart city**

The perceptions of respondents on the willingness of the municipality to become a smart city indicated a positive desire on the smart city initiative are analysed. Overall, the study established that there is a great deal of political will towards smart governance in the CoE. The leadership within the CoE has realised the important role played by the in introduction of ICT to promote smart governance. R9 in this regard stated that, “Firstly, with the smart city initiative, the CoE will have centralised systems that are efficient and sufficient. ICT will ensure that the smart city and technology through digital is accessible easier for the people to use. Secondly, the city will be in the forefront of technology before any department within the municipality request that service. ICT aid to provide infrastructure, applications, and hardware platforms that the city can use. It enables systems, enabling access to vital skills and to maintain the systems, enabling and reporting activities as systems. All this enables fast, efficient, effective and responsive kinds of public service delivery”.

From the above excerpt, it is concluded that the city’s leadership is willing to become smart, and this is concluded based the measures that the city is currently taking in terms of improving services in the city as a whole. R1 indicated that customers are satisfied that queues can be captured via the Ekurhuleni app. R9 added that “the Business Process Mapping has a huge advantage in revenue management for electricity supply and distribution which has shown a revenue or consumption figure of R8 billion in the 2018/2019 fiscal year for the municipality”. Furthermore, in the municipality, vehicles can be tracked electronically, therefore ensuring there is ample ease of doing business, living lives and sustainable community development for all. All these advantages are linked to the political dedication and willingness of the leadership in CoE to embrace and utilise modern day smart governance approaches. On the other hand, there were dissenting opinions on the issue of whether the municipal leadership was fully committed to making Ekurhuleni a smart city, as highlighted by R8 stressing that, “There is no way that the CoE can become a smart city, as long as the political mandate is still not given enough attention as it should, as ICT has unused monitors lying the offices for decoration and
money was spent on buying the equipment resources. There is too much obsession here in our municipalities on the use of ancient public sector practices while ignoring the fact that globalisation and inventions have given us smart solutions for improving how we provide services. Maybe the question should be how willing are those who deploy or appoint our political leadership to embrace and bring about smart solutions and make us a smart city”.

From the above argument the authors deduce that having a good political will can help departments within the municipality to enjoy great political support in the management of ICT infrastructure, and there are some areas where this support is lacking. R7 stated that, “The municipality has to make sure that political mandate of the fallen heroes is implemented within the CoE”. Furthermore, professionals/administrators who are trained and hired to execute solutions for people will not have much say on how deep and wide the municipality can embrace ICTs that solely rests in the hands of the mayors and other appointees. So often, when there are protests, the first thing that communities vent their anger and frustrations on are the municipal infrastructure problems, followed later by complaints that there is no library, clinic, or multi-purpose centre for their communities. It all should begin on the political will if these protests and grumbles are to be addressed amicably and sustainably.

This is also an indication of doubt on whether politicians have a good understanding of their important role in infrastructure management, specifically the ICT infrastructure as the most important infrastructure to make life easier for their communities. The study deduced that there is need for municipalities to appoint or deploy tech-savvy politicians who would further the smart governance initiatives for the betterment of service delivery in their communities. These are the kinds of leaders who would go to great lengths to pool and allocate resources for entrenching smart solutions in a city that is Smart Governance-conscious, like Ekurhuleni.

Technology related challenges affecting transformation into smart city

The respondents indicated a high level of technology related challenges that the city keeps on experiencing daily. From the data, it appears that the problems are more experienced in public libraries where people would want to use the internet and cannot or not have the required skills to operate the machine. Sometimes people would want to use the internet for academic purposes or for job application or job searching and sometimes may put down a complaint on the municipality’s database. The authors’ perception of this is that the situation may be caused by the shortage of librarians to assist the public citizens who need help, or the lack of skills from the staff members who are assigned to assist the people. A quote from R3 explores the frustration of employees and highlights that, “We need the skilled municipal employees to serve and promote smart solutions to our problems. The CoE is struggling when it comes to skills to design Business Process Mapping (BPM) on paper, skills to design and implement BPM electronically, skills to renew or tweak original designs of BPM, to a small extent, funding. Business intelligence software is required, for instance to link vehicle movement to calls logged, job cards, time management and material management”.

