

Determinants of Urban Resilience: an exploration of functional response diversity in a formalising settlement in the City of Tshwane, South Africa

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Abstract

Urban centres in the developing world are experiencing massive settlement growth often in the form of informal settlements with their concomitant informal economies. South Africa is facing similar trends, and the City of Tshwane is no exception. Apart from facing poor living standards and increasing inequalities in service delivery, these urban centres are also vulnerable to global and local economic instability. Improving the resilience of these settlements is one of the main challenges in the process of their upgrading and formalisation according to national and international development goals. This paper explores one of the determinants of urban resilience which is the response diversity in a formalising settlement in the City of Tshwane with specific reference to the function of retail activity provided in these areas. The diversity of responses to this function ranges from, (depending on the scale of operation) an informal trader to a large shopping centre. This paper further examines how the formalising settlement in terms of economic activity responds to the function of retail. This includes the role of the informal sector in the process of adapting to the formalising process. The informal economy is an important role player in South African cities and other developing countries. However, it is often disparaged as a defect in the system which poses a threat to the formal economy and which must therefore be suppressed, if not eradicated. This paper argues that the informal economy plays a vital role in the resilience of human settlements, especially in the face of poverty, unemployment and inequitable access to social services. This will be done by examining various case studies of shopping centre establishments in formalising settlements and field observations. The paper concludes with a model that places the different responses to the function of commerce on a panarchy within the context of a formalising settlement based on certain characteristics. This model can be used as a tool to look at the interdependencies of entire functional groupings within the context of urban resilience.

Keywords: formalising settlements, urban resilience, response diversity, panarchy

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1 Introduction

The informal economy is an important role player in South African cities and other developing countries. However, it is often disparaged as a defect in the system which poses a threat to the formal economy and which must therefore be suppressed, if not eradicated. This paper argues that the informal economy plays a vital role in the resilience of human settlements, especially in the face of poverty, unemployment and inequitable access to social services. This argument is based on the notion of response diversity to particular functions in an ecosystem as a main determinant of resilience (Elmqvist et al., 2003; Walker and Salt, 2006) and the assumption that this concept can be transferred to social-ecological systems such as cities (Pickett et al., 2004; Talen, 2006; Du Plessis, 2012). As such it also draws heavily on the broader theoretical basis of resilience thinking (Gunderson and Holling, 2002; Walker and Salt, 2006, Resilience Alliance, 2010), including the concept of panarchy. The concept of diversity within resilience thinking suggests that an increase in response diversity would provide multiple redundancies to a specific function, which would mean the provision to that function is more stable, resulting in an overall decrease in vulnerability to specific threats to that function. With the introduction of a panarchy model of the various responses, potential interactions across scale can be discovered in the urban or social-ecological system context.

Through both a desk top study of previous case study work and direct observations in the field, this paper develops a panarchy model to explore the response diversity (in one functional category i.e. the response to the function of commerce/retail) in one township area in the City of Tshwane. This township has both formal and informal elements (from housing to transport and retail activities) within close proximity. For the purposes of this paper specific attention will be paid to the formalising of the retail and commercial activities in the area although other formalisation processes are also occurring. The case study will be based around the Central City shopping centre in Soshanguve/Mabopane with specific reference to the retail function of the area.

2 Contextual background

2.1 Townships: Formation and Persistence

Townships in a South African context refer to areas that were created by the Apartheid government (through institutionalised regulation) to mainly segregate the black African population to peri-urban locations away from the central white town or city. The remainder of the black population was located to ethnic “homelands” in far, resource inefficient locations (Zondi, 2011, p.11). The townships served as a low-cost labour pool for the adjacent white areas where most of the economic activities were created. The labour and education regulations and legislation were positioned to exclude the majority black population from economic emancipation and keep the township areas from developing independently from the white areas. Thus a “permanent” state of economic inequality was created. Most South African cities and

towns had this economic system in place (Zondi, 2011, p.11). Although township areas were formally planned, they could not support the large number of residents in terms of housing and economic activity. This resulted in the organic, spontaneous and unsanctioned formation of informal settlements in the township areas, as well as other locations closer to economic activity.

