

The transformation and adaptive capacity of Tsweu Street in Mamelodi, City of Tshwane

Keletso Kgotse and Karina Landman

Department of Town and Regional Planning, University of Pretoria, Pretoria, South Africa

*CONTACT Karina Landman, Department of Town and Regional Planning, University of Pretoria, 0002 Pretoria, South Africa. Email: karina.landman@up.ac.za

Abstract

Cities and neighbourhoods are changing rapidly. While rapid change is accepted, it is less clear how to understand and analyse change and steer it towards a more sustainable trajectory. This paper focuses on the transformation of a particular street in Mamelodi, situated in Pretoria (capital city of South Africa). Utilizing a resilience lens, we unpack the various cycles of adaptation evident in the street. Our analysis shows that the transformation of Tsweu Street broadly followed the phases of the adaptive cycle, namely rapid growth, conservation, release and reorganization and incorporated three dimensions of resilience, namely social or community, spatial and institutional resilience. We argue that resilience thinking offers a mechanism to understand and analyse change at various scales, including the street level and that this provides planners with a tool to work with change through the application of appropriate measures at the relevant time to maximize their impact.

Keywords: Transformation; sustainability; resilience; adaptive cycle; changing streets

Introduction

Cities are changing rapidly. Rapid urbanization leads to an increase in population and rising demands related to affordable housing, public transport systems, basic services and employment opportunities. At the same time, governments need to deal with the increased vulnerabilities of the poor and risks associated with climate change. Changing conditions expose how well cities are planned and managed and whether they can cope and continue to function amid several disturbances (World Bank 2020). However, while there is a general acceptance that we are living in a time of profound global change (Bhan, Srinivas, and Watson 2018), it is less clear how to respond to rapid change. Although understanding how to respond to change and uncertainty in cities is becoming more important than ever, planners are often unaware of how to deal with rapid and unpredictable change (Nel, du Plessis, and Landman 2018). Yet, science destroyed our illusions of an eternal and predictable universe. 'In such a world, resilience, and with it the ability to respond and adapt to perturbations and fluctuations, becomes a critical quality to cultivate (Hes and du Plessis 2015, 34). Under such circumstances, city planners and managers have to increasingly plan for risk, crisis and uncertainty (Coaffee and Lee 2016). This is especially true in developing countries, particularly in Africa, where the continent is experiencing an urban revolution (Parnell and Pieterse 2014), which gives rise to multiple city complexities (Watson 2003). Being able to adequately respond to rapid change in these complex environments remains a challenge.

This paper focuses on the transformation of a particular street in a marginalized and vulnerable neighbourhood in the capital city of South Africa. The changes in Tsweu Street are analysed through a resilience lens. While sustainability, as promoted through the Sustainable Development Goals (SDGs) remains the goal for development to achieve more ‘inclusive, safe, resilient and sustainable human settlements’ (SDG Goal 11), sustainability theory cannot provide conceptual frameworks that can be used to address complex, non-linear and uncertain changes (Patel et al. 2020). Urban resilience studies are better placed to investigate and explain dynamic transformation (Nunes, Tomé, and Pinheiro 2019) and therefore support the notion of sustainability by providing a mechanism to achieve it (Peres, du Plessis and Landman 2017; Nel, du Plessis, and Landman 2018). Given this, resilience thinking can offer a lens to unpack unconventional changes, urbanization and climate change in the Global South (Chelleri, Schuetze, and Salvati 2015).

Utilizing a resilience lens, the paper investigated the various cycles of change. The analysis showed that the transformation of Tsweu Street broadly followed the four phases of the adaptive cycle, namely rapid growth, conservation, release and reorganization through the action and counter-actions of various role-players, including the residents and the municipality. These changes also incorporated three dimensions of resilience, namely the social, spatial and institutional dimensions. The paper argues that resilience thinking, through a focus on the adaptive cycle and various dimensions relevant in each phase, can offer a mechanism to planners to understand transformation at various scales, including the street level and direct interventions to be time- and context-specific. This can assist urban planners to deal with negative changes and identify opportunities for positive disruptions.

Resilience and the adaptive cycle

Resilience refers to the ability of a system to absorb disturbance and retain its basic function and structure. It, therefore, relates to the concept of sustainability and the challenge of addressing current service demands without eroding the potential to meet future needs (Walker and Salt 2006, 1–2). The Resilience Alliance (2010, 16) describes socio-ecological systems (SES) as complex, integrated systems in which humans are part of nature and ecosystems integrated with human society. Social-ecological systems are far more than coupled human-nature systems in which humans rely on ecosystem services. Instead, social-ecological systems represent the combination of the ‘exterior’, as created by biogeochemical processes and activities (in which humans and their technologies have come to play a disproportionate part), and the ‘interior’, as created by, and experienced through, processes of thought and shared cultural phenomena (Hes and du Plessis 2015, 27).

Cities are also socio-ecological systems. The view of the city as a complex, adaptive socio-ecological system changes our perception of it as an artefact to that of the city and its various urban spaces as an ever-changing socio-spatial-temporal meta-process, comprising innumerable interacting and nested processes resulting from self-organisation and adaptation and resulting in the emergence of unpredictable patterns and events. (Du Plessis 2011, 4)

A resilience approach emerges from complex relationships among different actors and recognizes that living entities sustain themselves through constant adaptation to their environments. Given this,

Urban resilience refers to the ability of an urban system – and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales – to maintain or rapidly return

to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity, (Meerow, Newell, and Stults 2016, 45)

The notion of urban resilience, therefore, offers a mechanism to understand and deal with change in cities. Urban resilience has many dimensions, including the ecological, economic, social, institutional and physical dimensions (Masnavi, Gharai, and Hajibandeh 2019). Social resilience is concerned with the ability of communities to sustain themselves in the aftermath of shocks and stresses and comprises the ability of social actors to cope with and overcome all kinds of adversities (Keck and Sakdapolrak 2013, 4). Physical or spatial resilience can be understood as the robustness of urban structures and networks against random failures (Salat and Bourdic 2012, 65) or changes and is influenced by the urban form and its relation to land use. Spatial resilience is increased through diversity, redundancy, proximity, intensity and connectivity (Landman and Nel 2021). Institutional resilience refers to the institutional ability to deal with disasters and risks associated with the environment. Institutions are an essential element of the operating environment and therefore actors within the institutions must be able to cope with extreme operating environments that are unpredictable, for example, natural disasters, social upheaval and other threats and deal with increased risk, greater uncertainty and scarcer resources. Institutional resilience could be increased through the enforcement of regulative, normative and cultural cognitive elements that may remain after a shock or disaster (Cruz et al. 2015). Therefore, urban resilience requires new techniques to make cities, their infrastructure and communities more adaptable to a complex combination of internal and external shocks and stresses (Coaffee 2016 and Lee).

