

Social innovation dynamics in the development of public transport apps in South Africa

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degree of Master of Management in the field of Innovation Studies**

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DECLARATION

I, _____, declare that this research proposal is my work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Innovation Studies at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name:

Signature:

Signed at

On the day of 20.....

ABSTRACT

Innovation within the public transport sector has increasingly been focused on increasing access to excluded groups in an attempt to redress the socio-economic inequalities. However, the modalities of innovation seem to be at odds with this ambitious goal. The study aimed to explore the dynamics of how the targeted end-users of the transport information applications (apps) were engaged during the conceptualisation of the four apps (Khwela, Go-Metro, Gautrain, and Gauteng on the Move), through a qualitative study.

Interviews included managers and specialists involved in developing the apps. The primary data was cross-referenced with sentiment analysis of 2,023 user comments. A combination of the social innovation process, Arnstein's typology of citizen participation, and Amartya Sen's conceptualisation of development as freedom were used to structure this study.

The study found that potential users were barely engaged while developers adopted a corporatist approach to solution development. Furthermore, the sentiment analysis of user comments exhibited growing negative emotions towards the apps. From a perspective of practice, this research suggests new insights into how social innovators might integrate users into the key design steps.

Keywords: Social innovation, Public transport apps, App review, User engagement, User Feedback

DEDICATION

I would like to express my sincere appreciation and gratitude to my family for their support and understanding.

It has been a privilege to work with my supervisor, Professor Geci Karuri-Sebina. Thank you for the motivation, support, and guidance in finishing this dissertation.

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LIST OF ABBREVIATIONS/ACRONYMS

App	(smartphone) Application
BoP	Bottom of Pyramid
DoT	Department of Transport
ICT	Information and Communication Technology
IDC	Industrial Development Corporation
IDI	ICT Development Index
IDRC	International Development Research Centre
IPTS	Intelligent Public Transport System
IT	Information Technology
ITU	International Telecommunication Union
MDGs	Millennium Development Goals
MEC	Member of the Executive Committee
OECD	Organisation for Economic Co-operation and Development
PC	Personal Computer
PRASA	Passenger Rail Agency of South Africa
RAMP	RIA's Africa Mobile
RIA	Research ICT Africa
SMS	Short Messaging Service
StatsSA	Statistics South Africa
USSD	Unstructured Supplementary Service Data

CHAPTER 1: Introduction

Mobility is considered a key driver to economic growth. Hence the increased focus amongst policy makers in South Africa on social innovation as a vehicle to improve the public transportation system. Chief amongst the strategies, is the proposed use of technology to make public transport efficient, accessible and affordable. Indeed, rapid technological developments seen globally means there is a scramble to share the spoils.

In the South African context, however, this is exacerbated by the legacy of apartheid, where the elderly, the poor (including the working poor), people living with disabilities, and/or the uneducated are still bearing the brunt of digital divide and social inequality. Some of the challenges faced by these groups include silo planning approaches of government, lack of infrastructure and little, if any, access to information.

It is against this background that this study sought to understand how the targeted end-users of the transport information applications (apps) were engaged during the conceptualisation of four apps, i.e., Khwela, Go-Metro, Gautrain, and Gauteng on the Move. More precisely, the study wanted to explore the role played by users throughout the innovation process. Furthermore, the study assessed how the user inputs are incorporated into the design of the app.

1.1 Problem Statement

There is a hype about improvements that innovation will bring to the public transportation space in both developed and developing countries (Kem, Balbo, & Zimmermann, 2017; Ravi, 2011). However, there is little focus on how the excluded groups are engaged when such initiatives are undertaken. For instance, a World Bank report of 2018 on overcoming the Legacy of Exclusion in South Africa cautioned that the introduction of an information system meant to increase the efficiency for the poor in South Africa can perpetuate their exclusion if not implemented through a flexible mechanisms that respond to users' needs. The report further highlights lack of access to technological infrastructure, low levels

of education, and unemployment as factors contributing to the perpetual exclusion of the poor.

With the growing advocacy for social inclusion, it is proposed that the role players in the sector build proper civic engagement, social capital, and public participation with the intended end-users. Some scholars are proposing “bottom-up” approaches as an alternative to the traditional “top-down” engagement approach (Meerkerk, 2019). Zhou, Hou, Zuo, and Li (2012) advocates for inclusive, unlike the traditional methods that excluded some sections of the community such as the elderly, the poor, the blind, the digitally excluded and the uneducated. Hence this study proposes that communities should play a substantial role in the social innovation process which goes beyond the mere utilisation of the solution, to one that incorporates communities' specific knowledge and feedback in order to meet their needs properly.

1.2 Significance of the study

When one looks at the rhetoric in the current public transport policy environment, it points to a keenness to broaden access to the public transportation system (Thomas, 2016; Walters, 2014), through increased use of technology (Niemand & Chauke, 2017). Introduction of transport apps targeted towards the users of public transport is proposed. However, reports show that marginalised groups' access to technology such as smartphones is low, and the low level of education could potentially affect their ability to access or interact with proposed technologies (Chigada & Hirschfelder, 2017).

Understanding of the complexities and importance of inclusion in the innovation processes may contribute to the reconceptualization of the current technological development and transfer approaches used in the South Africa public transport system to generate entry points for more inclusive strategies in which the marginalised groups play a prominent role.

It is, therefore, the aim of this study to contribute to the discussion of inclusive innovation (in particular the role of communities) in developing countries such as

South Africa. As failure to engage the public in a meaningful way may result in Information and Communication Technology (ICT) developers making solutions that are not in line with the challenges of the intended users, thereby excluding the very same users that it was supposed to assist.

1.3 Research questions

The research was guided by the following questions:

1. What is the role and nature of user engagement during the process of developing the public transport app?
2. What factors influences the user engagement?
3. How do solution developers' source and utilise feedback from the users?

In the following chapter (Chapter 2), the literature around technology in the South African public transport sector, digital landscape of the country, and social innovation in the developing countries is reviewed. This is followed by a discussion of the research methodology for this study (Chapter 3). In Chapter 4, the discussion turns to the main findings of this research, as discussed above, and this is followed by analysis and interpretations, as well as the conclusions reached by the research (Chapters 5 and 6 respectively).

CHAPTER 2: Literature Review

This chapter provides a general review of the knowledge that already exists regarding social innovation, particularly in the developing countries. The chapter first introduces South Africa's public transport context and related mobile apps. The mobile and internet penetration are briefly discussed as they are antecedent for a successful app usage. It then focuses on how innovation can be used as a vehicle for social inclusion, as well as various methods that can be used when engaging the intended users. The following themes emerged from the literature review as the most relevant for this study:

- Social innovation process – this focus on the interaction between the innovators and users throughout the innovation process.
- Engagement of users during social innovation – the key focus on level of user engagement and how it impacts the role they play during the innovation process.
- Communication channels – this focus on the key impact of communication channels to the innovation process when various strategies are used.

2.1. South Africa Public Transport in Technological Context

Countries are continually seeking new ways to improve their public transportation, particularly in the wake of global warming. As early as 2004, Sinha (2004) mentioned that public transportation could not be allowed to fail as the use of private cars is unsustainable. Technology is considered as a means to quickly and efficiently address some of the problems of accessing the public transport system (Vanderschuren, 2003). Elkosantini and Darmoul (2013) are of the view that an intelligent public transport system (IPTS) is a possible solution to improving access to real-information for both the passengers and decision-makers. This view is also shared by Ravi (2011), who states that IPTS is essential in improving the efficiency, security and reliability of the public transport system. Cirella, Mtizi, and Iyalomhe (2018) point out that public transport, as the primary mode of urban mobility, needs to be reliable, accessible, affordable, safe, and

flexible to be a valuable driver of economic growth. Zhou, Hou, Zuo, and Li (2012) warn that the implementation of such a system should be inclusive, unlike the traditional methods that excluded some sections of the community such as the elderly, the poor, the blind, the digitally excluded and the uneducated.

Efficient public transport assist passenger in making pre-trip and *enroute* travel decision by providing real time information about the state and operating conditions of the public transport network, such as train arrival time, status, ticketing, route navigation to the vehicle, price and capacity (Elkosantini & Darmoul, 2013; Vanderschuren, 2003). According to Kem, Balbo, and Zimmermann (2017) an advance traveller system assists the passengers by providing relevant and useful resources which are tailored to each passenger based on their preferences and needs. One passenger might prefer fast and comfortable transport mode, while the other might be more concerned about cost. Advanced system aids the passenger by presenting modes that meet the passenger's set criteria.

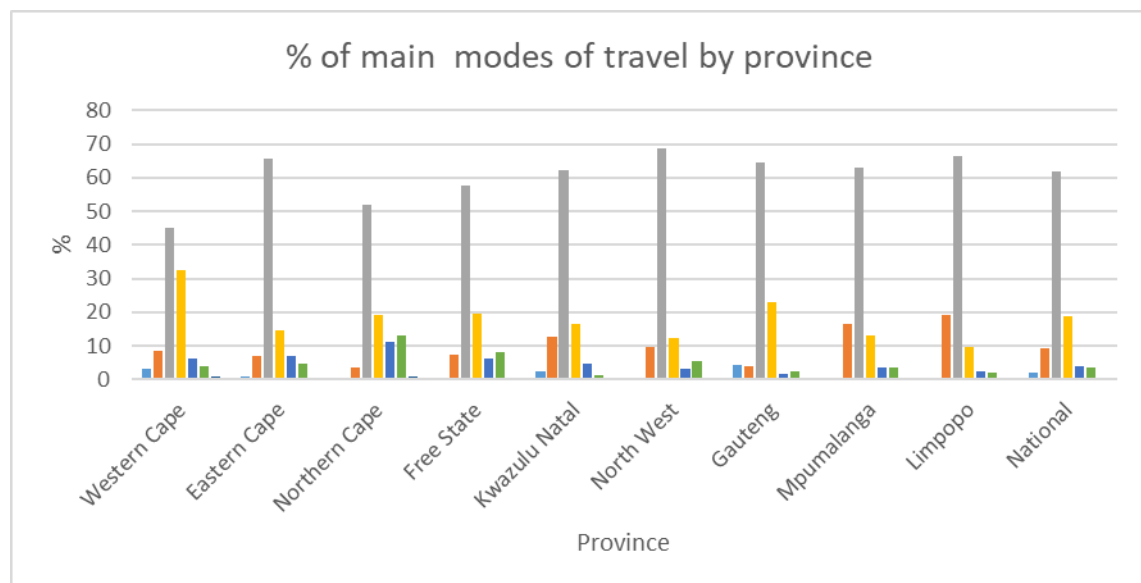


Figure 1: Modes of travel used by households in South Africa by province 2020. (StatsSA, 2021)

Figure 1 above shows that in 2020 61.8% of South African used taxis, 18.9% used private cars as drivers and 9.4% used busses as the main mode of travel. Nationally, the combined public transport mode accounted for 73.4% (i.e., 61.8%

taxi, 9.4% bus and 2.2% train) of the travels. The report further stated that the factors which includes travel cost, travel time, flexibility and reliability respectively influenced the choice of travel mode. Taxi (Figure 2) was identified as the most expensive public transport mode of travelling compared to busses and trains. Due to long commute distances, transport cost of minibus taxis operated by private operators is reported to be high, reducing the value of real wages and increasing the costs of job searches (World Bank Group, 2018). Therefore, the need for efficient and affordable public transport in South Africa is high and, as such, it can neither be allowed to fail nor be inefficient.

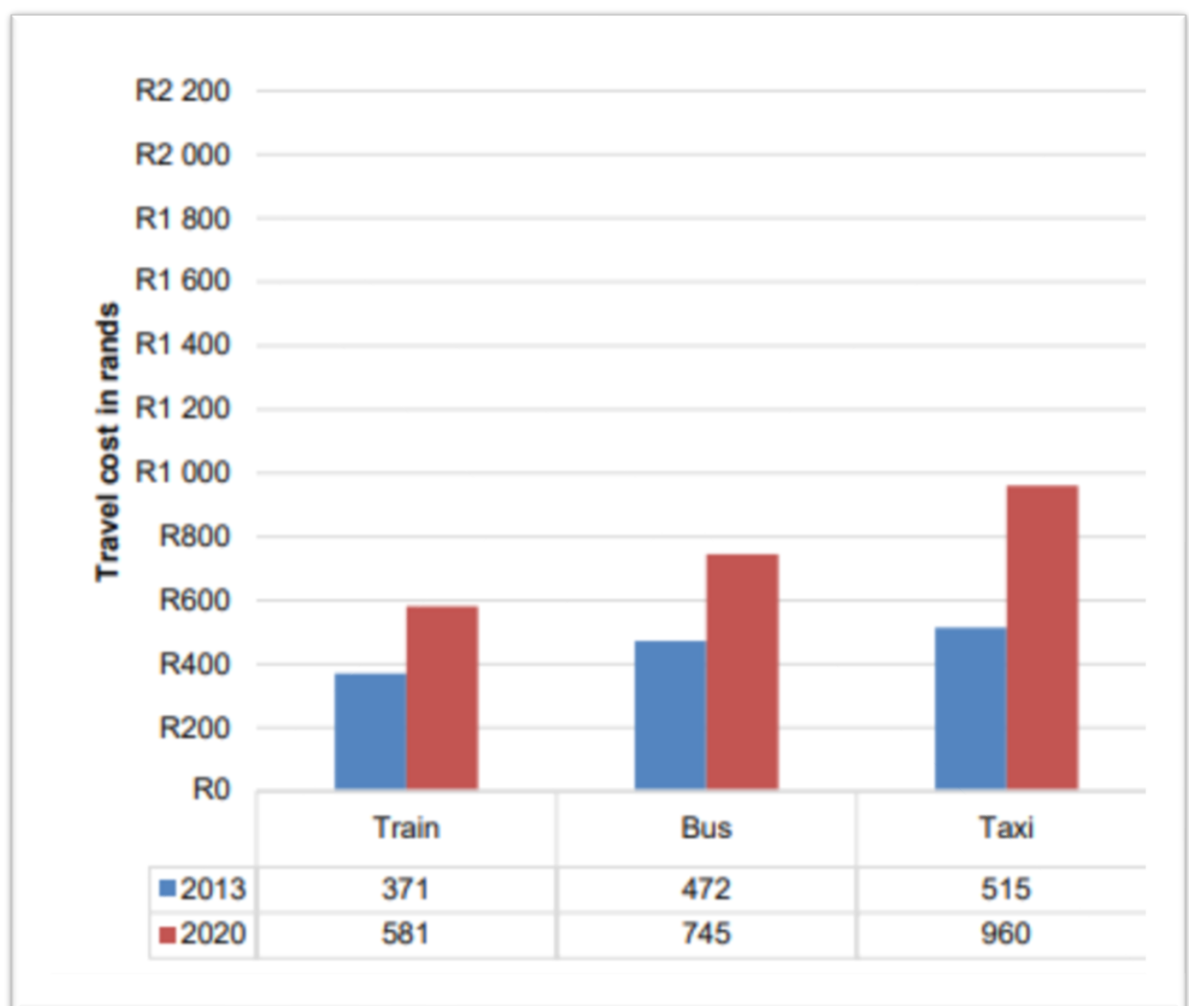


Figure 2: Monthly Expenditure on various modes of transport (StatsSA, 2021)

In an attempt to ensure the success and well-functioning public transport system, the South Africa government has put forward policies and strategies to improve the efficacy of public transport. However, the country is still faced with many challenges, such as:

- The silo planning approach making it difficult to provide the first and the last miles that are essential to the citizens (Walters, 2014)
- Lack of infrastructure that is being tackled piecemeal, in an uncoordinated manner, leaving the industry to be dangerous and with unacceptable levels of safety (Mostafa, Adediji, & Abejide, 2018)
- Lack of access to information, making it difficult for passengers to decide on their choice of travel (Mostafa et al., 2018).

A study conducted in Europe concluded that an introduction of technology in the public transport sector had a positive outcome on information accessibility and for attracting new passengers (CIVITAS, 2010). These innovations are reliant on passengers having access to technology (e.g., smartphone) and a means to access such service (internet/data). Nevertheless, it is reported that many of the citizens in South Africa lack means of access to full-scale internet provision (Merwe & Grobbelaar, 2016). In the South African context, most public transport users have low income and at times do not have access to such technologies.