In Post-Apartheid South Africa, townships and the informal settlements within them have remained persistent. The township areas are in constant flux between formal and informal, permanent and temporary and serviced and non-serviced (Weakley, 2012). From an economic and planning perspective, government policy with goals of promoting sustainable, equitable and inclusive cities, has not been able to fundamentally change the apartheid spatial structure (although provision of services have increased dramatically). The continued influx of people (rural-urban, intra-urban, refugee) to these areas has happened much faster than housing and infrastructure could be provided. Informal settlements are essentially an adaptation strategy for people with a low asset base to access urban amenities which they cannot access in a formal way. Trade-offs are made by residents in informal settlements between relatively poor living conditions and some access to urban amenities and employment prospects.

2.2 The study area

Soshanguve/Mabopane is located 35 km north of the administrative capital of South Africa, Pretoria (both within the City of Tshwane Metropolitan Municipality, the third largest city in terms of area in the world). The name Soshanguve comes from the languages spoken in the area, i.e. **Sotho**, **Shangaan**, **Nguni**, and **Venda**, while the adjacent Mabopane was once in a former “homeland”. Soshanguve and Mabopane are peri-urban township areas that were established in the 1960’s and 1970’s respectively to relocate black Africans (into specific ethnic groups) from the nearby city of Pretoria or other areas in the region by the erstwhile Apartheid Regime. Challenges faced by residents are closely linked to their vulnerabilities such as crime, environmental hazards including fire and flood, and general conditions associated by poverty.



Figure 1: Spatial structure of the study area, in Soshanguve/Mapobane based on field observations done by the author (Base map courtesy of Google Earth, 2012)

For the purposes of this study a dynamic economic hub was chosen which is located around the Mabopane train station and the informal secondary transportation infrastructure provided by private minibus taxis in two taxi ranks flanking the station (described in Figure 1). The area has both informal and formalised settlements with varying levels of service provision. This area includes the Central City shopping centre, as well as two other formal shopping centres. The overall spatial character of the area is similar to a transport orientated development where the main structuring element is the transport infrastructure which supports the informal as well as the formal retail development (including the surrounding residences) surrounding the station (see Figure 1). The informal activity around the centre forms an “informal high-street” of mostly permanent buildings next to the movement paths (street) of pedestrians and cars, including the traffic island separating the opposing traffic streams. In other areas, informal flea markets are evident with less permanent structures including mobile street vendors. The area has a lot of movement in the form of both car and pedestrian traffic intertwining between the formally planned and the sprawling organic informal trade and transport.

3 Theoretical background: Urban Resilience and its Determinants

In order to understand urban resilience within the context of the Soshanguve/Mabopane township area, a brief overview of resilience and its determinants is required. Resilience thinking’ as a conceptual framework is constructed upon the idea of multiple metastable regimes separated by critical thresholds at multiple distinctive scales with cross-scale interactions (the panarchy) (Du Plessis, 2012). Within a panarchy, what happens on one scale influences and affects what happens at a different scale (both in time and space) (Simmie & Martin, 2010, p.34). Cross scale linkages or dynamic interactions exists within and between the sub-systems contained in a system, although they might not be at the same stage in the adaptive cycle, thus responses will differ depending on the scale of the nested systems (Resilience Alliance, 2010).

As one of the determinants of resilience in ecological systems, functional response is based on the concept of functional groupings that provide for a certain specific function such as the function of predators/consumption (Elmqvist et al., 2003, p.489). The responses to that specific ecological function range across scales from lions to spiders and bacteria. Response diversity is referred to “as the range of reactions to environmental change among species of the same function”, and it is seen as “critical to resilience, particularly during periods of ecosystem reorganisation” (Elmqvist et al., 2003, p. 488).

