Journal of Infrastructure, Policy and Development 2024, 8(9), 6933.
https://doi.org/10.24294/jipd.v8i9.6933

Article

Artificial intelligence for citizen participation to promote sustainable services for sustainable development in South African municipalities: A conceptual analysis

Eric Blanco Niyitunga[1,*], Logic Lefika Modibedi[2]

[1] School of Public Management, Governance and Public Policy, University of Johannesburg, Auckland Park Kingsway Campus, Cnr. Kingsway 2092, South Africa
[2] Johannesburg School of Business, University of Johannesburg, Auckland Park Kingsway Campus, Cnr. Kingsway 2092, South Africa
*** Corresponding author:** Eric Blanco Niyitunga, niblanceric@gmail.com, ericn@uj.ac.za

CITATION

Niyitunga EB, Modibedi LL. (2024). Artificial intelligence for citizen participation to promote sustainable services for sustainable development in South African municipalities: A conceptual analysis. Journal of Infrastructure, Policy and Development. 8(9): 6933. https://doi.org/10.24294/jipd.v8i9.6933

ARTICLE INFO

Received: 5 June 2024
Accepted: 26 July 2024
Available online: 9 September 2024

Abstract: The linkages between adequate service delivery and sustainable development have been given a little academic attention in the South Africa's local municipalities. For this reason, the achievement of sustainable development has been difficult which has culminated in the occurrence of service delivery protests. These service delivery protests have posed critical threats to social security thus affecting the possibility to achieve sustainable development in South Africa. the paper findings showed that the delivery of inadequate services to the citizens is triggered by the failure to equally include citizens in the process. One of the threats that the paper found is the fact that these service delivery protests have become a major issue and any move to solve them without citizen participation has been unsuccessful. The paper findings also showed that that the lack of adequate service delivery to the citizens causes human insecurities which in turn affect the achievement of sustainable development. This is because the occurrence of the service delivery protests deteriorates national economic growth and human growth. They affect foreign investors and international tourists by instilling fear in them and yet they are contributors to sustainable economic growth that leads to sustainable development. The findings of this paper also presented that the use of Artificial Intelligence (AI) technologies can increase citizen participation during service delivery. It is through the use of citizen participation that openness, transparency, accountability, and representation principles that promote the delivery of adequate services are possible. The paper found that using AI technologies would also foster trust between the service provider and service receiver needed for delivering adequate services, thus achieve sustainable development in South Africa.

Keywords: artificial intelligence; citizen participation; sustainable development; service delivery protests; local municipalities

1. Introduction

The failure to achieve sustainable development in South Africa is caused by the failure to deliver quality and adequate services to the citizens. The contributions adequate service delivery to sustainable delivery has been overlooked by numerous scholars and policymakers. Delivering sustainable and adequate public services to the citizens is the key to achieving sustainable development. Niyitunga (2022) confirmed that delivering sustainable services to the citizens enables them to achieve a sustainable income which improves their livelihoods. Service delivery protests in South Africa's local municipalities have affected citizens' livelihoods, increased poverty and hunger thus threatening human security. Human security results from the delivery of adequate and sustainable services, and it leads to sustainable development

by ensuring that citizens are free from hunger and fear. However, the delivery of basic services in South Africa's local municipalities has not been able to lead to human security. The failure to deliver adequate services to the citizens is influenced by the financial irregularities, corruption, and poor administration, lack openness and transparency, lack of accountability and well as lack of professionalism within the South African Public Service Delivery Framework (Kroukamp and Cloete, 2018). There have been also the issues of social inequality, high levels of local government incompetence and inefficiency that have led to the delivery of inadequate services thus leading to service delivery protests (Kroukamp and Cloete, 2018).

Above all, corruption within the Public Service Delivery Framework has been a major source of inability of the local municipality to deliver quality services to the citizens. However, Napier (2018) argued that tools for detecting corruption and any misconduct such as misuse of power, and enforcing responsibility have been not effectively used. Jacoby (2008) and Kim (2012), argued that providing citizens with the necessary goods and services in a way that leads to sustainable livelihoods that promote the possibility to achieve sustainable development entails the involvement of the citizen in the process. This means that citizen participation in the services delivery process is paramount and key to delivering adequate services. Service delivery protests have affected social order and economic growth by affecting markets and businesses. This is because numerous criminals have infiltrated the protests to loot out shops and banks hence affect economic growth and development. Service delivery is paramount to citizens, and a lack of citizen participation has posed threats to the realisation of sustainable development in South Africa. Delivering quality services to everyone equally with satisfaction is an ingredient for human security which in turn influence the achievement of sustainable development. Delivering quality and adequate services promotes freedom from fear and wants and serves as a preventive mechanism that prevents the occurrence of any insecurity such as political violence, protests and social crimes and social disorder in society.

The use of AI technologies in the delivery of public services can alleviate corruption, address administrative burden and free up time that affect the delivery of quality and adequate services (Farha and Leon-Garcia, 2007). The use of the AI technologies can equally improve decision-making and promote good governance within the Public Service Framework, create cheaper and faster delivery services to the citizens (Eggers et al., 2017). For example, Engelhardt (1990) and Wirtz et al. (2018) have argued that within the Public Service Framework domain, the use of AI technologies such as robots have the potential to overcome problems within the framework and thus promoting delivery of quality services with less time spent. Wirtz et al. (2018) noted the use of AI technologies promote innovations within the Public Service Framework which increase the potential and prospects of delivering quality and sustainable services to the citizens. Bughin et al. (2017) argued that through deep learning, the AI can track services from the warehouses, stored in the shelves and all the way to the delivery process in the society. This paper is structured as follows. While the first section provided an introduction, the second section explained the methodological process that was adopted to collect and analyse data. The section also explained the theoretical framework that underpins service delivery protests in South Africa. The third section consisted of a literature review, while the fourth section

discussed the most relevant results from the conceptual review. The last section consisted of conclusion and proffered recommendations for policy makers and future research.