Cirella et al. (2018) advice that travel mobile phone applications can go a long way in addressing shortcomings such as lack of information, payments issues, overloading and traffic jams. Coetzee (2013) is of the view that transport systems should be seen as infrastructure and operations but must incorporate an informational layer to be efficient. The use of technology is expected to bring relief to the passengers, drivers, and owners as well, by providing relevant information to them. A case study undertaken by Niemand and Chauke (2017) in South Africa concluded that there was a positive relationship between the ease of use of the Gautrain Buddy application and its usefulness in dissemination of Gautrain-related information.

2.2. Digital Landscape in South Africa

Apps run on smartphones, and for the connectivity to occur these smartphones must be connected to the internet to get the latest information. In the case of public transport app, internet is required for the app to download the latest information related to urban mobility. To determine the readiness of the country's citizens to participate in digital space, one needs to look at the level of digital divide as measure equality in a society. According to Amartya Sen equality should be quantified by answering the question "Equality of what?" (Sen, 1992). In this study, equality refers to access to technological opportunities, specifically smartphones and internet. Considering technological opportunities, it important to review the current status in South Africa.

Digital divide is a concept that is often associated with the distinction between those who have access to technology (including the internet) and those that do not (Srinuan and Bohlin, 2011). Digital divide "refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICTs) and to their use of the internet for a wide variety of activities" (OECD, 2006, p. 5).

Additionally, the types of digital inequalities are extended to include disparity in the ability to execute a certain task which might be emanating from lack of knowledge or access to required technologies (Vassilakopoulou & Hustad, 2021). Acilar (2011) is of the view that the gaps are caused by the rapid introduction of technology, especially in developing countries. Srinuan and Bohlin (2011) state that for the social divide to be understood in its entirety, socio-economic, institutional and physiological factors must be looked at over and above the technological ones. The groups that are more vulnerable to digital divide include people with low educational background, persons living with disabilities, people

staying in rural or remote areas, unemployed people, and the senior members of the community.

In South Africa, causes of digital divide include social inequalities created by apartheid (World Bank Group, 2018). It is reported that about 22 million of 60 million people in South Africa owned a smartphone at the end of year 2021 (STATISTA, 2021). The rest used basic phones, such as flip phones or feature phones, and some have no phone at all. According to the Digital 2021 report from We Are Social 64% of South African adults were using the Internet, amounting to 38,19-million users, at the beginning of 2021. The statistics mentioned above reveal that there is still a huge number of users who do not participate in the digital space. Digital inequalities are still prevalent in South Africa and such care must be taken when proposing solutions.

2.3. Social Innovation: The Story of Developing Countries

There are two most prominent definitions of social innovation in the literature. On the one hand, Frost and Sullivan (2015) defines social innovation as “the deployment of technology and new business models to bring about real positive change to the lives of individuals and societies, creating shared value” (p.8). On the other hand, social innovation is seen as “the development and delivery of new ideas and solutions (products, services, models, modes of provision, processes) at different socio-structural levels that intentionally seek to change power relations and improve human capabilities, as well as the processes via which these solutions are carried out” (Nicholls & Ziegler, 2015).

As can be seen above, Frost and Sullivan (2015) go beyond the formulation of business models to bring in their impact on the people meant to benefit from the innovation. The main area of focus in this definition is the outcomes for the communities. Meanwhile, Nicholls and Ziegler (2015) put an emphasis on tapping the social power relations and improving human capabilities. The latter invokes Foucaultian scholarship on power and knowledge, as well as Amartya Sen’s view of development as freedom. According to Foucault (1982), power relations in

society are influenced by the level of knowledge possessed by different classes of people. Meanwhile, Amartya Sen sees socio-economic development as the freedom of individuals to choose their quality of life depending on their individual capabilities (Prendergast, 2005).

Accordingly, these definitions are important in this research. From Frost and Sullivan (2015), we can deduce that for social innovation to succeed it must be preoccupied with the outcome of its process. Meanwhile, Nicholls and Ziegler (2015) demonstrated that such an outcome should shift the power relations in society. Sen's contribution, on the other hand, is that social innovation cannot be said to be successful if it does not facilitate the poor's ability to live their lives as they so choose. Therefore, genuine, or meaningful participation amongst the poor in the development of the apps would have resulted in enhancement of their capabilities to use public transport for development.

While practices used elsewhere may serve as models, almost always there are going to be modifications needed to fit specific contexts, depending on economic factors, cultural practices, levels of knowledge, as well infrastructural access for that community (Kraemer-Mbula & Wamae, 2010); (Di Pasquale, Santos, Leal, & Tozzi, 2016). A study done by Rametse and Shah (2012), focusing on social innovators based in India and Kenya concluded that the cultural and political environment hindered their attempts to create social value and build networks, while partnerships to create social value were found to be vital. A field research done in Cambodia illustrated the importance of involving of marginalized people in developing countries as an opportunity to develop empowering outcomes in terms of needs and building their knowledge and capabilities (Hussain, Sanders, & Steinert, 2012).

Another study done by Voeten, Gerard, Job, and Nigel (2011) found that, unlike formalised institutions in western countries, Vietnam was comprised of small producers' cluster context which did not have any formal institutions – in the narrow innovation system sense - and that facilitated the innovation process. An empirical study that was done by Kayal (2008) in newly industrialised economies (namely, South Korea, Taiwan, and Singapore) shows that developing countries

should craft the innovation in such a manner that models their context without merely copying another country if they are to be successful (Kraemer-Mbula & Wamae, 2010; Merwe & Grobbelaar, 2016; Voeten et al., 2011).

Therefore, the innovation process needs to be customised if it is to be useful in address societal challenges (Kraemer-Mbula & Wamae, 2010). Based on the above studies, social context, political environment, informal actors, and partnership are cited as essential factors in diffusion of innovation. It is precisely for this reason that there is a rise in innovation for an inclusive developmental purpose (Iizuka, 2013).

Rogers (Rogers, 2003) proposes two approaches to diffusion of innovation, namely centralised and decentralised diffusion systems. In a centralised diffusion model, decisions are controlled by the teams at the top level of the initiative. Centralised diffusion model is applicable in innovation that requires the communities to have high technical knowledge, which is normal for technical experts with high level of education. Rogers (2003) mentions four characteristics that should be considered when balancing the diffusion system:

- The degree of centralisation in decision making and power
- Direction of diffusion
- Decisions on which innovation to diffuse
- Amount of reinvention.

The decentralized diffusion model provides new ideas from outside the initiative which increase the pool of getting good ideas. A decentralized workflow nurture discussions before acceptance or rejection of suggestions from external participants (J. Lee, Min, & Lee, 2016). Organisations can achieve this by increasing stakeholders' input for decisions, and engaging the impacted community continuously throughout the innovation process (Mack & Szulanski, 2017).

2.4. Social Innovation Processes

Generally speaking, the social innovation process can evolve into four stages, comprising of a social problem or source of need; formulation of a solution (designing, developing, prototyping, and piloting of ideas); assessment, scaling up, and diffusing of good ideas, and feedback. The main question is how each stage is being treated by the actors in the process.

2.4.1. Social Problem / Source of Need

At the beginning, the role players in the social innovation process must identify existing social problems that are not currently being addressed by available solutions (Mulgan, 2006). The problem might be relevant only to a set group of people. In the transportation sector, a gap was identified regarding the dissemination of information related to low-income earners who are currently excluded by the existing solutions. As Mulyaningsih, Yudoko, and Rudito (2016) put it, the social innovation process is driven by the desire of addressing societal problem with the view to establish new social values. Rogers (2003) defines need as “a state of dissatisfaction or frustration that occurs when one's desires outweigh one's actualities; when "wants" outrun "gets"”. Sometimes the need is created by agents that present the possibilities of something new. Murray, Caulier-Grice, and Mulgan (2010) state that the aim should be in identifying the root cause and not be limited to symptoms.

Such needs may be identified by two distinct groups, namely, social movements and social entrepreneurs. Social movements (Mulgan, 2006) and/or existing voluntary organizations are made up of various participants joining towards common goals. Given the common-cause motivation, social movement innovators are sensitive in making sure the desires of their fellow participants are considered (Jeppesen, 2021). Social movement's aim is to solve the problem of the group and beyond. True to their main objective in any society, social movements mobilise to create new power structures with the aim of overcoming social and structural barriers that may impede development in various communities (Gregg et al., 2020).

Mulgan (2006) argues that social innovations that acknowledges that users are competent interpreters of their own lives and have a role in solving their problems are very effective. As such, empowerment and participation have formulating a social innovation wherein both the formal and informal actors' from partnerships (Edwards-Schachter & Tams, 2013). A systematic change approach which is more participatory where empowerment and learning happen is vital (Bonifacio, 2014). The process of social interactions between individuals undertaken to reach specific outcomes is supposed to be participative, involving several actors and stakeholders with a common goal of solving a problem and empowering (Hubert, 2010). Based on the case study done in Khyber Pakhtunkhwa, a developing district of Pakistan, Wasai and Nouman (2016) proposed involvement of role players from various sectors, although the public sector will also have a significant role in initiating the process. Amartya Sen sees socio-economic development as the freedom of individuals to choose their quality of life depending on their individual capabilities (Prendergast, 2005). Since social movements must address movement's cause, it may be more difficult given that there is added requirement of meeting broad-based adoption.

On the other hand, social innovation can be driven by individuals (Mulgan, 2006), private firms, public organisations, social entrepreneurs and community groups in solving social problems have been neglected (Hubert, 2010; Lettice & Parekh, 2010). Social innovation requires several actors that fulfil various roles such as idea development, provision of personnel, provision of knowledge, funding, provision of infrastructure, diffusion and lobbying. These social innovations, which are often initiated by institutions, play a part in reshaping society as a more participative arena where people are empowered, and learning is central (Hubert, 2010). Howaldt, Kaletka, and Schröder (2016) state that a social entrepreneur is key to the generation and implementation of ideas (see also Peric and Vidovic (2016).

Nonetheless, the barriers for social entrepreneurs to excel in their innovations includes lack of financing, ability to scale, the targeted community's resistance to change, administrative and bureaucratic barriers (Oganisjana, 2017). Therefore, innovators are cautioned against only relying on their knowledge as there exists

a potential of mismatch between the diffused innovation and community needs. Christopher and Richard (2013).

Innovation in informal settings is often initiated by strong demand from users to acquire and improve welfare or quality of life. Many of the skills in informal settings are learned outside the formal education/training system (Kraemer-Mbula & Wamae, 2010). It is evident that the role of intermediary organisations or actors that facilitates knowledge diffusion in informal settings is essential (Merwe & Grobbelaar, 2016). Those actors can include both informal and formal; and the learning processes that take place among them is crucial.

Awareness of innovation can be stimulated through research, benchmarking and visiting other countries (Rogers, 2003; Vasin, Gamidullaeva, & Rostovskaya, 2017). Vasin et al. (2017) argue that benchmarking and comparative and historical analysis to study foreign experiences of social innovation should be used to identify best practice while formulating and identify possible antecedent conditions needed to develop localised social innovations. Kayal (2008) asserts that developing countries should then craft the innovation approach to model their context without merely copying another country to be successful. These are the same views shared by researchers (Kraemer-Mbula & Wamae, 2010; Maharajh, Karuri-Sebina, Sal, & Segobye, 2014; Merwe & Grobbelaar, 2016; Voeten et al., 2011).

2.4.2. Designing, Developing, Prototyping, and Piloting Ideas

Ideas on how a problem can be addressed can come from methods such as co-design, or can be user led. These methods show a shift from design for the users towards design with the users.

The co-designing process calls for an approach to social problems that see innovators partnering with the users to develop solutions (Davies & Simon, 2013). In fact, Rizzo, Deserti, and Cobanli (2015) emphasise that co-design is a way of envisioning possible future by working close with the affected communities. In order to change complex and entrenched social issues, skills, knowledge and experience of all stakeholders (formal and informal actors) is recognised as

critical component of the process (Burkett, 2012). Co-designing means that the professional works side by side or bottom-up, as opposed to top-down, with the end-users.

It follows that citizens are engaged and empowered while the designer learns from the community (Murray et al., 2010). Although users plays a role in co-design, Sanders and Stappers (2008) caution that their level of involvement should be influenced in part by their level of expertise, passion and creativity. Co-designing is criticised for its possibility of causing delays to the project (Maria, Lima, Moreira, & Marques, 2012), increase in costs (Hongyang, Ng, & Skitmore, 2012) and possibility of superficial analysis (Glenn, 2003). However, Bird, Haas, and Mehta (2005) is of the view that an adequately structured participatory approach will negate the overrun in cost and time.

User-centered designs rest on the premise that an end-product is most likely to fulfil user needs when its development is based on iterative processes in which potential users are consulted constantly (Witteman et al., 2015). The development of systems focuses on users' needs and interests. Marti and Bannon (2009) disagrees with the notion that users should always be involved in the development process based on the following:

- Not all users have the design skills necessary to play a positive role in all stages of the design process;
- Users may have problem of comprehending new technological infrastructures and ecologies; and
- The problem of limited user expressivity in certain domains (e.g., health)

Therefore, the role of users in the innovation process must be guided by need and the given the context. The advantages of user-centered design include increased user acceptance, reduced errors and hours of support and training, as well as provision of the best user experience possible (Chammas, Quaresma, & Mont'Alvão, 2015). Failure of experts to engage users early in the development process may make certain types of changes difficult to effect given time and cost constraints (Witteman et al., 2015). Care must be taken to ensure that users

involved in the development process are representative of the diversity of potential user groups (Grates, Heming, Vukoman, Schabsky, & Sorgalla, 2018). Failure to do so may perpetuate the digital inequalities by not meeting the needs of the excluded groups.

The process of refining and testing ideas through trial and error is key in building rapport amongst the stakeholders (Murray et al., 2010). For instance, in the case of M-Pesa¹, through engagements with the potential adopters, innovators learned that most people had basic phones, and such solutions had to be customised to meet the available devices and users' technical capabilities (Hughes & Lonie, 2007). Given the right tools for expressing themselves, users can become part of the design team giving insight in their daily experiences (Sanders & Stappers, 2008). By going beyond specific functionalities, co-designing and user-centred design reflect on product life cycle, and usage context, which reveals of new requirements (Wallisch et al., 2018).

2.4.3. Assessing, Scaling Up, and Diffusing Good Ideas

Scaling-up solutions require proper planning, combined with the ability to mobilise resources and overcome resistance (Mulgan, 2006). Communication is essential at this stage. According to Mulgan (2006), Social innovators need to continuously aim to capture the imagination of a community of supporters by employing various techniques. The innovators need to find communication channels that resonate with the community. Rogers (2003) argues that most individuals' decision to adopt is preceded by the identification of a benefit. It is, therefore, important that knowledge about the innovation is communicated and made accessible to the potential adopters for trial purposes.

According to Chalmers (2013), incorporating the user in the innovation process adds legitimacy to the solution which assist in its wider diffusion. In fact, social innovation diffusion processes that engage beneficiaries are considered to be good in addressing real needs of the community (Hubert, 2010). Yet, even well-planned innovations with proper diffusion mechanisms could still face challenges

¹ Safaricom and Vodafone launched M-PESA, a mobile-based payment service targeting the un-banked, pre-pay mobile subscribers in Kenya

in reaching their potential when the social, economic, and political context is not conducive for change.

It is proposed that an organisation should adopt a more 'open' social innovation, which is characterised by a receptive organisational structure, which is committed to investment in developing absorptive capacity (Chalmers, 2013). "Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas as they look to advance their technology" (Chesbrough, 2006). According to Murray et al. (2010) principles of innovation includes collaboration, sharing and decentralisation and multi participants. Organisations pursuing 'open' social innovation should be willing to reveal some of their intellectual property as it engages various stakeholders (Chalmers, 2013). An open innovation approach broadens the firm's pool of ideas and enjoys enhanced social legitimacy (Holmes & Smart, 2009). It is more about the building of solutions "by" or "with" society than building one for society (Simon & Davies, 2013).

2.4.4. Learning and Evolving through Feedback Mechanisms

Once the solution has been launched, unintended consequences arise, shortcomings are identified, and new demands might arise. Feedback loops must exist that are informed by learning, and as a result the products might need to be adapted (Mulgan, 2006). Sello (2017) states that it is of little value if the feedback mechanism put in place is not monitored and evaluated for effectiveness. Although the collection of customer feedback is noble, they are typically ignored as part of the overall solution development which means that the users' requests do not get prioritised as part of the features selection (Fabijan, Olsson, & Bosch, 2015). Focus should be on how the users' voice is embedded in the organisation's processes. The organisation must have open innovation culture.