Similarly, as argued by Du Plessis (2012), in social-ecological systems, humans as dominant species also have functional categories/groupings which are determined by the users and resources of the urban environment. In a city different functional categories can be identified such as (but not limited to) business and commerce, residential, industrial, infrastructure, social facilities and green users. Du Plessis adds that within these functional groupings different responses and scales of responses can be identified i.e. in the functional grouping of commerce responses could range from an informal trader to a large shopping centre. Building the range of responses to each of the functional groups and on different scales, multiple redundancies are

built into the system which increases functional diversity within the city which in turn improves the resilience of the city (Du Plessis, 2012).

Multi scale interactions between responses have been studied from an ecological systems perspective. Elmqvist, et al., (2003) created a multi-scale model based on response diversity of herbivores found in a coral reef system (see Figure 2). Response diversity exists because various species operate at different spatial and temporal scales. Disturbances to ecological functions usually only affects some of the responses to the function meaning other scales are undisturbed and can persist.

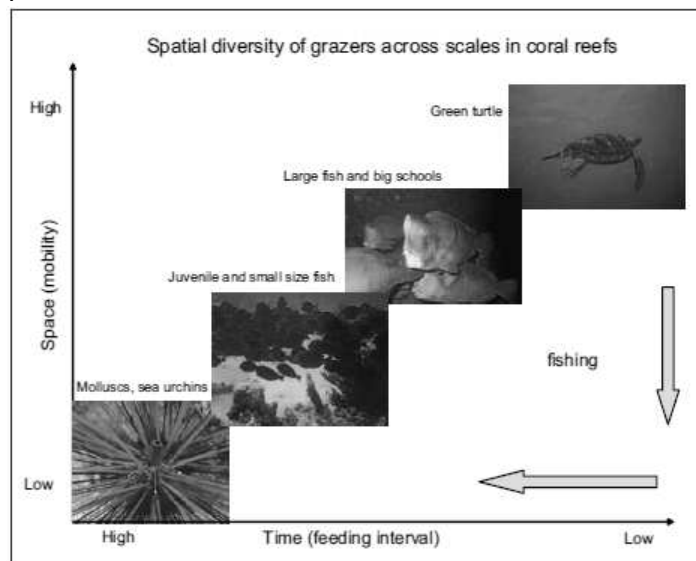


Figure 2: “The multiple-scale nature of response diversity in the functional group of herbivores of coral reefs. Response diversity is enhanced by species operating over a broad range of scales. Over fishing of large species resulted in a situation where grazing is maintained by a set of smaller species operating more intensively at faster intervals” (Elmqvist et al., 2003, p.492).

4 Response diversity to the function of retail in a township area

From a regional economic resilience point of view, Simmie & Martin (2010) argues for an evolutionary approach to resilience rather than an equilibrist. The evolutionary approach to resilience focuses on how economies adapt to changing circumstances rather than returning to a previous state of being which the equilibrist perspective emphasises (p 31). Local areas that have more diversity in economic activities seem to be less vulnerable to perturbations or at least can recover faster from them. Resilient regional economies depends on both longer term and shorter term processes to function. Jacobs adds that a combination of mixtures of activities is fundamental to the creation of successful neighbourhoods (Jacobs, 1969). The importance of neighbourhood resilience has been echoed by various authors (Jacobs, 1969; Tallen, 2006) who suggests that increasing social diversity, income diversity and land use mix will lead to more stable and resilient neighbourhoods economically and socially. Within a township context

this could be crucial in providing more stable economies for a vulnerable and emergent population.

