The effect of information and communications technologies deployment on citizen engagement in a South African metropolitan municipality

By

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TABLE OF ACRONYMS

Acronym	Meaning
C2C	Citizens to Citizens
C2G	Citizens to Government
G2C	Government to Citizens
ICT	Information Communication Technology

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ABSTRACT

Even though the South African government has joined other nations across the globe to embrace the use of selected technologies for citizen engagement, there has not been much meaningful impact on the decision-making process or governance because the government failed to realise that their engagement mechanisms were poor, their selected applications were not user-friendly, and they required more technicalities for participation with little or no protection for users. This study is designed to assess the effect of the deployment of information and communication technologies (ICTs) on citizen engagement in the City of Tshwane Municipality. This quantitative study adopted a survey research design. The study sampled 136 councillors randomly out of 205 councillors in the City of Tshwane via a structured questionnaire. The retrieved questionnaires were analysed using charts, simple percentage and frequency, cross-tabulation, chi-square and linear regression. In the end, the findings of the study revealed that the most critical operational changes needed to enhance citizen engagement in the City of Tshwane Municipality were improved support from the IT division/department, acquisition of technological tools for councillors, and regular live online Q&A sessions with citizens (e.g. Facebook Live, Twitter Spaces). In addition, the study found that improving the IT division/department support would enhance citizen engagement in the City of Tshwane Municipality the most. Based on the findings of this study, the research recommended, among other things, that the municipality should see the selected technologies for policy creation and public participation and comments/projects and ward monitoring as a potent tool for enhancing accountability, feedback, and municipal development rather than as a tool for political campaigning or propaganda since technology usage significantly affects citizen engagement.

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CHAPTER 1. INTRODUCTION

1.1 Purpose of the study

The purpose of the study was to assess the effect of the deployment of information and communication technologies (ICTs) on citizen engagement in the City of Tshwane Municipality.

1.2 Background of the study

The emergence of a democratically elected government in South Africa in 1994 made the citizens more optimistic that the new era would usher out inequality and open the opportunity for the voice of the citizens to be heard. According to Levenson (2018), the post-apartheid period was the period that South Africans had been waiting for. Their expectations were high about this period because they felt all racial related issues would be gone and that the government at all levels, most especially the local government level would be an all-inclusive one. Local Government was mentioned in the 1996 Constitution of the Republic of South Africa, Act No.108, where it was stated that it is a statutory duty of the local government to ensure that they involve their citizens in the process of policy and budget formulation, implementation, and review (Republic of South Africa, 1996). Given the statutory role of the local government, it was expected that the citizens would benefit from it.

According to Levenson (2021), the expectation of the citizens has been betrayed in this democratic dispensation because they have not enjoyed the popular participation they were envisaging as they have continued to grapple with issues relating to poor citizen engagement, thereby making the government less participatory at the grassroots level. Khan et al. (2014) noted that citizen engagement is crucial to the success of any democratically elected government. It has been argued that numerous challenges in time, place, and cost have been associated with citizenship engagement at the grassroots level in many countries including South Africa (Ricker et al., 2020). Some scholars (Dambruch and Krämer, 2014; Semanjski et al., 2016; Ricker et al., 2020) pointed out that many of

these challenges are associated with the traditional top to bottom approach used by the local government.

The gap has made it increasingly difficult for the government to involve the broad range of its citizens, regardless of their demographic characteristics, in the process of policymaking, implementation as well as service delivery. Vogt et al. (2014) noted that, even with the deployment of modern technologies to address these daunting challenges associated with citizen engagement, many of these challenges have limited the level of citizen engagement and widened the communication gap of Government to Citizens (G2C), Citizens to Government (C2G) and even that of the Citizens to Citizens (C2C). According to Slaev et al. (2019), even after the introduction of technology, many citizens still could not participate because of data protection requirements, lack of technical expertise, and the user-friendly interface.

According to Pade-Khene (2018), many South Africans lack the required skills that are necessary to take advantage of ICT for digital citizen engagement. Also, the effectiveness of digital citizen engagement in many municipalities in South Africa has been threatened by lack of data and information, poor infrastructure and access to the internet, lack of political support, digital divide, and lack of incentive and motivation. These challenges associated with the new technology have left the communication gap unclosed. This gap, therefore, has led to incessant protests (violent and peaceful) by the citizens against some unpopular government policies and development projects, which to a large extent were considered less relevant for the present time and a waste of public funds (Kanyane et al., 2021).

1.3 Research problem

The constant protests witnessed in various communities in South Africa are sufficient evidence to show that the citizens are not satisfied with the rate of development and level of social service delivery. In the light of these, various studies (Masiya et al., 2019; Machiri & Pade-Khene, 2020; Kanyane et al., 2021) have shown that several unfavourable policies as well as trading by-laws that have been formulated with little or no consultation with the stakeholders, or citizens, were major triggers to these grievances.

Stakeholders have continued to criticise the level of citizen engagement in South Africa because it is yet to yield the expected result. Scholars have equally criticised the level of engagement as having been shallow and that it has provided little or no opportunity for participation or influence from the citizens, meaning that it is not open. These factors have been a great source of discouragement to the members of the public who deserve to be heard and encouraged to participate in the process of decision-making and policy formulation (Molokwane & Lukamba, 2018).

Also, even though the government embraced the use of selected technologies for citizen engagement, there has not been much meaningful impact on the decision-making process or governance because the government failed to realise that their engagement mechanisms are poor, their selected applications were not user-friendly, and they required more technicalities for participation with little or no protection for users (Chen et al., 2020). Indeed, many of these applications are not readily accessible, unlike if they had adopted the use of social media platforms (Cho & Melisa, 2021).

Poor levels of digital literacy among citizens adversely affect the rate of citizen engagement in South Africa. The following research questions are raised in this study:

1) How effective are the ICTs used for citizen engagement in the City of Tshwane Municipality?
2) What is the effect of digital literacy on citizen engagement?
3) What are the factors influencing citizens' choice of medium to interact with government?
4) Which ICTs are used to promote citizen engagement?

1.4 Research objectives

The following are the research objectives that will be explored in this research:

1) To examine the effectiveness of the various ICTs used for citizen engagement in the City of Tshwane Municipality
2) To examine the effect of digital literacy on citizen engagement
3) To explore the factors influencing the citizens' choice of medium to interact with the government
4) To identify the ICTs that are used to promote citizen engagement.

1.5 Significance of the study

This study is significant in various regards. This research is significant in that the effect of selected technologies on citizen engagement has not received attention. This is important as technology increasingly will provide information and communications solutions. Furthermore, the extent of dissatisfaction with service delivery necessitates attention to community engagement and the implementation of strategies to address the implementation of technology in citizen engagement. Lastly, the concept of a smart city and the implementation of technologies in smart cities, will continue to grow as strategic directions for large metropoles, like the City of Tshwane.

It is against this background that the recommendations of this study would suggest means of improving the implementation of technologies to boost the levels of citizen engagement in the study area in the form of digital citizen engagement. Furthermore, the lapses of the current technology would be identified so that the government can recognise them and improve on them.

1.6 Delimitations of the study

This study is limited to the effect of the deployment of information and communications technologies on citizen engagement in the City of Tshwane Municipality. The study focused mainly on citizens' engagement in Tshwane Municipality.

1.7 Definition of key terms

- *Citizen Engagement*: According to Watson (2014), Citizen Engagement is the consultation where authorities want citizens' views on a largely complete plan, to the more recent recognition of the value of citizens' 'lay' or tacit knowledge about the places they know and care about.
- According to Pade-Khene (2018), *Digital Citizen Engagement* is defined as a form of ICT usage involving citizens to use new media/digital platforms to enhance communication channels.

- *Information Communication Technology*: Pandey and Pandey (2020) define ICT as the forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means.
- *Smart City*: According to Kim and Yang (2021), a 'smart' city is '… "a city that makes a conscious effort to innovatively employ ICTs in support of a more inclusive, diverse, and sustainable urban environment".

1.8 Chapter outline

The first chapter of this study is the introductory chapter. This chapter is comprised of the purpose of the study, the background of the study, the research problem, and a list of three research objectives. Furthermore, the first chapter contains the significance of the study, the delimitation of the study, the definition of terms, the assumptions, and the chapter outline.

Literature review is the title of the second chapter. This chapter comprises the introduction, definition of the topic, reviews on the three research objectives, an introduction on the literature where the gaps were drawn and then the analytical framework.

The third chapter presents the relevant research method. It identifies the research approach, the research design, the data collection methods, the population and sample, a discussion on the research instrument and the procedure for data collection, data analysis and interpretation, the limitations of the study, validity and reliability of the research instrument, and finally the ethical considerations.

The fourth chapter is the presentation of the research results. This chapter contains the personal profile of the respondents, the extent of technology use to promote citizen engagement, the effectiveness of the various technologies and methodologies used for citizen engagement, factors influencing the choice of medium to interact with citizens, policies and strategies that would enhance citizen engagement through the use of technology, and lastly a discussion of the findings.

The last chapter is the summary, conclusions, and recommendations. This chapter contains the introduction, summary of findings, implications for practice, areas for further research, conclusions of the study, recommendations, generalisability, and way forward.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This chapter presents literature reviewed on the concept of citizen engagement. The chapter will give a deeper insight into the extent to which technology has been used to promote citizen engagement, as well as how effectively various technologies have been over time.

2.2 Concept of citizen engagement

The quality of governance and policymaking can only be enhanced when there is an interaction between the stakeholders. Hence, citizen engagement is one vital instrument that the government should not toil with if they must remain a truly democratic government. The concept, therefore, has been variously described by scholars. Svara and Denhardt (2010) referred to citizen engagement as the "ability and incentive for ordinary people to come together, deliberate, and take action on problems or issues that they have defined as important" (p.5). Similarly, Ndima (2012) described citizen engagement "as an interactive process wherein the empowered, rational and well-informed citizens deliberate amongst themselves and between themselves and government representatives to reach consensus during the policy or decision-making process" (p. 2).

Participation of citizens in the government is essential and cannot be overemphasised since it is encouraged by the South African Constitution (Republic of South Africa, 1996; Chapter 7, Section 152 (1)). According to Olga et. al. (2012), the participation of citizens in the decision-making process can be categorised based on Arnstein's (1990) ladder of citizen participation.

