

Towards a Conceptual Framework for Sustainable Municipal Free Wi-Fi Interventions in South Africa: a City of Tshwane Case Study

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1 ABSTRACT

The Fourth Industrial Revolution is a reality to be reckoned with in cities. Many cities across the world have ventured into various technological innovations to keep up with the demands of the need for free and/or affordable data in the context of data drive smart cities. However, in the African context, there are valid concerns that such interventions are often not sustainable. This paper provides an attempt to contribute a conceptual framework for a sustainable municipal technological innovations in municipalities, using the municipals free Wi-Fi as an example. Currently, there is no framework model, and many municipalities are implementing free Wi-Fi in rather uncoordinated ways, leading to unsustainable outcomes. The paper was based on literature review and empirically gathered views of key local government stakeholders in South Africa.

Keywords: City of Tshwane, Fourth Industrial Revolution, Spatial Planning, Free municipal Wi-Fi, Smart City

2 INTRODUCTION

This paper proposes a conceptual framework model for sustainable free municipal Wi-Fi programmes for consideration by cities in South Africa. This conceptual framework model can be used utilized as a broad framework to design and/or evaluate the sustainability of municipal technological innovations by municipalities in South Africa. The target potential users of this conceptual framework model include city managers, heads of departments responsible for designing free Wi-Fi programmes, local government practitioners, councillors (politicians), scholars and academics, civil society organizations, the private sector, NGOs, and organized local government formations/associations, such as South African Local Government Association (SALGA) and the South African Cities Network (SACN).

3 WHY SHOULDN'T DATA BE SEEN AS A FREE BASIC SERVICE?

The first key element of the framework tackles the question of data as a free basic service to be provided by municipalities. Scholars such as Ramokgopa (2018) support the notion that free Wi-Fi be designated as a basic municipal service in South Africa. However, other scholars such as Nalla (2021) argue that South Africa should first focus on basic needs such as shelter, water, food, etc. This study aligns with the views of Ramokgopa (2018), and other scholars, i.e. that free Wi-Fi be designated as a basic municipal service in South Africa. This study supports the view that data should be designated as a basic municipal service in South Africa, especially where some of the basic services in the 21st century can be provided digitally. In such instances, lack of access to data can become a hindrance.).

4 KEY ELEMENTS OF THE CONCEPTUAL FRAMEWORK MODEL

The key elements of the conceptual framework model for sustainable free Wi-Fi programs in municipalities (cities) are discussed below.

4.1 Data-driven Smart City

The second key element of the framework tackles the question of smart cities embracing the use of data for decision-making (Mazzei and Noble, 2017). Many 'big' metros in South Africa profess to be working toward being smart cities (Das, 2020). The reality is that smart cities employ the Internet of Things (IoT) and big data analytics (Bassoo, et al., 2018); and use sensors to generate data (Gohar et al., 2018). So data management systems are one of the major imperatives for smart cities (Tang et al., 2015). In addition, smart cities are required to have a proper appreciation of the strategic implications of data (Wang et al., 2018). The capability to capture and analyze data to generate value is highly important (George et al., 2014). Digital transformation cannot be achieved in organizations which do not employ a digital-savvy workforce (Warner

and Wager, 2019) because these workers shape the organizational digital capabilities of an organization (Felin et al., 2012). Some of the key skills needed include data analysts, who handle data flow management and deploy data analytics tools (Mikalef et al., 2018). Meanwhile, data scientists assist organizations to derive insights from data (Ho et al., 2019). The appointment of competent key C-suite functionaries such as the Chief Information Officer (CIO) and Chief Data Officer can assist organizations to build capabilities to use data for decision-making purposes (Vogelsang et al., 2019). A CDO, for instance, can lead digital transformation (Singh et al., 2020), and the development of a “digital” strategy for an organization (Tumbas et al., 2018). The implications of all these for smart cities is that cities should appreciate that communities are using the Internet of Things more than ever before. So, cities need to develop strong capabilities to handle data-savvy communities. Importantly for this study, cities need to find ways of assisting communities, especially the poorest of the poor, to access data, due to cost or data restrictions (Golub, et al., 2019). This matter is discussed further below.