4.1 Commercial and retail investment “landscape” within townships

The retail sector in South African township areas has changed drastically in the past two decades. The retail environment pre-2000 was dominated by informal small scale businesses offering products for the low-income consumer market. Overall spending done in this period was out of the township areas in more established shopping destinations such as the core CBD of the adjacent town or city. This trend has been reversed drastically with the development of shopping centres in “almost all township areas with sizeable population numbers” (Ligthelm, 2008a). The reason for this dramatic shift is the emergence of the black middle class. The Bureau of Market Research at the University of South Africa has recorded the relative market expansion from 1994-2004 which indicates the growth in household expenditure of black households of 239% in that period, compared to white households of just 110% (Bureau of Market Research, 2008). The relative income of black households is very low compared to that of white household but the absolute number of potential base is much bigger (Statistics South Africa, 2012). The provision of the social grant system in South Africa for lower and no income persons have further provided a more stable income, thus decreasing their overall vulnerability and making it more viable to invest in lower income areas such as townships (Urban LandMark, 2011).

Within developing countries, the informal sector provides access to livelihoods, provision of goods and services to the marginalised, including food distribution, and can act as a gateway out of extreme poverty. With this in mind policies that govern economic development in urban centres in the developing world should be sensitive to the existence of the informal and rather than marginalising the sector, put it firmly into the development focus to facilitate the move from survivalist to entrepreneurial enterprises (Rogerson 1996, p179). A more holistic view of economic development is also needed in a formalising context in which the formal businesses sector can also start to explore potential synergies that exist between them and the informal sector (Urban LandMark 2011). Integration and support of informal activities can bridge the segregated nature of South African cities through the exploration and allocation of both private and public policy initiatives (Rogerson 1996). These initiatives can include private business strategies which can integrate the informal and formal, i.e. in the case of the study area the retail typology that exist can give way to new retail forms. The typical shopping centre retail typology focuses inward whereas the study area new forms can be introduced such as encouraging high street retail forms leading up to the shopping centre (Urban LandMark 2011).

4.2 Shopping centre development and related impacts within townships

Although the existence of shopping centre development in township areas is not completely new the pace of development has dramatically increased since 2000. Investors and developers in the formal retail centre development market have realised the potential in township areas.

Currently the biggest growing segment in retail development is the lower income brackets as market saturation has been achieved in many more established traditional retail investment locations, not to say that investment in township areas are not without risks (Urban LandMark, 2011).

Within the township context the development of formal retail activity is one of the only non-governmental investment activities into these areas. Notwithstanding the positive impacts of formal retail developments in formalising areas such as providing increased access to higher order goods and services (including access to banking services) to residents, some negative impacts have been recorded in the local economy. These include the increased competition in the informally dominated commercial/retail sector of the areas, increased openness to global market fluctuations and other lifestyle related impacts such as increased debt exposure (Urban LandMark, 2011).

A study conducted by Ligthelm (2008a), which measured the impacts of recent shopping centre development in Soshanguve/Mabopane, points to an overall decrease in township informal and small formal business within the first six months of the shopping centre opening. The study showed evidence of some of the customers of the original township business gravitating to the shopping centres, but the overall survival of the original businesses was due to adaptation strategies. The main adaptation strategies used by the spaza/tuck shops (small informal sector retail business operating from a residential home or zoned stand) centred on finding a niche that the large shopping centres could not fill, such as moving to a location convenient to consumer dwellings, personalized customer service, flexible business hours, satisfying emergency needs, access to credit facilities and availability of goods in small quantities (Ligthelm 2008a, p 52).

In further studies in Soweto (a large township in Johannesburg), Ligthelm (2008b) commented that small enterprises in townships that were most vulnerable to the new developments were those located in old shopping centres, businesses offering daily household necessities and those businesses closer to the newly developed shopping mall. Similar studies conducted in Soweto points to much more positive interactions between the newly developed shopping centres and the existing business. Studies commissioned by Urban Landmark on the impact of Jabulani Mall in Soweto and Central City in Soshanguve/Mabopane indicates a marked increase in shopping done in the area after the shopping centre development, as well as reduced travel time and transport cost to formalised shopping facilities. Initially support for local traders as an overall percentage of money spent on retail goods and services did decrease with the introduction of the shopping centre. However, the overall income from consumers increased, reducing the impact on traders.