If user reviews in app store that are managed well, they can become an essential feedback loop that alludes to co-value creation (Hoon, Vasa, Schneider, & Grundy, 2013). Such reviews can be used as channels to crowd source ideas from the users to improve the app (Khalid, Asif, & Shehzaib, 2015). The reviews can be positive, negative with regards to the quality of the app. Negative reviews,

especially concerning the shortcomings, often do not contain enough details of user experience which makes it difficult for the developers to effect changes (Pagano & Maalej, 2013).

App developers are overwhelmed by the amount of comments when trying to make use of app store's feedback mechanism making it difficult to identify topics and recurring trends (Iacob & Harrison, 2013).. On average, about 11% of user reviews are responded to by developers (Savarimuthu et al., 2017). Hence, there is mainly use of automated programs which adhere to predefined norms to limit the load on developers. Organisations are therefore advised to put a system in place if the rating is to be of value. Maalej, Kurtanović, Nabil, and Stanik (2016) experiment on app store reviews exhibited the advantage of using text classification and natural language pre-processing.

2.5. User Engagement and Associated User Roles

Given the multifaceted definition of social innovation presented in section 2.3, it is worthy to briefly introduce the concept of 'social participation' in the context of social innovation drawing on Arnstein ladder of participation. Although this study was about the involvement of end-user in the process of app development, the following public participation model provides a framework through which one can look at this process. User engagement involves consulting with the individuals, groups and organisations that are interested or (positively or negatively) affected by a proposed intervention before making a decision (André, Enserink, Connor, & Croal, 2006). Yet, there is no consensus regarding what the work engage mean.

Arnstein (1969) proposes a topology of citizen participation arranged in a ladder pattern. Each rise in the ladder's rung corresponds to the rise in citizens' power of influence.

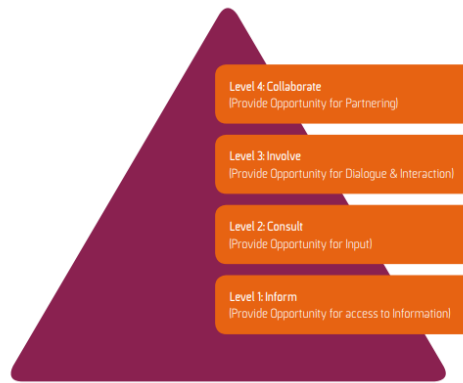


Figure 3: Adapted from Arnstein (1969) Ladder of Participation (Legislative Sector South Africa, 2013)

Figure 3 above shows each level of public participation increase in the opportunity for the public to influence decisions (Legislative Sector South Africa, 2013).

1. Level 1 of public participation is to “Inform” the public by providing balanced and objective information to assist them in understanding the problems and alternatives solutions.
2. Level 2 is to “Consult”. At this level, the public is invited to provide feedback or input.
3. Level 3 is to “Involve”. At this level, the public is provided with an opportunity for dialogue and interaction.
4. Level 4 is to “Collaborate”. At this level, the public is provided with the opportunity to partner or work jointly with decision-makers and the identification of the preferred solution.

At level one and two, citizens are informed and consulted respectively, and methods frequently used are attitude surveys, neighbourhood meetings, and public hearings. In both level one and level two, citizens are seen as end users occasionally engaged with the aim of strengthening social acceptance of innovations (Amanatidou, Gagliardi, & Cox, 2018). According to Arnstein (1969), some of these methods are not effective in taking into account the citizens’ concerns and input.

Gudowsky and Bechtold (2013) argue that proper two-way flow of information only occurs during discussions or dialogues (Level 3). On level three, citizens are seen as partners with the aim of finding new or changing practices (Amanatidou et al., 2018). During discussions, individuals give their buy-in through persuasion. However, discussions fails to appreciate that though the same information is provided, participants might have different levels of comprehension (Gudowsky & Bechtold, 2013). In dialogue, participants engaged to establish mutual understanding that is valued by both parties (Garrod & Anderson, 1987). The outcome of the engagement will direct the mode of communication. Not choosing the right one might result in participants who are left confused or even deciding to withdraw from the engagement. Gudowsky and Bechtold argue that proper engagement aligns with at least level 3 of the Arnstein ladder of participation.

Since some concepts are not easy to comprehend, especially in a situation where the recipient has limited information, it may be difficult to achieve maximum level of participation in fields such as application development. Such a discrepancy between the concept and recipient knowledge can have a significant influence on one's opinion. Therefore, it is essential to ensure that information is provided in a manner that considers the power of the participants (Gudowsky & Bechtold, 2013). If community engagement is not done correctly, it can reinforce social hierarchies and the exclusion of some groups or individuals. Public participation can be vested with over-representation of the most affluent, articulate and educated members of the community, thereby silencing the voice of other groups (Davies & Simon, 2013). Understanding needs of the society are vital in assessing the feasibility of the initiative (Mulyaningsih et al., 2016). Bottom up ideas generation and mobilising citizens for social inclusion are some of the necessary steps (Hubert, 2010). This necessitates engagement with potential adopters in manner that enable marginalised communities to priorities their needs and provide new insights.

Participatory methods that can be used include participatory panels, citizens panels and co-design (Simon & Davies, 2013). Public participation is necessary considering the nature of the challenges that social innovation aims to address. Many of these social challenges are not straight-forward issues, and as a result

they defy linear, top-down responses (Davies & Simon, 2013). Other reasons for participation includes better understanding of the problem, triggering diversity and new ideas, which in turn increase the legitimacy of initiative or decision (Davies & Simon, 2013).

Nevertheless, in the effort to include the marginalised through participation, significant gaps exist between the poor and better-off urban residents in terms of access, particularly to decision-making and more broadly, their ability to participate in and leverage the benefits associated with urban living (Avis, 2016). Some societies are faced with imbalances of power which might be caused knowledge asymmetry that, in return, may affect social innovation negatively (Mulgan, 2006). According to Foucault (1982), power relations in society are influenced by the level of knowledge possessed by different classes of people. The power imbalances might be compounded by restrictions of communication flow (Mulgan, 2006; Sello, 2017). Power imbalances can be constructed as a negative and divisive force when groups work together (Edwards-Schachter & Tams, 2013).

2.6. Communication Channels

According to Rogers (2003) the conditions under which information is exchanged influences how it will be received and transfer. The innovators need to find communication channels that resonate with the community, increase awareness, build capacities, and mobilise for change amongst various actors. Communication channels can be categorised as either mass media or interpersonal. The two communications channels are discussed in the sections that follow:

2.6.1. Influence of mass media on the process of diffusion

Rogers (2003) indicates that organisations use mass media communication channels as efficient means to raise awareness about the existence of an innovation, creating awareness-knowledge. These include traditional media such as radio, TV, and newspapers, or social media like Facebook, Twitter, Instagram, etc. One of the goals is to reach as many people as possible. According to Martin

and MacDonald (2020), Facebook and Twitter are interpersonal and mass communication channels and essential for diffusion of information. They further state that Facebook disseminate information through interpersonal social networks, while Twitter broadcast information. (Lee & VanDyke, 2015) claim that many organisations underutilize social media's potential for dialogue by continuing to practice one-way communication. This is effective in addressing knowledge deficient where message broadcast is essential, but not for dialogic strategies. Rogers (2003) warns that concentrating on awareness-knowledge alone is inadequate in a context where basic understanding is lacking. Effort should be put first on how-to knowledge which is essential for adoption and knowledge creation vital for teaching basic principles.

Joshi and O'Dell (2016) state that framing of agenda is important and they propose four mechanisms to do so:

1. The more the source of messages are presented as credible, the greater the likelihood that the proposed ideology will be disseminated to the public.
2. Mass media plays an "agenda-setting role" in which some messages are presented consistently to the public, the repetition of a topic day after day is the most powerful message of all about its importance.
3. A message should not only corroborate an audience's cultures and belief systems but should be crafted by media to fit with the local culture and belief systems.
4. When multiple outlets similar agenda, that agenda becomes even more widely disseminated and normalised (McCombs 2004).

2.6.2. Role of interpersonal communication in diffusion of innovations

Rogers (2003) argues that interpersonal channels are effective in persuading individual to adopt an innovation. Interpersonal interaction facilitates the adoption of new products. Todo, Matous, and Mojo (2014) highlight that potential adopters may have more opportunities to receive information about innovation through face-to-face communications. Unless the agent is reliable, the recipient might be reluctant to accept the information provided by the agent.

A qualitative study conducted by Martin and MacDonald (2020) investigated communication strategies applied on Twitter and Instagram to determine whether how they encouraged two-way conversations between science communicators and citizens. The results demonstrate that the application of interpersonal communication via Twitter and Instagram strategies encourage conversational engagement when looking at the number of messages exchanged amongst the participants (Martin & MacDonald, 2020). Their finding shows that level of engagement is influenced by how the social media presence is utilised.

As such, social media tools are most useful for stimulating innovation through user feedback, particularly in the early exploration and ideation stage (Ogink & Dong, 2019). Martin and MacDonald (2020) states that social engagements tend to be high when social media is used during problem identification and ideas generation stages. Yet, Friedrich (2013) warns that such tools should not be used substitute for face-to-face methods, but complement it. In a society with high digital divide, social media might exclude most of the people who are not connected.

2.7. Conclusion of the Literature Review

Technology is at the centre of innovation endeavour. A key element of social innovation approach is the diffusion of technology amongst the people, institution, and organisations. Core to social innovation is the fact that innovation is more effective when shared amongst the community, and not necessarily because of technological innovation.

Traditional top-down engagement approach is deemed to be successful in developed countries. However, there is a growing advocacy for bottom-up engagement approaches if innovation is going to work for developing countries. Political, cultural, social and economic environment, education level factors influence the capacity of marginalised groups to participate in innovative activities and as such the innovation should be customised. Hence, top-down and bottom-up approaches are incomplete by themselves in diffusing innovation; successful diffusion can be achieved by balancing the approaches in line with the context.

The bottom-up approach helps solution makers to gain insight into new perspectives from those who grapple with the issues on a daily basis. Community participation is essential in ensuring that the voices of the marginalised groups are heard and incorporated in the solution.

CHAPTER 3: Research Methodology

This chapter details how this research was undertaken by discussing the research design, sampling method, data collection, ethical considerations, as well as reliability and validity of the study. The rationale for the choices made is also discussed.

3.1. Research Design

This study followed a qualitative research approach with a primary focus on understanding and interpreting the participants' experiences of the development of public transport smartphone applications (Jackson, Drummond, & Camara, 2007). The qualitative research methodology was chosen because the study sought to unearth in-depth understanding or thick description of the process that the participants went through during the development of their respective apps. The approach also allowed for deeper engagement on what led to specific choices regarding involvement of potential end-users.

3.2. Sampling

This study was conducted through four smartphone public transport apps selected out of the possible target population of six, namely, Khwela, Khomba, Gauteng on the Move, Gautrain, Aftarobot, and GoMetro. The apps share three characteristics, i.e., they are free to public; meant to facilitate provision of public transport (busses, taxis, and trains); and cover public transport in South Africa, mainly in Gauteng Province. Three of the selected apps had an option for users to suggest ideas and feedback on how they can be improved. A target population is all the subjects which the researcher is interested in studying (Neuman, 2006).

The chosen sample was non-probability one based on the fact that although all the apps were given an equal chance to participate in the study, it was not possible to randomly assign them to the research and/or control group. Therefore, the study relied on the app development companies which positively replied to the letter of request to participate in the study, as well as the assigned individuals for the interviews. In all, 7 individuals participated in this study. These range from the CEOs, Marketing specialists, developers, and project manager.

The following apps participated in this study:

3.2.1. Khwela app

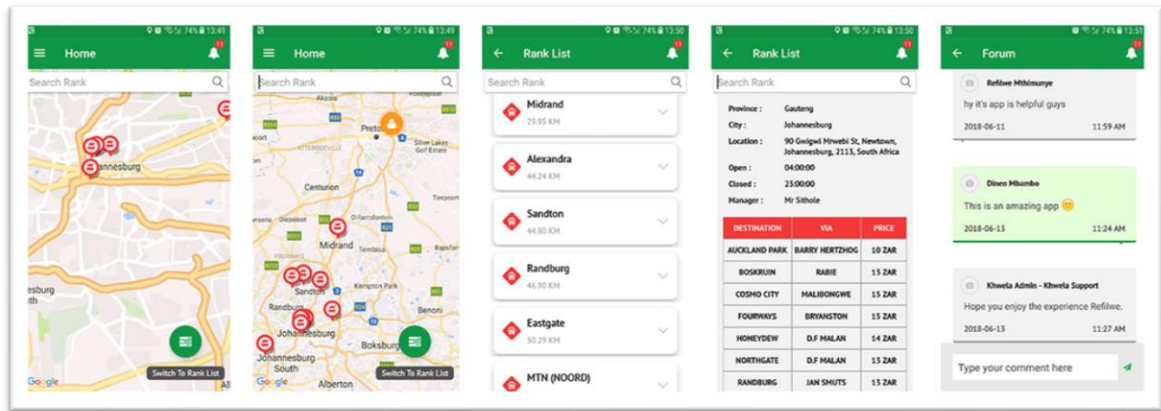


Figure 4 : Khwela app screenshots (Source: (Khwela, 2021))

“Khwela” is a Nguni word meaning climb. True to the name, the Khwela app is described as transport one-stop-shop providing public transport related information for commuters in South Africa with the initial rollout in Gauteng. According to Sowetan (2018), the Khwela app is a start-up company found in 2015 and based at the Innovation Hub and Tshimologong Precinct in Johannesburg. The app was launched in 2018.

Its features include the latest taxi ranks, transportation industry updates, routes, rank information and ability to connect fellow commuters. Through Khwela app, commuters can voice their concerns, queries, compliments and even sharing of taxi riding experiences. The app is said to have been designed to cater to the tech- and “not so” tech-savvy users. The intended users include school goers and domestic workers. The aim was to develop an app that includes a large segment of South African commuters who are excluded by existing apps (such as Uber, Bolt and Gautrain) due to the cost and limited information.

3.2.2. Go-Metro

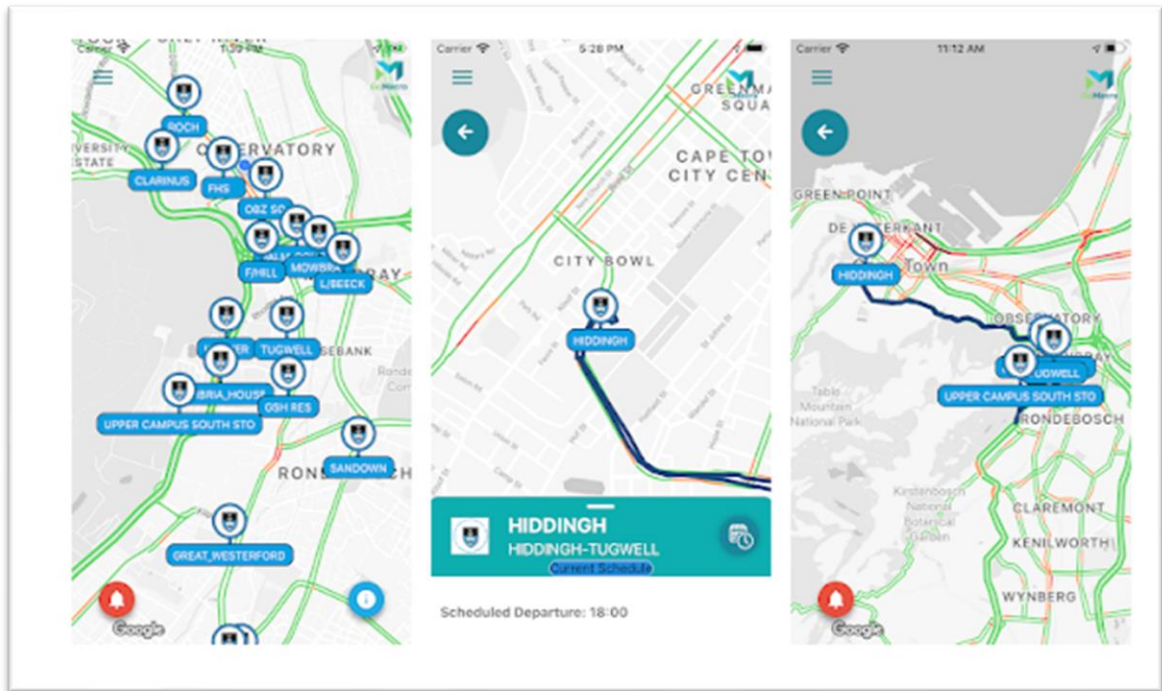


Figure 5 : Go-metro app screenshot. (Source: Google play)

The Go-Metro app is an information system app for urban trip planning and service disruption notifications (Coetzee, 2013). The Go-Metro app's idea is a result of a research done by its founder while pursuing his tertiary studies. The development of the app was funded by the Passenger Rail Agency of South Africa (PRASA), which runs the passenger rail in South Africa. Go-Metro app is cited as containing the latest PRASA schedules and updates for Metrorail in Cape Town, Gauteng, KwaZulu-Natal, and Eastern Cape.