2. Research methodology

To understand the role of the AI technologies in promoting adequate and quality services that lead to sustainable development, the paper used qualitative methodology. Flick (2014, p. 542) noted that the use of qualitative methodology enables researchers to analyse subjective meaning or the social production of issues, events, or practices by collecting non-standardized data and analyzing texts and images rather than number and statistics." The use of this methodology was also informed by the fact that the paper aimed to conceptually analyse and reveal what causes service delivery protests and the role of the AI technologies in addressing those causes to achieve the delivery of adequate services that would lead to sustainable development in South Africa. Qualitative methodology helped explore and describe the causal factors of service delivery protests in Africa in general and South Africa in particular. It enabled us to present an in-depth analysis of service delivery protests in post-apartheid South Africa and the role of AI and its effects on service delivery in South Africa.

The paper relied on secondary data which was collected data from a systematic literature review that provided secondary data material. This was made of the sources published in the public domain such as libraries, and internet from high recognised journals. Secondary data means data collected by someone other than the user or are used for an additional purpose than the original one (Johnston, 2014). Its sources range from censuses, reports from the governments, organisational records and data that were originally collected for other research purposes (Johnston, 2014). The systematic literature review was useful as it became reproducible method for identifying, evaluating, and synthesizing the existing sources published by researchers, scholars and practitioners (Fink, 2010, p. 3). Using secondary data was provided timely information that helped understand the role of AI technologies in promoting citizen participation and foster the delivery of adequate and quality services to citizens. As secondary data can be used in descriptive and analytical research (Boslaugh, 2007), it helped collect data that was used to conceptually analyse the role of adequate services in promoting sustainable development. Collected data also helped understand the problems withing the South Africa Public Service Framework that prevent the delivery of adequate basic services thus igniting service delivery protests that causes human insecurities in Local Municipalities.

Collected data was analysed through document analysis technique. Document analysis technique is a systematic procedure for analyzing, reviewing and evaluating documents which are either printed or electronic material (Corbin and Strauss, 2008; Rapley, 2007). Data examined and analysed through this technique enable the researcher to elicit meaning, gain understanding, and develop empirical knowledge from the documents read or analysed (Corbin and Strauss, 2008; Rapley, 2007). Document analysis technique was used in this paper because it is applicable to qualitative methodology and the aim was produce rich descriptions and analyses of the role of AI technologies in promoting citizen participation in order to provide

sustainable services that enhance the probability of achieving sustainable development in South Africa. Stake (1995) argued that document analysis technique helps researchers to understand single phenomenon, events, organisations, or programs they are studying. Merriam (1988, p. 118) argued that "documents of all types can help researchers to uncover meaning, develop understanding, and discover insights relevant to the research problem." Moreover, the use of document analysis technique was informed by the fact that the paper aimed to understand the factors that influence the failure to deliver sustainable services in the local municipalities, and the role of the AI technologies to address them so that local municipal officials are able to provide sustainable services to the citizens. This is because the paper's aim was to assess the interactions between sustainable services and sustainable development.

3. Theoretical framework

Depriving quality and adequate services to the citizens is the driving force of protests, rebellions and revolutions (Richardson, 2011, p. 1). For this reason, the paper adopted the relative deprivation theory to understand factors that triggers deprivation and service delivery protests. The theory showed that at the bottom-line of the inadequate service delivery lies social inequality (Richardson, 2011, p. 1). Gurr (1970, p. 5) noted that relative deprivation intensifies economic and financial uncertainty, and widen the gap between those who have-nots and those who have. From this argument, the theory therefore fits in the paper because it shows that prevalence of social delivery in South African local municipalities occur because citizens fill deprived of their services which are rightful due to them. These basic services are essential to the citizens livelihoods and for their daily survival because they support quality of life, protect health and safety, and promote social, economic and environmental well-being (Breakfast et al., 2021, p. 109). These essential services include education, public health services, access to drinking water, roads infrastructure for getting goods to market, housing, sanitation and energy. These essentials services are considered to be at the core of human survival. Moreover, these services stand at the core of sustainable development because their availability ensures the survival of the current generation and the generation to come. The theory helped to understand that the service delivery protests occur whenever services delivered to the citizens fail to meet their expectations. Smith and Pettigrew (2015, p. 2) argued that when expectations are not met, people feel deprived then nurture feelings of anger and resentment which might lead to violent behaviour. Niyitunga (2021, p. 142) argued that the felling and of deprivation ignites a violent behaviour that influence the occurrence of social protests and civil wars.

People who are deprived of their essential services become frustrated and aggressive as well. This situation may lead to social disorders, social crimes that pose human insecurities. The theory enabled one to understand that the failure to deliver sustainable services hinder the achievement of sustainable development because such as failure poses threats to human security. Niyitunga (2021, p. 142) argues that "mostly the relative deprivation comes from the government's failure to provide quality services to the people that satisfy their basic needs". Breakfast et al. (2021, p. 109) noted that "the inability or failure of government to deliver basic services to citizen

triggers frustration and aggression, which then leads to violent service delivery protests". In this sense, failure to satisfy the needs of the people leads to protests that jeopardize social order and stability, and failure to address these protests at an early-stage sparks violence and conflicts which in then end hinder the achievement of sustainable development. Depriving people of the essential services is a direct a violation of human rights, and most of civil wars that have hindered the realisation of sustainable development have resulted from human rights violations. The theory therefore enables one to see that delivering sustainable services to the people which meet their basic needs is a fundamental right. The prevalence of service delivery protests and civil wars in Africa is attributed to the failure to delivery sustainable services to the people. Niyitunga (2021, p. 143) noted that delivery of inadequate services to the citizens is common in Africa and whenever they feel deprived of their rights, income, services, and anything else they perceive entitled to them, they venture into violent means, and sometimes weapons. The feeling of deprivation makes people believe that they do not have what they deserve; thus, fighting for those services becomes inevitable (Niyitunga, 2021).