From a consumer perspective the new development was acceptable to very positive, in most cases reporting a need for the mall to expand. Bearing in mind that the circumstances differ similar trends have been noted in other township areas (Urban LandMark, 2011, pp.37-39). Although negative impacts have been recorded, the over 800 street traders in the vicinity of the Mabopane train station is evidence that informal businesses can function and even thrive in the

same area of the formal centres such as Central City, by providing goods and services not provided in the centres or by simply offering a more convenient shopping experience (Ligthelm, 2008a, p.52).

5 Towards a panarchy model of response diversity in the urban context

5.1 Typology of responses to the function of retail activity

The responses to the function of retail activity (distribution of goods and services) in townships have changed as previously mentioned. This change is due to certain characteristics that have changed in the study area, including a social-economic shift to higher and more stable incomes, together with market saturation of traditional investment locations. This change laid the foundation for the entrance of shopping centres into the township retail landscape (Urban LandMark, 2011). The pre-1994 retail landscape was dominated by informal and small formal activities including mobile street traders, informal traders; spaza/tuck shops; informal home-based services like barbers and taverns; and local convenience stores. From the late 1990's the retail landscape expanded to include neighbourhood centres; community centres, minor regional centres and regional retail centres (Ligthelm, 2008a: p 52; Urban LandMark, 2011: p 9). While the larger responses in terms of scale or size such as shopping centres have played a role before 1994 as residents used these facilities outside of the area, they have now become part of the township landscape and a direct competitor to the existing businesses in these areas.

5.2 Application of the panarchy model of response diversity in an urban context

As previously indicated by the response diversity model used to illustrate the ecological function (Figure 2) this paper argues for the use of such a model in the urban social-ecological context. As indicated by Simmie & Martin (2010) and Elmqvist, et al. (2003), large and small responses affect one another and can influence the overall resilience of the functional grouping, as well the resilience of the area.

The introduction of new responses (shopping centres) happened due to the change of neighbourhood characteristics or system change which resulted in viable locations for formal retail development. Such a model is described in Figure 3. With the introduction of the shopping centre into the area a perturbation was felt in the overall system with losses in revenue and changed customer patterns in the other responses (especially informal business). An adaptation period followed where the other responses reacted to the new entrant through various adaptation strategies as discussed earlier. A new equilibrium was reached replacing the previous equilibrium state, thus falling within the realm of adaptive change rather than static recurrence. A symbiotic relationship started to arise from the retail environment between the different responses (formal and informal activity).

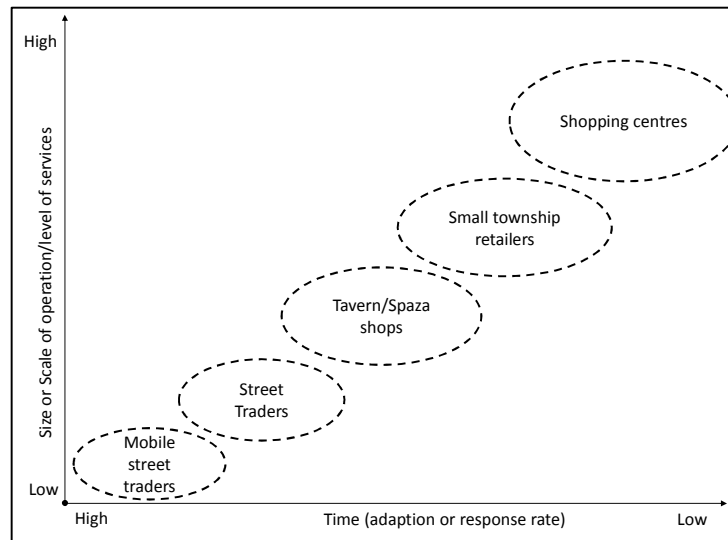


Figure 3: Panarchy model of retail activities in the Soshanguve/Mabopane area (adapted from Elmqvist, et al., 2003 Figure 2).