A multidisciplinary approach to the urban resilience concept makes it ideal to address sudden disturbances and changes in urban systems (Meerow and Newell 2016). The functionality of an urban system lies in its ability to absorb, adapt or transform when internal and external stresses and strains are exerted (Salat and Bourdic 2012) and the degree to which the urban system is capable of self-organization, learning, and adaptation (Stumpp 2013). The level of resilience is dependent on the properties and capacities of the urban system (Chelleri, Schuetze, and Salvati 2015; Leichenko 2011). Thus, the response of the various urban systems to local and socio-economic challenges is key in achieving resilience in SES (Chelleri, Schuetze, and Salvati 2015). This highlights the importance of the adaptive capacity of the various urban systems. This is the capacity of a system to adapt or transform in response to a crisis, shocks or other disruptions. It is determined by features such as diversity of options, the degree of connectedness within the system, and the tightness of feedback – how fast the consequences of change spread through the system (Walker and Salt 2006; Hes and du Plessis 2015).

Given this, there is a need to understand what builds adaptive capacity and limits potential disturbances (Roussou and Pozoukidou 2019) to direct planners to work with and plan for change within the urban system. Within the urban context, resilience is concerned with the adaptive capacity of land use, structural, and management measures to mitigate the negative impact of alterations on the social, economic and biophysical properties of an urban system (Coaffee and O'hare 2008). For example, diversity in the economy, socio-technical system, employment and socio-demography assist to recover from perturbations (Campanella 2006). Adaptive capacity differs by area or population and influences different levels of resilience to shocks (Davoudi 2012). Disturbances can also provide an enabling opportunity for a system to demonstrate its adaptive capacity or its failure to adapt (Müller 2010). Depending on the contextual spatial and temporal scale, disruptions have different effects on the urban system being investigated (Adger et al. 2020).

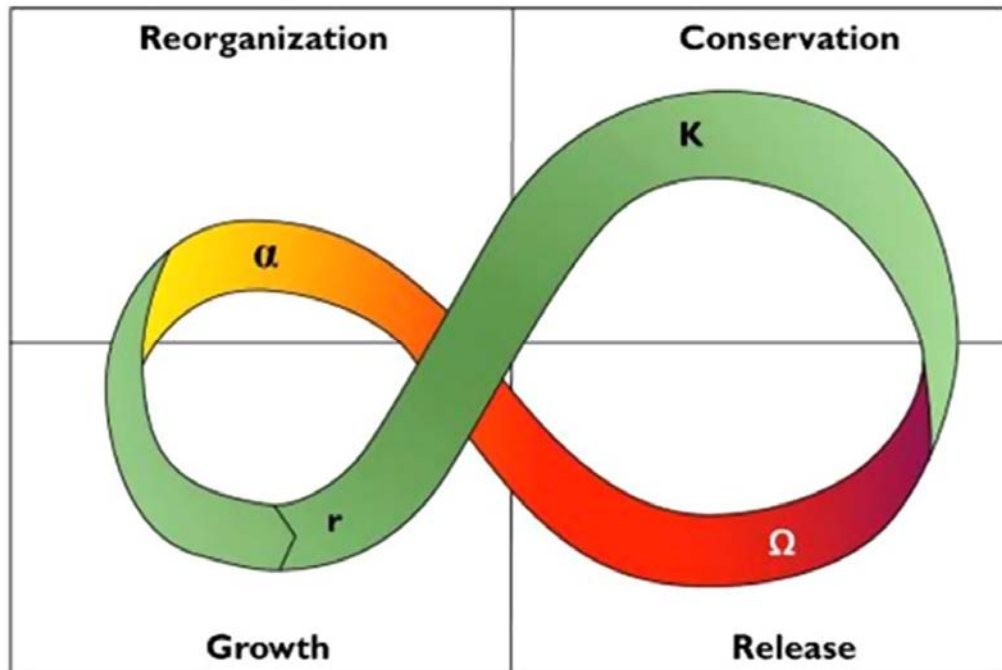


Figure 1. The adaptive cycle (Source: Raford (2013), adapted from Gunderson and Holling (2002)).

At the core of resilience theory, is the concept of adaptive cycles, which emphasizes that social-ecological systems exhibit dynamic cycles of change, where a system transforms from one state into another (Govindarajulu 2020). It, therefore, highlights the key characteristic changes that systems tend to experience over time (Nel, du Plessis, and Landman 2018). The characteristics of each phase have been outlined by Gunderson and Holling (2002), Albert and Marzluff (2004) and Walker and Salt (2006). The adaptive cycle describes the movement of a system through four phases, namely the growth, conservation, release and reorganization phase (Figure 1). The first phase is characterized by a period of rapid growth and increased competition between agents for resources. At this stage, the system tends to exhibit greater diversity but remains vulnerable to surprises as connections between components are weak. Examples in the urban environment include the establishment of a new neighbourhood, business node or services, as well as the arrival of new residents. As the system accumulates more resources, it slowly moves to the conservation phase, where growth slows and certainty is preferred. This period is characterized by stability and greater rigidity, which makes it more vulnerable to shocks in the system. In terms of the urban environment, it refers to ageing and often more conservative populations, which tend to resist change. It can also refer to ageing infrastructure and inflexible bureaucracy. The release phase can occur suddenly as a shock pushes the system past a tipping point. This tends to coincide with a release of regulations controlling the system and the resources accumulated by the system. In the urban environment, the destruction of buildings or infrastructure, the subdivision/consolidation of land and the creation of special economic zones can represent this phase. Following the disruption caused by the release phase, the reorganization phase exhibits weak connections. However, at the same time, there is a huge potential for innovation and intervention. The system is easily influenced by external factors and embodies a large amount of uncertainty. At this stage, the system can either renew itself or collapse. Examples from the urban environment include a change in the population demographic, land use, innovation through disruptive technology and the redevelopment of land through urban renewal programmes (Nel, du Plessis, and Landman 2018). Disruptive technology refers to a technology that changes the normal functioning of the market or industry,