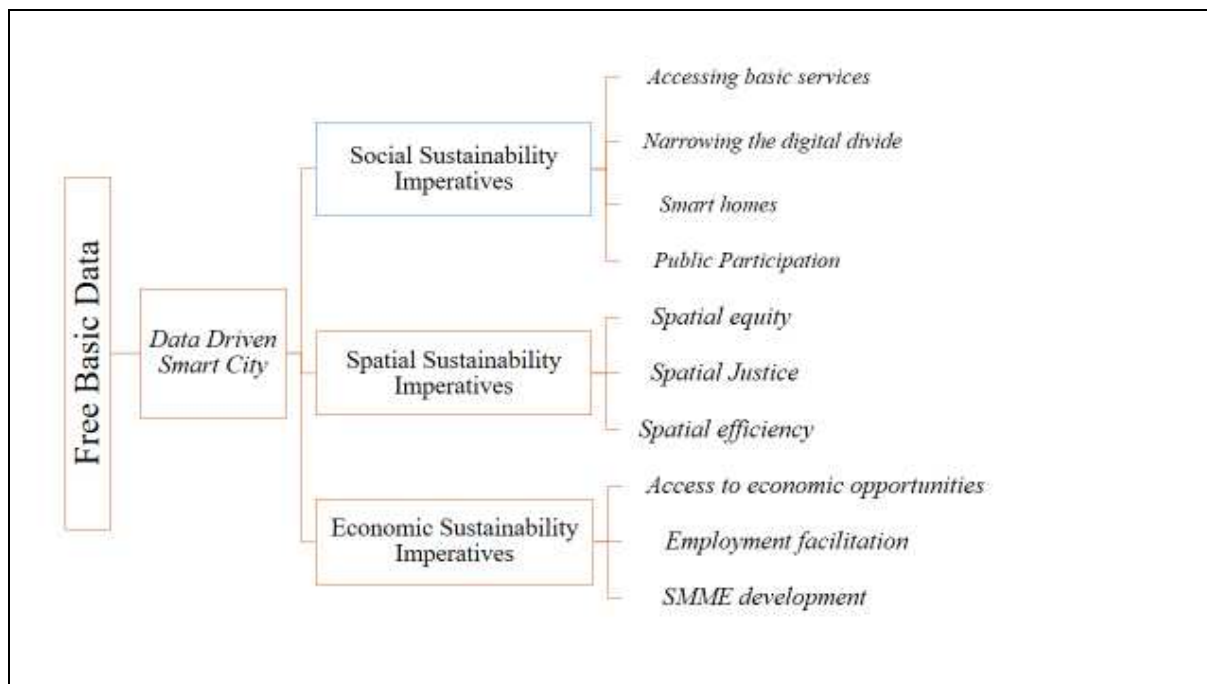


Figure 1: Key elements of the conceptual framework model for sustainable free Wi-Fi programs in municipalities, Source: Author (2023).

4.2 Social sustainability imperatives

Under the social sustainability imperative, the first motivation is that the actual reality is that some of the basic services in the 21st century can be provided digitally. So, access to data as a free service would have multiplier effects for accessing other basic services as well. For instance, Robertson, et al (2019) found that the provision of free Wi-Fi contributes to narrowing the digital divide and assisting residents to view their utility bills online. In addition, many scholars (Vigil-Hayes, et al. (2018); Zarocostas (2020); Hanson, et al. (2020), Kroese et al., (2021); Ullah, et al., (2021); Gibbs, et al., (2022) found that Internet access is one of the means through which communities access health-related services. It has been found that since the advent of the COVID-19 epidemic, the delivery of education services has changed, and embraced digital methods (Joffe, 2021; Vigil-Hayes, et al., 2018). So, internet access is one of the most prominent means to access education services (Cobo et al., 2020; Antoni, 2020; Mondal, 2020). Libraries in most parts of the world utilize free Wi-Fi (Vigil-Hayes, et al., 2018; Mersand, et al., 2019; Lenstra and Campana, 2022).

