

# Article

## Satellite settlement on the spatial periphery: lessons from international and Gauteng experience

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### Abstract

Gauteng Province's proposal to create large new settlements mainly on the spatial periphery of the city-region is intended both to address the inefficiencies of scattered small-scale developments and to respond to economic decline outside the urban core. An ambition to create self-sufficient satellite towns or cities is, of course, not new. In this paper we assess experience internationally and in South Africa, exploring the extent to which sustainable economies have been created in satellite settlements. Internationally, there is a mixed story. There are instances of success but many more cases of failure, or of initial success with later decline. The frequent consequence of a well-intentioned satellite development internationally is extensive commuting. In Gauteng there is a long history of state- and private-sector led satellite town development. This has included the initial expansion of the mining sector; the later development of towns focused on heavy industry; and the displaced urban settlements around the apartheid-era industrial decentralisation points. While there was success in building economies for periods of time, the developments have proven vulnerable to changing global conditions, shifts in policy, and new local dynamics. In recent years, the Gauteng periphery has declined relative to the core, leaving large numbers of people in poverty traps or dependent on commuting. International and Gauteng experiences offer a sobering lesson for present day attempts to create large new settlements on the spatial periphery where economic prospects are, at best, highly uncertain.<sup>1</sup>

### Introduction

In 2015, the Gauteng premier and his Department of Human Settlements put forward a proposal for 'mega-human settlements' taking the form of

‘new cities’.<sup>2</sup> These would be large projects, with a minimum of 15,000 housing units, and each with a population of approximately 60,000 people. A provisional map of these projects indicates that while some might be close to the existing urban fabric, others are planned to be on the edge or beyond, effectively a type of satellite development (GCRO 2015). The size and consequent land requirements for these greenfield developments are also likely to drive them to more peripheral locations. This may be exacerbated by the absence of appropriate mechanisms, tools and budgets to undertake them in better located areas. Of course, there is a complexity to location on the periphery: Gauteng is a polycentric city-region, with diverse economic nodes, so what constitutes ‘well located’ or ‘peripheral’ needs to be understood in relation to access to economic opportunities, services, facilities and the type and cost of housing available (Biermann 2004, Trangos and Bobbins 2017). Nevertheless, some of these new settlements appear to be quite distant from existing areas of economic opportunity, and the focus in policy is primarily on housing, with limited attention to the promotion of economic development.

The human mega-settlements policy, now mainly referred to by the national Department of Housing as ‘catalytic projects’, represents a departure from the post-apartheid policy focus on urban compaction and integration, which in part reflects frustrations with the difficulties experienced in achieving this kind of restructuring, and with the slowing rates of housing provision overall. ‘New cities’ are also intended to galvanise government departments to work together in a more coordinated way, which has previously been lacking, and to include both public and private sectors in their development. Ballard and Rubin (2017, this issue) provide a fuller account of this policy and its evolution.

As other articles in this focus issue indicate, the ‘new city’ concept is not well-developed or strongly elaborated within the policy. Further, there is real ambivalence and debate amongst policy makers about the concept, even amongst advocates, for example over whether it means satellite towns, or simply scaling up housing projects (Ballard and Rubin 2017, this issue). Nevertheless, a document produced in 2015 (Gauteng 2015) suggests that while delivering larger housing projects is central to the concept, ‘new cities’ should be self-contained, offering economic activities and employment, along with a full range of services and facilities. They should also include a range of income groups in order to move beyond segregated urban forms not only inherited from the past but

perpetuated through some kinds of post-apartheid development. The ideas put forward are not entirely new: there are echoes here of the thinking that underpinned the creation of new towns and satellite cities in the post-World War II era in many parts of the world, and of contemporary advocacy of ‘new cities’ as a response to rapid urban growth in the global south (Turok 2016). Gauteng itself also has its precedents and histories of creating forms of satellite city development.