The services are also available via Unstructured Supplementary Service Data (USSD) and website for those without smartphones. Its target market includes students and workers. Go-Metro passenger features include (Go-Metro, 2018):

- Bus route map
- Bus stop locations
- Service schedule
- Real-time bus locations
- Bus status

- Neary public transport
- On-demand bookings

3.2.3. Gautrain app

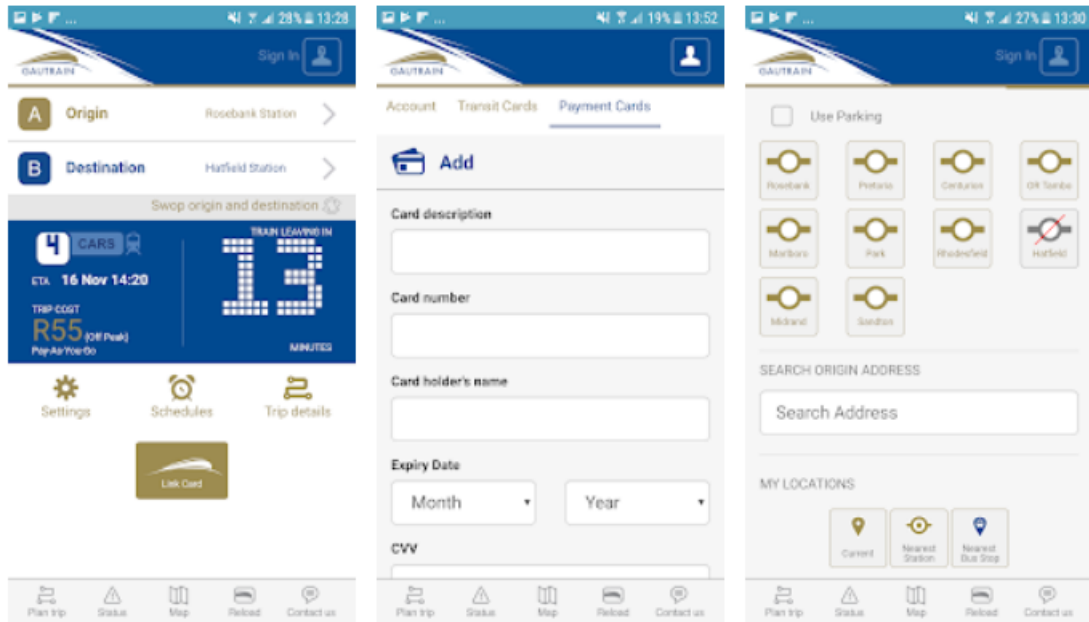


Figure 6: Gautrain app Screenshots (Source: Google play)

Gautrain app provides travel information about the Gautrain. Gautrain app features include real-time journey planning, ticket balance, fares, and schedule. Travel information provided extend to other public transport operators in Gauteng which assist in provide first and last miles for commuters in Gauteng.

3.2.4. Gauteng on the Move app

Gauteng on the move is a mobile app developed by the Gauteng Department of Roads and Transport providing passengers with transport related information for Gauteng's public transport modes. The can be used by the commuters to plan their journeys with the option to select their desired transport modes, travel times and criteria specific to travel modes. The Gauteng on the Move app provides information for operators such as Gautrain, Metrobus, AreYeng, Rea Vaya, Metrorail, Gautrain Bus Services, Johannesburg City Sightseeing Bus, Tshwane Bus Services and to some extent the minibus.

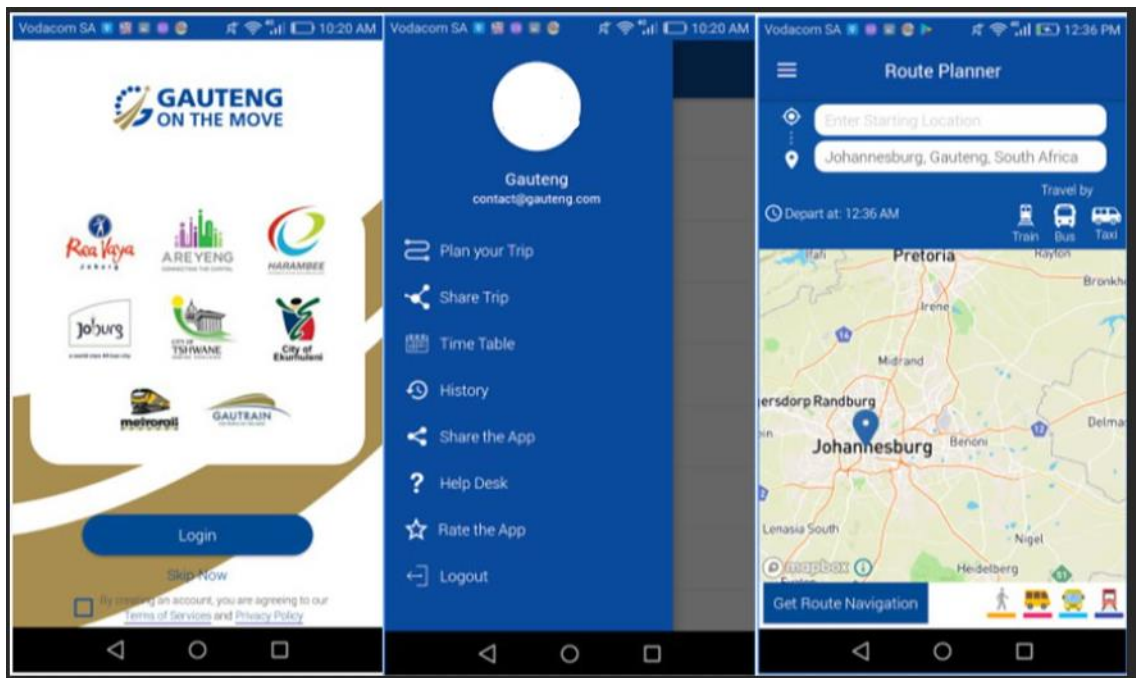


Figure 7: Gauteng on the move (Source:(CGTN, 2021))

3.3. Data Collection

Different from quantitative research, qualitative research uses data expressed in words to answer research questions (Neuman, 2006). As such, in-depth interviews were used in this study to gain a deeper understanding and insight into underlying reasons and motivations for a choice of specific modalities through which end-users were involved in the development of the apps. The study used semi-structured interviews as an instrument for gathering data from the participants. A standard interview schedule with questions focusing on problem identification, idea generation, solution development, scaling and diffusion, and feedback was used in all interviews (See Appendix 1). Furthermore, user reviews were collected directly from google app store, although only three of the four apps that formed part of this study, namely, Khwela, Go-Metro and Gautrain, had reviews.

Due to the COVID-19 pandemic, this study used virtual meeting platforms – Zoom and Microsoft Team – to conduct the interviews. Four out of seven respondents granted a permission to record the meeting digitally. In the remaining three, written notes were used as a primary recording mechanism. Nonetheless, the digital recording of the meeting came handy as it allowed for an easy transcribing

of the interviews. The auto-caption within the virtual meeting platforms was used to assist in transforming voice recording to a textual representation of the interviews. The auto-translation had benefits as it saved time that it could have taken, as well as the potential cost, in getting a professional transcribing service (Dempster & Woods, 2011; Evers, 2011)². In cases where the transcribing system got the words wrong, the text was corrected manually. Most of the recordings were of high quality, but in a few instances, the quality degraded when the bandwidth was low due to high internet utilisation. Repetitions and no-words utterance were removed to make the text easier to read.

In the case of Khwela, the primary data could not be collected. Hence, the secondary data, in the form of interview recordings from both the media and the developer's social media and public website, was utilised instead. These included the engagements the founder held with the app's end-users. While this method might pose some skewed data in comparison of all apps, the most comparable data was on user feedback with other two apps.

During the interviews, it was discovered that app rating was the preferred source of user feedback mechanism, and it made an interesting place to look at for insights as it would allow a glimpse on how the users engaged with the developers and what was done with the provided feedback.

3.4. Data Analysis

As it is indicated above (1.3), the data collected for this study was qualitative in nature, meaning it was stored in words, as opposed to the numerical data collected through quantitative research methods. This data was collected through two mediums, i.e., in-depth interviews and user reviews gathered from the google store as the source of the applications (apps.).

² However, it should be noted that most auto-transcribing systems at the time of performing the analysis were still learning other accents and as such they at times get it wrong transcribing African accents (Tawo, 2021)

As exploratory research³, this study sought to explore the topics, themes and issues that emerge from the field. Generally speaking, there is very little research done on this field. Therefore, it was prudent to utilise both deductive and inductive approach in analysing the data. This means that the research took advantage of theory application in situations where the theoretical framework discussed in Chapter 2, more especially relating to the social innovation process, was applicable, yet allowed emergence of the themes, topics and establishment of variable relations in the field. For example, Roger's diffusion model was used to test if developers opted for the pure decentral, centralised or balanced model.

The usage of in-depth interviews and app user review provided an opportunity to triangulate the collected data. This was adopted not only because it offered an ability to cross reference, but it increases an understanding of the research area, which aided in strengthening the standpoint or arguments made in the study (Barbie; 2012). Information from the social media platform, websites and publications was used to validate the data gathered during the interviews. This also assisted in providing another dimension of looking at the same phenomena as it allowed for new information to surface and/or collection of data that would otherwise be difficult when one source was used.

Both the in-depth and user review data was coded using social innovation process, and the codes were used to categorise the responses from the respondents. Qualitative Data Analysis (QDA) miner computer software was used to organise the data. QDA miner is a computer programme used to organise, shape and make sense of unstructured information (Adu, 2019). The transcripts from the interviews and the secondary data (user reviews) were imported into the software, and analysis, in which themes and matching patterns were identified, was performed. Out of this analysis, thirty codes were generated, some of which were merged to create twenty-two overall codes. The textual

³ Exploratory research is used to explore the possibility of emerging social issues in new research areas or for topics with little or no research. This is different from descriptive research, which seek to give details to the issues mainly uncovered through exploratory research, and explanatory research, which is done to get an in-depth understanding of the social issue (Babbie, E.R (2012). *The Practice of Social Research*. Pearson Education South Africa: Cape Town.

segments were then explored from the system and were used to analyse and interpret the data.

Furthermore, the reviews of the Google App store were subjected to a sentiments analysis software, Theysay⁴. This was done as it was going to be very time-consuming in going through all the reviews that were posted in the app store. The sentiments analysis software allowed for a quick presentation of the mood of the users (Luo et al., 2013). According to Farhadloo and Rolland (2016), sentiments analysis assist in determining the customers' perception regarding a service or product. It is acknowledged that the sentiments analysis outcome might be affected by the language used, especially with regards to the use of slangs which was observed in certain instances. Farhadloo and Rolland (2016) further highlighted that more still needs to be done in improving the linguistic challenges which affects the results of sentiment analysis software.

3.5. Ethical Considerations

It is of utmost importance that throughout the research processes the respondents are protected from harm that might emanate as a result of the study being undertaken (Binti Mohd Arifin, 2018). Letters were sent to the identified organisations to seek approval for their employees and managers to participate in the study. Emails, phone calls and social media platforms were used to communicate with the identified organisations. For those that responded, favourable letters of permission detailing the aim of the study, together with their company's approval were sent to them before the interview. Consent was again requested from each participant before the interview, and it was made clear that they can withdraw such consent at any time during the process if they so desired. Consent was requested both verbally and in writing and at a minimum contained the following as guided by Nnebue (2010):

- Identity of the researcher.
- Purpose of the research.

⁴ Theysay is a sentiment analysis tool that interrogates positive and negative words or phrases and gives an overall tone or emotion users (Luo, Chen, Xu, & Zhou, 2013)

- Privacy, anonymity, and confidentiality provisions.
- Future use of the information; and
- Right to withdraw from the research process at any time.

In line with the above, some of the information gathered, such as people's name, places and title was sanitised to hide the identity of the participants. Further, the recording and transcript were stored in secure platforms, where the access is secured through encryption, identity and multifactor authentication (Basharat & Azam, 2012).

3.6. Reliability and Validity of the Study

Generally speaking, reliability means that if used in different setting, the research method used here can yield similar results. It means the level the study can be replicated and consistency of findings thereof (Babbie, 2012). On the other hand, validity means the degree to which the research study what it purports to study. In other words, it answers the question as to whether the research process and the data can be used to answer the research questions. Internal validity talks to the processes, the techniques, instrument used were appropriate to derive the data which could be used to answer the research questions (Babbie, 2012). Meanwhile, external validity is about whether the data itself answers the research questions.

In this study, a qualitative research approach was the most suitable because it was an exploratory study and it sought thick description of the process of public transport app development. As such, in-depth interviews, using semi-structured interview schedule, were used. An expert who understands the topic read through the interview schedule and provided feedback. They evaluated whether the questions effectively capture the topic under investigation and proposed changes. The questionnaire was then administered to the first respondent and minor changes were done before administering it to the other respondents. The usage of both QDA and Theysay software also improved the reliability and validity of the study.

3.7. Limitations of the Study

This study was constrained by factors stated below and as such results should be treated with caution:

- The findings of this study cannot be generalised, as it is based on a limited number of public apps, not only in the sample, but the population in general;
- There might be skewed or asymmetric data on two apps studied here, as there were no interviews for one app, and no user reviews for the other.

CHAPTER 4: Presentation of Findings

This chapter presents the findings in response to the research questions. The data gathered using semi-structured interviews are presented. The identities of the respondents are not revealed, and they are either referred to as respondents or interviewees. Furthermore, the study collected user reviews from the Google App store which present the interactions between the app developers and the users.

4.1. The Role of Community and Communication Channels in the App Development Process

This section presents the role that the community played during the development of public transport app. The question asked aimed to solicit the participants' views and experiences of user involvement during the app development was posed: *"How did the users participate in the development of the App?"*

4.1.1. Problem/need identification

All respondent reported that the intended users of the apps were not involved in the development of the apps. They expressed concerns over the lack of user involvement, by providing a perspective on the dangers of omitting user involvement as well as the benefits that could have been attained. Some respondents related the omission of users' voices to a solution which is based on apps developed in other countries such as Europe where technological infrastructure and digital inequalities are different. This has potentials of failing to meet local needs. Understanding of user's challenges within their context was emphasised by respondents.

Some respondents highlighted that the needs of such a solution came from leadership who go around scouting for innovation without the development team's involvement;

It was the role of those that gave us a request to develop the app to engage with the users. But I do not think their problem definition come from the users. It was more of what the app owner wanted to address. (Text Segment 1)

One respondent mentioned that failure to engage the users meant that the solution would not address factors that deprive the marginalised group's access to technology, highlighting the inequalities in South Africa;

The mother makes R4000 and have two kids she must pay school fees, transport and food. Honestly, we know that they will not be able to afford a smartphone. This is a luxury, data is expensive. So yeah. What do we do in such a case? Developing an app that integrates [with the] transport we had to then acknowledge [cost of data]. Are we going to cover their cost? Unfortunately, we cannot cover their cost. Therefore, we need alternative ways that can be accessible to the people. (Text Segment 2)

One respondent mentioned that their personal experience that they acquired over the years of using the public transport was the influence behind the development of the app. Such experience was seen as a vital source of information. Another interviewee confirmed this notion by giving an example of how they later learned one of the user's key issues that was not obvious to the solution developers—the importance of viewing users as knowledge providers was emphasised.