Scholars such as Castells (2000:442), we are living in the days of an “information society”, characterised by “flows of capital, flows of information, flows of technology, flows of organizational interaction, flows of images, sounds, and symbols”. This “information society” further creates network societies between the virtual and real worlds; thus creating social capital (Claridge, 2018; Colbjørnsen 2021). So, internet access is no longer a luxury, as it is needed by all communities to share information and content-related data (Vigil-Hayes, et al., 2018). From this perspective, the provision of free data can enhance societal transformation (Crowdy and Horst, 2022). Free data can enhance the application of smart homes (Nettikadan, and Raj,

2018). For many poorer households, this will never become a reality without the assistance of free municipal Wi-Fi. Free municipal Wi-Fi can assist greatly in youth development efforts. Young people spent at least 20% of their daily time on the Internet, for various reasons (Agbawe, 2018; Fab-Ukozor and Ojiakor, 2020: 24); including skills development (Ojeleye, et al., 2018); and wealth creation in the world of self-employment and entrepreneurship (Agbawe, 2018). Free municipal Wi-Fi can assist municipalities to enhance their informational right to the city. The informational right to a city can be seen as a “sub-set” of the concept of the right to a city. On its own, the right to the city is seen as an agenda for social change (Vergara-Perucich, and Arias-Loyola, 2019), especially in the context of smart cities (Van der Graaf, 2020). So, Free Wi-Fi possess the potential to promote informational access for the citizens because today, networks are based on borderless informational networks, powered by the internet (Yang and Saffer, 2019). In South Africa, Section 32 (1) (a) of the Constitution provides that everyone has the right of access to information. Similarly, the Promotion of Access to Information Act (2000) advocates for the informational rights of citizens.

In this study, a majority (68%) of the free Wi-Fi users who participated in the online survey believe that the Tshwane Free Wi-Fi made either lot or modest contribution to the residents exercising their informational rights in the City of Tshwane. It is encouraging that the users express a positive affirmation about the contribution of free Wi-Fi in advancing informational rights in the context of the fourth industrial revolution.

Equally, the majority of stakeholders who participated in the interviews believe that the free Wi-Fi’s making a lot of contribution (60% plus) in terms of promoting informational rights to the city. However, one of the independent experts points out that sometimes information asymmetries negatively affect the informational right of the city. These findings seem to align with the findings of other scholars. For example, Robertson, et al. (2019) posit, among others, that the provision of free Wi-Fi can contribute to narrowing the digital divide. Similarly, Vigil-Hayes, et al. (2018) found that where data is ‘effectively free’, informational right to a city can easily take place (Crowdy and Horst, 2022). The information right to the city can be pertinent to the youth, who use a lot of data for a variety of informational purposes (Umeogu and Ojiakor, 2014). From a policy perspective, if achieved, the South African government’s ambitious target of achieving 100% broadband access to everyone by 2030 could lead to better informational rights in the city. International research by the United Nations (2020) found that the deployment of ICTs can facilitate digital interaction and public participation. The informational right to a city can be seen as a “sub-set” of the concept of the right to a city. On its own, the right to the city is seen as an agenda for social change (Vergara-Perucich, and Arias-Loyola, 2019), especially in the context of smart cities (Van der Graaf, 2020). Free Wi-Fi can positively contribute to social networking created through digital technologies. So, they possess the potential to promote informational access for the citizens. Today, networks are based on borderless informational networks, powered by the internet (Yang and Saffer, 2019).

In South Africa, Section 32 (1) (a) of the Constitution provides that everyone has the right of access to information. Similarly, the Promotion of Access to Information Act (2000) advocates for the informational rights of citizens. In this study, the results showed that a majority (68%) of the free Wi-Fi users who participated in the online survey believe that the Tshwane Free Wi-Fi made either lot or modest contribution to the residents exercising their informational rights in the City of Tshwane. It is encouraging that the users express a positive affirmation about the contribution of free Wi-Fi in advancing informational rights in the context of the fourth industrial revolution. Various scholars confirm that in South Africa, prohibitive costs, and access to data remain some of the key challenges (Lorini et al., 2019; Tshishonga, 2020, and Muridzi, et al., 2021). Free data can enhance the application of smart homes (Nettikadan, and Raj, 2018). For many poorer households, this will never become a reality without the assistance of free municipal Wi-Fi. Sixthly, free municipal Wi-Fi can assist greatly in youth development efforts. Young people spent at least 20% of their daily time on the Internet, for various reasons (Agbawe, 2018; Fab-Ukozor and Ojiakor, 2020: 24); including skills development (Ojeleye, et al., 2018); and wealth creation in the world of self-employment and entrepreneurship (Agbawe, 2018).