Arnstein (1990), in his ladder of citizen participation, explains the eight types of public participation:

- Step one: manipulation
- Step two: therapy
- Step three: informing
- Step four: consultation

- Step five: placation
- Step six: partnership
- Step seven: delegated power
- Step eight: citizen control

These eight types of public participation broadly can be organised into three categories, namely non-participation, tokenism and citizen power.

i. Non-participation. Olga et al. (2012) posited that the first two steps, manipulation and therapy, are situated in the non-participation category. Many communities around the world belong to this category. Luoma-aho et al. (2020) noted that this level is characterised by one-way relationship communication between the government and the citizens. The government keeps updating the members about their achievements and progress without allowing the citizens to evaluate their performance or make recommendations. At this level, the government takes all the developmental decisions on behalf of the citizens without them giving any input at all. The relationship mechanism that is seen at this level is the G2C.

ii. Tokenism. The second category comprises steps 3 to 5 (informing, consultation and placation). Citizens at this phase are passive, well-informed about government policies and developmental projects, and they have little stake in the matter. This level was what Chikova and Chilunjika (2021) classified as consultation level. The contribution of the citizens is extremely limited. They are only allowed to provide feedback on the issues that the government has spelt out, many of which may not be utilised. The relationship mechanism that is seen at this level is the C2G.

iii. Citizen power. The third category, according to Sinxadi (2020), is the degree of citizen power which comprises steps 6 to 8 (partnership, delegated power and citizen control). This is the top of the ladder of citizen participation where the citizens are fully active and involved in governance. This is a critical phase where the citizens have been fully empowered by the government to take developmental decisions. A free flow of communication and the two-way mechanism is more potent at this level, implying C2G and C2C, as well as another unique flow from citizens to citizens which is the C2C.

Those decisions that are taken by these citizens are taken in all fairness and they are relevant to the needs of the people. So instead of the government taking developmental decisions based on their discretion, they empower the citizens to decide while the government swings into action to address it. In this regard, citizen engagement becomes important for the government to identify the most pressing needs of the citizens and address them accordingly. It is only when relevant needs are met that impact is felt. This equally makes it possible to assess the performance of the government since the provision and delivery of essential services is their responsibility at both the municipality and local government levels in South Africa. It is their constitutional responsibility which is clearly explained in the Constitution (Republic of South Africa, 1996).

2.3 The use of technology in citizen engagement

The widespread use of technology has significantly contributed to the rapid pace of global development, a situation in which the world has been turned into a global village and the whole world can be accessed through various mobile devices. The pace of information flow and circulation is fast-increasing to the extent that there is no single information is hidden.

With the use of technology, citizens can now monitor and evaluate the government via various mobile device applications and other online groups or forums (Wesselink et al., 2015). Technology usage has made public participation easy which has led to a significant increase in the turnout of the citizen in governance. With this, citizens now have ample access to open-source geo-web tools that can support or facilitate social movement and advocacies whenever the need arises (Pedregal et al., 2015).

Hudson et al. (2012) observed that the use of technology has enhanced citizen relations with the community, most especially in the way they communicate and disseminate information. In the area of communication and information dissemination, technology has now allowed the citizens to mobilise for support, within and outside their country, as well as hear views on local and national issues.

Technological innovation has increased the number of voices that are heard and insists that the government improve on its performance, accountability, and transparency because the government now knows that more citizens are watching (Pade-Khene, 2018).

The citizens are not only watching, but they are now using different ICTs, including social media sites, to break through some institutional barriers that have kept many of them from being involved in the deliberations in governance. According to Elelman and Feldman (2018), the use of technology as a strategy to effectively engage communities in policy creation has supported citizen participation in local government. Many of the technologies used for citizen engagement support feedback which is why many citizens utilise those technologies (Cho & Melisa, 2021).

However, Van Dijk (2000) argued that although technology plays a critical role in citizen participation; if not well designed or carefully selected, it can widen the gap that exists between the information-rich and the information-poor. Similarly, Wilhelm (2000) posited that technology is useless in the citizen engagement process if the social and political problems that underlie citizen engagement are not resolved. Hence, using sophisticated technology without addressing the social and political problems would eventually render the whole process of citizen engagement futile.

2.4 Effectiveness of technology for citizen engagement

Various technologies have been used for citizen engagement over the years, many of which have been rated as being effective. According to Ho and Cho (2017), in a bid to embrace technology, the government is shifting its focus gradually from the traditional approach to a digital approach; e-governance which encourages e-participation. Chen et al. (2020) posited that the use of social media platforms by the government is becoming very popular and very effective because social media patronage from citizens is growing geometrically.

Also, many government agencies now use social media platforms as a vital tool for information dissemination and interaction with the general public, something the traditional media is not capable of. Gruzd et al. (2018) found that the government at the grassroots level has seen social media as a potent tool for effective citizen engagement. According to Oke and Fernandes (2020), both the government and the citizens now have the opportunity to choose from several social media platforms that are available to them, based on their needs. Therefore, the nature of the information has to be considered before

selecting a social media platform on which to engage the citizens. The government has the liberty to choose from "microblogging (i.e. Twitter), social networking (i.e. Facebook), multimedia sharing (i.e. YouTube), open data (i.e. Data.gov), questioning tools (i.e. Quora), crowdsourcing (i.e. Mechanical Turk), and content syndication (i.e. RSS)" (Cho & Melisa, 2021 p:5). However, the most commonly used social media, by both the citizens and the government, due to their effective nature are Facebook, Twitter, YouTube, and LinkedIn (Oltmann et al., 2020). These sites support interaction and the use of audio-visual, visual and audio. Also, Cho and Melisa (2021) found that social media is a very effective tool for G2C interaction, for informing and nudging citizens, for C2G communications, like sourcing and citizen reporting, and that Twitter is the most effective among the social media tools.

2.5 Factors influencing the citizens' choice of medium to interact with government

Citizens do not thoughtlessly select a medium for communication or interacting with the government. They must decide on the most effective medium which will enable them to interact effectively. According to Oke and Fernandes (2020), citizens choose the medium of interaction based on their capabilities and abilities. To avoid embarrassment, many citizens prefer to use a medium that they can handle effectively, which has few or no hitches. According to Pade-Khene (2018), digital literacy is fundamental to basic service delivery in recent times. To a large extent, it supports and enhances two-way communication between the government and the citizens. It has been argued by Pade-Khene (2018) that three variables affect the level of citizen engagement via ICT: differential access, differential capacity and differential motivation. This influences how well the government or the citizen uses the ICT facilities available for knowledge transfer. Hence, the crux is for both the government and the citizens to become more digitally literate if they are to realise the true benefit that is embedded in digital citizen engagement.

Similarly, Machiri and Pade-Khene (2020) opined that citizens prefer to use mediums in which they are confident. No citizen is ready to use a medium, that they are not confident will deliver the required result. Also, the choice of the medium is influenced by the socio-

economic status of the citizen, most especially the cost of the medium, such as the cost of data subscription.

2.6 Conclusion of literature review

From the literature reviewed, it was found that citizen engagement is an essential tool for the government to achieve any meaningful development. However, the extent to which citizen engagement is employed by the government in the City of Tshwane Municipality is subject to debate. Furthermore, the literature reviewed was able to establish that technology utilisation enhances citizen engagement, therefore, the level of technology utilisation in the study area is yet to be established, in conclusion, it can be said that technology has been effective in achieving citizen engagement one thing that this study must stand to establish. Similarly, the study was able to establish that the choice of technology used is dependent on the nature of the information that is to be disseminated. Therefore, submitting to the findings of this study that Twitter is most effective may be wrong, if it is not the most suitable for information dissemination or interaction between the government and the citizens in the study area. Therefore, this study would also consider the social media platform that is most used and that is most effective. In addition, several factors have been said to have constituted choice medium interaction. This would also be examined in the study area to be sure of the factors that are influencing it.

2.7 Analytical framework

Two frameworks are considered in this study. They are the theoretical framework and the conceptual framework.

2.7.1 Theoretical framework

This study adopts the Putnam Social Capital Model because it best explains the phenomenon under study. This model was developed by Putnam (1993). The model explains that social relationships (for instance, citizen engagement) are a great asset that can result in societal development and the accumulation of human capital (Savage &

Kanazawa, 2002). The nine variables that influence social capital are presented in Figure 2.1.

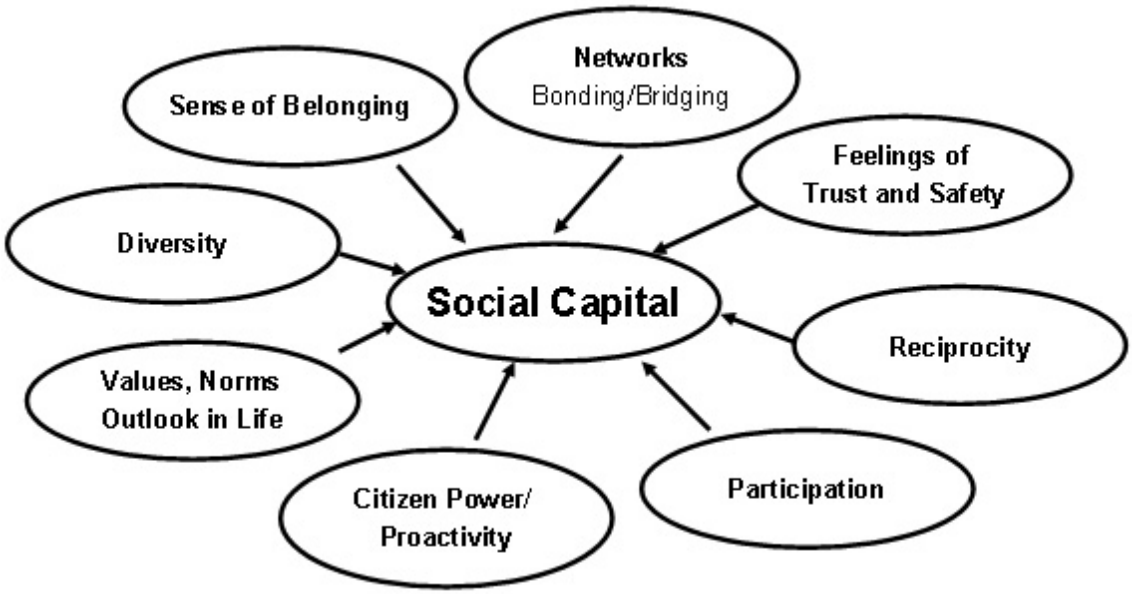

Figure 2.1: Social Capital Model (Source: Fari, 2015, p.21)

The relevance of this model to this study is that citizen engagement is not only benefitting the leader but also the entire community. Therefore, before citizen engagement can be achieved, the government must come to terms with the reality of the nine variables. These variables are explained below:

(1) Sense of belonging: When people are surrounded by those who are invested in their overall achievement, they feel safer. In essence, a sense of belonging and teamwork enhances an individual's morale and confidence (Chow & Chan, 2008).

(2) Network: A network connects individuals for involvement and mutual exchange of ideas and developments, regardless of their location or time restrictions (Ritter et al., 2004).

(3) Feelings of trust and safety: People who are surrounded by people who have common interests and ideas feel safer than those who are alone. In other words, trust encourages individuals to share (Andrews & Delahay, 2000).

(4) Diversity: Mixing with others also requires a high level of diversity. Individual features and histories bring value to a community of practice when people from the same profession join together.

(5) Common concepts and views are fine-tuned to prepare the path for unified standards to develop (Fernandez et al., 2000).

(6) Reciprocity: Individuals are guaranteed some type of compensation in exchange for their involvement and contributions, whether it be information/knowledge, recognition, or self-development (Rosenthal, 1997).