e.g. mobile phones. The term was coined by Prof Christensen from the Harvard Business School. The increasing concerns about rapidly changing cities have opened up many questions related to the practices of transformation in cities to address various challenges and create better opportunities in the future. The phases of the adaptive cycle offer an opportunity to understand these changes and identify practices of transformation. This is discussed concerning the adaptation of Tsweu Street in Mamelodi.

Study background and methods

Background

The City of Tshwane forms part of the Gauteng Province in South Africa. It borders Mpumalanga to the east, Limpopo to the north, and the City of Johannesburg Metropolitan Municipality to the south. In December 2000, an amalgamation of the previous City of Tshwane with three Metsweding Municipalities (Kungwini Local Municipality, Nokeng tsa Temane Local Municipality, and Metsweding District Municipality) resulted in the establishment of a very large municipal area, covering 6260 km² (City of Tshwane 2015). The municipality accommodates the administrative seat of government, as well as various industries, office spaces, research and educational facilities. However, although the municipality provided a large number of houses and significant services to the poor, levels of unemployment at 24% and poverty remains high, with a significant number of households with no income (Tshwane of Tshwane 2013).

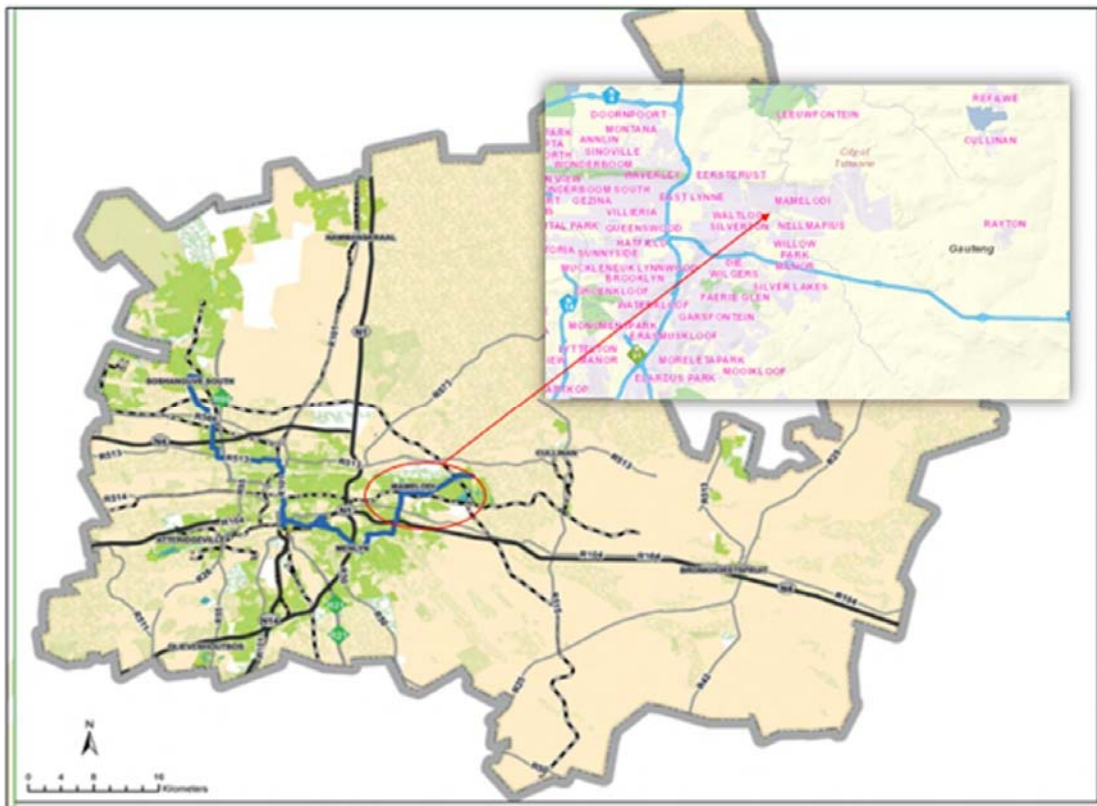


Figure 2. Location of Mamelodi (Source: City of Tshwane website – <https://www.tshwane.gov.za>).

Mamelodi is situated to the northeast of the City of Tshwane, and 20 km from the City Centre of Pretoria (Figure 2). It is bordered by the Eersterust Township on the west, the Magaliesburg mountain range on the northern side, residential suburbs, such as Silverton and the Willows on the southern side, and is situated near the industrial areas of Waltloo and Silverton. Solomon Mahlangu Road (K69) links Mamelodi to the south-eastern suburbs of the City of Tshwane where some residents of Mamelodi are employed. The population of Mamelodi is estimated to be close to a million with a high rate of unemployment, poverty, and over-crowded living conditions (City of Tshwane 2010). Although the majority of residents in Mamelodi are unemployed, they have created multiple streams of income generation through the creation of small businesses in both the formal and informal sectors. This has contributed to the transformation of many of the local streets (Figure 3).