4. Literature review

The causal factor of service delivery protests in South Africa appears to be dissatisfaction with the delivery of essential services at the municipal level. These services include, among others, water, education, health, electricity, and toilets, especially in informal settlements. The lack of the above services is also intensified by the harsh life in the townships caused by unemployment, high poverty levels, poor infrastructure, and the lack of houses for shelter. There have also been allegations of rampant corruption, recruitment of unqualified comrades to occupy offices, and the practices of nepotism within local government structures. Several protesters have accused the ANC of practicing nepotism on the deployment of comrades to positions for which they are not qualified. Others have accused the ANC government of lacking openness, transparency, and lack of citizen participation. Subsequently, the country experienced poor leadership, marred with corruption, thus leading to the delivery of inadequate services that fail to satisfy people's basic needs.

4.1. Sustainable service delivery: An ingredient for sustainable development

Sustainable service delivery means the process of providing essential and adequate services to citizens in a consistent, accountable, transparent, equitable, and responsible way (Abegunde, 2019). It ensures there is sustainability of services and point at consistently providing healthcare, education, water and sanitation, transportation, and roads infrastructure services (Barasa, 2010). The governments must ensure that citizens are receiving services that are meeting their expectations. There must receive services that enable them to significantly improve their livelihoods. Sustainable services must largely improve human development and economic growth, and must as well as improve the overall well-being of the citizens. This is because there is relationship between sustainable service delivery and sustainable development (Kalonda and Govender, 2021).

Niyitunga (2024) noted that ssustainable development means the ability for the citizens to have sustainable livelihoods and income to meet their present needs and the skills to use them in ways that do not compromise the future generations efforts to meet their own needs. Sustainable development is centred on the ability of the government to recognise that providing sustainable services to the citizens is a right that needs to be protected and upheld. It is based on the values of equity, which implies fairness and transparency and freedom from fear and wants. Beatley and Manning (1998, p. 3) said that sustainable development must include freedom and quality of life. Abubakar (2017) indicated that sustainable development is at the core of fundamental human rights. It influences the achievement of sustainable human security through the protection of people's human rights. Sustainable development in this paper is thus understood as the sustainable way and ability of a system to produce and reproduce sustainable services and deliver them to the citizens at equal basis. It is approach to economic growth and development that uses the provision of sustainable services for the current generation and as well for the next generation. Wheeler (1980) noted that sustainable development is achieved when citizens are able to consistently receive quality services that lead to economic and human growth. Wheeler (1980) argued that meeting basic needs enhances the possibilities of meeting human development goals while at the same time sustaining the ability to provide services leads to sustainable livelihoods which in turn informs sustainable development. It can be seen that sustainable service delivery is the prerequisite for achieving sustainable development. This is because providing sustainable services ensures that current generation are provided with services that meet their expectations, and those services are provided in a way that sustains the ability of the future generations to meet their own expectations.

4.2. Factors leading to service delivery protests

A relative deprivation school of thought is used to explain the causal factors of service delivery protests and the role of AI in addressing them. From this school of thought, service delivery protests are caused by the deprivation of people's basic human needs. These protests are caused by the gap between the "haves" and "have nots" which produces dissatisfaction that has the potential to lead to frustrations and anger, thus causing protests (Breakfast et al., 2021, p. 109). During the delivery of essential services, the people's expectations must be met because they play a crucial role in ensuring that they are free form fear and wants (Masiya et al., 2019, p. 20). It is important to note that the concept of satisfaction is critical in understanding the occurrence of service delivery protests. For example, people's satisfaction with service delivery, such as health, education, food, water and sanitation are critical as these services touch the core of the citizens' values and interests in society (Mangai, 2016, 2017). Therefore, evaluating people's satisfaction could be helpful in local municipalities to understand whether citizens are satisfied with the services provided (James, 2009).

The expectations models can enable a service provider to understand whether service receivers are either satisfied or dissatisfied with the services provided (Masiya et al., 2019, p. 20). For example, the expectation disconfirmation model can be adapted

to analyse whether municipal services delivery to the citizens have met their expectations (Masiya et al., 2019, p. 20). Van Ryzin (2004, p. 435) indicated that through this model, satisfaction and expectations resulting from service delivered can be determined. Scholars have further argued that "this model begins with the idea that citizens have expectations to meet and satisfaction to achieve, therefore have already formed a kind of judgment even before the service is delivered to them (Morgeson, 2013; Oliver, 1977). The provision of services that fail to meet the expectations of the citizens is therefore a key factor that promote the delivery of inadequate services that lead to service delivery protests.