(7) Values, norms and outlook in life: those who participate in formal communities of practice and/or networks draw some values and norms from the society that characterises them as professionals or practitioners. A person's view of life is defined by this position (Li and Lin, 2021).

(8) Citizens' Power and Proactivity: Individuals' involvement and contribution in communities of practice confer collective power and authority as a group, as well as the ability to practise as members of a formal institution (Jones & Taylor, 2012).

(9) Participation: Individuals become more excited when they work together toward a similar objective and are given roles and tasks to complete, adding to the system's overall success (Weber 2020). So, before any engagement can be effective, all the factors in the model have to be effectively applied.

2.7.2 Proposed conceptual framework

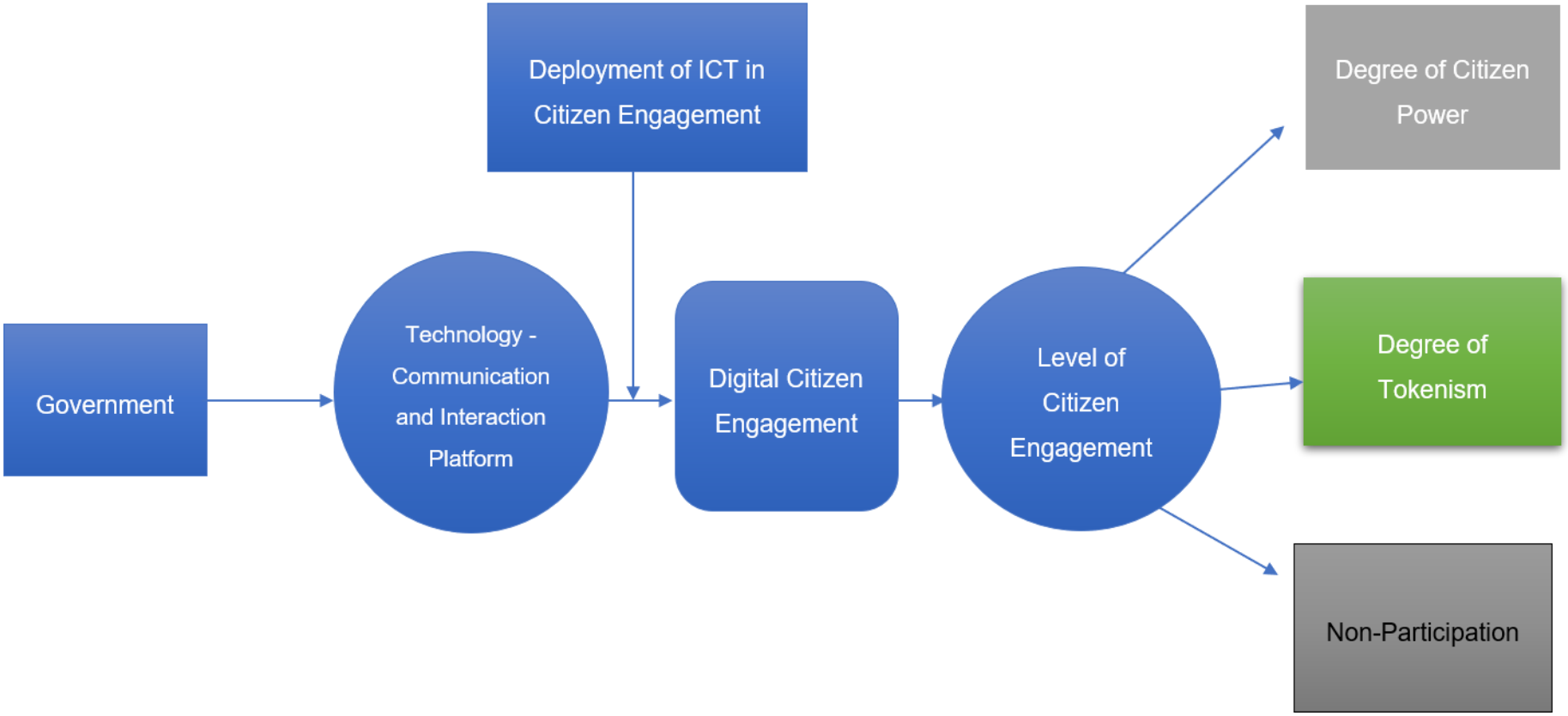

Figure 2.2 Proposed Conceptual Framework

The framework indicates that there is an interaction between the government and the citizen, which is either G2C or C2G. Whichever way the interaction is initiated, the initiator employs technology. The deployment of ICT can be determined by several factors such as the nature of the information that is discussed. This will in turn influence the level of citizen engagement as digital citizen engagement.

CHAPTER 3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used to collect and analyse the data relating to this study. This chapter confirms the correct procedures were followed so that the right data would be collected to address the research questions: How effective are technologies used for citizen engagement in the City of Tshwane Municipality? What are the effects of digital literacy on citizen engagement? What are the factors influencing the citizens' choice of medium to interact with the government? Which technologies are used by the government to promote citizen engagement?

To address these research questions, the research is structured as follows: identification and description of the research approach adopted in section 3.1; the research design adopted in section 3.2; the data collection methods used in section 3.3; the population and the sample in section 3.4. Also, the chapter describes the research instrument in section 3.5 and the procedure for data collection in section 3.6. Furthermore, the chapter presents the data analysis and interpretation in section 3.7 and identified the limitations of the study in section 3.8. The validity and reliability of the instrument are discussed in section 3.9 while the ethical considerations are listed and discussed in section 3.10.

3.2 Research approach

This study adopts a quantitative research approach. This research approach supports the collection of standardised data from a vast number of respondents. In this study, the respondents are councillors of the City of Tshwane Municipality. In their constitutional roles, councillors play the critical function of representing citizens, interacting with citizens to provide feedback on the functions performed by the government, as well as acting as a contact for citizens in interacting with the government.

This study also adopts the quantitative approach because this approach is suitable for addressing the "what" research questions which were used in this study. Lastly, notable other researchers in this field adopted this approach, such as Mawela, Ochara, and Twinomurinzi,

2017 who used a quantitative method when assessing how social media interplays with G2C in a municipal environment.

3.3 Research design

The research design that was adopted in this study is the survey research design. According to Check and Schutt (2012, p.160), this research design refers to the collection of information from a sample of individuals through their responses to questions. This method also supports the quantitative approach that was adopted in this study. A survey research design is suitable for this study because it allows the researcher to have access to first-hand data. The data obtained through this research method is usually detailed and objective. Also, this method is most suitable for a large sample size.

Considering the research questions raised in this study, this non-experimental research is a descriptive study. It is not a longitudinal study because it is bounded by time. It is important to note that the unit of analysis of this study is the councillors.

In this quantitative study, primary data was collected through a structured questionnaire that was administered electronically to the respondents. This method was deemed fit for this study because it best avoids the limitations of misconception.

3.4 Population and sample

The population, the sample and the sampling method for this study are further described below.

3.4.1 Population

The population of this study includes all city management, administrators, councillors, oversight committee members, etc., but to frame the sample, only those who are elected councillors were surveyed. The reason for this is because councillors are the closest electoral arm to the masses and the participatory patterns of citizens can be verified from councillors. This population was selected for this study more so because it has a direct bearing on the phenomenon under study, which is the effect of deployment of information and

communications technologies on citizen engagement in the City of Tshwane Municipality. The total number of councillors was 205 in the City of Tshwane at the time of data collection.

3.4.2 Sample and sampling method

A sample of 136 respondents was selected for the study using Taro Yamane Formula:

$$S = \frac{N}{1+N\,(0.05)^2}$$

$$= \frac{205}{1 + 205\,(0.0025)}$$

$$= 135.6 \text{ (approximately 136)}$$

The 136 councillors were thus randomly selected from the sample frame that contained all 205 councillors in the City of Tshwane. The reason for using the simple random sampling method, which is a probability sampling method, was to give all the councillors an equal opportunity to participate in this research and to gather more comprehensive data.

3.5 Research instrument

This research used a self-developed questionnaire to collect the data from the councillors of the City of Tshwane. The questionnaire contains five sections (Section A - E). It has 30 questions (see Appendix B for the questionnaire). The items in the instrument were extracted from the literature that was reviewed in this study. Each section in the instrument was designed to address each of the objectives of the study. Question 29 and 30 has open ended questions and the responses will be collated and converted in to quantitative responses to suit the quantitative nature of this study.

3.6 Procedure for data collection

The instrument was administered to the respondent through Survey Monkey instead of administering the instrument face-to-face to the respondents. This was done in a bid to keep

both the researcher and the respondents at safe distance because of the prevalence of COVID-19.

3.7 Data analysis and interpretation

This study used frequencies and percentages, bar charts, and descriptive statistics, including mean and standard deviation. In addition, the inferential statistics that were used in the study were cross-tabulation, chi-square and linear regression.

3.8 Limitations of the study

This study has some limitations. The study should have captured the opinions of both the citizens and the councillors on the subject matter. This would have given the research a more comprehensive result. So, collecting data from only one category of respondents presents the limitation of being one-sided. This will be improved upon in further studies.

Furthermore, using a single method was a significant limitation for this study. The study would have adopted the mixed-method approach, which would have been preferable to also obtain insights from policy and decision-makers but due to COVID-19, it was decided to select a quantitative method only.

Another limitation of this study was that the sample size was small this was because many of the councillors that were reached did not give the researcher audience. This will be improved upon in feature studies

3.9 Validity and reliability

Validity and reliability are two concepts used in quantitative research. These two concepts were applied to the instruments used in this study. Reliability is a measure that is used to check whether the results obtained from a particular instrument are repeatable (Bryman and, 2012). Therefore, before carrying out fieldwork, a pilot study was conducted with the instrument to ensure that the instrument is reliable and capable of obtaining the required result in line with the aim of the study.

Babbie and Mouton (2006) describe the concept of validity as the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration. There are four types of validity which include face validity, content validity, construct validity, and criterion validity. To achieve face validity, the research submitted the instrument to the supervisor for assessment.

In other words, validity was used to measure the integrity of the research data, while reliability was used to ascertain the degree to which the instrument measures a construct each time it is used under the same conditions with the same respondents. Validating this instrument helps to ensure that the right questions were used while the wrong ones were either removed or modified. This enabled this research instrument to have the most appropriate set of questions.

3.10 Ethical considerations

Before the researcher embarked on the data collection, all the details on the Wits Business School ethics form were completed and approved. This enabled the ethics committee to ensure that the human rights of the participants were protected.

All the instruments were accompanied by a consent form for the participants to complete. This form provided all the necessary information about the research to avoid misinterpretation. Reading and signing the consent form indicated consent to participate in the research.

In this research, ethical principles were considered while collecting the research data, such as protecting the identity of participants involved and maintaining confidentiality over data collected. The respondents were notified that their participation was voluntary and that they could decide to terminate their participation at any time. Also, they were assured of anonymity. In addition, the introductory note on the instrument assured the participant that all the information provided would be treated as highly confidential and not made available to anyone not involved in the research study.