4.3 Spatial sustainability imperatives

This framework model posits that a sustainable free Wi-Fi programmes should assist municipalities to address issues of spatial injustice in cities. Spatial inequality is one of the strongest predictors of disparities in the digital inequality stack. In countries such as India, just over 20% of people in rural have access to

internet connectivity. Taiwan has managed to address this through the provision of good-quality internet access and computer training in rural areas. The introduction of free Wi-Fi technologies can go a long way to halting the widening of the gap between rural and urban residents. Such efforts should be accompanied by skill-building opportunities, along with investment in infrastructure, and improvement of information services (Robinson, et al., 2020). In South Africa, the municipalities are required by law to consider principles of spatial justice, efficiency, and sustainability (RSA, 2013). This implies that when municipalities consider investment decisions on free Wi-Fi, they must consciously and deliberately ensure that such investments will have the effect of building inclusive cities and communities (spatial justice). In other words, municipalities must not use free Wi-Fi technologies to entrench and reinforce apartheid spatial injustice in South Africa.

In this study, the results showed that a majority (92%) of the free Wi-Fi users who participated in the online survey believe that the Tshwane Free Wi-Fi is making a lot of contributions in terms of enhancing spatial justice. Equally, the majority of stakeholders who participated in the interviews believe that free Wi-Fi's making a lot of contribution in terms of addressing the question of spatial justice. Some of the stakeholders believe that some people wouldn't have to travel if the township economies were strong and vibrant. However, others believe that free Wi-Fi is only beneficial to those living in closer range of the Wi-Fi. However, as a matter of principle, the free Wi-Fi users who participated in the online survey believe that free-Wi-Fi should serve everyone irrespective of their location. A majority of these participants (52%) value the importance of free Wi-Fi to address spatial inequalities. In addition, even though the majority of stakeholders who participated in the interviews believe that free-Wi-Fi should serve everyone irrespective of their location, from a practical point of view, a majority of these respondents either disagree or strongly disagree that the current modus operandi is one where the free Wi-Fi benefits everyone irrespective of their geographic locations. They believe that the free Wi-Fi tends to benefit those that are located in cities and urban areas. They argue that the Wi-Fi's are accessible to, and favours the rich, whereas the poor can't access them due to locational disadvantages. This is a spatial justice matter that cities should give close attention when they design their free Wi-Fi programmes.

There is a need to take an integrative approach in tackling pertinent questions about the use of municipal technologies to address spatiality questions in cities. The views of free Wi-Fi users and stakeholders regarding their perspectives on the extent, and whether or not the free Wi-Fi is advancing goals of spatial justice, access and equity need to be engaged. The use of Geographic Information System (GIS) tools to show the extent to which the spatial allocation of the free Wi-Fi in different regions and/or areas in cities is promoting principles of spatial justice, access and equity is also important. Municipalities need to have transparent and objective tool/criterion for allocating free Wi-Fi sites per region and/or area. For instance, in the case of the City of Tshwane, it is not clear if the city uses data on the population size, digital literacy, community needs, and data usage trends. In the absence of such an objective and transparent data-based process, key decisions about allocating free WiFi infrastructure could be based on political considerations, thus threatening the sustainability of the programme. The spatial planning principles of equity, efficiency, good governance, and spatial justice could be useful in this regard. Another interesting observation is the possibility of cross-border usage by residents between wards and between regions. In addition, cities need to consider strategies to allocate free Wi-Fi infrastructure in rural and/or agricultural areas. These are critical questions worth investigating further.

It should be mentioned that geographic universal provision of WiFi encounters the same problem as supplying other services throughout remote and low density areas (e.g. public transport, health care provision, etc). Other spatial policies would need too be considered simultaneously, as well as fiscal arrangements which would cross subsidise consumption services in remote low density areas. It is also a matter of finding the funding for universal provision of wifi at municipal level. By their nature poorer communities have more restricted budgets to spend on public services. Installing WiFi masts throughout the vast country of South Africa may be beyond municipal budgets. Perhaps experimenting with, and adopting alternative, cheaper, more efficient technologies like light driven 'LiFy' could be an option (see BBC radio 4, The Life Scientific (interview of Harald Haas by Jim Al'Khalili, 230627, 9am on optical wireless communication technology to access the internet, BBS sounds – a simple desk lamp was used to stream a video on 2011).