On the contrary, one of the respondents was critical of user participation because he believed the government leadership already knew what the user needs and issues are through other means. He said that he was of the opinion that all users have the technology required for the app, which according to him means they will not have difficulty accessing and using the app;

It was the prerogative of the province to go and find what is it that makes the users not to use public transport. Well, there is the question used to define the problem, why people are not using trains, why people are not using buses why people are not using...Uh. AreYeng. I would say seven in ten of them...would have some kind of a mobile device that is a smartphone that will call because all that is required [is] just as much. It was even less than a smartphone. But here I'm only just referring to a smartphone. I would say seven out of ten. They will have a smartphone. But this system was in a low end so that even someone who is not using a smartphone was catered for. (Text Segment 3)

Only one of the respondents mentioned that the problem identification had to be redone after a disastrous launch of their app. They further indicated that user involvement was the centre of the second iteration. The views of the respondent are exemplified in the following interview extracts:

You miss an opportunity. Maybe in the beginning to engage with the users, then you go back. The point I want to make is that we had a big launch and only then we started learning about the customer. Only then we started listening to the user and the customer. (Text Segment 4)

I think not involving the users did affect the project because if you develop something that you think people want, you might hit, or you might miss. So, it is something very basic that you start with a very clear understanding of what your constituents want. (Text Segment 5)

This [problem identification] was another missed opportunity to get input from the users. It was only later that we engaged and got some very good feedback on how to make our app more relevant. (Text Segment 6)

Respondents were asked to narrate how users participated during the system design and testing of the APP. The developers in all apps did not involve users during the design of the app. A user was not seen as a knowledge provider but as product user. However, they did give a narration of the source of insight used to inform the choice of solution.

4.1.2. Generation of Possible Solutions

The inventor's personal experience or the managers in charge was cited as the common source of solution. Respondents felt the need to assist the users in finding it easy to use public transport. Their experience was used as a guide in determining which features will make the life of community better. Below are some of the respondents' sentiments:

Commuters deserve a better experience, you know. I have been catching taxis since I was about nine years old, and it's been this way since then. I asked myself, is that really the only place it can go and is that really it? The

question was: How do I apply the skills that I have to attend to what I am looking at right now?"- (Text Segment 7)

Problem was identified as one of the limitations of the users to use their public transport to say that they are not able to connect, or they are not able to use various public transport. Of course, these [needs] were not necessarily deliberately set by the users. But it was one thing that was identified in terms of developing this project. Users themselves ...were not directly involved in my knowledge. (Text Segment 8)

One of the respondents said that it was his experience as an ex-public transport user that results in an omission of vital information that users needed as it was different during their days of using the public transport. Most respondents agreed that they missed some key functionality which would have benefited the user. The sentiment shared by one responded captures the general view:

I will give you an example. We launched the app without thinking about the weekend schedule. And so, the first weekend comes, and we start getting complaints on the app about the missing weekend schedule. I remember we literally had to post pdf files on the app on a Saturday because we never thought about it. I used to use the train from Monday to Friday. It did not occur to me that anybody uses the train on Saturday and Sunday. (Text Segment 9)

Academic research and projects can become a good source of identifying a problem that a specific community might be facing. At times it can be a desktop study that is conducted. Three respondents indicated that the solution was based on such studies:

End-user was never really involved. I would say it was more of a desktop study. The app came up when the executive travelled to Europe. So, what he experienced at the time was he was able to easily use the public transport system. (Text Segment 10)

OK, so I was not particularly involved in the problem definition. However, what was said to me at the time was that the executive wanted an

application that can aid user journey from Point A to Point B, and that must include all modes of transport such as public bus, train, taxi, and bicycle. (Text Segment 11)

After doing my research on the effect of a mobile advanced traveller information system, I was approached by someone from a government entity to develop an app that could assist with the dissemination of information to train users. (Text Segment 12)

The above-mentioned research details a study done on the use of mobile apps in countries such as the United States of America, London and Belgium on how mobile apps could be a potential solution in improving the experience of typical South African commuters (Go-Metro, 2012).

4.1.3. Interactions Complexities During Development of the App

Some respondents highlighted that the flow of information related to the development of an innovative solution - exchange of information - was not properly done. Furthermore, the respondents highlighted the lack of a formal process to manage innovation. For example, they mentioned that they were of the opinion that the community engagement had happened in other structure though they did not get any report or insight to that effect.

In support of the above view, one respondent mentioned that the mandate given to them was very restrictive, and this negatively impacted their ability to engage with the user community. At times, they failed due to information asymmetry that existed between the managers and developers regarding the problem to be solved:

Their solution was launched before any engagement happened with the users. There was no engagement with the potential users of the solution due to the contractual limitations that prevented engagement with the users. (Text Segment 13)

An important aspect raised above is that clearly defined innovation process are key to the success of solution development. The process would make it easy for

the structured flow of information from one actor to another involved in developing the solution.

One of the respondents mentioned that though they had a desire to engage with the users, the sheer volume of public transport and complexity of taxi structures discouraged them. Some respondents highlighted that the public transport sector is unstructured, which makes it difficult to know whom to involve when identifying the actors. According to their knowledge, this seems to be the pattern across government projects;

I think the minute that you deal with the public it does become difficult to engage with the users. So, my view [is that] the user requirements were not [solicited] properly if it was done at all. If you intended to engage with the users, it becomes difficult to know where to start especially in areas such as taxi [industry] where there are a lot of role players involved. (Text Segment 14)

Notwithstanding the view above, one respondent believed that the known public structure could be used as the gateway to the user community and then build from that information. Another interviewee who supported this sentiment stated that though disparities exist, both busses and taxis do have some form of formal or informal structure they belong to which could have been engaged.

4.1.4. Fitness of Solution to the Needs

Despite their lack of user involvement in the app development, the respondents gave an insight into the perspective of social innovation for the marginalised, how there could be a disconnection between the solution and the end-users. The respondents expressed their concern about the limitations which will make it difficult for the end-user to make use of the app. The respondents gave the following comments:

Technologies and mode of access are expensive for households that are still making end means to afford basic needs. We could have worked with the user in finding solutions that are within their skills and means. (Text Segment 15)

It is very key to know who your end users are and put them into different categories. Do they use Facebook regularly? Do they use apps regularly? Have they ever used data? Did they ever use the internet? Do they have a smartphone; do not have a phone? Different strategies [must be developed] for every type of customer based on the way they consume technology. (Text Segment 16)

Another respondent believed the way the app was done is for the elite and as such did not address the needs of the marginalised. In her view, the app was perpetuating inequalities.

My honest opinion, the app is for the elite. It is for people with a certain level of education. The app is not developed for an uneducated commuter and those with few financial resources. (Text Segment 17)

It can be argued that the respondents know the capabilities of their users though they highlighted the shortcomings that existed in their app in meeting those needs and user capabilities.

The majority of the respondents cited rush to launch as the main factor that influenced the decision of the actions taken. Though the approach inhibited some traits of a minimum viable product, the information provided indicated it was not an intended approach. Lack of adequate time contributed to the omission of user participation. Some respondents' expression are as follows:

And then so we were working against time and such we were not able to engage the users. One of the challenges with the project was tight timelines. I think that the manager needed to deliver the project before his contract expired. (Text Segment 18)

If I remember correctly, time was a major issue, and we wanted to get the app off the ground ASAP. (Text Segment 19)

In agreement to the above, one respondent argued that the culture of chasing the launch dates results in incomplete solutions at times;

You could imagine that everything must be a big launch so yeah. Launch the new train, launch that. We then overlooked the users and focused on the functionality of the app. (Text Segment 20)

Even though the projects did not involve the user, it gave users a platform to raise their needs after launch. The respondents narrated how the app's initial version became a reference point for end-users to start adding ideas on how the solution could be improved. Furthermore, they highlighted that this was a lesson learned not to leave your end-users in the first place.

I got one email from a blind guy who uses the train and he sent me this long email. He has this software that he talks to. So, he basically gave me ten ways to make our app better for blind people. Furthermore, another guy highlighted that when the transport is late, they need a credible way of letting their bosses know that they will be late due to issues with public transport. (Text Segment 21)

In agreement with the narrative put forward by Foucault (1982) scholarship on power and knowledge, as well as Amartya (Prendergast, 2005) Sen's view of development as freedom, marginalised voice is key in taking control over their future. Two respondents, for example, agreed that the users are the ones to tell you what their fears, needs which could assist in balance power as opposed to dumping a technology on them.

4.1.5. Closed Testing and Piloting of the App

When respondents were asked about the user community's involvement during testing and piloting of the app, the majority commented that this was limited to the developers. The app was not given to the community to test and provided feedback.

During Project execution level, we did not involve the end-users. The scope was changed constantly but still no input from the end-users. I mean even the trying out of the app was done by the team that was involved in the development of the app, they did their testing. (Text Segment 22)

The testing of the app was purely done by the developers with no involvement of the users. (Text Segment 23)

Some respondents linked the absence of piloting of the app to most of the negative feedback that they received from the user community. An analysis of the user comments on the Google app store showed that users felt the app was not properly tested as it had the wrong information, certain functionality was not working, and the app was only working on some devices.

Differing to the approach adopted by the majority, one respondent indicated they opted to roll out the app in a phased approach as it allowed them room to get feedback and correct bugs before rolling the solution throughout the country. They did this by launching it to limited taxi ranks where they engaged the traveller, provided downloading facility and subsequently asked them for the feedback.

The pilot APP has been launched to a limited traveller with the aim of getting feedback and improving on it. (Text Segment 24)

4.1.6. Assessing, Scaling Up, and Diffusing Good Ideas

To overcome the technology "chasm", proper planning and mobilisation of resources is essential. Social innovators need to capture a community of supporters' imagination by combining contagious courage and pragmatic persistence. Limited information sharing happened during the rollout of the solutions in which developers engage with the end-users of how to acquire and subsequently use the app.

Two respondents indicated that one-on-one engagement with the users did more than raising the awareness of the app, but it gave them an opportunity to identify the challenges that the users had. They quickly learned that some users lacked

the ability to download the app, which necessitated the introduction of “Free Wi-Fi” in some taxi and train stations. The respondents further stated that the engagement with the users face-to-face gave them an opportunity to impart knowledge as some users had difficulty operating the smartphones. In return, the users also gave an insight into how the developers can better the app.

We went to stations in the afternoon. Being the entire company, you know whether you are working in advertising or anywhere. Everyone put on a vest and go to the station. And then we do two things: we hand out the flyers, and we talked to the users. This gave us an opportunity [to] understand the challenges that the users had in using our app and raise awareness to those who never heard of it. We learned a lot during the engagements with the users. So, we had to learn from that lesson that we actually did not know what the users' needs were during our initial rollout. (Text Segment 25)

In the taxi rank where we basically engaged the communities, we allowed them to download the app. We provided downloading facilities, and they were able to engage [us]. (Text Segment 26)

One of the respondents indicated that engaging the users gave them an opportunity to pass knowledge to some of the community members since their techno-savvy level was low. It necessitated them to develop a manual as the initial approach of users learning by doing, using, and interacting was not adequate. Although at first training was deemed not to be necessary, the experience proved otherwise.

All respondents cited that they have a social media platform used to source feedback from the users. Some respondents expressed that the social media was mainly used during the apps' launch, and the volume has dramatically reduced over the period in certain instances coming to a total halt. Social media mentioned included Facebook, Twitter, and Instagram.

Twitter was used to let the users know about the app that has been launched. The reaction was mixed view from the users. I mean, even if we

go back to Twitter. When the app was launched, there wasn't much activity. I mean, there was not even build up then. I think it remained on the Internet for few months. (Text Segment 27)

Yeah, social media was the main source of marketing the APP to the potential users. (Text Segment 28)

Social media platforms (Facebook, Instagram, and Twitter) showed that all the apps in the study did engage with the users at some point. An analysis of the app developer's social media presence demonstrated traits of a one-side communication where app developers were sharing information with users with minimal user induced communication. Most of the communication was of marketing in nature.

Majority of respondents reported that mass media was key in raising awareness of the app with the intended user base. The mass media platforms were effective in communicating the development in the public transport space.

Interviews were done with various media houses explaining the app and sharing with the public where the public transport system was going. (Text Segment 29)

There was a launch, and several media houses were invited, and several government officials were in attendance. (Text Segment 30)

Notwithstanding the above view, a respondent raised concern regarding a big media launch as they believed that build up marketing campaign was supposed to be made before the big event. They attributed some of the push back regarding the app to the fact that people were shocked by the announcement. Media publications regarding the launching of the apps were found in various media platforms which includes radio, television, online blogs and media houses (Eye Witness News, 2018; JoburgToday, 2018; Mail and Guardian, 2018). The findings were in support of the statement made by various respondents.

Despite the lack of user participation in the project, the respondents gave their perspective about innovation and how various public transport actors were important. Two respondents expressed that some public transport operators and associations assisted with the legitimisation of the app. This view characterises legitimacy, which is derived from perceived value.

Some taxi associations were very supportive in making the app a reality and are very interested in knowing what commuters are experiencing. These associations saw this platform as a tool which can assist them in improving the rider's experience and thereby changing their perception of the taxi industry. (Text Segment 31)

4.1.7. Limited Funds as a Constraint for Solution Diffusion

The study's findings indicated a mixed outcome regarding the sustainability of the apps, with the majority of participants indicating the difficulties they had to overcome. Funds were evidently the most common barrier that forced the developers to forego some of the key features as it was no longer affordable for them. In one case, the app was dimmed unattainable and had to be stopped. It was common for the sponsors to come in when the project started, yet the same sponsorship is withdrawn soon afterwards. This, to a greater degree, affected those that were relying on USSD.

One respondent narrated the impact of the funding withdrawal. In the interview, he mentioned how the SMS service had to be stopped when the sponsorship was withdrawn leaving the user without access to data or smartphone stranded: "We run out of funding for USSD services". Lack of funds was cited as a reason for discontinuing the USSD services. The USSD was meant to provide service to users without Smartphones.

We provided USSD to users without Smartphones. However, when the sponsor withdrew their funding, we had to stop as we could no longer sustain it. (Text Segment 32)

*USSD was a great initiative, but no one was willing to fund the cost of it.
(Text Segment 33)*

Despite the challenges of funding, one respondent indicated that it drove them to finding innovative ways of sustaining the business.

The app is being self-sufficient as a commercial model. It gets paid through advertising. We keep advertising revenue that comes through the app. That has covered its costs and allowed us to support it and keep it going. Pretty much full for the last six years. Yeah! It is self-sufficient. There is a significant demand for this [public transport app] service. People really need this information. And it solves an important need in society. (Text Segment 34)

4.2. User Feedback as the Main Voice in Public Transport Apps

This section aims to examine how feedback from the user community was used to improve the apps. Continuous improvement partly depends on the interchange amongst the various role-players, which include the user community. In other words, feedback loops must exist to get the input informed by learning from the user community, which can then be used to adapt the solution. This section is divided into two parts; the analysis of the feedback system, and the last section presents findings of app rating as it was identified as the most used mechanism.

4.2.1. Results on the user feedback system

Respondents cited the importance of user feedback as they saw it as an avenue to improve their app. The respondents reported that there were some forms of feedback mechanism used to get the users' views. However, they could not provide a process that guide how idea or feedback from users were managed throughout its lifecycle. The responses pointed towards an ad-hoc review were each individual approach the feedback as they see fit.

When respondents were probed to provide what was done with the user's feedback, they provided mixed views. Some indicated that they did look at some of the feedback, and on few instances the idea was incorporated into the app.

Majority highlighted that the way feedback platform such as app rating is structured made it difficult for them to get actionable insight. Still, all respondents were reliant on such channel for most of the feedback. Below are some of the interviewees' sentiments regarding feedback mechanism.

We value commuters' feedback because we do want our app to be something that is as easy to use than their current system. (Text Segment 35)

Well, I can't comment on all of them, but I'll say maybe one that I do remember of course. When you do something you do expect some come backs and some fair comments and some unfair reviews on how they are finding the app. Of-course, there was a hype around it. So, the users did give in their own comments. There were some other functionalities which were missing and others not functioning as intended I should say. (Text Segment 36)

The respondents interviewed did not only reveal the mechanisms used to engage with the user community but also revealed how some of the feedback informed the generation of new knowledge. The interviewees mentioned the importance of user participation but revealed that it is often done too late in the process. One respondent believes that early collection of feedback from the users could have saved their project which ended being canned shortly after its launch.

Another respondent remarked on the importance of user feedback. The respondent was critical of the channels that were used to collect feedback from the user. This can be attributed to how the app rating system works, allowing quick score without providing any rationale for it.