According to Mangai (2017) citizens' satisfaction is derived by comparing the actual quality of service delivery and how they think the government is performing in delivering services. It has been said that citizens' satisfaction with public services is linked to a broad array of political behaviors (Lyons and Lowery, 1986). Such behaviour includes "supporting or opposing proposals to raise taxes or cut services and protesting and rioting" (Beck et al., 1987, p. 223). The judgment of citizens' form is, in turn, used as a feedback mechanism to improve and prioritize service delivery (Mangai, 2016). Elliot and Yannopoulou (2007, p. 991) state that "perceptions of the quality and sufficiency of municipal service delivery should be based on expectations." In Africa, the failure of the governments to meet the people's expectations has led to dissatisfaction that has resulted in service delivery protests. As was explained, the dissatisfaction gives rise to the feeling of deprivation, leading to social unrest that breeds a whole range of service delivery protests. It can also lead to the creation of rebel movements or revolutions that affect the achievement of sustainable development. For example, the Arab Spring, which swept North Africa, was triggered by the failure of the governments to provide essential services that meet people's expectations. Abdalla (2012, p. 1) argues that social protests in Tunisia, Libya, and Egypt were triggered by the feeling of deprivation that originated from the failure to deliver essential services that meet the citizens' expectations. According to Acemoglu and Robinson (2013, p. 2), the national protests in Egypt were triggered by corruption and the high rates of inequality that led to the delivery of inadequate services, that failed to meet the citizens expectations.

In Burundi, the failure to provide sustainable services to all without any discrimination or inequality led to dissatisfaction that triggered a civil war (Jackson, 2000, p. 13). Dissatisfaction with the services makes people feel deprived of their rights thus turn into violence to demand for their rights. Vaux and Visman (2005, p. 13) argued that Nigeria has faced riots and violence in its norther region because the unequal distribution of basic services. Habib (2015, p. 16) recognised that service delivery is the key to poverty alleviation. Sustainable service delivery play a key and crucial role in poverty reduction and promote economic development (Berry et al., 2004, p. 7; Narayan, 2000). In South Africa, service delivery protests have resulted from the feeling of deprivation that citizens experience during the provision of municipal services. The current occurrences of service delivery protests result from social inequality which emanate from the lingering legacies of Apartheid (Breakfast et al., 2012, p. 109).

Alexander (2010) argues that South Africa has experienced a movement of local protests amounting to a rebellion of the poor. Booysen (2009, pp. 128–129) further

suggests that "service delivery protests continue to be grassroots actions, the triggers increasingly being inequality within housing, land and job opportunities." The current African National Congress (ANC) is confronted with violent collective protest actions associated with the lack of sustainable services caused by systemic corruption in the sphere of local government. Steyn-Kotze and Taylor (2010, 198) argued that due to the lack of the provision of sustainable services, people have resorted to violent protests that has led to destruction of property and prevented the economic growth. These protests have been associated with the underperforming local government councillors. Mananga (2012) argues that in South Africa, inequality in housing which has led to informal settlement have been a triggering factor for service delivery protests. Service delivery protests have been remarkable in the areas where poverty and unemployment rates are high. About housing, Mananga (2012, p. 2) argues that "protests have escalated in informal settlements where poverty and unemployment are the highest." People who live in suburban areas are relatively more gratified, while those who reside in informal settlements and townships are relatively deprived of essential services (Ngcamu, 2019, p. 4).

Furthermore, the other triggering factor that has led to the occurrence of service delivery protests is the lack of accountability, citizen participation and openness. The other factors also include corruption by local councillors and municipal officials, poor financial management and cadre deployment (Alexander, 2010; Steyn and Van Heerden, 2011). Mananga (2012, p. 2), Steyn and van Heerden (2011, p. 167) argue that lack technical skills and shortage of management skills are the primary contributing factors to poor service delivery thus leading to violent protests." Moreover, "inadequate service delivery and a lack of accountability by local councillors and municipal officials strengthen these protests" (Alexander, 2010, p. 37). Meanwhile et al. (2010) and Booysen (2009) have argued that inadequate service delivery that have led to social protests results from the lack of accountability, transparency, citizen participation and trust between local councillors and the citizens. McLennan and Munslow (2009) argued that rising costs of basic needs such as clean drinking water, sanitation, and electricity are the causal factors behind service delivery protests in South Africa. Muller (2007), McLennan and Munslow (2009), opined that service delivery protests are attributed to the local government's failures to provide sustainable access to water, electricity, sanitation, and basic infrastructure.

Matebesi and Botes (2017) argued that social protests in South Africa are mainly about the shortage and quality of houses and the corruption in the mayor's office. Mpehle (2012, p. 8) argued that "service delivery protests because of the inadequacy of the municipal services that failed to meet the people's expectations." Mpehle (2012) further attributed the service deliver protests in South Africa with the deployment of unskilled, unqualified and inexperienced cadres to municipal management positions. These had negatively decreased municipalities' capacity to deliver quality services equally. It can be argued that violent service delivery protests threaten security because of the lack of stability and social order. Social protests also intensify poverty because of social tensions and insecurity that do not create an enabling environment for economic growth. Breakfast et al. (2019, p. 110) argued that, "There is synergy between national security and economic development."

Booysen (2009, p. 21) found that, "Service delivery protests have been associated

with voicelessness of public communities in meaningful participation in decision-making processes, structures, and municipal priorities." Nleya (2011) argued that service delivery protests in black townships are caused by inadequate citizen participation in communal meetings. Nemeroff (2005, p. 10) argued that service delivery protests are a result of dysfunctional relationships between citizens and local government. Mathekga and Buccus (2006, p. 13) argued that, "While the protests are often linked to immediate service delivery issues such as lack of water supplies, housing, and electricity, it is clear that citizens also wanted to express their dissatisfaction with government's poor consultation and its limited engagement with citizens at the local government level." Ngcamu (2014, p. 144) postulates protests have occurred because the lack of "citizen participation by departments in municipalities, which is a negligence of constitutional responsibility of consulting and influencing participation of the local communities in municipal governance."