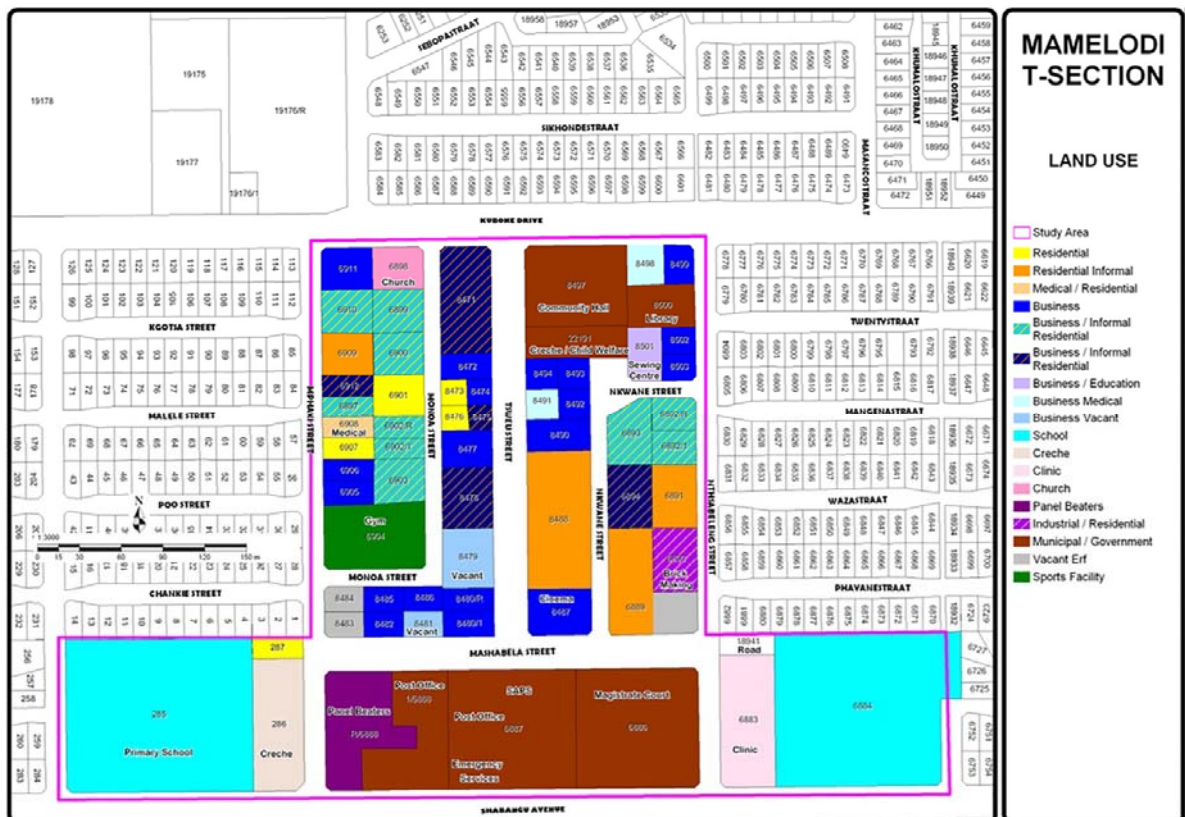


Figure 3. Location of Tsweu Street and land use in 2008 (Source: City of Tshwane).

Tsweu Street is the study area and it forms part of the T-Section Precinct in Mamelodi, located within the western part of Mamelodi. Tsweu Street was established in the mid-1950s as the Central District of Mamelodi and remains the Mecca of Mamelodi attracting people across Gauteng for entertainment purposes. The development of small businesses in Tsweu Street is a response to the lack of employment opportunities and the high poverty rate in Mamelodi. The businesses in Tsweu Street have become a multi-functional urban space.

Methods

The discussion is based on a study that investigated the transformation of Tsweu Street through an understanding of the socio-economic, and spatial changes, their impact and the implications

for planning and development in Tsweu Street. The following research methods were used to collect data: semi-structured interviews, participant observation, information conversation (unstructured interviews) with locals and spatial analysis.

Semi-structured interviews were conducted with various key stakeholders from September 2018 until October 2019, to understand the transformation of Tsweu Street. The researcher interviewed twelve business owners in Tsweu street, including the Tshwane Play House Building owner, liquor store owner, salon owner, upholstery owner, hardware store owner, night club owner, pharmacy owner, gym owner, Kasi Brandz store owner, tattoo parlour owner and restaurant owner. The intention was to interview all the business owners in the street to understand the transformation of the street. However five business owners in Tsweu Street refused to be interviewed. Two officials from the City of Tshwane Metropolitan Municipality, who dealt with the development and implementation of spatial planning policies, were also interviewed regarding their involvement in the development process. Pseudonyms were used to protect the confidentiality of these officials. The researcher also conducted informal talks with business owners and locals to gain insight into their views of the transformation. The following maps were analysed: the zoning map of Tsweu Street that was acquired from the municipality, a land-use map that was in the T-Section Precinct Plan 2008, and the land use map that was created by the researcher based on the current land use activities. The comparison of different maps assisted to determine the changes in land use activities and intended interventions.

The changes were analysed through the adaptive cycle, identifying the events that related to each phase and the various dimensions of resilience that was evident in each phase.



Figure 4. T-Section Precinct Plan (2008) (Source: City of Tshwane).

The transformation of Tsweu Street

The City of Tshwane's City Planning and Development Department prioritized the implementation of the T-Section Precinct Plan and considered it as 'the main project', due to the great potential inherent in the precinct. The municipality's Tsosoloso Programme informed the development of the T-Section Precinct Plan (Figure 3) to achieve the goal of transforming public places in previously marginalized areas into a dignified destination. The infrastructure projects in Tsweu Street are intended to create a conducive environment for mixed land-use activities (Figure 4).