This requirement seeks consideration to achieve the aims of smart city. It can therefore be considered that the city still has a lot of work to do when it comes to transforming into a smart city. Other challenges that the study established include unethical behaviour affecting smooth adoption and support of smart governance programmes, corruption and nepotism that is affecting the appointment of the right competent staff into key positions which drive ICT adoption and implementation. R4 bemoaned the lack of compliance in various aspects including procurement and supply chain management, which have affected the ability of the municipality to accrue and utilise state of the art technologies. In substantiation, the study quotes R11’s opinions who stated that, “Corruption, maladministration, poor oversight, floating of procedures, poor governance administration and disregard of rules and regulation are rampant in this municipality. The city is also lacking people with ideology in making sure that the people and the city understands the purpose of digital city. The deficiency of proper planning, lack of ICT usage between the departments and between the city and the community. There is also a challenge with the old, dilapidated form of some of our infrastructure such as sewerage and water supply lines has affected the allocation of resources to smart governance initiatives.”

There are several challenges of affecting smart governance in the municipality and those challenges are discussed by different scholars in the ensuing paragraph. As respondents in the study indicated, there are numerous challenges affecting smart governance within the CoE. Additional obstacles are summarised as including the lack of collaboration among agencies; poor intergovernmental cooperation on smart governance; delays in smart service delivery systems, inadequate information or data on service standards and benchmarks as well as a lack of transparency in service delivery.

The preceding discussion can be supported by literature from various scholars and organisations as follows. Bwalya (2009, cited in Salam & Islam, 2015:3) faced some challenges on smart governance like low level internet penetration, lack of budget, lack of citizen awareness, limited ICT skill and training. The most critical factors contributing to the failure of some smart governance programmes or their implementation in the local sphere of government may be linked to lack of digitalised infrastructure, strategies incorporating ICT in the programmes and linking to vision and mission, to state a few (see Hossan et al., 2005, cited in Salam & Islam, 2015:3).

Some other scholars added factors hampering the implementation of smart governance such as socio-economic-technological divide; lack of accessibility, understanding and use of digitalised platforms; inadequate investment in capacity-building interventions; to state a few (see Jaeger, 2003, cited in Salam & Islam, 2015:2). described several broad areas in which smart governance faces obstacles. Srivastava and Sharma (2010, cited in Salam & Islam, 2015:3) further identified “security and privacy of personal and financial data” as additional variables affecting the effective implementation of smart governance.
Possible solutions to current smart governance challenges

Respondents had the chance of providing advice to the study on how the various smart governance challenges can be resolved. Respondents had a high degree of expectation from the CoE’s smart city initiative. The perception is that even though there are some positive outcomes that come with the smart city initiative, they feel that there is still gap. The city needs to have a critical eye on these going forward. Some respondents voiced their concerns: they expect ICT to come with new ways of dealing with public issues and they believe that ICT has come with new ways. However, the issue of lack of skilled or well-equipped employees within the municipality remains as the major challenge of the municipality, in relation to the smart city transformation. Some participants’ recommendations on how the city can resolve the smart governance challenges they encounter in the process of being smart, were given by the respondents. R7 reflected that, “The CoE needs to sustainably manage its processes and programmes, for example, prevent overspending through a sustainable management of expenditure and budget through smart systems. In addition, smart solutions are needed in energy, vehicle movement, job cards, time management and material management have massive positive implications. Upgrade the ICT department and provide funding for awareness programmes and training. Buy proper equipment and avoid having proper equipment only for decoration purposes. Improve communication to the customers and budget availability to deploy and implement such systems”.

It shows that there is greater chance of improvement in the CoE. The study emphasises the point of training and development is a key pillar to building a sustainable ICT infrastructure and practice. Nonetheless, the study adds that ethical and professional conduct should reign in on unscrupulous practices such as corruption and nepotism. The city is not far from becoming a smart city as it can be considered to be one of the richest cities in the country. R12 stated that, “For the city to be smart, they need to provide good quality ICT infrastructure that can be used to shape public policy. There is also a need for sustainability within the ICT unit in the city of Ekurhuleni Metropolitan Municipality. The municipality need to enforce the utilisation of ICT equipment as well as improve on budget allocation for the accrual of smart equipment for real transformation.”

From the above quotation, the study infers there is a lack of leadership within the officials of the CoE. Thus, the respondent feels the need to enforce the utilisation of ICT equipment. This means equipment is available, but it remains unused; this can be due to lack of skills from the staff members or from the managers. Other respondents in the study argue that the following can be strategies that can be used to re-route the CoE back on the path of transformation into a smart city with smart governance. The said strategies include meritorious deployment of political officers of the municipality and enforcement of a profession code of conduct for municipal employees. Further strategies encompass training of both developers and users of smart solutions; strict adherence to statutes and polices that guide local government procurement and finance management; use of public-private partnerships for improved service delivery and above all, the utilisation a multi-stakeholder approach to adopting and implementing smart governance.