CHAPTER 4. PRESENTATION OF RESEARCH RESULTS

This chapter presents the analysis, interpretation of data collected from the fieldwork, and the discussion of the findings. The results presented were based on the responses from 62 respondents.

4.1 Personal profile of respondents

The personal profile of the 62 respondents is presented in Table 4.1. This table indicates simple percentages relating to respondents' age, gender, years of councillorship and educational background of the respondents.

Table 4.1: Personal Profile of the Respondents

Age	**Frequency**	**Percentage (%)**
18-27 years	2	3.2
28 - 37 years	17	27.4
38- 47 years	23	37.1
48-57 years	15	24.2
58 years and above	5	8.1
Total	62	100.0
Gender		
Male	39	62.9
Female	23	37.1
Total	62	100.0
Years' Experience as a Councillor		
Less than 1 year	1	1.7
1-5 years	41	68.3
5-10 years	14	23.3
11 years and above	4	6.7
Total	60	100.0
Educational Background		
High School	2	3.2
Matric	9	14.5
Diploma	18	29.0
Undergraduate/Honours	15	24.2
Postgraduate Degree	18	29.0
Total	62	100.0
Familiarity with Citizen Engagement		
Very unfamiliar	2	3.2
Somewhat unfamiliar	1	1.6
Not Sure	2	3.2
Somewhat familiar	10	16.1
Very familiar	47	75.8
Total	62	100.0

Table 4.1 shows that 37.1% of the respondents were between the ages of 38 and 47 years old, while 3.2% of the respondents were between the ages of 18 and 27 years. From this, it seems that most of the councillors that participated in this study were between the ages of 38 and 47 years. From the table, 62.9% of the respondents were males while 37.1% were females. This result shows that more than half of the councillors that participated in this study were male and that the City of Tshwane Municipality also has female councillors. The table shows that 68.3% of the respondents had been councillors for between one and five years, while 1.7% of the respondents had spent less than one year as a councillor. This result shows that more than half of the respondents had spent between one and five years in office, which means that they would be knowledgeable about the subject of this research. The table further shows that 29% of the respondents had diplomas while only 3.2% had high school certificates. This implies that the majority of the councillors only had diplomas, which would to some extent influence their knowledge about citizen engagement in the City of Tshwane Municipality. The table showed that 75.8% of the respondents were very familiar with the concept of citizen engagement at the municipal level while 1.6% were somewhat unfamiliar. This result shows that most of the councillors were familiar with the concept of citizen engagement at the municipal level.

4.2 Extent of technological use to promote citizen engagement

The extent to which technology is used to promote citizen engagement was presented in three levels based on their mean score: low (1.00 – 2.3), moderate (2.4 – 3.6) and high (3.6 – 5). The mean scores were determined by subtracting the lowest response option possible, which is 1 (strongly disagree), from the highest response option possible, which is 5 (strongly agree). The outcome is divided by three to obtain average classification scores presented as low, moderate and high, as indicated in Table 4.2.

Table 4.2: Decision Table

Mean Score	**Extent**
1.00 to 2.3	Low
2.4 to 3.6	Moderate
3.6 to 5	High

Table 4.3: Extent of Technological Usage to Promote Citizen Engagement

S/N	Assertions	Mean	SD	Rating	Ranking
1	Community mobilisation can be enhanced through the usage of technology	4.15	.846	High	1
2	Active citizenry can be achievable using technology	4.11	.960	High	2
3	Technology makes it easy for citizens to report issues and complaints	4.10	.863	High	3
4	Technology helps citizens to air their views on local and national issues	4.06	.903	High	4
5	Technology has been a useful tool for obtaining citizen feedback	4.02	.799	High	5
6	Technology allows councillors to reach a wider audience in the municipality that otherwise would not be reached through traditional means of communication e.g. town hall meeting	3.93	1.167	High	6
7	Technology makes it easy for citizens to mobilise support for the government	3.79	1.010	High	7
8	Citizens find it easy to carry out advocacy and equally criticise the government	3.73	.926	High	8
9	Technology allows for citizens to monitor wards and municipal projects	3.52	1.052	Moderate	9

10	Citizens find it easy to engage in deliberations with the government via technology	3.27	1.119	Moderate	10
11	Citizens find it easy to disseminate information using technology	3.18	.950	Moderate	11
12	Technology limits the ability of councillors to maintain contact with citizens	2.50	1.334	Moderate	13
13	Technology is a barrier to councillors' interactions with the citizens	2.24	1.183	Low	14
14	Ideas for policy creation and/or public participation and/or comments are received via selected technologies	3.16	1.059	Moderate	12

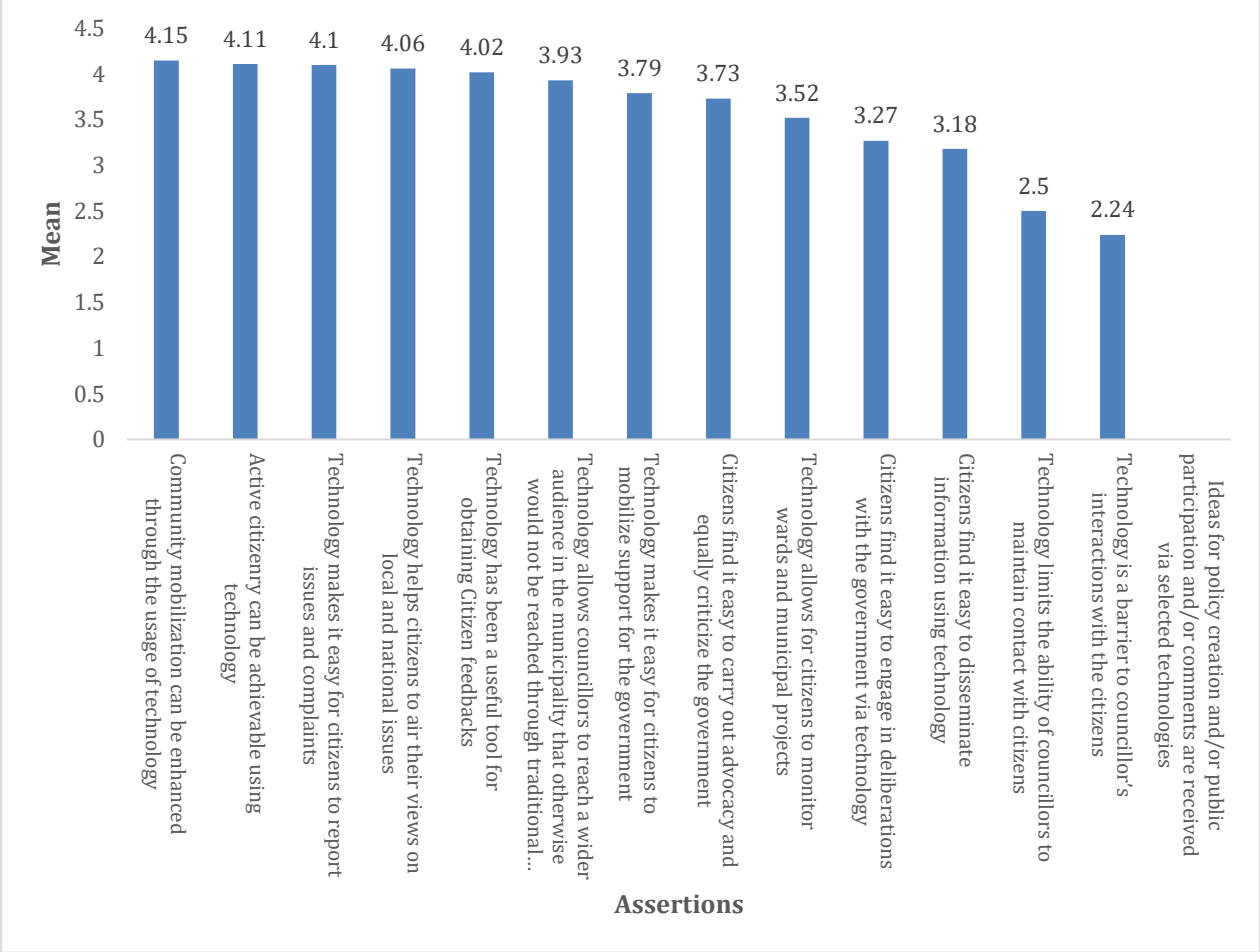

Figure 4.1: Extent of Technological Usage to Promote Citizen Engagement

Table 4.3 and Figure 4.1 show that the extent to which technology promoted citizen engagement was high on eight of the assertions, moderate on five, and low on one of the assertions. Also, the extent of technology used to promote citizen engagement was highest in 'community mobilisation' with a mean score of 5.15 and a standard deviation SD of 0.846 followed by 'active citizenry' with a mean score of 4.11 and an SD of 0.960. Reporting issues and complaints showed a mean score of 4.10 and an SD of 0.863. Therefore, the three most effective ways in which technology has promoted citizen engagement to a very large extent are by enhancing community mobilisation, activating citizenry, and making it easy for citizens to report issues and make complaints in the City of Tshwane Municipality.

Hypothesis 1

H_0: Technology usage does not significantly affect citizen engagement

H_1: Technology usage significantly affects citizen engagement

Table 4.4: Relationship between Technology Usage and Citizen Engagement

		B (values for the regression equation)	Std. Error	Beta	T	Sig.
1	(Constant)	3.293	.478		6.886	.000
	Technology usage	.317	.113	.340	2.799	.007

(R = 0.340[a]; Adjusted R^2 = 0.101; F= 7.836; Sig. 0.007[b]; df =1)

Table 4.4 shows a correlation between technology usage and citizen engagement (R) of 0.340[a]. According to Miles and Banyard (2007), the correlation coefficient is a standardised measure of an observed effect. It is a commonly used measure of the size of an effect; for instance, values of ±.1 represent a small effect, ±.3 is a medium effect and ±.5 a large effect. The correlation result shows that some increase in technology usage will result in some increase in citizen engagement since the relationship between the two variables is moderate, and the direction of the relationship is positive. The adjusted R^2 of 0.101 means that 10.1% of the increase in citizen engagement was caused by technology usage, while the remaining 89.9% increase in citizen engagement was accounted for by other variables other than technology usage. The effect of the independent variable (technology usage) on the dependent variable (citizen engagement) was very significant (F = 7.836; df = 1; 62; $p<0.05$). This means that the derived regression model effectively predicted the outcome. Furthermore, Table 4.4 reveals the extent of the effect of the independent variable on the dependent variable, which is expressed in Beta weights and t-test. Technology usage has a very significant effect on citizen engagement (B = .072, t = 8.402 (521); $p<0.05$).

The study, therefore, rejects the null hypothesis, which states that technology usage does not significantly affect citizen engagement and accepts the alternative hypothesis, which states that technology usage significantly affects citizen engagement.