Growth phase

In the early phase of the adaptive cycle, the system is in a period of growth as people seize available resources and new opportunities. The components of the system are independent with fewer regulations (Walker and Salt 2006). The growth phase in Tsweu Street occurred from 2008 to 2014. The lack of development in the T-Section Precinct compelled the residents of Mamelodi to form a community group called the 'Parklands Group', which initiated the Parklands projects to develop the T-Section Precinct. This partnership between the 'Parklands Group' and the City Planning and Development Department initiated rapid growth to redevelop the T-Section into a sustainable node through the implementation of the precinct plan. The City Planning and Development Department determined where the strengths and weaknesses of the T-Section were concerning the social, economic, and spatial aspects of the precinct. The capital reserves or resources of the municipality determined the municipality's response to the challenges in the precinct.

The T-Section Precinct Plan was approved in 2008 and the municipality started implementing infrastructural projects identified in the precinct plan. The first phase of improving the infrastructure in the precinct including Tsweu Street was approximately R26 000 000, which was acquired from the Department of National Treasury through the Neighbourhood Development Partnership Grant (NDPG). The National Treasury has been instrumental in the development of the Neighbourhood Development Programme (NDP) to facilitate the development of higher quality neighbourhoods through grant funding and technical assistance provided to municipalities for capital projects (National Treasury Website). The NDP aims to reconnect the important nodes in marginalized or degenerated inner-city areas with those areas of higher potential in cities to address the fragmented nature of South African cities and underdeveloped township areas. This includes the development of several guides to explain the involved processes and design requirements, including an *Urban Hub Design Toolkit* to restructure the hubs to be more sustainable through better connections, integration of land use and compaction, alongside the spatial preconditions necessary to create vibrant, people-friendly environments (Urban Design Toolkit 2014). Acquiring funding from the National Treasury was not an issue because the municipality had already approved the precinct plan and Urban Development Framework (UDF) for the T-Section. The funding from National Treasury assisted in the enhancement of the infrastructure in Tsweu Street. Consequently, entrepreneurs seized the opportunity to establish small businesses in a conducive environment characterized by an existing business.

The municipality also approved the leasing of municipal-owned Erven in the T-Section precinct including Tsweu Street for business purposes. Furthermore, the municipality rezoned numerous properties to permit mixed land use activities that made the street more conducive for business purposes and that attracted numerous entrepreneurs from Mamelodi to the street.

Business owners from Mamelodi saw Tsweu Street as an ideal street to operate their businesses as infrastructure in the street was enhanced by the municipality and the property rights allowed mixed-use activities, which attracted more businesses to the street. According to Official X from the municipality,

The formulation and implementation of the T-Section precinct plan was to meet the needs of the community organisation called the Parklands Group. The community group wanted the T-Section Precinct to be redeveloped with the establishment of residential developments, business developments, the establishment of an environment that entails safe streets, community facilities, diversifying land uses, facilitating private sector buy-in, and encourage nodal development to ensure sustainability. The municipality upgraded roads, paved walkways, provided parking, street lights and rezoning properties to 'Business 2' zoning to allow business, residential, retail, industrial uses, which attracted more businesses owners from Mamelodi to operate their businesses in the street.

This emphasized the need to address the vulnerability related to future investment and the relationship with the municipality to create a more viable environment for investment.

Consolidation phase

The second phase is characterized by an increase in stability and regulations. As the connection between different factors of the urban system improves, growth slows down. The Conservative phase in Tsweu Street occurred after the municipality implemented infrastructural projects and businesses started to settle down in the street, from 2015 to 2016. This initiated a period of stability. Businesses owners operated well in a conducive environment due to upgraded infrastructure. However, unfortunately, the development of Tsweu Street was stopped before it was redeveloped into an activity spine comprising of residential, retail, offices, and entertainment activities. The intention was that the ground floor should be reserved for business activities while the first and second floors were to be used for residential purposes. Due to the partial implementation of the plan, the officials involved in the formulation and implementation of the T-Section Precinct Plan were very dissatisfied:

The time we were busy with the T-Section Precinct Plan, that is when Official X was part of the City Planning and Development Department, projects were being implemented. As a result of political decisions, Official X was moved to the City Manager's office and everything stopped. The City Manager's office had no complementary staff to assist with the implementation of the Tsosoloso Programme, causing the programme to stop and funding from the NDPG to be reduced. Official X was championing the renewal of the T-Section precinct because it was funded through the NDPG. There are so many frameworks for Mamelodi, but they are not implemented because of political instability in the City of Tshwane Municipality. The T-Section precinct was 'the main priority project' for the City Planning and Development Department because we saw the potential of Tsweu Street. If the NDPG funded projects were not moved to the City Manager's office, it was going to be easy for the City Planning and Development Department to plan and implement. (Official in the management position)

The T-Section Precinct Plan was discontinued because of political instability, poor decisions, inflexible bureaucracy, and a lack of capacity. This was an indication of the inability of the municipality to find alternative solutions to continue the urban upgrading programme. The street started losing investors as property ownership issues were not addressed by the municipality. Investors could not purchase properties in the street from the beneficiaries who had a ninety-nine-year lease agreement, as they did not have title deeds. The Group Property Department failed to transfer properties to the beneficiaries. Investors eventually invested in

other parts of Mamelodi where there were no issues related to property ownership and a lack of infrastructure development. The City's Group Property Department struggled to determine to whom the properties should be transferred since the initial beneficiaries either have sub-leased the properties or had passed away. Given this, Official X asked:

Will the children, grandchildren, and other extended family members acquire the properties of the deceased that had a 99 years lease agreement with the City of Tshwane Municipality?

Yet, another obstacle proved to be related to a lack of institutional capacity:

Land ownership issues would have been solved if the City of Tshwane Group Property Department had the capacity to manage all municipal-owned properties. The Group Property Department should conduct a land audit to ensure that the rightful lessees, owners are occupying the properties in Tsweu Street. The municipality must evict those who are illegally occupying municipal properties and evaluate the properties then sell them. Through auditing, it will give the municipality an idea of which properties to keep and which to sell. The municipality should also subdivide properties in the street that still need to be subdivided and then transferred to the beneficiaries. (Official in the management position)

The rigidity of the system, therefore, stifled further growth and limited innovative alternatives.