This paper draws on historical experience of satellite new towns internationally and in the Gauteng context to assess the prospects for the ‘new city’ concept, in particular its idea of creating relatively ‘self-balanced’ and ‘self-contained’ cities beyond the urban edge. Within the literature on new towns, the concept of ‘self-balance’ refers to a match between housing and jobs (and sometimes skills), limiting the need for commuting to work (Cervero 1995). From this perspective, the ability to attract both population and economic activity to the new cities, to match jobs on offer with local skills, thus avoiding extensive commuting, is critical. The stability of the local economy and employment over time is also key. Some definitions of ‘self-balance’ also include a mix of social and economic groups, which is contained in the Gauteng ‘new city’ idea. ‘Self-containment’ is a broader concept which refers to the development of settlements which ‘allow many to live, work, shop and recreate within a community’ (Cervero 1995: 1136). In reviewing the international literature and the Gauteng experience, we focus in particular on the creation of local economies and employment, their stability over time, and the extent to which residents come to rely on commuting. We nevertheless make some reference to some of the broader lessons emerging from the international literature<sup>3</sup> for policy debates on Gauteng’s ‘new cities’.

Internationally, there are some satellite new towns where significant local economies have been created, but many where such development has been limited or decline has occurred after a period of growth. Satellites frequently become centres linked to the broader region, with extensive commuting, even where there are levels of employment locally (Cervero 1995, Gaborit 2010). Gauteng has a long and instructive history of state- and private-sector led settlement on the spatial peripheries of the city-region, including the development of towns through the initial expansion of the mining sector; the later development of towns focused on the steel, metals and petrochemical industries; and the displaced urban settlements

and industrial decentralisation points of the 1970s and 1980s. Several of these processes created economic bases for a while, but proved vulnerable to shifts in policy, sectoral economic dynamics, and changing global conditions *inter alia*. In the post-apartheid era, the spatial periphery of the Gauteng City-Region has declined economically relative to the core, although with some variation, leaving large numbers of people spatially stranded in terms of jobs and livelihoods, or dependent on commuting (Harrison and Dinath 2017). Both the international and Gauteng experience offer a sobering lesson for present day attempts to create large new settlements on the spatial periphery where economic prospects are, at best, highly uncertain.

### **International new town satellite development**

Policies to develop satellite new towns beyond the edges of major cities emerged in the post-World War II era in Europe as a response to rapid urban growth and high densities in inner city slums. Influenced by Garden City and modernist planning ideas, new towns were intended to create better living environments for residents, an alternative to city living (Gaborit 2010, Ward 1993). In several western European countries, these new towns were financed and developed by state agencies as part of welfarist policies. These approaches were also influential in several colonies and former colonies in this period, such as Hong Kong, India, Singapore and Egypt (Ching 1997, Levien 2013, Shaw 2004, Stewart 1996, Ziari and Gharakhlou 2009). Nevertheless, there were variations in how these new towns were conceptualised and developed, in terms of the size of settlement, their distance from the city, housing types and employment and levels of self-balance expected.

The United Kingdom's programme is perhaps the most extensive and well-known, running from 1946 to the 1970s, through three generations of policy. The first generation of satellite new towns were close to London (around 20-30 miles from the centre), while later generations were larger and more distant from the centre. The third generation, developed in the 1960s and 1970s, were well beyond the periphery of London, with populations of at least 150,000. All of these new towns however were intended to be self-balanced and self-contained, and considerable effort went into the development of economic activity and employment in these places. Although they were expected to achieve a social mix, the earlier new towns focused on rental housing for relatively

low-skilled workers who were employed in industries attracted there, while later new towns were more mixed in terms of tenure, housing type and occupation (Alexander 2009, Ward 1993).