We received a lot of user feedback via the app rating channel. Although very few of the reviews provide information which can be used to improve the app most of them were just low score without any explanation. At times the reviews were bad but had nothing to do with the app but more to do with the issue regarding the train in question. (Text Segment 37)

Regarding app rating system as a feedback mechanism, respondents indicated that most of the feedback came through this channel. In agreement with the literature review findings, respondents indicated most of the time the app was used to complain about subjects that had nothing to do with the functionality of the app. They argue that the score rating did not provide much information on the action that they must take next. However, some respondents highlighted its limitations:

Some users will give us one star because the train was late which had nothing to do with the functionality of the app. Similarly, other will give three or five stars without any explanation for the score. (Text Segment 38)

We received app reviews also through the app rating features available on the app store and google play. (Text Segment 39)

Users gave a lot of bad reviews via the google play rating feature. (Text Segment 40)

One participant remarked on the importance of taking the context into account when collecting input from the user community. She mentioned that the traditional face-to-face collection of feedback allowed for an in-depth understanding of the issues, which helped a lot in the generation of new insight. The input from the user community has greatly influenced changes to their system.

Some feedback channels were found to be too busy and thereby requiring a considerable amount of effort from the developers. Some believed that feedback must be institutionalised into the innovation process of the organisation, if it is to become fuel for the organisation's innovation process.

The email system was mentioned as one of the channels that are used to get feedback or request from the users. There was not much emphasis on how it is used but rather more on it still be an option.

There was also the email where users could send in their comments on how they are finding the app. (Text Segment 41)

Still one respondent emphasised the use of email by narrating a story: -

You know people who use the app would email us and I remember a number of people would email us and just tell us what they thought. I got one email from a visually impaired guy who uses the train and he sent me this long email. He has this software that he talks to. So, he basically gave me ten ways to make our app better for visual impaired people. (Text Segment 42)

Another example was the introduction of a feedback button that was used to collect responses from the users. The feedback button was deemed to provide more insight over all the channels that were used to collect data by a particular respondent. Some of the comments regarding using a feedback button to get users' perception of the solution were:

We had a little feedback button which enabled the users to tell us exactly what was wrong with the app; if there was a schedule missing, if there was a certain train missing on the route. So, users would give us hundreds of comments on how to improve the app and in return, allowed us to give them what they want. A lot of features came from users suggesting those features to us. (Text Segment 43)

It is evident that the feedback button was valued as a mode of receiving feedback from the user. The respondent indicated that some of the new features came from the suggestion made via the feedback button.

A respondent gave an insight of how the feedback was extended to be a collaboration platform for the app users. The feedback channel was used by users to give feedback and for user-to-user engagements. This became key in solving some of the incorrect information presented on the app.

The app also features a forum, where commuters can find out about things such as disruptions or congestion and raise their concerns and post queries.
(Text Segment 44)

It can be inferred that the respondents valued the feedback from the end-users, even though they differ in how they approached it, or the tools used. App rating received mixed feeling as others view it as a platform where users give a score that has nothing to do with the app.

4.2.2. Sentiment's findings of the App store review

To cross-reference the interviewee's response in the previous section and get additional information that might have been missed during the interview, the user comments found in the app store were collected and analysed. In keeping with the anonymity of the participants, the verbatim comments of the users are not shown as they are publicly available with potential risk of revealing the identity of the users. App store rating feature was mentioned as a simpler way of getting feedback from the users as it is there by default on the app store. To assess the feedback provided by the user community, the app store reviews were used to get an insight into the user perception

An examination of the acknowledgement revealed that most of those responses appeared to be auto-response as the message was almost the same per app. An insignificant number of developers' feedback probed the user for further information encouraging them to send through new features the users would like added on the app.

Regarding acknowledging the user's feedback, the analysis shows that, on average, only 10% of users' feedback was acknowledged. The acknowledgements were done at random time frames and usually in bulk. For example, the developers will respond to seven consecutive message, and then be silent for the next 30, and then respond to another five feedback messages.

As some respondents have highlighted in previous sections, the app launch also attracted a lot of negative reviews from the user community. The two main

categories that stand out in the comments were wrong or missing information, and the App's inability to execute as intended. These issues also resulted in the users low rating of the app. Other comments pointed towards the frustration the users had in using the app.

To get some insight into the voice of the users regarding the various apps, comments were retrieved from the Google app store and subjected to a sentiment analysis tool. Three of the apps covered in this study had data that was still accessible. To hide the identity of the apps they will only be referred by their pseudonym namely, App A, App B and App C. The intention was to get a sense of the users' perception of the public transport app. The sentiment analysis tool which gives a score which represents the mood of the overall comments per app was used. Theysay[®] computes the given text into three sentiments: Positive, Neutral and Negative for an overall score of 1. The higher score means that mood was quite strong in the text provided.

An analysis of how the users' mood changed over the years was conducted. Reviews for each app were divided into three equal time periods namely, early, mid-, and late period. The early period contained all the reviews that occurred during the first one-third; mid-period contained the second one third period of the comments; and the late presented the last 1 third of the time frame. For example, an app with comments ranging from 2010 to 2018 will be divided as follows: Early period will be from 2010 until 2012; Mid will be 2013 until 2015; and late will be 2016 until 2018.

App A

Figures 8 summarises users' sentiments of app A for the early period, highlighting a balance between positive and negative views. The data shows that 47% of the comments were positive. Users were praising the initiative taken by the innovators in solving a need for commuters. Although users were happy with the initiative, they believed that the app had serious flaws that needed significant updates. The negative comments can be categorised into three main issues: user experience, technical glitches and lack of features perceived to be necessary.

The findings point towards a diffused app that intended to solve a need within a community but not conceived in line with the users' capabilities and expectations.

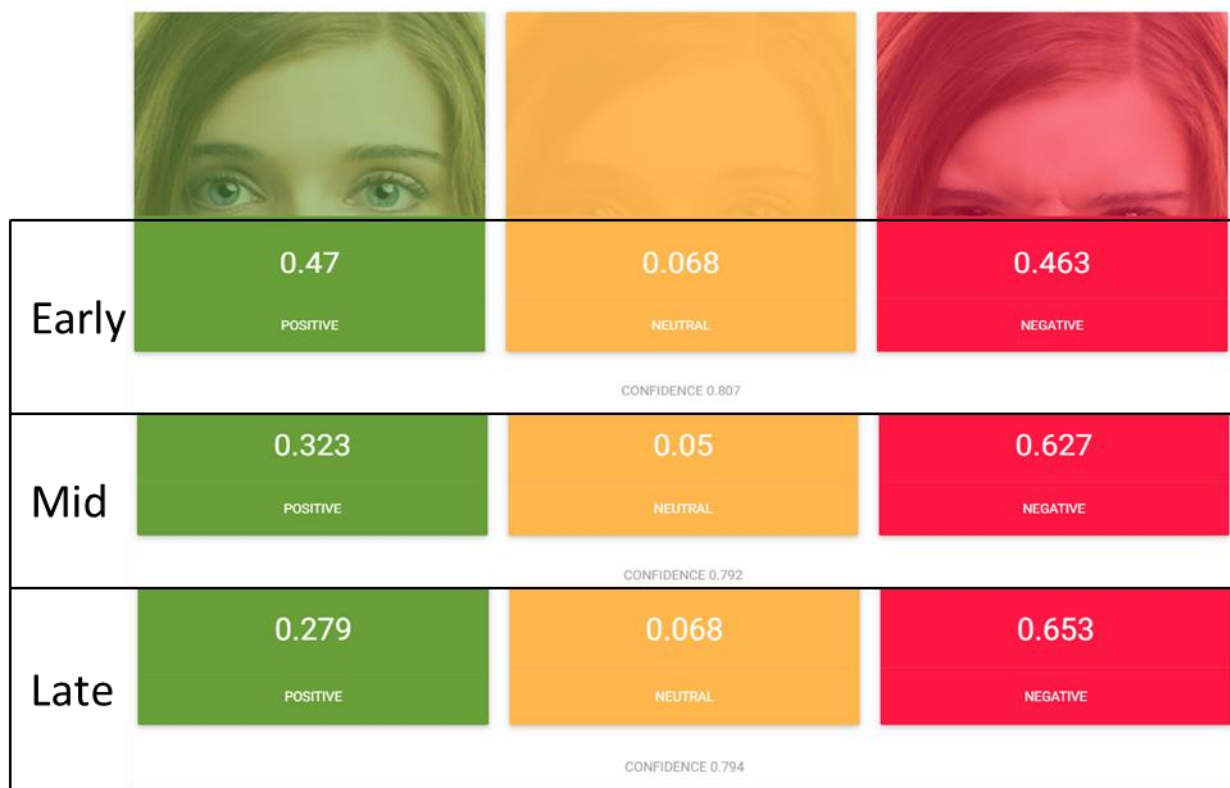


Figure 8: App A users' sentiments over the years

The above figure illustrates that the users' perception during the mid-period were more negative by 16% compared to the early period stages of the app. Like the early period, users raised concerns regarding user experience and technical glitches and lack of perceived key features as those that were done during the early stages of the app. It was observed that the users started to also demand more advanced functionalities. The initial app seems to have triggered ideas from the user community on how the app can be made better. It appears as if the users' feedback given during the early period was not considered. This finding points towards app developers who were not proactive in gathering user feedback with the aim of offering better experience.

Likewise, in the late period the users' sentiments continued to shift from positive towards negative. The sentiments of users' comments highlight that the mood was seriously negative (65.3%). The data shows that 27.9% of the comments

were positive. Most of the negative comments could be categorised into two main issues: user experience and technical glitches. The users were getting frustrated with the app and discouraging other potential users from trying the app. It appears as if the app was getting worse as time goes by resulting in frustrated users.

App B

For app B, users' sentiments show a robust positive perception during the early period. The positive sentiments are 51.8% compared to 41.9%, which are negative. App B user perceptions are similar to what was observed for app A regarding the need that was being solved. However, for app B, the users were unhappy about the information presented by the app as they felt it lacked critical urban transport operational status and alerts.

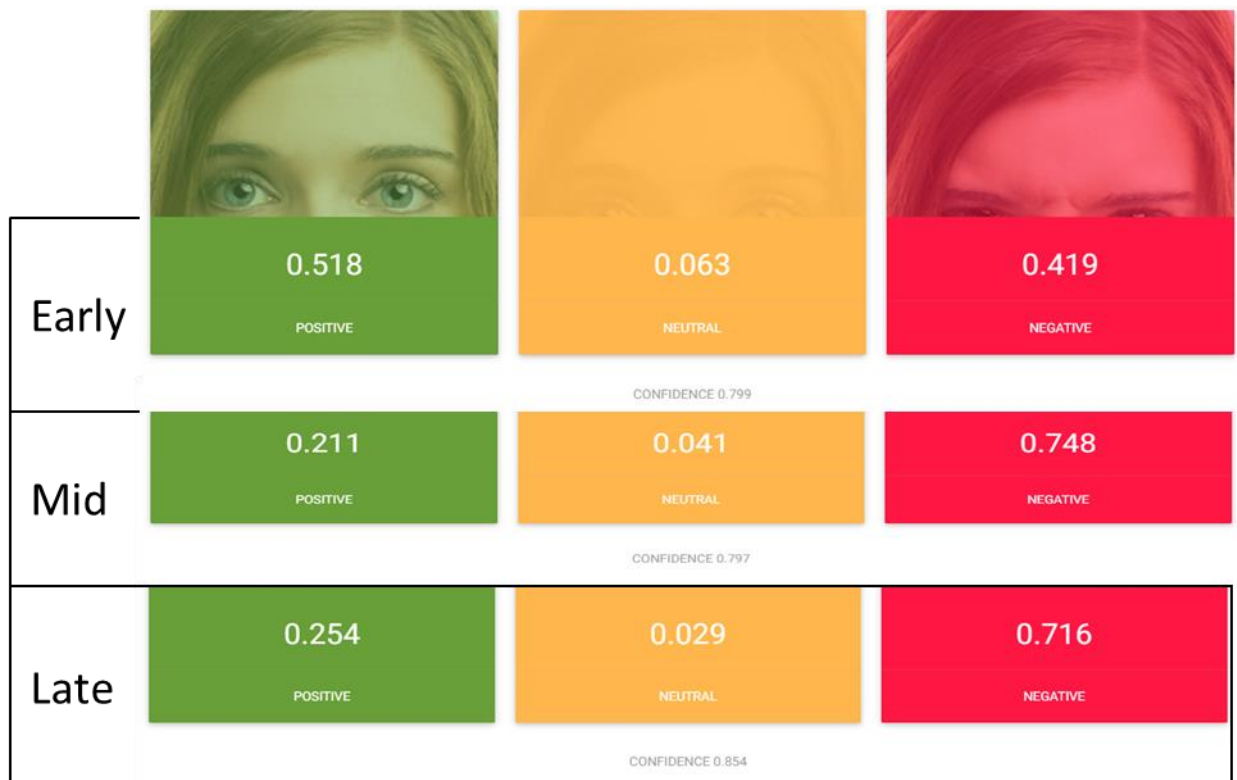


Figure 9: App B users' sentiments during the early years

Figures 9 summarises the sentiments on users' comments, highlighting that the mood was seriously negative (74.8%) during the mid-period. This shows an

increase of negative perception by 32.9%. Most of the negative comments could be categorised into two main issues, technical glitches, and wrong information. Compared to the early period of the app, it appears as if there were changes that resulted in the app not functioning as intended (based on the comments reviewed). The update seems to have resulted in the wrong computation of the information presented to the users.

As observed in the above figure, there were very minimal changes regarding user sentiments compared to the mid-period—the negative sentiments reduced by 3.2% towards a positive sentiment. Users still felt the app was not providing expected information. The slight improvement could be driven by a feature that was added that the users found to be of value.

App C

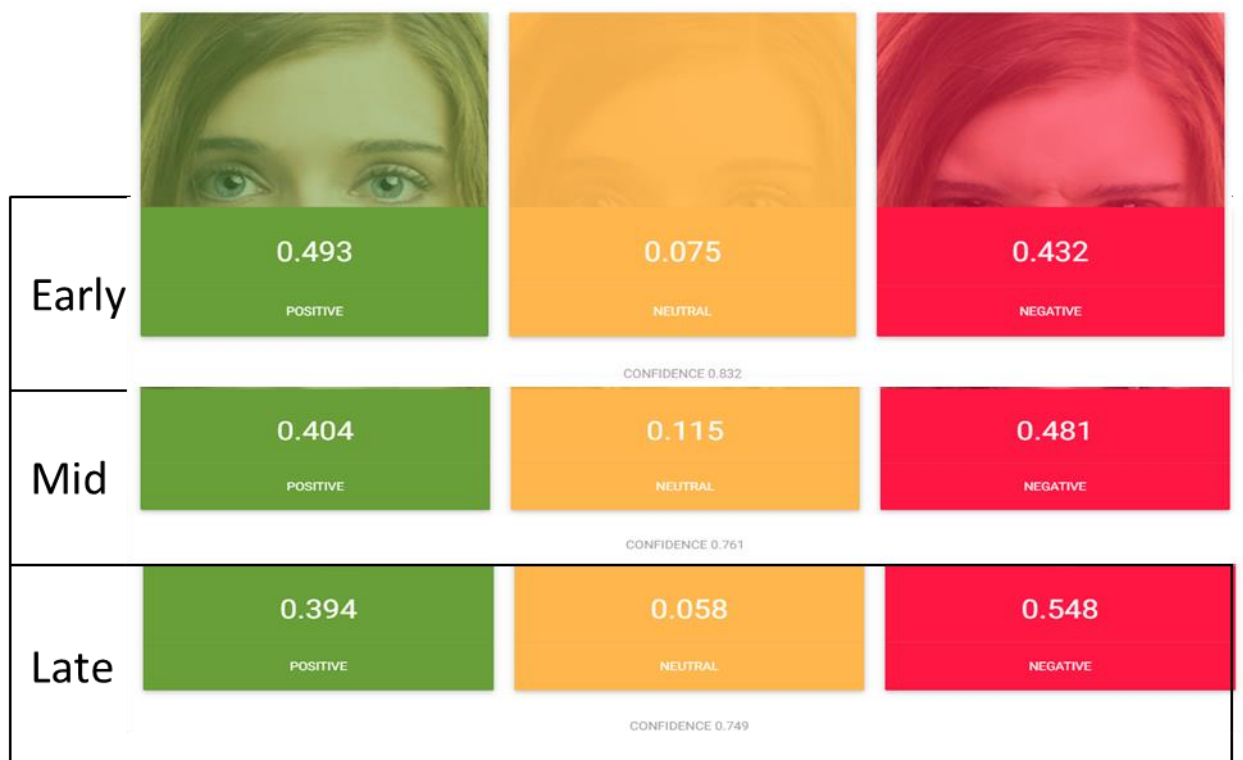


Figure 10: App C user's sentiments during the recent period

Figure 10 summarises the sentiments on users' comments which emphasises balanced sentiments between positive and negative during the early period. The data shows that 49.3% of the comments were positive. Users were praising the

initiative taken by the innovators in solving a need for commuters. 43.2% shows that users were unhappy with the app as they believed the app had serious flaws and needed significant updates. The negative comments were mainly centred around the lack of some key features, and wrong information displayed. This finding concurs with the respondents' view on the lack of comprehensive testing and absence of user during the testing phase. Users gave positive sentiments as they value the initiative of having public transport information at their disposal.