4.3 Effectiveness of the various technologies and methodologies used for citizen engagement

The effectiveness of the technology and methodologies used for citizen engagement was presented in three levels based on their mean score: ineffective (1.00 – 2.3), moderate (2.4 –

3.6) and effective (3.6 – 5). The mean scores were determined by subtracting the lowest response option possible, which is 1 (strongly ineffective), from the highest response option possible, which is 5 (strongly effective). The outcome is divided by three to obtain average classification scores presented as ineffective, moderate and effective in Table 4.5.

Table 4.5: Decision Table

Mean Score	**Interpretation**
1.0 to 2.3	Ineffective
2.4 to 3.6	Moderate
3.6 to 5	Effective

Table 4.6: Effectiveness of the Various Technologies and Methodologies used for Citizens

S/N	Technologies	Mean	SD	Rating	Ranking
1	Messaging platforms (e.g. WhatsApp, Telegram)	4.40	.639	Effective	1
2	Community radio stations	4.32	.621	Effective	2
3	Social networking (e.g. Facebook, Instagram)	4.19	.721	Effective	3
4	TV stations	4.15	.765	Effective	4
5	Online meeting platforms (e.g. Microsoft Teams, Zoom)	3.90	.970	Effective	5
6	Multimedia sharing (e.g. YouTube)	3.73	.728	Effective	6
7	Website	3.71	.894	Effective	7
8	Walk-in-centres	3.65	.960	Effective	8
9	Call centre	3.61	1.030	Effective	9
10	Microblogging platforms (e.g. Twitter, Tumblr)	3.44	.861	Moderate	10
11	Open data (e.g. Data.gov, Stats SA)	3.35	.851	Moderate	11
12	Municipal app	3.23	1.015	Moderate	12
13	Questioning tools (e.g. Quora)	3.16	.944	Moderate	13
14	Crowdsourcing (e.g. Mechanical Turk)	3.15	.649	Moderate	14

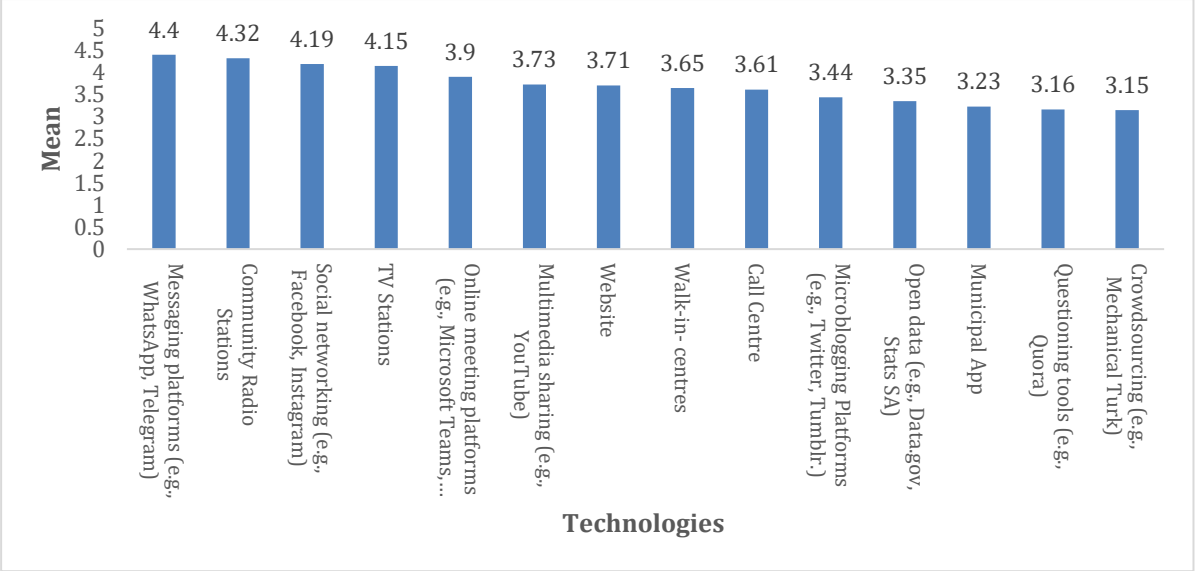

Figure 4.2: Effectiveness of the Various Technologies and Methodologies used for Citizens

Table 4.6 shows that nine of the technologies were effective because their mean scores were between 3.6 and 5.0, while the remaining five technologies were moderately effective because their mean score of between 2.4 and 3.6. However, the three most effective technologies and methodologies used for citizen engagement among all fourteen listed in the table are messaging platforms (e.g. WhatsApp, Telegram) with a mean of 4.40 and an SD of 0.639, community radio stations with a mean value of 4.32 and an SD of 0.621, and lastly social networking (e.g. Facebook, Instagram) with a mean of 4.19 and an SD of 0.721. Therefore, the three most effective technologies and methodologies in the City of Tshwane Municipality used for citizen engagement were messaging platforms (e.g. WhatsApp, Telegram), community radio stations and social networking (e.g. Facebook, Instagram). The most effective among the three is messaging platforms (e.g. WhatsApp, Telegram).

Hypothesis 2

H_0: Type of technology does not significantly affect citizen engagement

H_1: Type of technology significantly affects citizen engagement

Table 4.7: Type of Technology and Citizen Engagement

Types of Technology	Response Option	Level of familiarity with the concept of citizen engagement at the municipal level					Total	X-Cal	df	Sig. (2-sided)
		Very unfamiliar	Somewhat unfamiliar	Not Sure	Somewhat familiar	Very familiar				
Open data (e.g. Data.gov, Stats SA)	Strongly Ineffective	0(0.0%)	1(1.6%)	0(0.0%)	0(0.0%)	0(0.0%)	1(1.6%)	69.903[a]	16	0.000
	Ineffective	0(0.0%)	0(0.0%)	0(0.0%)	2(3.2%)	6(9.7%)	8(12.9%)			
	Neutral	0(0.0%)	0(0.0%)	2(3.2%)	5(8.1%)	18(29.0%)	25(40.3%)			
	Effective	2(3.2%)	0(0.0%)	0(0.0%)	3(4.8%)	19(30.6%)	24(38.7%)			
	Strongly Effective	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4(6.5%)	4(6.5%)			
	Total	2(3.2%)	1(1.6%)	2(3.2%)	10(16.1%)	47(75.8%)	62(100.0%)			
TV stations	Ineffective	0(0.0%)	1(1.6%)	0(0.0%)	0(0.0%)	1(1.6%)	2(3.2%)	39.644[a]	12	0.000
	Neutral	0(0.0%)	0(0.0%)	0(0.0%)	2(3.2%)	6(9.7%)	8(12.9%)			
	Effective	2(3.2%)	0(0.0%)	0(0.0%)	7(11.3%)	22(35.5%)	31(50.0%)			
	Strongly Effective	0(0.0%)	0(0.0%)	2(3.2%)	1(1.6%)	18(29.0%)	21(33.9%)			
	Total	2(3.2%)	1(1.6%)	2(3.2%)	10(16.1%)	47(75.8%)	62(100.0%)			
Website	Ineffective	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	7(11.3%)	8(12.9%)	35.566[a]	12	0.000
	Neutral	0(0.0%)	0(0.0%)	0(0.0%)	5(8.1%)	5(8.1%)	12(19.4%)			
	Effective	0(0.0%)	0(0.0%)	0(0.0%)	5(8.1%)	27(43.5%)	32(51.6%)			
	Strongly Effective	0(0.0%)	0(0.0%)	2(3.2%)	0(0.0%)	8(12.9%)	10(16.1%)			
	Total	2(3.2%)	1(1.6%)	2(3.2%)	10(16.1%)	47(75.8%)	62(100.0%)			
Call centre	Strongly Ineffective	0(0.0%)	0(0.0%)	0(0.0%)	2(3.2%)	0(0.0%)	2(3.2%)	35.640[a]	16	0.003
	Ineffective	0(0.0%)	1(1.6%)	0(0.0%)	3(4.8%)	4(6.5%)	8(12.9%)			
	Neutral	0(0.0%)	0(0.0%)	0(0.0%)	3(4.8%)	10(16.1%)	13(21.0%)			
	Effective	2(3.2%)	0(0.0%)	0(0.0%)	2(3.2%)	24(38.7%)	28(45.2%)			
	Strongly Effective	0(0.0%)	0(0.0%)	2(3.2%)	0(0.0%)	9(14.5%)	11(17.7%)			
	Total	2(3.2%)	1(1.6%)	2(3.2%)	10(16.1%)	47(75.8%)	62(100.0%)			

Out of a total sample size of 136 councillors, there were 62 respondents. The results were based on the responses. Table 4.7 shows the statistical relationship between the type of technology and citizen engagement using the chi-square test tool. From the result, 30.6% of the respondents that were very familiar with the concept of citizen engagement at the municipal level use open data technology (e.g. Data.gov, Stats SA). The result shows that the chi-square calculated (X-Cal), which is 69.903[a] is more than the table value (X-tab), which is 26.30 at df = 16. Also, the result shows that the P-value (significance level), which is 0.000, is less than the 0.05 level of significance, which is used to test the hypothesis. There is a significant association between open data technology (e.g., Data.gov, Stats SA) and the level of familiarity with the concept of citizen engagement at the municipal level.

From the results, 35.5% of the respondents were very familiar with the concept of citizen engagement at the municipal level using television station technology. The result shows that the chi-square calculated (X-Cal), which is 39.644[a] is more than the table value (X-tab), which is 20.03 at df = 12. Also, the result shows that the P-value (significance level), which is 0.000, is less than the 0.05 level of significance, which is used to test the hypothesis. There is a significant association between television stations and the level of familiarity with the concept of citizen engagement at the municipal level.

Furthermore, from the results, 43.5% of the respondents that were very familiar with the concept of citizen engagement at the municipal level use website technology. The result shows that the chi-square calculated (X-Cal), which is 35.566[a], is > the table value (X-tab), which is 20.03 at df = 12. Also, the result shows that the P-value (significance level), which is 0.000, is < the 0.05 level of significance, which is used to test the hypothesis. There is a significant association between website technology and the level of familiarity with the concept of citizen engagement at the municipal level.

Lastly, from the results, 38.7% of the respondents were very familiar with the concept of citizen engagement at the municipal level using call centre technology. The result shows that the chi-square calculated (X-Cal), which is 35.640[a], is > the table value (X-tab), which is 26.30 at df = 16. Also, the result shows that the P-value (significance level), which is 0.003, is < the 0.05 level of significance, which is used to test the hypothesis. There is a significant association

between call centre technology and the level of familiarity with the concept of citizen engagement at the municipal level.

Therefore, $H_{0,}$ which states that the type of technology does not significantly affect citizen engagement, can be rejected in favour of H_1, which states that the type of technology significantly affects citizen engagement, shall be accepted. This implies that the type of technology significantly affects citizen engagement.

4.4 Factors influencing the choice of medium to interact with citizens

In this section, the study examined twelve factors that can influence the choice of medium of interaction with citizens.