The panarchy model for response diversity describing the function of retail activities plots the typology of responses according to scale and the response time. Each of the identified responses operates at their scale or level although they influence each other. From the resilience point of view diversification within the responses to functions are crucial in building adaptive capacity in neighbourhoods. The panarchy model illustrates how diversity to a specific function is structured according to scale according to variables such as scale of operation, capital needed for response, good and services provided, survivalist vs. entrepreneurial enterprises, capital available to response actor, vulnerability, adaptability (responses to adversity and response time), and openness to global/local economic fluctuations. The panarchy model does not indicate that one response is superior to another. Rather it proposes that the different manifestations of retail activities (typologies) are part of the same functional grouping and can potentially be in symbiosis with each other. For example, informal traders targeting the convenience shopper or shoppers who can only buy small quantities at a time can purchase their goods from bulk retailers inside the formal shopping centres, while the shopping centre caters for a clientele who may be making some more considered or bulk purchases. A trader providing a service such as a barber may also purchase his supplies from the shopping centre.

Adaptation strategies are key to the survival of businesses on all scales but may differ across scales. For example, on the lower end in terms of scale a mobile street trader can change location or type of product that is being sold, whereas a fixed shopping centre may respond by changing or upgrading the centre or implementing new advertising strategies (Ligthelm 2008a). Although more capital is available at the higher scale of the panarchy, the activities are more rigidly bounded in time and space. Comparative size of operation is also a factor which influences adaptive capacity, as the amount of potential available to the system increases with scale.

As shown in Figure 3 the response or adaptation rate becomes higher at the smaller scale, allowing actors at these scales to respond faster to a perturbation in the system. On the other hand, systems at larger scales have more accumulated potential that allows them to ride through smaller perturbations. An example of such a perturbation could be the operational difficulties and service delivery protests in the nearby train station which forced Metro Rail (the operating authority) to temporarily suspend its operations (SABC, 2012). Informal traders around the station targeting commuters may see a radical decline in patronage, but can shift their operations to the taxi stands or bus station. Traders linked to the funerary activities of the nearby cemetery may not notice any impact on their business or may see new niches opening up. Central City is a destination point in itself and its particular range of responses are not that directly linked to the functioning of the railways. It may be able to ride out the perturbation as its size provides robustness. However, it may be more vulnerable to perturbations at higher scales such as the national economy.

The increased diversity of responses provides multiple redundancies to a neighbourhood in terms of the provision of retail activities. Although increased competition might be perceived as negatively impacting the smaller scale operator in the commercial and retail sector, understanding the system as a panarchy suggests that a mutually beneficial relationship can develop between the responses to a specific function at different scales. Both for the users and the producers (providing the function) more diversity means less vulnerability to a range of perturbations as actors at one scale can step in to provide the function if actors at another scale fail. Actors at different scales can also provide responses in niches that are not open to actors at other scales. The increase in diversity of retail activity furthermore increases the amount of livelihood opportunities. Thus, when taken in the context of a township the existence of the informal economy, by adding diversity, contributes in many ways to the economic resilience of the township.

6 Conclusion

The application of ecological theory or practice in a social-ecological context has been led by various authors (e.g. Elmqvist et al., 2003; Folke, 2006; Resilience Alliance, 2010). The application was only recently extended to larger human-dominated systems such as urban areas which increases the need to explore these contexts (Resilience Alliance, 2010; Walker & Salt, 2006). The panarchy model gives insight into the dynamics that exist between responses at different scales across a functional grouping.