5. Discussion of the findings

The role of AI in the delivery and provision of public services is critical and significant in-service delivery frameworks. AI, is "a branch of computer science, involves developing computer programs to complete tasks which would otherwise require human intelligence" (Mohammed, 2019, p. 3). For example, "AI algorithms can tackle learning, perception, problem-solving, language-understanding and logical reasoning" (Mohammed, 2019, p. 3). Pan (2016), Huang and Rust (2018) indicated that of the emergence of AI technologies has revolutionized and reformed as well as reshaped the service delivery framework through technological innovations it comes with to the public service sector. The AI technologies are currently used in human services to alleviate considerable administrative burden, reduce time for service delivery and improve decision-making that promote good governance for service delivery (Huang and Rust, 2018, p. 161). AI technologies are bringing digital opportunities through a wide range of innovations, that have the potential to change service industries and enable the provision of sustainable services that enhances the possibility of achieving human security that leads to sustainable development.

The finding of this paper showed that the use of AI technology increases accountability. This finding is in agreement with Reis, Amorim et al. (2018), Warner and Wäger (2019) who argued that the use of AI in public service improves coordination and communication between the service provider and service receiver. They also say that the AI technologies used in business promote customer experience, streamline operations and create new business models that lead to economic growth. Wirtz et al. (2018) supported this finding that the use of the AI technologies can develop cognitive abilities and enhance human capabilities. It is through the development of human capabilities that the path towards achieving sustainable development can be smoothly achievable." The paper found that AI technologies used in service delivery increases the added value to customers and thus leading to the satisfaction of the citizens. The AI technologies possess the ability to revolutionize service delivery sector systems and address all incompetency and corruption. The paper found that the use of AI technologies increases accountability, which is one the factors that was found to lead to the delivery of inadequate services that trigger service

delivery protests in South Africa. It can be used to deliver essential services like healthcare, education, and water (Sau and Bhakta, 2017), and in daily business to evaluate citizens loyalty and improve their satisfactions (Ansari and Riasi, 2016, p. 18).

The finding showed that the use of AI in service delivery increases citizen participation. Without significant citizen participation in the decision-making process regarding service delivery in quantity and quality (Brinkerhoff and Johnson, 2009), it is difficult to deliver sustainable services that would enhance people's livelihoods, promote their freedom from wants and fear. Using AI technologies in service delivery can enhance citizen participation through digital citizen participation. Using digital citizen participation in service delivery would democratize South Africa Public Service Framework, to increase inclusivity, transparency, accountability and effectiveness (Gillis, 2014; Noveck, 2018). It can address deteriorating trust and disillusion between citizens and municipal officials (Economist Intelligence Unit, 2016), and can digitize services thus enhancing the delivery process. The use of the AI would promote digital mass participation during service provision as it can serve as an open call for the citizen to participate in the service delivery process (Brabham, 2013; Vromen, 2017). When citizens are allowed to share ideas, problems, needs, knowledge and opinions, with the service providers, the possibility of delivering sustainable services becomes high (Brabham, 2013; Vromen, 2017).

Noveck (2018) further noted that digital mass participation in the service delivery framework enhances collective ideas and opinions for them citizens that enable decision-makers to make inclusive, transparent policies that improve the quality of the services and the way these services need to be delivered to the citizens. Digital mass participation can address the causal factors like lack of citizen participation, reduce corruption and corrupt deals that divert services from the citizens, and can increase transparency and make municipal officials more accountable. This finding has been supported by Landemore (2017), Noveck (2018), Landemore and Elster (2012), and Surowiecki (2005) that digital mass participation improves decision making process because it welcomes citizens ideas and inputs of how they would like to be lead and what kind of services that would meet their expectations, thus addressing factors that trigger service delivery protests. When citizens have received services that meet their expectations, there is human security that leads to sustainable development because citizens are having sustainable livelihoods.

Integrating AI technologies into human services transforms government services as it enhances administrative efficiency, a cornerstone for delivering sustainable services (Alhosani and Alhashm, 2024). Cooke et al. (2017) indicated that AI technologies would enhances the accessibility to the services and would be used to alleviate and problems that would jeopardize the delivery of services in the future. This means that AI technologies are able to predict the future of service delivery framework and are able to pre-empty and foreseen challenges that would reduce the quality of services. Hence, it is evident that using AI technologies would thus promote and increase the possibility of delivering adequate and sustainable services, would enhance the effectiveness and efficiency of markets to promote economic growth which leads to sustainable development. AI technologies can facilitate and strengthen democratic participation during service delivery process. Lack of democratic

participation within the service delivery framework has been found to be one of those factors that trigger the occurrence of service delivery protests in South Africa.

The finding of this paper showed that AI technologies can increase openness and transparency which are needed principles for delivering sustainable services that ensure citizens are free from fear and wants. This finding is supported by Arana-Catania, et al. (2021) who argued that AI technologies creates a digital platform for the public that enhances openness, inclusiveness, and transparency. Ai technologies used in the services delivery, digitalize services and enable municipal officials to deliver quality services in an open and transparent way. Citizen's services satisfaction would therefore be met when services are delivered in a transparent and open way, when citizens have been involved in the delivery process. Digital mass participation opens up processes that enable citizens to participate in the service delivery and, above all, make the processes to be open and transparent.

The use of AI technologies opens up new channels for citizen to participate in the process that ensures that law is followed and human rights are upheld (Arana-Catania, et al., 2021). Furthermore, openness and transparency in services delivery builds trust and confidence as well as good relationship between service providers and service receivers needed for sustainable services that meet citizens' expectations to be delivered or provided. The use of AI technologies empowers communities and improve social networking (Pečarič, 2017), enhances public budgeting processes, where citizens are given control over a part of a community's budget to decide where best to invest public funds" (Sintomer et al., 2008). The AI technologies have been found to lower the costs of public good provision for governments, as the ideas generated through mass participation have the potential to garner innovative ideas at relatively low cost (Aitamurto and Chen, 2017).