The above figure shows a minor change during the mid-period compared to the early period regarding app C's user perceptions. An analysis of the comments revealed that the users could not interact with the app due to technical glitches. Yet, other users were happy that the solution was working and providing relevant information. The comments show that those who were not happy when using the app were finding bugs on the advanced features while those who were happy were using the basic features of the app. This clearly shows that users have different capabilities and as such expect the solution to meet their capabilities.

During the late-period, there was an increase of 6.7% in negative sentiments compared to the mid-period. Most users mentioned that they were unable to use the app at all. Few users mentioned that they were able to interact with the app, and as results, they provided positive sentiments. From the comments, it appears as if the app was only working on a limited brand of devices since some users mentioned that it did work on the previous device and not on their new device. Overall majority of the users were not happy with the app.

4.2.3. The Apps' Overall Sentiment Overtime

The graphs in figure 11 give an overall picture of how the user sentiments changed over a period of time. All apps start relatively balanced between positive and negative sentiments. This is followed by a drop in positive sentiments and an increase in negative sentiments. The same is observed for the recent period except for app B where a slight increase in positive sentiments is observed.

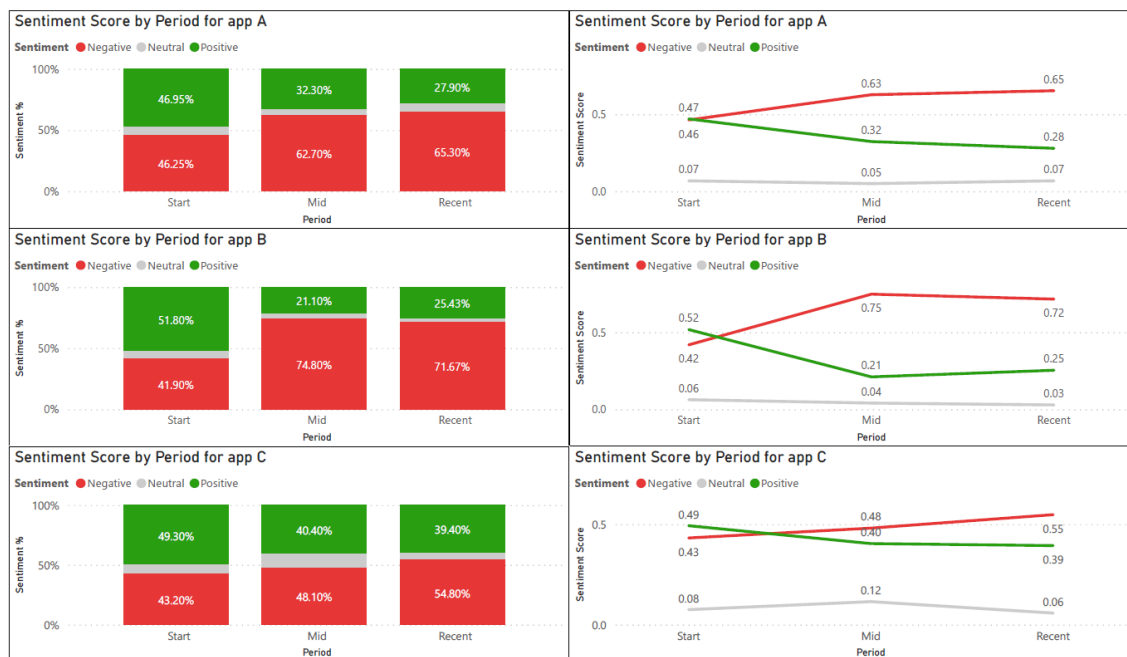


Figure 11: Sentiments for all apps over various time frames.

Although it was observed that app B negative sentiments during the mid-period was significant compared to the other apps, user comments displayed that the users were happy with the initiative. However, they are unhappy with the lack of key features, technical glitches, and user experience deemed unfriendly. This could be attributed to the absence of the user's voice during the design and testing phase based on the comments of the interviewees who mentioned that involvement was limited to the specialists. Overall, the perception of the app appears to be dropping with each change in period.

4.3. Summary

This chapter presented the empirical data collected in this study. The data revealed complexities that affected the app development process.

From the interviews, it was clear that the respondents did not undertake to engage the users during the development of the apps. They nevertheless acknowledged the value of walking the path with the users. The results showed that the app development organisations utilised methods such as copying what other countries were doing and developers' experience in shaping their app. The chapter provided some insight into how time, lack of standardised process and

money was a significant factor in some of the decisions taken. Lack of localisation was identified as the shortcoming of the approach chosen.

The interviewees indicated that some organisations were not open to sharing of data. However, some respondents reported that these challenges drove them to come up with innovative ways of ensuring sustainability of their apps. The need for public transport in agreement with the respondent's views was amplified by several reviews from the comments from the users.

The findings revealed that user feedback was collected through such channels as email, face-to-face, feedback button and app rating. Nonetheless, app rating was the main source used, and it had shortcomings which reduced its effectiveness. Results further revealed a low feedback acknowledgement rate and lack of customised responses. Face-to-face feedback mechanisms was stated as a better way of handling these assisted them in getting insights to the shortcomings of the app. Face-to-face allowed developers to observe and discuss what the users' challenges were in accessing or using the app and where possible solutions were provided.

Majority of the complaints were technical where the app was not working as anticipated by the users. Information quality was also mentioned as a downside to the app. Because of these issues, some users saw the app as a waste of their data and time.

CHAPTER 5: Discussion of the Findings

This chapter focuses on the analysis of the findings presented in Chapter 4. The chapter is divided into two sections: the community's role during the development processes of the public transport app; followed by collection and utilisation of the users' feedback.

Primary data was collected through interview and secondary data from online sources which includes organisations' websites, social media platforms and media houses. The data from chapter four was cross-referenced with the documentary analysis

5.1. Limitations of Centralization in Identifying Community Needs

Social innovation aims to diffuse a new idea into existing social problems that are not currently being addressed by available solutions (Mulgan, 2006). Rogers (2003) suggests that organisations should adopt a diffusion system that is balanced between the centralised and decentralised participation models. A decentralised (bottom-up) approach to innovation encourages the local community and other role players to express their views and participate in the innovation process. Participation of the users has an impact on how innovation is diffused. Generation of new ideas from the bottom-up and mobilising citizens for social inclusion positively influence the diffusion of innovation (Hubert, 2010). Rogers (2003) mentioned four characteristics that should be considered when balancing the diffusion system, i.e., (1) the degree of centralisation in decision making and power; (2) direction of diffusion; (3) who decides which innovation to diffuse; and (4) amount of reinvention.

The findings show a clear preference for a centralised diffusion system during the development of the apps. Respondents stated that the decision making, and control were restricted to the officials and technical specialists with no 'involvement of the community'.

Christopher and Richard (2013) suggest that innovation must be undertaken such that the type of learning, the level of community involvement and their inter-relations, are enhanced and not confined to the formal actors. Organisations that are developing a solution for social purposes must strengthen their relationship and involvement of various actors such as users and community representatives. This fosters a better understanding of problems and context, which is vital in shaping the innovation to be diffused. More importantly, the innovator's source of knowledge should not be restricted to formal/expert actors as ideas originate from many sources (Kraemer-Mbula & Wamae, 2010). This also serves to empower the end-users to acquire the capabilities required for their freedom to choose and influence design and repertoire of the solutions.

5.1.1. Disregard of Contextual Challenges by Experts

Most respondents stated that senior officials decided on the problem to be solved. The awareness of innovation inspired the idea of the needs that could be solved. One respondent indicated that the challenges faced in the public transport space, such as information asymmetry, led them to consider using their skills to solve the problem they deemed relevant to their fellow community members. It was evident from most responses that the community did not form part of the problem or need identification and analysis, yet the project was able to solve issues such as location of taxi ranks and train platforms.

In contrast, Somosi and Krisztina (2018) argue that it is almost impossible to solve social problems without the direct creative participation of the community. As much as the innovator might have insight into the technical know-how, it is still essential to ensure cooperation with the society since successful innovation involves technical and social changes (Simon & Davies, 2013). In fact, Brown and Wyatt (2010) state that going to meet the users is not enough if one has already preconceived ideas of the challenges and solutions. Some respondents cited that the apps developed failed to provide train status, accurate routes, and costs. Successful social innovation depends on groups, such as marginalised groups, rather than relying on a handful of skilled people and social entrepreneurs (Westley & Antadze, 2013).

5.1.2. Hurried Implementation Inimical to User Engagements

Time was indicated as the fundamental factor that inhibited attempts to get the voice of the community. This finding is similar to Maria et al. (2012) on the participatory community involvement in the project, which found that the project leaders perceived user engagement led to the delay of the project. However, the study further suggested that the involvement of the community gave critical insight to the project team.

The respondents indicated that there was pressure regarding the date that the solution had to be launched. They were of the opinion that overlooking the community assisted them to meet the deadlines. However, they said that once the apps were launched there was a push back from the user which made them to undertake community engagements. This then allowed them to understand the community challenges better and thereby developing solutions that are compatible to the needs and ability of the community.

5.1.3. Benchmarking for Awareness of Possible Solutions

The findings revealed that foreign travelling was one of the mechanisms that were used to acquire knowledge about available innovation. The respondents cited that leaders would go to foreign countries and learn about innovations used in the public transport sector. The findings from those trips were used to inform the innovation to be diffused. However, the respondents criticised the implementation of this method as it failed to consider the difference between the source country and their country which was inundated by high level of digital divide and low level of income (Christopher & Richard, 2013). The failure was caused by the lack of adaptation of the innovation to the local context.

Kayal (2008) asserts that developing countries should craft the innovation system to model their context without merely copying another country to be successful. These are the same views shared by researchers (Kraemer-Mbula & Wamae, 2010; Maharajh et al., 2014; Merwe & Grobbelaar, 2016; Voeten et al., 2011). Even though the projects did not involve the user, it gave users a platform to raise their needs after launch. The respondents narrated how the app's initial version

became a reference point for end-users to start adding ideas on how the solution could be improved.

It can be concluded that copying or benchmarking on other countries is not wrong. However, care must be taken in contextualising the idea to make it applicable to the environment. Vasin et al. (2017) argue that benchmarking, comparative, and historical analysis to study foreign experiences of social innovation should be used to identify best practice while formulating and identify possible antecedent conditions needed to develop localised social innovations. Findings from the users showed that their needs were misaligned to what the solution was providing and, to a degree, not accessible due to high level of digital divide.

5.1.4. Experts-only solution design: New Groups of Excluded Communities and ill-conceived Apps created a new group of excluded community

Howaldt, Domanski, and Kaletka (2016) perceive social innovation as community and customers no longer limited to providing information about their needs (as in traditional innovation management); they make contributions to developing of new products to resolve problems. Integrating local interest in decision making provides a more affluent and detailed view of where the innovation will be diffused (Maria et al., 2012).

Based on the participant" responses and document analysis, there was no evidence of user engagement during solution development. Solution design was constrained to the leaders and developers. Failure to engage the users has the potential of mismatch between the diffused innovation and community's need (Christopher & Richard, 2013). The expert-led approach can treat the symptoms rather than address the root cause of the problem (Murray et al., 2010).

As pointed by some respondents, apps were built on assumptions that the users have data to access this solution. Nevertheless, this was later proven to be one of the barriers. Respondents engaged the user after the rollout of this solution and found that not everyone had a smartphone. There was another group of users who had smartphones but were not knowledgeable about how to use the

apps. This illustrates the importance of user involvement, mostly when a solution is done for inclusion purpose. According to Lubberink, Blok, van Ophem, van der Velde, and Omta (2018), inclusion is about the involvement of stakeholders and society in a manner that can guide innovation in the desired mutual direction. It is, therefore, fundamental that when a solution is built, it must not be built *for* the user but *with* them since the aim is building awareness, knowledge transfer and impacting community.

Prototypes of an idea allow innovators to quickly get feedback from potential adopters (Mulgan, Tucker, Ali, & Sanders, 2007). According to Onsongo (2019), feedback will signal if the potential adopters want this solution and any adjustment that needs to be made. In the case of M-Pesa, the system was adapted to local languages and devices that were used amongst the unbanked population (Hughes & Lonie, 2007). Respondents cited that overlooking piloting of the app resulted in significant negative perceptions due to the misalignment between the users and the diffused innovation. Similarly, users' comments on the app review highlighted challenges in interacting with the app. Several times users mentioned the inability to register to the service and difficulties in navigating the app.

In retrospect, the developers reported a missed opportunity to include some key features such as the weekend schedule which could have reduced the negative feedback from the users. When exploring what might limit the scaling of solutions, Mair and Seelos (2016) mention that organisations need to test potential solutions and avoid the big bang approach by conducting several pilots and experiments. Importance of prototype to solicit feedback from the users is emphasised. Respondents indicated that they adopted the big bang approach. Prototyping and experimenting with different solutions give the developers a glimpse of whether the solution proposed will meet the requirements that were identified in the initial phases. This allows adjustments to be made. Nevertheless, in the apps that were studied, it was evident that developers closed tested the idea, citing time as the barrier. This finding highlights the danger of rushing to diffusion innovation without creating a connection with the community.

5.2. Communication channel and feedback mechanisms

The active dissemination of information and technical assistance helps spread the innovation impact, which fuels innovation diffusion. According to Rogers (2003), mass media channels are good for knowledge sharing, while interpersonal channels are vital during persuasion stage.

When the solution is out there in the market, unintended consequences arise, shortcomings are identified, and new demands might arise. Feedback loops must exist that ensures learning from the field are captured and apps are adjusted (Mulgan, 2006). Sello (2017) states that it is of little value if the feedback mechanism is not monitored and evaluated for effectiveness. Although customer feedback collection is noble, they are typically ignored as part of the overall solution development, which means that the users requested do not get prioritised as part of the features selection (Fabijan et al., 2015). It is not more about collecting the users' feedback but about how the users' voice is embedded in the organisation's processes. The organisation must have open innovation culture.

5.2.1. Ad-hoc Mass media not effective for raising awareness

Mass media communication channel effectively raises awareness about the innovation to potential adopters. The assumption is that the recipient will be able to decode and understand the message. Mass communication is cited as being key in raising awareness-knowledge about a new idea. With mass media channels, innovation trickles down. Respondents mentioned mass channels were used to disseminate messages to the potential adopters via media events, media houses and radio stations. Respondents cited that the mass media coverage was done when the project was launched, with limited pre-launch and after launch messages. They cited that using mass media as a one-stop-shop is not enough as they believe that constant messages must be sent out. This view is supported by Joshi and O'Dell (2016), who mentioned the importance of persistence use of messaging channel to reinforce the message.

When different structure emphasises the same message, it becomes widely disseminated and normalised. Therefore, the constant flow of intact message must occur to raise awareness-knowledge. As indicated by the respondents, this result shows that the effort was on creating awareness-knowledge and not on how-to knowledge, which was not very effective in assisting the potential adopters in deciding to adopt an innovation.

5.2.2. Face-to-face user engagement nurtured exchange of information.

Rogers (2003) cites interpersonal channel is effective in persuading an individual to adopt an innovation. Respondents also supported this view by saying that face-to-face engagement with the potential adopters allowed for the exchange of information, which was key in users adopting the solutions. The developers were able to find additional barriers that were preventing the users from adopting the innovation, and in certain instances, they were able to transfer knowledge to the users.

Missing functionality on the app was also discussed during the face-to-face engagements with the users. The respondents said that face-to-face was the most effective channel in advancing adoption. This finding is in line with the view that face-to-face is still relevant and must not be substituted by new methods but supplemented (Garau, 2012).