By contrast, new towns around Stockholm were planned around a rapid mass transit route and its stations, and were expected to be only 'half-balanced', ie providing some level of local employment, but also extensive commuting. Although dormitory towns were avoided in the earlier towns, second generation towns were more often 'bedroom communities' (Cervero 1995). French new towns were built along a new rapid mass transit system around Paris from the mid-1960s, but were expected to be much larger than UK new towns (with a target of 200,000 population, scaled down from initial expectations of 400,000 – 500,000), and with a broader economic base, where some 80 per cent of the population could work if desired (Tuppen 1979). New towns were developed in Hong Kong from 1959, with further rounds in the 1970s and 1980s. Distances from the centre ranged from five to 44km, with target populations ranging from 230,000 to 750,000, all much larger than the UK towns, and very much bigger than the planned new cities in Gauteng. Although they were intended to be socially balanced, they were initially developed around public housing and industrial development, but private housing was introduced in later years (Ching 2007).

City planning in socialist countries in Eastern Europe and Asia also made extensive use of state planned satellite new towns (Gaborit 2010, Tan 2010). In China, satellite cities matching industrial jobs to workers through the '*danwei*' system ensured a strong focus on 'self-balance' (Lin et al 2015) and limited commuting, at least until the 1980s. However social facilities were neglected, a problem also noted in satellite cities developed in eastern European countries (Gaborit 2010), making these areas unattractive to more skilled workers and professionals. Influenced by Soviet and Garden City principles, India's developmentalist state undertook an extensive programme of new towns, mainly around steel and other industries. New towns included satellite cities intended to decongest large cities, such as Navi Mumbai, planned in 1970 to grow to two million (Levien 2013, Shaw 2004, Vedula 2007).

By the 1990s, satellite new town policies had lost favour in many countries, as state welfarism and costly associated programmes were cut back, and as critiques emerged of the environments created, and of policy outcomes, which were sometimes contrary to intentions. A new wave of

satellite new towns has however emerged since then, particularly in Asia. In several cases, developments have emerged in a context of financial deregulation and economic liberalisation, where foreign and local investment has flowed into the real estate market. Governments have used their powers of land management to realise rapidly rising increases in land values, in their own interest, or in support of the private sector (Shatkin 2016). Satellite towns are usually developed by the private sector for profit, sometimes in partnership with the public sector, and have emerged around new economic activities such as IT, special economic zones (SEZs), or around middle and high income residential development, sometimes in combination. Some are fully planned, while others have emerged over time. They provide an escape from congested central cities and their squalor, declining infrastructure and weak governance (Bhattacharya and Sanyal 2011, Percival 2012). For instance in India, with liberalisation, foreign investment in industries such as software services found locations on the edge of places such as Mumbai, Bengaluru, Chennai, Hyderabad and Pune. In some cases, the Indian state designated SEZs, attracting this investment, and in other cases it followed with supporting investments (eg the IT Corridor in Chennai) (Levien 2013).

In contrast to the inclusionary intentions of the older new towns and their developmental orientations, these satellite cities often involve land dispossession and displacement of small farmers and the peri-urban poor, without offering employment to them (Levien 2013, Parikh 2015). Like Gauteng's new large private developments such as Steyn City and Waterfall, they tend to be socially segregated, often gated spaces, although some include small proportions of inclusionary housing (Percival 2012). Asian new towns of this sort range in size and distance from the centre, but can be over a million in population (eg Rajahat near Kolkata, India) (Wang et al 2010), reflecting the huge scale of urban growth in these cities – in contrast to the much smaller size and expected growth of cities in Gauteng.

In China, entrepreneurial local governments in major cities such as Shanghai and Beijing have also driven major satellite city developments as a way of generating revenues through capturing increases in property values. They are also used to accommodate the huge scale of growth and to increase city competitiveness by providing space for the development of important new sectors, such as ports, IT, creative industries and tertiary education, or to relocate older industry (Jie 2015, Wu 2013). Considerable

attention is being paid to creating spaces attractive to middle class groups and professionals, to avoid the reverse commutes which were common in previous years.