The finding of this paper further showed that the use of AI technologies in service delivery increases good governance for service delivery. The use of AI technologies enables the achievement of good governance for service delivery because it enables people to share information via digital platforms and through digital mass participation, AI technologies promotes inclusivity which leads to good governance (Benz Matthias and Stutzer, 2004). AI technologies used in public services promote effective in making decisions (Verhulst and Nijeboer, 2007) that democratize service delivery process, enhance the protection human rights for all (Frey and Goette, 1998), therefore improving essential services (Cabannes, 2015, p. 258). AI technologies would increasingly allow and enable citizens to participate in policymaking (Aitamurto et al., 2016). Their participation would therefore promote good governance at different policy levels, ranging from participatory budgeting and local and policy-making to service delivery processes (Bernal, 2019; Koc-Michalska and Lilleker, 2017; Suteu, 2015). AI technologies can promote good governance for service delivery because it leads to mass participation that widens the people involved in law and policymaking process beyond experts. The AI used carefully can generate knowledge that public officials and citizens as well would otherwise not have access to.

6. Conclusion

The paper aimed to assess and explain the role of the AI technologies to improve

citizen participation to promote adequate and sustainable services that lead to the achievement of sustainable development. The paper took a conceptual analysis with qualitative research methodology. The role of the AI technologies on delivering sustainable services is immense and admirable. Its use in public services is timely as it improves citizen participation which is one of the principles that needed for delivering sustainable services. It became evident that the use of AI technologies increases the effectiveness of citizen participation and collective intelligence processes in a significant way during service delivery. Moreover, the use of AI technologies was found to promote inclusivity, openness, transparency and as well as accountability that is needed to provide and deliver sustainable services that lead to sustainable development. The AI technologies in service delivery promote trust and togetherness between service providers and service receivers. It ensures that all members of the local municipalities have access to at least the minimum level of basic municipal services. The paper therefore recommends that the use of AI technologies at municipal, provincial and national government is South Africa be introduced and made compulsory. The national governance should also establish centres for AI and ICT training so that the population receives awareness of how to use those digital technologies and their roles in promoting the delivery of sustainable services. The government also needs to establish robust network connections and provide financial means for the citizens so that they are able to afford a smart phone and data bundles to connect them to internet and be able to request services.

Author contributions: Conceptualization, visualization, methodology, formal analysis, data curation, writing—original draft preparation, EBN; supervision, writing—review and editing, validation, LLM. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

Abegunde, O. (2019). Local Government Administration and Service, Delivery in Nigeria Prospects and Challenges. International Journal of Research and Innovation in Social Science (IJRISS), III(IV), 2454-6186.

Abubakar, I. R. (2017). Access to Sanitation Facilities among Nigerian Households: Determinants and Sustainability Implications. Sustainability, 9(4), 547. https://doi.org/10.3390/su9040547

Aitamurto, T., & Chen, K. (2017). The value of crowdsourcing in public policymaking: epistemic, democratic and economic value. The Theory and Practice of Legislation, 5(1), 55–72. https://doi.org/10.1080/20508840.2017.1282665

Aitamurto, T., Chen, K., Cherif, A., et al. (2016). Civic CrowdAnalytics. In: Proceedings of the 20th International Academic Mindtrek Conference. https://doi.org/10.1145/2994310.2994366

Aitamurto, T., Landemore, H., & Saldivar Galli, J. (2016). Unmasking the crowd: participants' motivation factors, expectations, and profile in a crowdsourced law reform. Information, Communication & Society, 20(8), 1239–1260. https://doi.org/10.1080/1369118x.2016.1228993

Alexander, P. (2010). Rebellion of the poor: South Africa's service delivery protests – a preliminary analysis. Review of African Political Economy, 37(123). https://doi.org/10.1080/03056241003637870

Alexander, P. (2010). Rebellion of the poor: South Africa's service delivery protests – a preliminary analysis. Review of African Political Economy, 37(123). https://doi.org/10.1080/03056241003637870

Alhosani, K., & Alhashmi, S. M. (2024). Opportunities, challenges, and benefits of AI innovation in government services: a review. Discover Artificial Intelligence, 4(1). https://doi.org/10.1007/s44163-024-00111-w

Ansari, A., & Riasi, A. (2016). Modelling and evaluating customer loyalty using neural networks: Evidence from startup

insurance companies. Future Business Journal, 2(1), 15–30. https://doi.org/10.1016/j.fbj.2016.04.001

Arana-Catania, M., Lier, F. A. V., Procter, R., et al. (2021). Citizen Participation and Machine Learning for a Better Democracy. Digital Government: Research and Practice, 2(3), 1–22. https://doi.org/10.1145/3452118

Barasa, T. (2010). Reforming local authorities for better service delivery in developing countries, Lessons from RPRLGSP in Kenya. The Institute of Policy Analysis and Research.

Beatley, T., & Manning, K. (1998). The ecology of place: planning for environment, economy and community. Washington, DC: Island Press.

Beck, Allen, P., Rainey, H. G., et al. (1987). Citizen Views of Taxes and Services: A Tale of Three Cities. Social Science Quarterly, 68, 223-43.