Recommendations

The following recommendations are proposed that the municipality should take into consideration towards attaining the required transformation:

Balancing policy prescripts and implementation or practice

The CoE needs to ensure that strategically the ICT policies are in place and implemented with adequate ICT infrastructure and resources. However, there is an existing gap witnessed in this regard. For instance, the CCTV monitors at the municipal head offices in Germiston are left unattended, hence losing vital data on what will be going on at a particular time. The study therefore suggests that the municipality has operational manuals, codes of conduct, monitoring tools and leadership oversight to ensure that all its ICT programmes and infrastructure are going according to plan. Robust strategy can markedly improve the path towards smart governance and smart city targets by the CoE.

Prioritizing ICT in planning and budgeting

CoE needs to prefer ICT interventions in its IDP and allocate appropriate budget for the implementation of smart governance. The CoE also needs to advance its strategy and move towards learning, adopting, and implementing 4IR measures to offer smart services to community members. In a bid to achieve its smart city and smart governance targets, the CoE should consider ranking ICT plans and programmes higher when it plans and budgets for its service delivery components. The influence of technologies cannot go unappreciated and there is need to move away from the conventional ways of delivering services. Such a move will begin with the municipalities placing equal and deserved priority to ICT so that all ensuing initiatives run smoothly without any resource-glitch. Oftentimes, the CoE has been castigated for looking at ICT and smart governance on a small scale. Thus, expanding the budget and significance of this much-needed resource can be the stepping-stone into the 21st century league of smart cities.

Intensified investment in ICT infrastructure

The CoE needs to extend its ICT infrastructure to accommodate community members who are residing in geographically far areas or rural areas and are restricted to embrace smart services. Furthermore, the municipality must view ICT from a macro perspective to ensure that it is treated as a major need for local communities. This all begins with how the municipality allocates a higher-ranked
priority to investment in ICT infrastructure based on the unique and general needs of the communities that it serves. The authors believe that a massive ICT infrastructure drive in the CoE will bring economies of scale in the delivery of all other municipal services through smart solutions like increased CCTV coverage for community safety.

Conclusion

The main findings of the study have indicated that there is a huge gap between policies written on paper and what is being done or implemented in terms of policy execution. This is due to the low level of professionalism where everyone does what is good on their own side, forgetting the rules and regulations of how things should be done. Most importantly, the study has found that a lack of appreciation of the many advantages of smart governance by municipal officials, is affecting the ability of the CoE to plunge into being a fully-fledged smart city. Moreover, the study has found that the problems affecting the city from becoming smart are not due to lack of policies, but rather due to the misinterpretation of policies from the officials, which results in poor service delivery from the government. It appears that the implementation process is also an issue for the city; for instance, they have training programmes drafted on paper but taking action is problem. This is due to the lack of skills. The study also indicates that the top management level of the municipality is not comfortable of dealing with change since people are resistance to change, and they are failing to develop leaders. Likewise, engaging in both developer and user training is also a problem. Delivering consistent training skills application and improving learning effectiveness is a struggle within the municipality.

The findings additionally explore challenges such as inadequate ICT polices, inappropriate implementation of policies, lack of capacity and skills to implement such policies, hence restricting CoE to fully become a smart city. It also requires motivation and leadership form the top management to embrace 4IR at an organisational level. The CoE needs to capacitate both customers: internal and external for the optimal utilisation of smart services. The internal customers must be provided with proper training to operate ICT interventions. The external customers require capacitation to understand how to use smart services. Once both customers are capacitated and smart services and 4IR interventions are in place with adequate ICT infrastructure, the CoE will be able to provide smart services through smart governance. Overall, it could be significant for all municipalities (general context) and the CoE (specific context) to conduct continuous monitoring of ICT initiatives to identify weaknesses and to find solutions for improvement.

The pilot study was conducted in 2018 and findings formed part of the dissertation in 2019. Thereafter due to covid-19, the research process to advance the study was stalled. As the reduced lockdown measures progress, a future study is intended to be planned in the CoE with an aim to explore capacity-building interventions for effective implementation of ICT/4IR-based service delivery mechanisms. The findings will form part of future research.

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