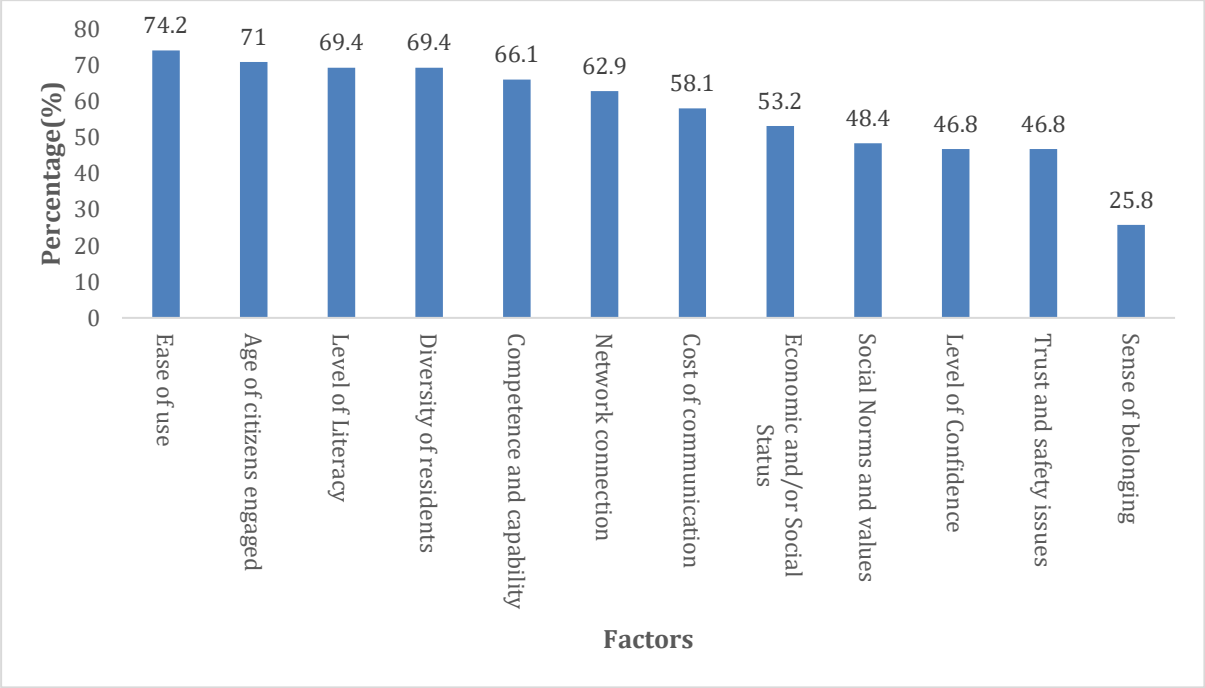

Figure 4.3: Factors Influencing the Choice of Medium to Interact with Citizens

Figure 4.3 shows the three most important factors that influence the choice of medium of interaction with citizens. From the table, 74.2% of the respondents indicated ease of use, 71.0% indicated the age of citizens engaged, 69.4% of the respondents indicated (perceived) level of literacy of citizens/constituency being engaged, and another 69.4% indicated the diversity of residents. These results show that the major factors that influence the choice of medium used by the councillors to interact with their citizens in the City of Tshwane Municipality were ease of use, age of citizens engaged, indicated (perceived) level of literacy of citizens/constituency

being engaged and diversity of residents. Among all these, the most critical factor is the ease of use.

Hypothesis 3

H_0: Digital literacy does not significantly affect citizen engagement

H_1: Digital literacy significantly affects citizen engagement

Table 4.8: Relationship between Digital Literacy and Citizen Engagement

		B	Std. Error	Beta	t	Sig.
1	(Constant)	4.734	.417		11.360	.000
	Competence and capability of both you and citizens in using technology	1.634	.623	.871	2.625	.011
2	(Perceived) level of literacy of citizens/constituency being engaged	-1.684	.639	-.874	-2.635	.011

(R= 0.329[a]; Adjusted R^2 = 0.078; F= 3.586; Sig. 0.034[b]; df =2)

Appendix 2 also shows a simple correlation between digital literacy and citizen engagement (R) of 0.329[a]. According to Miles and Banyard (2007), the correlation coefficient is a standardised measure of an observed effect; it is a commonly used measure of the size of an effect, and the values of ±.1 represent a small effect, ±.3 is a medium effect and ±.5 is a large effect. The simple correlation result shows that a little increase in the level of digital literacy will result in a moderate increase in citizen engagement since the relationship between the two variables is moderate and positive. The adjusted R^2 of 0.078 means that 7.8% of the increase in citizen engagement was accounted for by an increase in digital literacy, while the remaining 92.2% increase was accounted for by variables other than digital literacy. The effect of the independent variable (digital literacy) on the dependent variable (citizen engagement) was

significant (F = 3.586; df = 2; 62; p<0.05), which means that our regression model effectively predicted the outcome. Furthermore, Table 4.8 reveals the extent of the effect of the independent variable on the dependent variable, which is expressed in Beta weights and t-test. Competence and capability of both you and citizens in using technology has a more significant effect on citizen engagement (ß = 1.634, t = 2.625 (62); p<0.05) than (perceived) level of literacy of citizens/constituency being engaged (ß = -1.634, t = -2.625 (62); p<0.05). The study, therefore, rejects the null hypothesis, which states that digital literacy does not significantly affect citizen engagement and accepts the alternative hypothesis, which states that digital literacy significantly affects citizen engagement.

4.5 Policies and strategies that would enhance citizen engagement through the use of technology

In this section, six operational changes as well as another six strategies that could be adopted to enhance citizen engagement through the use of technology were examined.

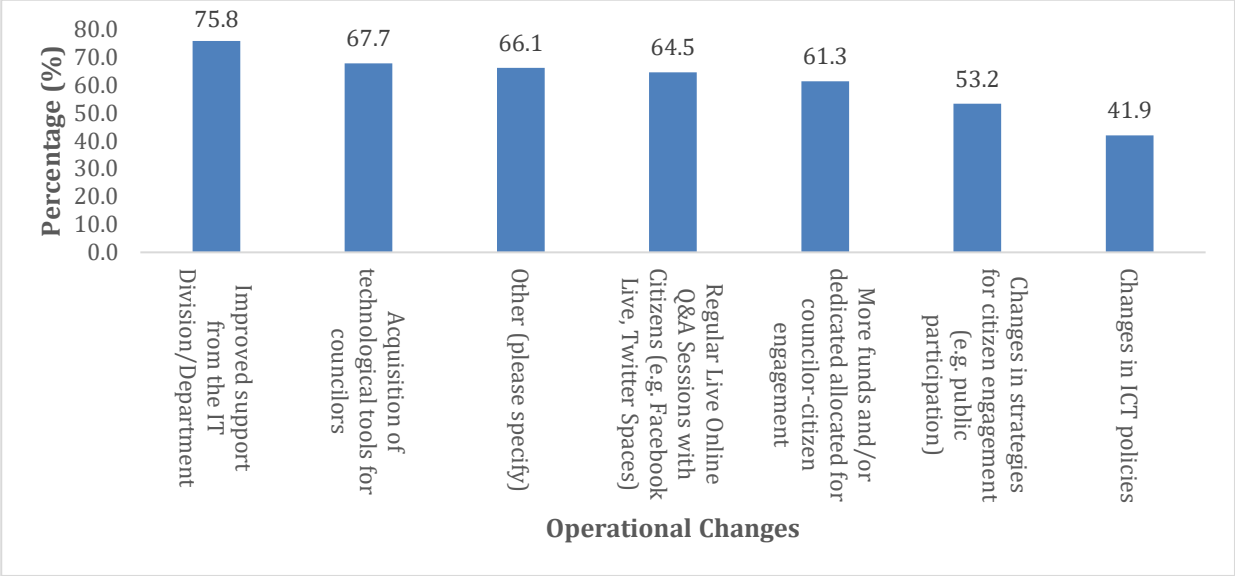

Figure 4.4: Operational Changes that would Enhance Citizens Engagement Through the use of Technology

Figure 4.4 shows six operational changes that need to take place. Of the respondents, 75.8% indicated that improved support for the IT division/department was one of the operational changes that were needed to enhance citizen engagement, 67.6% indicated that acquisition of technological tools for councillors, and 64.5% indicated that regular live online Question & Answer (Q&A) sessions with citizens (e.g. Facebook Live, Twitter Spaces) were operational changes that would enhance citizen engagement. From the result, the three most essential

operational changes that are needed to enhance citizen engagement in the City of Tshwane Municipality were improved support from the IT division/department, acquisition of technological tools for councillors, and regular live online Q&A Sessions with citizens (e.g. Facebook Live, Twitter Spaces). However, among all of them, improving the support for the IT division/department would enhance citizen engagement in the City of Tshwane Municipality the most.

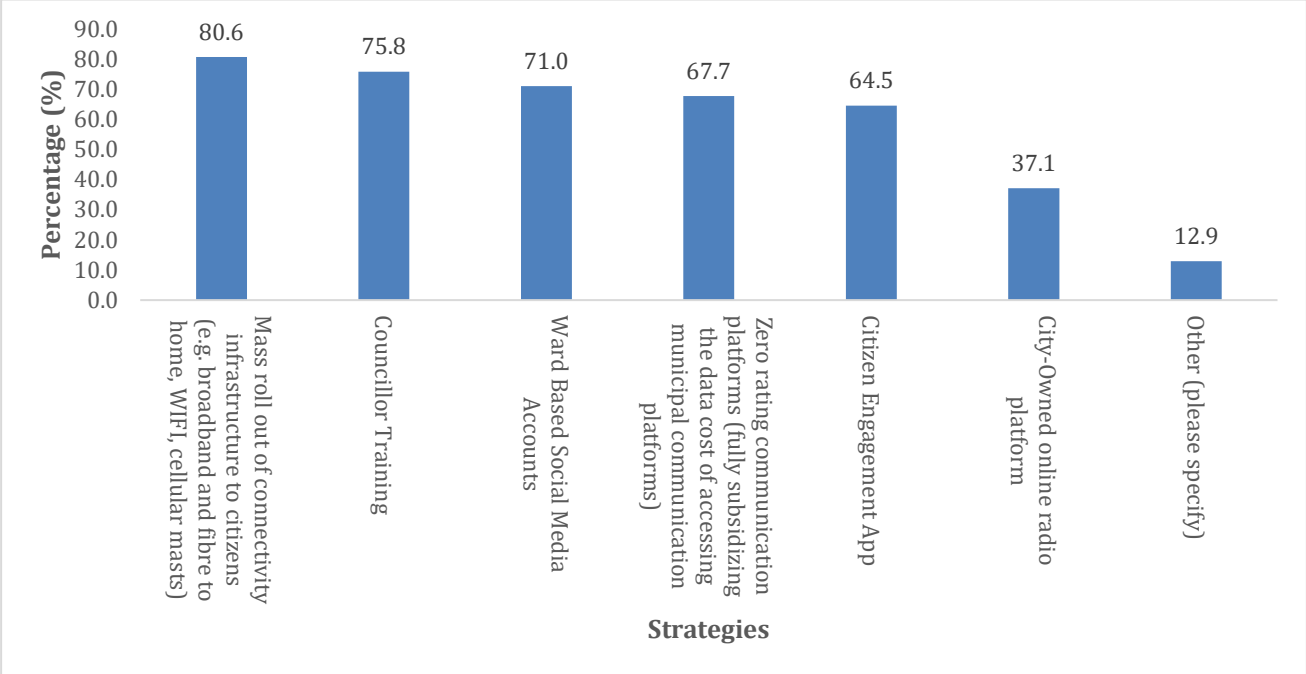

Figure 4.5: Strategies/technologies that would Enhance Citizens Engagement in the Municipality

Figure 4.5 shows that six different strategies could be used to enhance further citizen engagement in the municipality. Out of the six, three are the most important strategies that should be concentrated on. From Figure 4.5, 80.6% of the respondents indicated that mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to the home, WIFI, cellular masts), 75.2% of the respondents indicated councillor training, while 71.0% of the respondents indicated that ward-based social media accounts would enhance further citizen engagement in the municipality. From the study, the mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to the home, WIFI, cellular masts), councillors training and ward-based social media accounts are the three major strategies that would enhance citizen engagement in the municipality. However, among the three, the mass roll-out of connectivity

infrastructure to citizens (e.g. broadband and fibre to the home) is the most important strategy that should be adopted to enhance further citizen engagement in the municipality.