Similarly, a study done in South Africa by Vivier, Seabe, Wentzel, and Sanchez (2015) concluded that a vast majority of the community preferred to be engaged in face-to-face meetings. This is due in part to the lack of access to the ICT platform and the level of education in certain instances. The participatory approaches that include face-to-face allow the citizens without technology at their disposal to participate in the process of social innovation (Garau, 2012).

One respondent emphasised that face-to-face allowed them to understand better the difficulties the users were faced in accessing the app. Given the level of the digital divide in South Africa, face-to-face interaction should form part of the end-user engagement strategy (Mcleod, 2017). Those who are not tech-savvy will be

excluded if one moves from a base that all have resources and knowledge to access the platform. This is critical since most of these apps were done to provide a solution for the marginalised public transport users i.e., those with limited educational background, low income, and limited access to smartphones.

5.2.3. Late Use of Social Media's Contribution to One-sided Communication

Respondents cited that social media platform was used to communicate with users. A study done by Martin and MacDonald (2020) demonstrates that social media (Instagram, Twitter and Facebook) encourages conversational engagement in terms of the number of comments and unique individuals involved in conversations with the specialists. Contrary to this finding, a review of the public app developer's social media pages points towards a one-way communication. Furthermore, the results indicated that the flow of information was mostly from the developers, with an insignificant response from the users.

The social media platforms were mainly used to broadcast information to the users, and in most cases it was general news. The usage of social media platforms late in the app development appears to have resulted in low engagements. Martin and MacDonald (2020) state that engagements tend to be high when used during problem identification and ideas generation. The analysis of the messages displayed characteristics of knowledge-deficit (Lee & VanDyke, 2015). In other words, the social media platforms were mainly used as broadcast tools meant to inform and not to foster engagement. This finding highlights that social media platform was not used effectively, resulting in a lack of replies, questions, and engagements. The results show the complexity in fostering a conversational exchange of information.

5.2.4. App Rating dichotomy

According to Alsubaihin et al. (2015), the app store is a great place for mining and analysing user perception expressed in ratings and comments. Rating score is another form that is utilised in expressing the overall perception of the app. According to Carreño and Winbladh (2013) user perception are imperative for incremental innovation. However, a study done by Ruiz et al. (2017) found that a

cumulative rating score system was found not to be dynamic enough in capturing the changing user satisfaction levels associated with the evolving nature of apps. Some respondents felt the rating score system was inadequate as it allowed users to give a low score with no rationale being provided.

Respondents divulged that the app store was used to collect feedback from the users. Some respondents felt that the amount of data was huge, requiring them to put in a significant effort. Moreover, the respondents felt that some of the responses had to do with the public transport operators and not the functioning of the app. As a result, the reviews were done randomly, and not all reviews were taken into consideration. This finding is similar to what Carreño and Winbladh (2013) mentioned in their study using the app store. They suggested that the organisation should have an automated topic extraction process to alleviate the manual processing burden. A review of the app store revealed that only a fraction of reviews was acknowledged. For this reason, Ruiz et al. (2017) recommend that organisations consider adopting an automated tool that can respond to some and flag those that need to be responded to manually.

The study points to the lack of a systematic process for dealing with users' reviews. This finding shows the unsystematic approach to user feedback and lack of integration between the app developers and the public transport operators, which resulted in a low app rating. Consequently, the low app rating can deter potential adopters. The inefficient handling of the feedback by the developers failed to address the technical issues raised by users resulting in increased negative perception of the apps.

5.3. Summary

Innovators who seek to diffuse innovation for social purposes must have a balanced diffusion model. Thus, innovators that take a purely centralised or decentralised approach to diffusion will risk diffusing solutions that do not address the needs of society. The findings in this chapter support an argument that solutions should be based on what users have access to, and those solutions are best discovered when a partnership with the social actors is formed. The above

shows that the developers can miss an opportunity for a simple solution that can emanate if proper engagements are not done.

During the app's conceptualisation, the information was flowing from the experts to the community with no user engagement. The source of innovation was coming from the experts who have accessed the available technologies in the sector. They did this by visiting foreign countries, conducting desktop studies, and copying what they observed. The diffused innovation was mainly based on technology push driven by the already diffused innovation by other countries.

The face-to-face interaction allowed users to express their views on how they want to see the app work. This gave the developers first-hand experience of the users' limitation, which allowed them to develop complementary solutions within the users' reach and capabilities.

The choice of the technology to diffuse was based on the perceived needs and problem that the experts thought needed to be addressed. However, based on the respondent's feedback, this approach has often inadequately captured the problems and needs of the users. The execution failed to include the actual beneficiaries of the innovation.

CHAPTER 6: Conclusion and recommendations

This chapter summarises the study findings based on the literature reviewed and the interviews conducted. With the growing body of literature on innovation in developing countries, the study set out to examine the dynamics of participation of intended end-users in conceptualising the passenger transport apps in South Africa. Furthermore, it explored the impact of end-user participation during the development of apps. The study adopted a constructive approach to understanding the role of excluded groups during problem definition, solution development, diffusion of the innovation, and how the users' feedback was incorporated into the developed systems. The main questions of the study are as follows:

1. What was the role of the community during the development of public transport app?
2. What factors influenced the user engagement?
3. How did the solution developers utilise input from the users to improve the app?

6.1. Key findings

6.1.1. User involvement dynamics

The study's findings show that the developers intended to address the perceived problems for the excluded groups. The centralised diffusion system model was embraced, characterised by centralised decisions with no community involvement. The experts assumed that their knowledge would be enough to decide on the problems and needs that the communities wanted to be addressed. However, the diffusion of the public transport app was met with mixed reviews, as it was revealed that there were structural inequalities which prevented the adoption of the innovation (the public transport app) for some users who lacked the necessary capabilities and resources. Since the excluded communities were not involved in identifying the public transport problems to be addressed, the communities were not able to discuss which innovations could be most appropriate given their socioeconomic statuses. Data showed that users can be

the source of innovative ideas as they have knowledge of their own needs, desires, experiences and tacit knowledge.

The role played by the community was limited to that of end-user with no involvement in the innovation process. Similarly to the published articles, this study highlighted factors that impact the diffusion of innovation, such as infrastructure challenges, sponsorship withdrawal, varying educational levels and economic conditions in developing countries. A participatory and consultative approach are fundamental when organisations seek to localise innovation. The organisation's process must be adapted to facilitate the exchange of knowledge from various local actors. A balanced top-down and bottom-up approach to diffusion of innovation is necessary for successful diffusion.

The study revealed that innovating organisations acquired innovations from other countries through visits and desktop-based studies. However, there were inefficiencies identified regarding the failure to customise the solutions for the local context. Failure can be caused by factors such as lack of understanding of the potential barriers, limited information about the prevailing material / environmental conditions within which the potential end-user live in and capabilities of the potential adopters. The findings provide evidence that embracing community involvement is key to localisation. A balanced diffusion system is needed to foster the inclusion of the users as part of the innovation process. A standard process can serve as a guide to clarifying the different roles that actors need to play. The interviewees cited that the process flow from the senior officials left out some critical information, making the activities challenging to execute.

Consistent with Rogers (2003) findings, this study confirmed that relative advantage and compatibility influenced the public transport app's diffusion. This highlights the value of identifying these factors to predict potential adopters reaction (Askarany, 2009). Hence, Zhou et al. (2012) highlight the importance of ensuring that social innovations are inclusive, unlike the traditional methods that excluded some sections of the community such as the elderly, the poor, the blind, the digitally excluded and the uneducated. Given the high level of inequality in

South Africa, the closed testing (developers only) appears to be misaligned with the environment characterised by a lot of unfavourable socioeconomic statuses. Therefore, a more systematic and participatory model that will allow the testing of the suitability of the solution is justified.

The solutions developed excluded some groups within the community. When those excluded groups were engaged, they narrated the problems that they are facing concerning public transport and proposed solutions that can address their problem. Involving potential adopters is likely to identify features deemed essential by potential adopters, thereby positively influencing diffusion (Kshetri, 2016).

Pressure from those who want to see the solution rolled out can cause social innovations to be implemented prematurely. Some respondents felt that the pressure of meeting a target date drove them to not engage with the end-users. For example, one respondent mentioned that “they put more effort into meeting the deadline of the app since the app was being launched in a big way, and there was no room for failure”. This was also exacerbated by some of the leaders who needed to deliver before their contracts expire. Rushing to deliver superficial technical solutions without a deeper understanding of the local culture and context is cited as one of the downfalls of many social innovations (Murray et al., 2010). Therefore, this calls for real engagement with the people who are faced with the challenges that are being addressed.

The above discussion points to an organisation that needs results to be delivered very quickly which leads to pressuring the development teams to doing their work and skipping some steps during the app development process. The above shows that the organisations are at risk of developing and implementing half-baked solutions due to timelines that do not allow the innovation process to take its course.

The study also found that collaboration amongst the various stakeholders was limited. This resulted in the limited expansion of the solution to other modes of transport. The lack of data sharing knowledge transfer amongst the stakeholders

was cited as one of the barriers. Open innovation amongst the various players must be encouraged. According to the literature reviewed, collaboration assists with the sharing of costs and risk amongst various organisations. Given the lack of funds identified as the barriers, collaboration can be of value.

6.1.2. Feedback mechanism

Implementation of feedback mechanisms facilitates collecting ideas which is an effective way to improve the app. Evidence showed that feedback channels could also become a source of knowledge if proper engagement with the users happens. It becomes critical to acknowledge the comments and feedback from the users and, where possible, incorporate them into the solution. Due to the potentially high number of comments on some channels, automation is proposed as a solution.

The comments of the app review did show some level of auto-response though it was deficient. Based on the reviews, it was evident that most of the responses were acknowledging the comments and not customised to the user's comment. Users are discouraged when they realise that the response is generic and not customised. Therefore, it is in the developers' best interest to find means that will allow them to respond to the reviews despite their high number. Based on the above discussion, the study points to the lack of a systematic process for dealing with users' reviews. This finding shows that the developers may fail in listening to the voice of the user. This can further discourage other users when they see low app ratings as it will give them a perception that the app does not work.

A study done in South Africa by Vivier et al. (2015) concluded that a vast majority of the community preferred to be engaged in face-to-face meetings, driven by, amongst others, lack of access to the ICT platform and the level of education in certain instances. The participatory approaches that include face-to-face allow the citizens without technology at their disposal to participate in the process of social innovation (Garau, 2012). Face-to-face allowed developers to understand better the difficulties the users were accessing the app. Given the level of the digital divide in South Africa, face-to-face interaction should form part of the engagement strategy. Those who are not tech-savvy will be excluded if one

moves from a base that all users have access to resources and knowledge to access the platform. This is critical since these apps was done to provide a solution for the marginalised public transport users. This means those with limited educational background, low income, and limited access to some technology will continue to be excluded.

Social media is useful in fostering a two-way conversation if the communication strategies adopted are sufficient. The reviews of the social media messages in this study show a lack of two-way flow of information attributed to an inefficient communication strategy. The innovators missed an opportunity for meaningful engagements by limiting social media to the broadcasting of messages.

6.2. Recommendations

When developing solutions, societal challenges must be considered in South Africa, where there is a high level of inequalities with regards to income, education, and employment. Failure to consider this might result in low impact and further suppress the very same people excluded. Care must be taken to avoid creating a new group of excluded amongst the excluded.

In most instances, it was revealed that pressure from executives led to the omission of user engagement as time became the constraints of the project. Officials should allow the innovation to take its course as shortcuts lead to backlash and rework, which tends to be costly. Similarly, the developers should find new ways of engaging with the users within their constraints.

The lack of user involvement appears to lead to significant flaws with the system, which materialises either in technical, usability or omission of features. In line with the social innovation process, pilots to test the functionality and usability of the system should be considered.

The mechanism used to engage users is very vital ensuring that the mechanism put in place is accessible to the users. Modern mechanisms are suitable to use, but one must not be easily tempted in overlooking the traditional methodology such as face-to-face that might be relevant given the context of South Africa.

It was acknowledged in some apps that users will not afford data to run the solution, and the USSD was implemented to provide a second access channel. However, in both cases where it was implemented, it was unsustainable due to its cost. In this case, a partnership with mobile operators or other partners can be essential. Partnerships were cited as one of the enabling factors in the case of M-Pesa.

The inclusion of excluded groups in the innovation process is indeed still a prevalent problem. Innovators need to acknowledge the complex dynamics and interactions with the various actors when pursuing social initiatives. Thus, a heightened need to find a balancing diffusion model between the bottom-up and the top-down approach. Decentralised diffusion systems will foster a convergence model of communication in which participants create and share information to reach a mutual understanding (Rogers, 2003).

Therefore, a meaningful two-way engagement of marginalised groups in the conceptualisation and implementation of the public transport innovation is advised for an inclusive outcome. Meaningful engagement with the marginalised group is key to achieving the intended impact. When engagements happen with the groups, the developers must guard against preconceived notions of the challenges and solutions. Social innovation requires systematic solutions based on the needs and input of the users and not founded on traditional approaches that focus on the functionality of the solution. Through prototypes, constant feedback can be gathered from the users.

An integrated approach that includes both the app developers and public transport operators is essential as the user see it as a one-stop solution. The two groups should ensure that their process is integrated to facilitate timely feedback to users.

6.3. Suggestions for future studies

There are number of gaps that were identified during the study which would benefit from further research. Future studies can build on the findings of this research and focus on the following:

- More studies can be conducted to see if app development in other sectors (e-government) inhibits the same characteristics since this was limited to apps used in the public transport sector.
- Future research could explore the sustainability of apps meant for social innovation in developing countries.
- A study focused on the roles and effectiveness of cross-sector partnerships (government, non-profit organisations and profit organizations) for a systematic change.

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APPENDIX A: Permission Letter



University of Witwatersrand

PERMISSION TO CONDUCT RESEARCH

Public Participation in social innovation: Public Transport Information Apps in Gauteng (Multi-Case study)

Research conducted by:

Maanda Muneri

Contact details: (0848523143, muneritm@gmail.com)

Greetings

I am a student at the University of Witwatersrand studying towards Master of Management in Innovation Studies. The study seeks to investigate how the users of the public transport information App (App X) were engaged during the conceptualisation of the App.

I hereby invite your company to participate in this research. I request permission to conduct interviews with the relevant people in your organisation that were involved in the development of the App. The interview is estimated to take about 30 minutes. The means and time of interview will be direct to your suitability and availability. Due to the Pandemic of COVID-19, virtual meetings may be ideal.

Please note the following:

- The results of the study will be used for academic purposes only and may be published in an academic journal.
- This study involves individual interviews. The information obtained during the research will be kept confidential and will not be used for any other purpose than the one stated above. Pseudonyms names will be used to hide the identity of the participant.
- Participation is voluntary and participants can withdraw at any time they desire to do so.
- You can contact my supervisor, Prof G Karuri-Sebina at geci.Karuri-Sebina@wits.ac.za if you have any questions regarding the study.
- If you have any questions about the study do not hesitate to contact me.

Please sign the form to indicate that:

- You have read and understood the information provided above.
- You give permission for the study to be done in your organisation, subject to the confidentiality agreement stipulated above.

Respondent's signature

Date

APPENDIX B: Interview Questions

Construct	Key Question	Possible Answers	Time Horizon	Supporting Question (Community involvement)
Problem identification	How did the users participate in the definition of the social problem?	a) Social Movements b) Online petitions c) Voluntary organizations d) Open Forums	How did it change over the innovation process?	- How representative were these people that participated? [e.g., Digital divided, various levels of education, income levels] - Did the structures give an opportunity for citizens to provide input and raise demands? [Y/N] - Did the structures give an opportunity for citizens to become partners? [Yes/No] - How were the identified participants empowered in understanding their roles? - Did the citizens know their role and extent of contribution in the App making? - What would you say were the factors that hindered or hampered your efforts to engage the users during your innovation effort?
Solution Ideas	How were ideas sourced from the end-users?	a) Crowdsourced ideas b) Online petitions c) Idea bank d) Not done e) Other		
Design	How did users participate during the solution design stage?	a) Co-design b) Co-creation c) Participatory works d) Focused observations, e) Mapping user journeys		
Diffusion	What role did the user play during the roll out of the solution? What feedback did you receive from the intended users? How was it collected? What was done with the feedback	a) Mass media b) Intrapersonal relations c) Promotion platforms d) Intermediaries e) Imitation		