Release phase

This phase is characterized by fewer regulations controlling the system, while resources accumulated by the system are released. Uncertainty prevails and small events can shape the future. The longer the conservation phase continues, the smaller the shock needed to force it into the release phase, where the system seems chaotic, as there is no stable equilibrium (Walker and Salt 2006). The release phase for Tsweu Street commenced in 2017. The failure to continue the Tsosoloso Programme to implement the T-section precinct plan in Tsweu Street was a critical event that shifted the system into a release phase. Political instabilities that the municipality experienced made it impossible for different departments to achieve their mandates. Objectives set in the precinct plan were not implemented and the street degraded, while crime increased. The Group Property Department failed to manage the area and to ensure that people do not hijack municipal properties. There were no regulations or enforcement to stop illegal occupations of municipal-owned properties as the system deteriorated into chaos. Vacant sites and buildings owned by the municipality were illegally occupied for residential or business purposes. This was exacerbated by investors who realized that they could not own properties in the street due to beneficiaries not being in possession of title deeds to trade properties.

The lack of action and implementation of the T-Section Precinct plan by the municipality forced residents to reconsider the redevelopment of Tsweu Street. Many entrepreneurs wished to establish businesses in Tsweu Street due to the popularity of the street and the presence of established businesses. Consequently, the owner of the Tshwane Play House saw the demand for space to operate businesses. This motivated him to refurbish the dilapidated building:

Before the dilapidated building comprised of the Tshwane Play House, offices, a church; it was called Thebu Cinema and owned by a former councilor Mr HM Pitje, who got it during apartheid years. Mr HM Pitje became bankrupt and could not maintain the building. It became an abandoned building, with young boys using it as a place to consume drugs and as a crime spot. It remained in that state for 15 years before I renovated it. I bought the building because I

saw the potential of the building and I also wanted to stop the criminal activities in the building. Today the building provides space for a church, office space and people can rent out the Tshwane Play House for social events. (Owner of the Tshwane Play House)

The owner of the Tshwane Play House, therefore, intervened to contribute to the development of Tsweu Street:

I have provided a building with office spaces where people can rent and operate their businesses. The building also consists of the Tshwane Play House, people have their social events and there is also a church that rents out a section of the building. I also have a construction and property development company that operates in the building and I have permanently employed four people who are residents of Mamelodi. The church that operates in the building also employs Mamelodi residents but it operates more like a community organisation.

The refurbishment of the Tshwane Play House assisted to alleviate crime in the street and initiate a process of reorientation (Figure 5).



Figure 5. The Tshwane Play House after refurbishment (Source: Author).

Reorganization phase

The final phase of the adaptive cycle is characterized by high potential, as all options are open. Early on in the phase, the future is uncertain. This phase may lead to a repetition of the previous cycle, bring about a new cycle of accumulation or lead to a collapse. Experiments, inventions and renewal are evident, while in a social and economic system new groups may appear and take over control of the area or organization (Walker and Salt 2006). The reorganization phase started mid-2019, when new businesses were established in the street. To seize the opportunity due to relaxed regulations, some residents started to redevelop Tsweu Street. After the owner of the Tshwane Play House refurbished the building that accommodates various businesses,

more property owners followed suit. Consequently, Tsweu Street evolved into a vibrant mixed-use street where residents of Mamelodi took the initiative to contribute to the economy through the establishment of new businesses such as a butchery, nightclub, clothing store, hardware store, gym, hair salon and restaurants leading to employment opportunities. This was done without the support of major investors and financial institutions. Young entrepreneurs have established innovative businesses in the street. The owner of the local brand store decided to open a store that sells locally branded merchandize to promote Mamelodi. The owner also wanted different local designers to reach a greater market by having their designed merchandize in a central store (Figure 6).

There has never been a store in Tsweu Street that promotes local brands before this store. I opened the store in Tsweu Street because of the immense number of visitors in the street daily, as opposed to other streets. Local designers have gained exposure and a platform to acquire more clients. I have plans of opening more stores in other townships across South Africa for local designers to gain exposure. (Local Brand Store owner)

The different innovative businesses complement each other and they have contributed to the resilience of the street even in the absence of municipal interventions. For example, when a person visits the street they usually support more than one business. Most businesses sell more goods during the night when people come to the street for entertainment purposes at the nightclubs.



Figure 6. Kasi Brand Store (Source: Author).

Comparing the land use maps from 2008 (Figure 3) and 2019 (Figure 7) reveals several changes in land use activities. A dilapidated building has been refurbished into mixed-use buildings consisting of offices, an event venue and a church. A site, previously used for dumping is now developed with a butchery. A site that previously accommodated a fruit market now consist of illegal informal dwellings. Mixed land-use activities that were not present in 2008 are now present in Tsweu Street such as tattoo parlour, a local brand store, a butchery, restaurants and a gym. Several young entrepreneurs with innovative business ideas have opened businesses in

the street. The T-Section Precinct Plan was a vital tool in creating a conducive environment in Tsweu Street for entrepreneurs to operate their businesses, without following an expensive process of rezoning properties to obtain business rights. However, although there have been land-use changes in the street through interventions by young entrepreneurs, the proposal specified in the precinct plan for Tsweu Street for the development of an activity spine consisting of high-density buildings to accommodate mixed-use activities, has not been fully achieved. Nevertheless, as activities in the street are essential elements in the sustainability of the street, the interventions of the business owners contributed to the liveliness and sustainability of the street. These businesses complement each other and offer a variety of services, including restaurants, nightclubs, a gym, salons, and a clothing store.



Figure 7. Current land use map of Tsweu Street (Source: Author).

They also attract a younger market. The owner of the tattoo parlour believed that if people want their businesses to grow; they have to open their business in Tsweu Street. He pointed out that there is an opportunity to make a profit in Tsweu Street because of the number of people that visit the street. In the reorganization phase, the system displays the potential of innovation. The new businesses continued to be innovative and the owners had a great vision. The butchery owner specializes in agro-processing and sells the meat at the butchery at an affordable price, wishing for an increase in job opportunities (Figure 8).