4.6 Discussion of the findings

In this section, the research questions were answered and discussed in line with the research objectives. The findings were either used to refute or support an argument.

4.6.1 How effective are the technologies used for citizen engagement in the City of Tshwane Municipality?

In addressing the first research question, this study found that technology usage significantly affects citizen engagement. This finding corroborated the finding of Roengtam (2021) that using digital technology promotes public participation in policy making. The finding further supports Hudson et al.'s. (2012) claim that the use of technology has enhanced citizen relations with the community. With the use of technology, the movement of citizens up the ladder of citizen participation can be rapid, and they can move from the level of just being informed and being a consulted passive agent to becoming an active agent with managerial power as indicated by Olga et al. (2012). The usage of technology has a significant effect on citizen engagement because it gives rise to two-way communication, which the top to bottom traditional method did not provide, characterised by G2C, but will now operate at C2G level. They further found that the three most effective ways in which technology has promoted citizen engagement are enhancing community mobilisation, activating citizenry, and making it easy for citizens to report issues and make complaints in the City of Tshwane Municipality.

The study found that the type of technology significantly affects citizen engagement. This finding corroborated Roengtam (2021), who stated that the choice of media, especially social media, can enhance the communication efficiency between the municipality and the public. This is in line with Haikin et al. (2016), who claim there is an association between the type of technology and citizen engagement. Thus, the type of digital media that is used can easily enhance the interaction between the citizen and the government. This was supported by Daskal (2018), who said that the technology used in citizen engagement involves the two parties and requires them to be knowledgeable about the technology. This type of technology is essential because it would enable the user to participate effectively in governance. This is in line with Henninger (2017), who stated that the choice of technology media that is used for citizen

engagement is largely dependent on the effectiveness of the technology in enhancing citizen engagement. Any technology that cannot increase citizen engagement would not be chosen or used by the two parties. Again, the study found that the three most effective technologies and methodologies in the City of Tshwane Municipality that were used for citizen engagement were messaging platforms (e.g. WhatsApp, Telegram), community radio stations and social networking (e.g. Facebook, Instagram). This finding further corroborated the finding of Skoric et al. (2015) who found that social media has a positive relationship with citizen engagement.

4.6.2 What is the effect of digital literacy on citizen engagement?

In a bid to address the second research question, this research found that digital literacy significantly affects citizen engagement. This corroborated the findings of Pade-Khene (2018) that digital literacy promotes citizen engagement. Digital literacy does not only apply to the government officials such as the councillors in the City of Tshwane Municipality, it was also relevant to the citizens. Supporting this argument, Henninger (2017) posited that digital literacy applies to both government and citizens. Although much research has emphasised civic literacy as the most paramount, having a political office holder that is not digitally literate can constitute a serious setback to the use of digital technology in enhancing citizen participation. Daskal (2018) stated, based on this finding, that a public office holder without digital literacy will not run a responsive government which means responding to the citizens' requests or engaging them in any meaningful conversation on the progress of the municipality would be unachievable. This was further supported by the finding in this study, that competence and capability of both the councillors and citizens in using technology have a more significant effect on citizen engagement than the perceived level of literacy of citizens/constituency being engaged, which suggests that the reality of competence of the two parties is much more important than the perceived competence of the two parties, which may or may not be true. Martins and Hobbs (2015) found that media literacy supports civic engagement in the digital age. As previously mentioned, it is not only all about having access to information, but having access to information that cannot be harnessed is a disaster. There is a need for competencies in both parties, and the competencies here include that both parties should know about the technology that is used and even others that are yet to be used. They should be able to manipulate the technology to enable them to analyse the message. Studies such as those by Romer et al. (2009); Quintelier and Hooghe (2011) have shown that digital literacy supports

information seeking and motivates citizens to participate in the government because of the feeling of competency in the use of the technology.

Applying social capital theory to this study, digital literacy enables the citizens or even the government to participate in governance. Since both citizens and government have the technical know-how and can easily manipulate the technology, this would serve as a motivation to participate. Furthermore, contributing to municipal development gives the citizens a sense of belonging despite the diverse culture that makes up the municipality. If this interaction is allowed to continue over some time, the citizens will start to develop trust in the system and a sense of security. On the same platform, they can build formidable networks, which will boost citizen engagement and make citizens more proactive and empowered.

4.6.3 What are the factors influencing citizens' choice of medium to interact with government?

Concerning the third objective, the study found that the major factors that influence the choice of medium used by the councillors to interact with their citizens in the City of Tshwane Municipality were ease of use, age of citizens engaged, indicated (perceived) level of literacy of citizens/constituency being engaged and diversity of residents. Among all these, the most critical factor is the ease of use. These findings support the finding of Pade-Khene (2018), who found that ease of usage is a major factor that determines the choice of media that can be used for citizen engagement. People want the technology that they can manipulate or even learn how to use to effectively participate in governance. However, any technology that is complex and not user friendly cannot be selected by either the government or the citizens, who are the two parties in the engagement.

4.6.4 What technologies are used to promote citizen engagement?

In a bid to address the fourth objective, the study found that the three most essential operational changes that will be needed to enhance citizen engagement in the City of Tshwane Municipality are improved support from the IT division/department, acquisition of technological tools for councillors, and regular live online Q&A sessions with citizens (e.g. Facebook Live, Twitter Spaces). However, among them all, improving the support for the IT division/department would enhance citizen engagement in the City of Tshwane Municipality the most. This corroborated the finding of Cho & Melisa (2021) that the government is at liberty to choose

from microblogging (Twitter), social networking (i.e. Facebook), multimedia sharing (i.e. YouTube), open data (i.e. Data.gov), questioning tools (i.e. Quora), crowdsourcing (i.e. Mechanical Turk), and content syndication (i.e. RSS). According to Oke and Fernandes (2020), all the technologies found in this study have the capacity to promote citizen engagement, if effectively utilised.

Also, the study found that mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to home, WIFI, cellular masts), councillor training, and ward-based social media accounts would enhance citizens' engagement in the municipality further.

Table 4.9: Consistency Table: Research Questions, Propositions, Data Collection and Data Analysis

RQ #	State Research Question or Objective	Prop/Hyp #	State Proposition or Hypothesis	Data Collection Detail	Data Analysis Method
1	To what extent has technology been used to promote citizen engagement in the City of Tshwane Municipality?				Descriptive statistics
2	How effective are the technologies used for citizen engagement in the City of Tshwane Municipality?	1	H_0: There is no significant relationship between the type of technology deployed and the level of citizen engagement.		Chi-squared test
3	What are the factors influencing citizens' choice of medium to interact with government?				Descriptive statistics
4	What are the technologies that would enhance citizen engagement?				Descriptive statistics

CHAPTER 5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The level of citizen engagement in the City of Tshwane Municipality and, by extension, in South Africa, in general, has not been impactful because the government has not given sufficient opportunity for the citizens to be engaged in government operations. Some scholars have blamed this missed opportunity on the limited usage of information and communication technology by the government in engaging citizens. This study assesses the effect of the deployment of ICTs on citizen engagement in the City of Tshwane Municipality. This chapter provides the conclusion, summary, and recommendations derived from the research.

5.2 Summary of the findings

The study found that ICT usage significantly affects citizen engagement and that the three most effective ways in which technology has promoted citizen engagement to a very large extent are by enhancing community mobilisation, activating citizenry, and making it easy for citizens to report issues and also make complaints in the City of Tshwane Municipality.

The study also found that the type of technology significantly affects citizen engagement and that the three most effective technologies and methodologies in the City of Tshwane Municipality that were used for citizens engagement were messaging platforms (e.g. WhatsApp, Telegram), community radio stations and social networking (e.g. Facebook, Instagram). The study found that digital literacy significantly affects citizen engagement. The study found that the major factors that influence the choice of medium used by the councillors to interact with their citizens in the City of Tshwane Municipality were ease of use, age of citizens engaged, indicated (perceived) level of literacy of citizens/constituency being engaged, and diversity of residents. The most crucial factor was the ease of use.

The study found that the most critical operational changes needed to enhance citizen engagement in the City of Tshwane Municipality were improved support from the IT

division/department, acquisition of technological tools for councillors, and regular live online Q&A sessions with citizens (e.g. Facebook Live, Twitter Spaces). However, improving the support for the IT division/department would enhance citizen engagement in the City of Tshwane Municipality the most.

The study also found that mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to homes, WIFI, cellular masts), councillor training, and ward-based social media accounts would enhance citizens' engagement in the municipality further.

5.3 Implications for practice

The implications of this study for practice are that the study has established that technology usage significantly affects citizen engagement. This means that even the level of citizen engagement that has been seen thus far has been because the councillors engaged in the use of technology. However, there is a need to select the type of technology that is most suitable for citizen engagement so that the citizen can patronise it. In addition, digital literacy must be encouraged among the councillors and the citizens because this makes the interaction with the technological devices easier. Therefore, the government needs to introduce policies that will enhance digital literacy. Also, there is a need for policies that will improve support from the IT division/department.

Funds should be released for the acquisition of technological tools for councillors and regular live online Q&A sessions with citizens (e.g. Facebook Live, Twitter Spaces). In addition, the IT division/department should provide adequate funds so that they can perform their task, especially by ensuring that the IT facilities that were made available to the councillors were well maintained.

To enhance citizen participation, the government needs to engage in the mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to homes, WIFI, cellular masts) to encourage them to engage with the municipality.