The appeal of new satellite towns as a way to escape the challenges of the ‘real’ city has grown in recent years. Towns of several million people and economic activities are being proposed as a way to address the congested capital cities of Russia (New Moscow) (Argenbright 2011) and Egypt (New Cairo) (*Guardian* March 16, 2015). Several rapidly growing African cities are planning new towns on a smaller scale to provide attractive spaces for the growing middle classes, and to escape the perceived chaos of the city (Watson 2013). For now these are largely ‘fantasy cities’ (Watson 2013), but some versions of major satellite developments are starting to emerge as residential or economic complexes, for instance the Chinese supported housing developments on the periphery of Luanda, such as Kilamba (Buire 2014). Variants of satellite cities are being proposed in Cape Town (Ciriola 2014), as well as in Gauteng.

The following section discusses the experience of satellite new town developments, focusing particularly on the older new town programmes, which enable a long-term view of the outcomes of these programmes and how they have evolved over time.

### **International new town satellites development: outcomes and experiences**

The literature on new town satellite developments suggests that there are variations in the extent to which they have been able to attract population and economic activity, and in their levels of ‘self-balance’ and ‘self-containment’ versus commuting. These are not static however, and their performance in these terms has shifted over time. The long view presented by the older new towns is therefore very useful.

Several of the early new town programmes placed a strong emphasis on economic development and job creation, with varying outcomes. In the UK, the first two decades of new town programmes in the 1950s and 1960s were quite successful in terms of diversifying local economies and creating jobs, but less so after this period (Ward 1993). These early phases of growth coincided with a period of rapid economic expansion, with new demands for industrial space (larger sites and buildings, better road access), which could be made available in the new towns where land

was cheaper. Incentives were also used to attract industry to these locations. However, many new towns suffered economic decline with recession and economic restructuring, from the 1970s (for instance the closure of steel mills, branch plants and distribution centres), and later deindustrialisation and globalisation in the 1980s and 1990s. Places that were dependent on a single major employer or sector were most affected, while new towns with more diversified economies did better (Alexander 2009). Larger new towns which were well located in relation to London, and on good transport routes, or in the path of growth (Turok 1990), were more successful. Linked to these processes, UK new towns became more self-balanced and self-contained in their first two decades, but these aspects declined in later years (Ward 1993, Cervero 1995). Larger and more spatially isolated new towns were more likely to be self-contained (Ward 1993) – more often the third generation new towns, but these are also more car oriented in their design (Cervero 1995).

In Hong Kong (Ching 2007), new towns initially focused on industrial development, but industries found it difficult to access labour, so policies shifted to emphasising the development of public housing estates first. Households were drawn into new towns by the availability of housing in a context of scarce supply and rapid population growth. While public facilities and transport access were initially poor, these improved over time, and new towns became connected through both mass transit and highway development.

Prior to 1977, industrial growth in the Hong Kong new towns was limited, but over the following ten years, 55 per cent of new factories were developed in these areas, although towns closer to the main centres were more favoured by the market. The growth of new towns as spaces for industry and residence was enabled by the severe shortage of suitable land in central areas, by rapid economic growth, and by the state's dominant ownership of land in these areas. New towns provided cheaper land for space consuming factories (Ching 2007), but from the 1990s, industry began to shift outside of Hong Kong into sites in adjacent China. Furthermore, economic restructuring from the secondary to the tertiary sector led to new growth in central city areas rather than in new towns. Although policies attempted to decentralise offices, they remained quite concentrated.

Ching (2007) argues that Hong Kong new towns have never succeeded in matching jobs, working populations and levels of skill. For instance, in

1981, new towns had 44 per cent of factories and 21 per cent of the industrial workforce, 0.39 per cent of offices and 13.2 per cent of the population working in the tertiary sector. Ten years later, they had 47 per cent of factories and 39 per cent of the industrial workforce, 3 per cent of offices and 33 per cent of people working in the tertiary sector. Although job growth occurred in new towns, there was considerable cross-commuting as people attempted to retain the jobs they had in the centre, and as firms locating in new towns often brought their own workers. Good transport links developed in later years have enabled commuting, in effect making new towns an extension of the main urban areas (Ching 2007).