The intention of the business is to contribute to the economy of Mamelodi and produce what is needed in townships, which is why I decided to operate an agro-processing business and sell the meat that I have produced at a butchery in the street. My business is more of a revolution, I want to see more than 100 people getting jobs in the street through manufacturing products and the circulation of the Rand in Mamelodi through the support of local businesses. (Butchery owner)

It is in the reorganization phase that innovation arises through invention, creative ideas and willing people (Walker and Salt 2006). The new innovative businesses established by young entrepreneurs from Mamelodi created more employment opportunities for Mamelodi residents.

The appropriate zoning in the street enabled infrastructure development that created a conducive environment for a diversity of land use activities that translated into numerous economic opportunities for people. Despite the premature end of the redevelopment of Tsweu Street, residents of Mamelodi played a pivotal role in redirecting the transformation of the street through their businesses. Although the nightclub was in existence before the formulation of the T-Section Precinct Plan (2008), the owner keeps on renewing it to cater for the target market which has translated into more jobs. The nightclub employs 20 people from Mamelodi and has also branded Tsweu Street as the entertainment hub of Mamelodi. As a result, the street is very popular.



Figure 8. Butchery (Source: Author).

The proximity of businesses to the nightclub in Tsweu Street has been beneficial in the sense that it shows how businesses can work together and support each other. This contributes to both resilience and long-term sustainability. The Kasi Brand Store that sells locally branded merchandise has also created opportunities for local designers. Through sales, local designers acquire capital to grow their businesses. The upgraded gym has employed more than 20 people who gained skills to train people, as well as in business management and administration. This assisted them to acquire better jobs. The refurbished and rebranded salon has also been a platform for people to learn and then find better jobs. Most business owners who operate their businesses in Tsweu Street wish to transform the street economically. They desire to see businesses grow in the street and create jobs for residents. They yearn to see the street become a place of employment for many of the unemployed residents. Both the officials at the City of Tshwane and business owners in Tsweu Street are uncertain when the municipality will resume prioritizing the development of Tsweu Street and the T-Section Precinct as there is an approved precinct plan with a relevant proposal for the street and the entire precinct. Despite the uncertainty, Mamelodi residents continue to contribute to the redevelopment of Tsweu Street through the establishment of various innovative businesses that have kept the street sustainable and improved the livelihoods of residents that work in Tsweu Street. Although the Tsweu street

still remains in the reorganization phase, these conditions create the platform for a new growth phase to emerge (Figure 9).

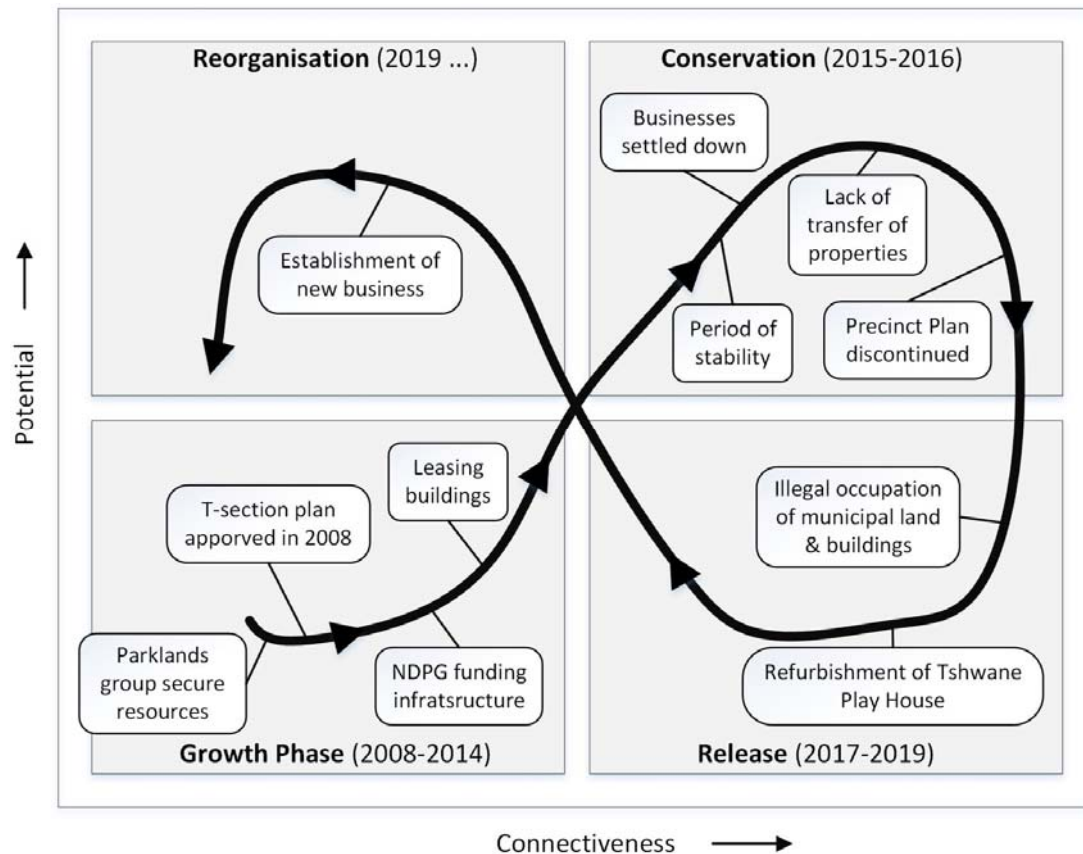


Figure 9. A representation of the changes in Tsweu Street through the adaptive cycle with key events and changes indicated. (Source: Author).