Benz, M., & Stutzer, A. (2004). Are voters better informed when they have a larger say in politics? Evidence for the European Union and Switzerland. Public Choice, 119 (1-2), 31-59. https://doi.org/10.1023/B:PUCH.0000024161.44798.ef

Bernal, C. (2019). How constitutional crowdsourcing can enhance legitimacy in constitution making. Comparative Constitution Making. https://doi.org/10.4337/9781785365263.00017

Booysen, S. (2007). With the ballot and the brick. Progress in Development Studies, 7(1), 21–32. https://doi.org/10.1177/146499340600700103

Booysen, S. (2009). Beyond the ballot and the brick: Continuous dual repertoires in the politics of attaining service delivery in South Africa. In: McLennan, A., & Munslow, B., (editors). The politics of service delivery. Wits University Press, Johannesburg.

Boslaugh, S. (2007). Secondary Data Sources for Public Health. Cambridge University Press. https://doi.org/10.1017/cbo9780511618802

Brabham, D. C. (2013). Crowdsourcing. MIT Press. https://doi.org/10.7551/mitpress/9693.001.0001

Breakfast, N., Bradshaw, G., & Nomarwayi, T. (2019). Violent Service Delivery Protests in Post-apartheid South Africa,1994-2017: A Conflict Resolution Perspective. African Journal of Public Affairs, 11(1), 105-126.

Brink, H. I. L. (1993). Validity and reliability in qualitative research. Curationis, 16(2). https://doi.org/10.4102/curationis.v16i2.1396

Bughin, J., Hazan, E., Ramaswamy, S., et al. (2017). Artificial Intelligence: The Next Digital Frontier? McKinsey Global Institute.

Cabannes, Y. (2015). The impact of participatory budgeting on basic services: municipal practices and evidence from the field. Environment and Urbanization, 27(1), 257–284. https://doi.org/10.1177/0956247815572297

Clemm, A., Granville, L. Z., &Stadler, R. (2007). Managing Virtualization of Networks and Services. In: Lecture Notes in Computer Science. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-75694-1

Economist Intelligence Unit. (2016). Democracy Index 2015: Democracy in an age of anxiety. Available online: https://dataspace.princeton.edu/bitstream/88435/dsp017p88ck01w/1/EIU-Democracy-Index-2015.pdf (accessed on 2 June 2023).

Eggers, W., Fisherman, T., & Kishnani, P. (2017). AI-augmented human services: using cognitive technologies to transform program delivery. Deloitte Insights.

Elliott, R., & Yannopoulou, N. (2007). The nature of trust in brands: a psychosocial model. European Journal of Marketing, 41(9/10), 988–998. https://doi.org/10.1108/03090560710773309

Engelhardt, K. (1990). Service robotics and artificial intelligence: current research and future directions. ISA Trans. 29(1), 31-40. https://doi.org/10.1016/0019-0578(90)90029-K

Fink, A. (2010). Conducting Research Literature Reviews. Internet to Paper.

Flick, U. (2014). An introduction to qualitative research, 5th ed. London: Sage Publications Ltd.

Frey, B. S., & Goette, L. (1998). Does the Popular Vote Destroy Civil Rights? American Journal of Political Science, 42(4), 1343. https://doi.org/10.2307/2991861

Gillis, N. (2014). The why and how of nonnegative matrix factorization. Regularization, Optimization, Kernels, and Support Vector Machines, 12(257), 257-291.

Habib, A. (2015). Send in the competent in place of the Cadres. Sunday Times.

Huang, M. H., & Rust, R. T. (2018). Artificial Intelligence in Service. Journal of Service Research, 21(2), 155–172. https://doi.org/10.1177/1094670517752459

James, O. (2007). Evaluating the Expectations Disconfirmation and Expectations Anchoring Approaches to Citizen Satisfaction

with Local Public Services. Journal of Public Administration Research and Theory, 19(1), 107–123. https://doi.org/10.1093/jopart/mum034

Jayanti, R., & Jackson, A. (1991). Service Satisfaction: An Exploratory Investigation of Three Models. In: Holman, R., & Solomon, M. R., (editors). NA—Advances in Consumer Research. Provo, UT: Association for Consumer Research.

Johnston, M. P. (2014). Secondary Data Analysis: A Method of which the time has come. Qualitative and Quantitative Methods in Libraries, 3, 619-626.

Kalonda, J. K., Govender, K. (2021). Factors Affecting Municipal Service Delivery: A Case Study of Katima Mulilo Town Council, Namibia. African Journal of Public Affairs, 12(2).

Kim, J. K. (2012). Delivering on development: Harnessing knowledge to build prosperity and end poverty. World Bank Group.

Koc-Michalska, K., & Lilleker, D. (2016). Digital Politics: Mobilization, Engagement, and Participation. Political Communication, 34(1), 1–5. https://doi.org/10.1080/10584609.2016.1243178

Kroukamp, H., & Cloete, F. (2018). Improving professionalism in South African local government. Acta Academica, 50(1). https://doi.org/10.18820/24150479/aa50i1.4

Landemore, H. (2017). Democratic reason: Politics, collective intelligence, and the rule of the many. Princeton University Press, New Jersey.

Landemore, H., & Elster, J. (2012). Collective Wisdom. Cambridge University Press. https://doi.org/10.1017/cbo9780511846427

Li, D., & Du, Y. (2017). Artificial Intelligence with Uncertainty. CRC Press. https://doi.org/10.1201/9781315366951

Lyons, W. E., & Lowery, D. (1986). The Organization of Political Space and Citizen Responses to Dissatisfaction in Urban Communities: An Integrative Model. The Journal of Politics, 48(2), 321–346. https://doi.org/10.2307/2131096

Mangai, M. S. (2016). The Dynamics of Failing Service Delivery in Nigeria and Ghana. Developments in Administration, 1(1). https://doi.org/10.46996/dina.v1i1.5101

Mangai, M. S. (2017). An alternative solution to service delivery problems in developing countries. Enschede: Ipskamp Printing.