4.4 Economic sustainability imperatives

This framework model posits that a sustainable free Wi-Fi programmes should assist municipalities to address issues of economic disparities in cities. In South Africa, cities like Cape Town have high levels of economic inequality (Enqvist and Ziervogel, 2019). It means the rich are getting richer and the poor getting poorer. So, municipalities can use free Wi-Fi to address some of the intricate issues about economic injustices. Admittedly, often, there is an overlap between social and economic and/or distributive justice (Moroni, 2020). In this regard, it is argued that cities should find innovative ways to use free Wi-Fi platforms to foster environments where access to opportunities which can better the economic and/or financial position or status of community members can be constructed. So, free Wi-Fi can be deliberately used by cities to serve redistributive intentions of addressing some of the economic dimensions of justice within a city, especially in cities where the rich are getting richer and the poor getting poorer.

As cities go through periods of economic decline, the issue of economic justice becomes even more prominently important (Rodrigues and Franco, 2020). Free Wi-Fi should be used to reverse all forms of marginalisation and exclusion of people, whether based on gender, creed, class, etc can be a norm in cities. When justice is delivered to people, this can have positive economic outcomes on people in cities (Baars, et al., 2021). In the context of the “right to the city”, free data should be seen as one of the foundational basis for smart city endeavours. As scholars such as Ragnedda et al. (2020) correctly posit, the economic class does affect the accumulation of digital assets and capital. This means that those who have access to economic opportunities and higher incomes are more likely to acquire digital tools than low-income groups.

So, the free Wi-Fi interventions can be designed from a policy perspective with an inherent agenda to redress such inequalities and imbalances. The reality is that access to the Internet access is one of the potent means through which communities access economic activities/services (Vigil-Hayes et al., 2018); and lack thereof can lead to a state of poor income, or financial instability (Lau, et al., 2022). So, the relationship between access to income and access to data remains (Smith, 2020). In countries such as Indonesia, free Wi-Fi interventions have been used successfully to assist village entrepreneurs to improve online marketing; thus promoting their products to the wider market (Kania, Anggadwita, and Alamanda, 2021). Such efforts of using free Wi-Fi as an economic tool of redress are needed, especially in African cities, where economic inequalities are growing. In this study, the results showed that a majority (79%) of the free Wi-Fi users who participated in the online survey agree that many residents in Tshwane rely on the Tshwane Free Wi-Fi for economic opportunities such as job application and business transactions. Equally, the majority of stakeholders who participated in the interviews believe that the free Wi-Fi’s making is making a modest contribution (40%-59%) in terms of enhancing access to economic opportunities.

In South Africa, many municipalities talk about developing the local township economy. So, the free Wi-Fi data can be used to enhance the implementation of this strategy, through focussed attention to local small businesses such as grocery food stores, spaza shops, shisanyama, pubs, hair salons, car wash businesses, internet cafes. The free Wi-Fi data can be used to empower local small businesses for a variety of things, including, to communicate with clients and suppliers, promoting and market local businesses, participating in social media platforms, accessing financial opportunities, doing financial transactions, etc. So, municipalities need to design their free Wi-Fi programmes with the small business operators in mind, with a view to assist them to improve sales; and income/profits. However, for that to happen effectively, municipalities need to overcome challenges such as distance, poor network, poor reliability, and load shedding, etc.

5 CONCLUSION

This paper makes some contribution on the discourse regarding whether free data should be seen as a basic service to be provided by municipalities in South Africa. This contribution is made in the context of data driven smart cities. The study does not endeavour to set a fixed amount of data as minimum free service. A one size fits all approach is not advocated. So, this is left for each individual municipal council to make policy choices in this regard. Inadvertently, some municipalities would afford to make a certain amount of data free; others could afford to offer more. This would depend on various contextual factors, including: budgets, affordability, and the ability of municipalities to embark on crowdfunding and partnerships with other stakeholders, etc. Significantly, the paper presents a conceptual framework model for sustainable municipal technological innovations in municipalities, using the free Wi-Fi in South African municipalities as an example. Currently, there is no framework model, and many municipalities are implementing free Wi-

Fi in rather uncoordinated ways, leading to unsustainable outcomes. This is one of the areas where this study is making some modest original contribution to the academic and practical discourse on sustainable municipal free Wi-Fi. In this regard, the paper presents three imperatives for a sustainable free municipal Wi-Fi programme, to cater for social sustainability imperatives, spatial sustainability imperatives, as well as economic sustainability imperatives. The conceptual framework model is flexible enough to be adapted for a variety of municipal technological innovations in municipalities, not just free Wi-Fi.

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