Working with change through the adaptive cycle and various dimensions of resilience

The discussion indicated that the transformation of Tsweu Street in Mamelodi followed the four phases of the adaptive cycle through actions and counter-actions of various key stakeholders such as the local community, business owners and the municipality. In the *growth phase*, the community group called the ‘Parkland Group’ played a crucial role in the redevelopment of Tsweu Street. They worked with the City of Tshwane (COT) to develop the T-Section Precinct Plan and to secure more resources from the municipality. Bilateral information flows (bottom-up and top-down) and emergent leadership through collaboration with organizations not originally tasked with a particular crisis are critical to a successful growth phase (Fath, Dean, and Katzmaier 2015). This reflects the presence of strong social resilience represented by the ability of a community group to overcome challenges related to a lack of development. The precinct plan intended to develop a mixed-use activity spine and a business node. The partial implementation of the precinct plan created a conducive environment for people to operate diverse businesses and attracted more investment to the street. Providing essential infrastructure also enhanced business opportunities. Through the implementation of infrastructure, the municipality also recognized the need for change in the street to mitigate the impact of socio-economic challenges such as poverty and unemployment and build spatial resilience through increased diversity, connectivity and proximity.

In the *conservation phase*, business owners that were attracted to the street because of enhanced infrastructure started settling and working better in the street. However, the development of Tsweu Street came to a sudden standstill. Political decisions to move the Tsosoloso programme to the city manager's office resulted in the premature end of the implementation of the T-Section Precinct Plan. The Property Department also failed to transfer properties in the street to the new owners, which inhibited further innovation and reduced diversity. Negative feedbacks, blocking further growth and maintaining diversity are important to escape the rigidity trap (Fath, Dean, and Katzmaier 2015). This is an indication of a lack of institutional resilience due to the inability to deal with disruptions and risks associated with the changing political and spatial environments. Inflexible bureaucracy and a lack of capacity created a situation that prevented the continuation of the plan in practice, which pushed the transformation into a release phase through the creation of a rigidity trap.

The release phase was characterized by fewer regulations and resources, while investment temporarily moved to other locations. Safety and maintenance were a concern among users and business owners. The weak connections between the residents and the municipality disrupted the street. Fewer regulations or enforcement, especially regarding the occupation of municipal land, resulted in the illegal occupation of municipal-owned buildings and plots by residents for residential and business purposes. This created a platform to reorganize the street through the ability to prevent the crisis to spread throughout the street by cohesive leadership from the Tshwane Play House Owner. In this way he managed to maintain vital functions through improvisation. These are all considered elements of success to push the system into the reorganization phase (Fath, Dean, and Katzmaier 2015). It also demonstrates the ability of residents to deal with adversity in the face of huge disturbances, hence an indication of community resilience.

As the refurbishment of the Tshwane Play House building moved the transformation of Tsweu Street into the *reorganization phase*, more property owners started to refurbish their buildings. This in turn attracted more businesses. Tsweu Street changed into a vibrant mixed-use street where Mamelodi residents have taken the initiative to contribute to the economy through establishing new and innovative businesses, reflecting aspects of self-organization – another feature to ensure movement toward a new growth phase. These initiatives contributed to spatial resilience through a diversity of land use activities and business, the proximity of businesses to each other and great connectivity to the rest of Mamelodi – a high-density area supporting business in Tsweu Street. These businesses managed to create more employment opportunities without the help of the local government. It, therefore, illustrates the potential of building a strong connection at the community level to address challenges in South African townships with severely impeded local governments (Zhong et al. 2020). The strength of communities is tested during developmental challenges, as people become the major actors in resilience management (Hu and Tanaka 2020). The concerted adaptive capacity of individuals, communities and regions contributes to the overall resilience of an urban system (Chelleri, Schuetze, and Salvati 2015).

The discussion illustrates the importance of resilience thinking to work with change and enable an adaptive approach to planning (Rauws and De Roo 2016). The case from Tsweu Street highlights the adaptive capacity of land use, structure and management responses to mitigate the impact of the socio-economic, spatial and institutional properties of the system. The diversification of the economy and the creation of additional employment opportunities assisted the Street to recover from perturbations. Therefore, due to significant bottom-up

intervention from the residents and entrepreneurs, alongside intervention (infrastructure development) from the municipality, enabled the system to adapt instead of collapse.

Conclusion

The transformation of Tsweu Street was investigated to understand cities as a complex adaptive social-ecological system at a granular scale. It was indicated that the street changed over more than ten years and advanced through all four phases of the adaptive cycle, namely rapid growth, conservation, release and reorganization. Through the adaptive cycle, we can understand how the Street was established, developed over time, and reorganized itself through various actions by several stakeholders such as the local business owners, residents and municipality. Understanding the importance of a system's internal connections and its ability to respond to disturbances, and how these aspects change from phase to phase helps to contribute to resilience thinking (Walker and Salt 2006).

The paper argues that resilience thinking, through a focus on the adaptive cycle and various dimensions relevant in each phase, could offer a mechanism to planners to understand transformation at various scales, including the street level. The adaptive cycle offers a tool for planners to 1) understand change and 2) respond to certain disturbances or conditions through appropriate interventions at the relevant time. For example, while the growth phase offers a good opportunity for infrastructure development, the stakeholders may not be as receptive during the consolidation phase. In contrast to popular thought, the release phase may not simply mean inevitable destruction. It may expose potential and illuminate opportunities for intervention, which may then be explored in more detail during the reorganization phase to establish a foundation for a new growth phase to emerge. Parallel to this, there needs to be an appreciation of the various dimensions of resilience and the extent to which social, spatial and institutional resilience influence action in the various phases.

The study highlighted the fundamental challenge in the planning profession related to the degree to which planners are influencing local level activities through policies, strategies and precinct plans. The findings indicated that the business owners and community members, who acted as champions for change, played a larger role in the transformation of the street than any of the institutional interventions. The innovation and commitment of residents are often more powerful instruments to facilitate change than official, technical plans and reports. The study also highlighted the frustration of the institution in the lack of ability to transfer property ownership. The story of Tsweu Street, therefore, reflects frustrated relationships and the inability of the local authority to respond to the expectations of the community. Given this, resilience thinking offers a mechanism to unpack complex and uncertain changes and therefore encourage planning towards more inclusive, safe, resilient and safe human settlements.

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