By developing a panarchy model of retail activities in the Soshanguve/Mabopane township area in the City of Tshwane in South Africa, an argument was built for the importance of the informal economy in providing response diversity to the function of commerce in areas characterised by poverty, unemployment and inequitable access to social services. This diversity aids in building the adaptive capacity in the economic system of these areas. It can therefore be illustrated that applying an ecological resilience framework to the understanding of urban dynamics may reveal

avenues for building resilience that see unexpected benefit in scenarios more often perceived as threats to a functional urban system.

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References

Allen PM (1999) *Cities and regions as self-organizing systems: Models of complexity*, Gordon and Breach Science Publishers, Amsterdam.

Bureau of Market Research (2008) "Small business sustainability in a changed trade environment: The Soweto case", University of South Africa, University of South Africa Press Release, Pretoria.

Cilliers P (2000) *Complexity & Post Modernism*, Routledge, New York.

Du Plessis, C. 2012. 'Applying the theoretical framework of ecological resilience to the promotion of sustainability in the urban social-ecological system.' Proceedings, SASBE 2012, Sao Paulo, Brazil, 27-29 June 2012.

Elmqvist T, Folke C, Nystrom M, Peterson G, Bengtsson J, Walker B & Norberg J (2003) "Response diversity, ecosystem change, and resilience", *The Ecological Society of America* 1: 488-494.

Folke C (2006) "Resilience: The emergence of a perspective for social-ecological systems analyses", *Global Environmental Change* 16: 253-267.

Gunderson LH & Holling CS (2002) *Panarchy: Understanding transformations in human and natural systems*, Island Press, London.

Holling CS (2001) "Understanding the Complexity of Economic, Ecological, and Social Systems", *Ecosystems* 4: 390-405.

Jacobs J (1969) *The economies of cities*, Random House, New York.

Ligthelm AA (2008a) "The impact of shopping mall development on small township retailers", *SAJEMS NS 11 1*: 37-53.

Ligthelm AA (2008b) *Small Business Success and Failure in Soweto: A Longitudinal Analysis*, Research Report No. 377. Pretoria: Bureau of Market Research, University of South Africa.

Resilience Alliance (2007) "Urban Resilience research prospectus: A Resilience Alliance initiative for transitioning, urban system towards sustainable future", Research prospectus, CSIRO, Resilience Alliance, Canberra.

Resilience Alliance (2010) *Assessing resilience in social-ecological systems: workbook for practitioners*, (Available online <http://www.resalliance.org/3871.php> [accessed on 31/03/2012]).

Rogerson CM (1996) "Urban poverty and the informal economy in South Africa's economic heartland", *Environment and Urbanization* **8(1)**: 167-179.

SABC (2012) *Metrorail shuts down services north of Pretoria*, (Available online <http://www.sabc.co.za/news/a/98e469004d0c6306b971bf2f84b022c7/Metrorail-shuts-down-services-north-of-Pretoria-20121012> [accessed on 22/11/2012]).

Simmie J & Martin R (2010) "The economic resilience of regions: towards an evolutionary approach", *Cambridge Journal of Regions, Economy and Society* **3**: 27-43.

Statistics South Africa (2010) "Millennium Development Goals Country Report 2010", Statistics South Africa, Pretoria.

Statistics South Africa (2012) "Census 2011", Statistics South Africa, Pretoria.

Talen E (2006) "Design that enables diversity: the complication of a planning ideal", *Journal of Planning Literature* **20**: 233-249.

Urban LandMark (2011) "taking stock; the development of retail centers in emerging economy areas; impact on local consumers, local businesses and the local economy", Urban LandMark, Pretoria.

Walker B & Salt D (2006) *Resilience thinking: sustaining ecosystems and people in a changing world*, Island Press, Washington.

Weakley D (2012) "Kya sands informal settlement: Vulnerability and Resilience", in L Poulsen, M Silverman (eds.), *The South African Informal City*, Architects' Collective, Johannesburg.

Zondi GM (2011) "Investigating the social and economic effect of Jabulani and Maponya malls on the residents of Soweto", Dissertation, University of Stellenbosch, Stellenbosch.