Masiya, T., Davids, Y. D., & Mangai, M. S. (2019). Assessing Service Delivery. Research Center in Public Administration and Public Services, 14(2), 20-40.

Mathekga, R., & Buccus, I. (2006). The challenge of local government structures in South Africa: Securing community participation. Critical Dialogue Public Participation Review, 2(1), 11-17.

Melchior, J. T., Walker, R. G., Cooke, A. L., et al. (2017). A consensus model of human apolipoprotein A-I in its monomeric and lipid-free state. Nature Structural & Molecular Biology, 24(12), 1093–1099. https://doi.org/10.1038/nsmb.3501

Morgeson, F. V. (2012). Expectations, Disconfirmation, and Citizen Satisfaction with the US Federal Government: Testing and Expanding the Model. Journal of Public Administration Research and Theory, 23(2), 289–305.

Napier, C. J. (2018). Political oversight committees and the separation of powers in the local sphere of government: the case of the City of Tshwane. Journal of Public Administration, 53(2), 169-185.

Ngcamu, B. S. (2019). Exploring service delivery protests in post-apartheid South African municipalities: A literature review. The Journal for Transdisciplinary Research in Southern Africa, 15(1). https://doi.org/10.4102/td.v15i1.643

Nielsen, J. (1993). Usability Testing. Usability Engineering, 165–206. https://doi.org/10.1016/b978-0-08-052029-2.50009-7

Niyitunga, E. B. (2021). A Qualitative Review of the Recurrence of Xenophobic Violence and their Effects on South Africa's Role in International Diplomacy. In: Proceedings of the 6th Annual International Conference on Public Administration and Development Alternatives, Virtual Conference.

Niyitunga, E. B. (2022). Good Health-Sustainable Development Nexus: Assessing the Prospects and Opportunities of Artificial Intelligence in Africa. African Journal of Governance and Development, 11(1.1), 47-78.

Niyitunga, E. B., & Musyam, J. K. (2024). Dependency Syndrome Within Africa's International Relations: A Hindrance to Sustainable Development in Africa. Journal of Infrastructure, Policy and Development.

Noveck, B. S. (2018). Crowdlaw: Collective Intelligence and Lawmaking. Analyse & Kritik, 40(2), 359–380. https://doi.org/10.1515/auk-2018-0020

Oliver, R. (1977). Effects of Expectation and Disconfirmation on Postexposure Product Evaluations: An Alternative Interpretation. Journal of Applied Psychology, 61(2), 246-250.

Pan, Y. (2016). Heading toward Artificial Intelligence 2.0. Engineering, 2(4), 409–413. https://doi.org/10.1016/j.eng.2016.04.018

Pečarič, M. (2016). Can a group of people be smarter than experts? The Theory and Practice of Legislation, 5(1), 5–29. https://doi.org/10.1080/20508840.2016.1259823

Rocha, Á., Adeli, H., Reis, L. P., & Costanzo, S. (2018). Trends and Advances in Information Systems and Technologies. In:

Advances in Intelligent Systems and Computing. Springer International Publishing. https://doi.org/10.1007/978-3-319-77703-0

Sau, A. (2017). Artificial Neural Network (ANN) Model to Predict Depression among Geriatric Population at a Slum in Kolkata, India. Journal of clinical and diagnostic research. https://doi.org/10.7860/jcdr/2017/23656.9762

Sintomer, Y., Herzberg, C., & Röcke, A. (2008). Participatory Budgeting in Europe: Potentials and Challenges. International Journal of Urban and Regional Research, 32(1), 164–178. https://doi.org/10.1111/j.1468-2427.2008.00777.x

Smith, H. J., & Pettigrew, T. F. (2015). Advances in Relative Deprivation Theory and Research. Social Justice Research, 28(1), 1–6. https://doi.org/10.1007/s11211-014-0231-5

Stagnation, P. B. P. E. (2010). Monthly Review | South 'Africa's Bubble Meets Boiling Urban Social Protest. Monthly Review.

Surowiecki, J. (2005). The Wisdom of Crowds. Knopf Doubleday Publishing Group: New York.

Suteu, S. (2015). Constitutional conventions in the digital era: Lessons from Iceland and Ireland. Boston College International and Comparative Law Review, 38, 251

Van Ryzin, G. G. (2004). Expectations, performance, and citizen satisfaction with urban services. Journal of Policy Analysis and Management, 23(3), 433–448. https://doi.org/10.1002/pam.20020

Vaux, T., & Visman, E. (2005). Service Delivery in Countries Emerging from Conflict. Available online: https://www.gsdrc.org/docs/open/ss15.pdf (accessed on 2 June 2012)

Vromen, A. (2017). Digital Citizenship and Political Engagement. Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-48865-7

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. Long Range Planning, 52(3), 326–349. https://doi.org/10.1016/j.lrp.2018.12.001

Wheeler, D. (1980). Basic needs fulfilment and economic growth: A simultaneous model. Journal of Development Economics, 7(4), 435-51. https://doi.org/10.1016/0304-3878(80)90038-3

Wirtz, B. W., Weyerer, J. C., & Geyer, C. (2018). Artificial Intelligence and the Public Sector—Applications and Challenges. International Journal of Public Administration, 42(7), 596–615. https://doi.org/10.1080/01900692.2018.1498103

Wirtz, J., Patterson, P. G., Kunz, W. H., et al. (2018). Brave new world: service robots in the frontline. Journal of Service Management, 29(5), 907–931. https://doi.org/10.1108/josm-04-2018-0119

Yi, Y. (1990). A Critical Review of Consumer Satisfaction. In: Valerie, A., (editor). Review of Marketing. Chicago IL: American Marketing Association.