5.4 Areas for further research

The study could be further developed by the use of mixed-method means to re-examine the effect of technology usage on citizen engagement in the City of Tshwane Municipality. Furthermore, there could be further studies on social media and citizen

engagement because many citizens are becoming more familiar with social media, and this could be a more effective tool for enhancing citizen engagement in the City of Tshwane Municipality. Also, further studies could be conducted on the impact of walk-in centres and a municipal app on citizen engagement in the City of Tshwane Municipality.

5.5 Conclusions of the study

To assess the effect of deployment of selected technologies on citizen engagement in the City of Tshwane Municipality, the following research objectives guided this study: to identify the technologies that are used to promote citizen engagement, to examine the effectiveness of the various technologies used for citizen engagement in the City of Tshwane Municipality, to examine the effect of digital literacy on citizen engagement, and to explore the factors influencing the citizens choice of medium to interact with the government.

The first research objective was to identify the technologies that are used to promote citizen engagement. From the study, it was found that the type of technology does not significantly enhance citizen engagement. This is because the councillors were less concerned about the technologies that were used. Their interest lies in communicating with the people, and the most effective technologies would be adopted regardless of when it was invented, their name or size. Therefore, in the City of Tshwane Municipality, three major technologies were identified to enhance citizen engagement: to improve support from the IT division/department, acquisition of technological tools for councillors, and regular live online Q&A sessions with citizens (e.g. Facebook Live, Twitter Spaces). Furthermore, the study concluded that some of the policies that can be adopted are the mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to homes, WIFI, cellular masts), councillor training and ward-based social media accounts, all of which would enhance citizen engagement in the municipality.

The second research objective was to examine the effectiveness of the various technologies used for citizen engagement in the City of Tshwane Municipality. Just a few studies have been conducted on the use of technology for citizen engagement in general. No known study of this nature has been conducted in the City of Tshwane Municipality,

which made the findings of this study very significant. The study was able to establish that the technologies used for citizen engagement in the City of Tshwane Municipality were effective because they significantly affect citizen engagement. Technologies used were so effective to the extent that they were able to enhance community mobilisation, generate an activated citizenry, and ease the process of reporting and complaining about issues in the City of Tshwane Municipality. This is in line with the proposed conceptual framework which also suggest that the deployment of ICT in citizen engagement can influence the level of engagement of citizens from a lower level of non-participation to higher levels of an empowered citizen that is engaged in government planning and decision making.

The third research objective was to examine the effect of digital literacy on citizen engagement. The study concludes that a relationship exists between digital literacy and citizen engagement, the effect of digital literacy on citizen engagement was significant when compared to other factors such as cost, and that competence and capability of both the councillors and citizens using technology has a more significant effect on citizen engagement than the perceived level of literacy of citizens/constituency being engaged.

The fourth research objective was to explore the factors influencing the citizens' choice of medium to interact with the government. Some research conducted in other municipalities in South Africa has examined this subject, and they served as the basis for which all twelve factors that were used in this study were identified. Even though eight of the factors had a significant effect, among all the factors, the study concluded that three factors could significantly influence the choice of medium to interact with the subject. The three factors were ease of use, age of citizens engaged, indicated (perceived) level of literacy of citizens/constituency being engaged, and diversity of residents.

5.6 Recommendations

The recommendations of this study are based on the findings of this study and the literature that was reviewed in the study. These recommendations are designed so that more informed and relevant recommendations can be identified and listed for the relevant stakeholders to benefit from.

The municipality should encourage the citizen, through public awareness, on the need to increase the way they use the technology to disseminate information about the municipality. This will help the councillors to ascertain the extent to which the citizens are informed.

Since the citizens find it easy to engage in deliberations with the government via technology, it is therefore expedient that the councillors make themselves available from time to time to deliberate with the citizens on pressing issues via the same technologies that the citizens prefer.

The municipality should see the selected technologies for policy creation and/or public participation and/or comments/projects and ward monitoring as a potent tool for enhancing accountability, feedback, and municipal development, rather than as a tool for political campaigning or propaganda since technology usage significantly affects citizen engagement.

Even though the type of technologies and methodologies that were used do not significantly affect citizen engagement, those technologies such as microblogging platforms (e.g. Twitter, Tumblr etc.), open data (e.g. Data.gov, Stats SA), crowdsourcing (e.g. Mechanical Turk), questioning tools (e.g. Quora), and a municipal app were moderately effective needs to be improved upon to ensure that their effectiveness is enhanced like the other technologies. Therefore, the councillors need to be trained on the usage of these technologies so that they can excel at these forms of communication and engagement.

Also, since digital literacy does not significantly affect citizen engagement, there needs to be an improvement of the interface of the municipal app to make it easier to use so that regardless of the literacy level of the citizens, their age or even the diversity of the residents, it would be user friendly. This will increase the rate of citizen engagement too.

In terms of operational changes, the government should increase their support for the IT division/department in terms of finance and recruiting more competent hands, while those that are due for training are sent for training. This would enhance citizen engagement in the City of Tshwane Municipality.

With regards to the strategies and techniques that would be used in the future, it is recommended that mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to homes, WIFI, cellular masts) will reduce the rate of poor network, cost of

subscription, and increase the efficiency of internet connectivity which will reduce the frustration experienced by citizens while deliberating with the stakeholders online.

5.7 Generalisability

The quantitative data that was collected for this study, which comprised 62 questionnaires, constituted 45.6% of the total sample size of the study. Since this data is not half of the total sample size, generalising the result is not sufficiently sound. However, it can be generalised that information and communications technology usage significantly affects citizen engagement in the City of Tshwane Municipality. Citizen engagement in the City of Tshwane Municipality can be promoted by enhancing community mobilisation, activating the citizenry, and reporting issues and making complaints through it.

It can also be generalised that messaging platforms (e.g. WhatsApp, Telegram), community radio stations, and social networking (e.g. Facebook, Instagram) affect citizen engagement in the City of Tshwane Municipality, while digital literacy has a serious effect on the extent of citizen engagement in the City of Tshwane Municipality. Ease of usage often influences the type of media that the councillors use to interact with their citizens in the City of Tshwane Municipality.

The government in the City of Tshwane Municipality needs to improve their support for the IT division/department so that citizen engagement in the City of Tshwane Municipality can improve. Also, the government should ensure the mass roll-out of connectivity infrastructure to citizens (e.g. broadband and fibre to homes, WIFI, cellular masts) so that they can have internet access to engage at a minimal cost. The government should train councillors and provide ward-based social media accounts.

For this study, face validity was established for the instrument. The instrument was given to the supervisor and the ethics committee for validation. After they all gave their input, the researcher reviewed the instrument to be sure that they were able to elicit the right responses based on the recommendations of the supervisor. After they reviewed the instrument, the final version of the instrument was produced and used for this survey.

Due to the COVID-19 pandemic, the researcher was not able to conduct a pilot study, but rather some items in the instrument were adopted from other similar studies in which their instruments had been confirmed to be reliable at between 0.71 and 0.86 using Cronbach's alpha**.**

5.8 Areas for further research

Further research needs to be conducted on other strategies that the councillors are using to promote citizen engagement since many of them were less concerned about the technologies that were used.

Further studies also need to be conducted on the factors influencing the governments at the apex’s choice of medium to interact with the citizens.

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APPENDICES

Appendix A: Consent Form

The effect of deployment of selected technologies on citizen engagement in the City of Tshwane Municipality

By

Musawakhe Khumalo

I, ……, agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I have been shown the information sheet and I agree to the following:
(Please circle the relevant options below).

● I agree that my participation will remain anonymous	YES NO
● I agree that the researcher may use anonymous quotes in his / her research report	YES NO

● I am aware that I can skip any questions(s) I am uncomfortable with and that I have the right to stop the survey at any time. YES NO

…… (Signature)
…… (Initial of participant)
…… (Date)

Many thanks,

_____
Musawakhe Khumalo

Appendix B: Data collection instrument(s)

Section A: Demographic Profile

Please tick (√) the appropriate option

S/N	Questions	Response	Code
1.	Age	(a) 18 - 27years (b) 28 - 37 years (c) 38 – 47 years (d) 48 - 57years (e) 58 years and above	1 2 3 4 5
2.	Marital Status	(a) Single (b) Married (c) Divorced (d) Widowed (e) Separated	1 2 3 4 5
3.	Educational Background	a) Less than Grade 12 b) Higher than Grade 12	1 2
4.	For how long you have been a councillor	(a) Less than 1years (b) 1 -5 years (c) 6-10 years (d) 11 years and above	1 2 3 4
5.	Are you familiar with citizen engagement at local government	(a) No (b) Yes	1 2

Section B: Extent of technology usage to promotes citizen engagement

How will you rate the following assertions? Please indicate (√) though

1- Strongly Disagree 2- Disagree, 3- Neutral, 4 Agree, 5- Strongly Agree

S/N	Item	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
6.	Citizens find it easy to disseminate information using technology					
7.	The technology makes it easy for citizens to mobilise support for the government					
8.	Citizens find it easy to carry out advocacy and equally criticise the government					
9.	Active citizenry can be easily achievable using technology					

10.	Citizens find it easy to engage in deliberations with the government via technology					
11.	The technology helps citizens to air their views on local and national issues					
12.	Ideas for policy creation are gotten via selected technologies					
13.	Technology has been a useful tool for obtaining feedbacks					
14.	Community mobilisation can be enhanced through the usage of technology					

Section C: Effectiveness of the various technologies and methodologies used for citizen engagement

How effective do you feel the following technologies and methodologies are in engaging citizens?

1- Strongly Ineffective 2- Ineffective, 3- Neutral, 4 Effective, 5- Strongly Effective

S/N	Item	Very Ineffective (1)	Ineffective (2)	Neutral (3)	Effective (4)	Very Effective (5)
15.	Walk-in-centres					
16.	microblogging (e.g.., Twitter, Tumblr etc.)					
16.	Open data (e.g., Data.gov, Stats SA)					
17.	Crowdsourcing (e.g., Mechanical Turk)					
18.	Questioning tools (e.g., Quora)					
19.	Multimedia sharing (e.g., YouTube)					
20.	Social networking (e.g., Facebook, Instagram),					

Section D: Factors influencing your choice of medium to interact with citizens

Please rate your perceptions of the extent to which the following factors influence the choice of medium in interacting with citizens

S/N	Item	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
21	Available/Allocated Funds for technology					

22	(Perceived) Level of Education of Citizens					
23.	Level of Confidence to use proposed medium					
24.	Competence and capability of both government agency and citizens					
25.	Social Norms and values					
26	Diversity of residents					
27.	Trust and safety issues					
28.	Sense of belonging					

Section E: Policies and strategies that would enhance citizen engagement through the use of technology. Please add your comments here.

29. What are those policies that can enhance citizen engagement through use of technology

_____
_____
_____
_____

30. What are the strategies that would enhance citizen engagement through use of technology

_____
_____
_____
_____