The UK and Hong Kong new towns show some levels of self-balance and self-containment, but there are many instances where this has not been achieved. There are many cases where planned satellite cities become dormitory towns to a significant degree, such as in Tehran, Stockholm, Luanda, Jakarta and Singapore, or operate as part of the larger city, with considerable cross-commuting (Buire 2014, Gaborit 2010, Padawangi 2010, Mirmoghitoadaee 2012, Wang 1987). Most Iranian new towns built since the 1960s have fallen well short of their targeted populations, but still act as ‘housing warehouses’ (Ziari and Gharakhlou 2009: 6). Gaborit (2010) argues that European new towns are often dormitory towns, reliant on commuting. For Cervero (1995), patterns of commuting are determined less by levels of self-balance and self-containment, and more by the availability of good transport infrastructure and networks. Where networks are poor, however, and households do not have alternatives, satellite city development can add to congestion. In reality, it is difficult to see new towns as autonomous entities.

The UK and Hong Kong new town experiences shows how vulnerable new towns are to shifting patterns of economic development – a point developed more fully in relation to the Gauteng experience. With economic liberalisation, India’s steel towns went through similar processes to those in the Vaal area, discussed below. Gaborit’s (2010) review of European new town experiences shows how common these patterns are, and the many instances where planned or expected economic development failed to occur or collapsed due to shifting dynamics within particular industries. This can be devastating in small, narrowly focused, local economies. Many of the older new towns have been unattractive to the new businesses associated with the growth of the knowledge economy – in part due to their location and image, and the lack of an appropriately skilled and educated

workforce keen to live in these areas. While a level of middle class housing did develop in the early years in European new towns, these towns are now predominantly low income. Middle class residents and professionals working in these areas prefer to live in the central city or in surrounding small towns. Funding cuts and lack of reinvestment, as well as poorer facilities (such as shopping and leisure) than in central cities have made them unattractive places to live for those who have alternatives.

Some new towns attract economic activity, while others have struggled to do so. For instance, of the two satellite cities planned around Kolkata, India in the 1970s and 1980s, Salt Lake City located 8.5km from the CBD grew, while the other, some 88km away failed to become fully functional as many administration offices and businesses refused to locate there (Wang et al 2010). After 30 years, Navi Mumbai, had reached 1.3 million in population and offered 350,000 jobs, but had not met expectations. Over this period, Mumbai continued to grow by 6 million, with 67 per cent of the population in the region and 80 per cent of jobs. A planned CBD where infrastructure had been provided failed to develop as a commercial centre, while another node, where government land was available, took off, it is argued because it is much closer to Mumbai and better connected with it (Vedula 2007).

New towns are also vulnerable to poorly predicted or unexpected trends. Perhaps the most obvious case is the French new town programme around Paris which was famously planned in a period of rapid population and economic growth in the 1960s (Tuppen 1979). Population in Paris/Ile de France region was expected to reach 15 million by 2000, but grew to less than 11 million by then in fact (Gaborit 2010). Hence, new towns were overplanned relative to demand, imposing significant costs (Tuppen 1979). Here the state left housing, office and factory construction to the market (Cervero 1995). While some of the new towns around Paris managed to attract economic activities, others struggled to do so, remaining largely as dormitory towns, reliant on commuting (Cervero 1995, Gaborit 2010). In contrast to expectations that these towns would benefit from industrial growth, industrial decline began to set in during the 1970s. By the late 1970s, offices accounted for most of the economic growth in new towns, but growth was slow, and despite land price advantages, the new towns could not compete with the centre and existing suburban locations (Tuppen 1979). In later years, some of the new towns found economic roles, for instance Marne-La Vallée attracted Disneyland Paris, and towns

in the west and south have grown around office, high technology and light manufacturing. These have greater balance, while those in the east have attracted large numbers of foreign migrants, looking for affordable housing, and dependent on commuting (Cervero 1995).

There are also cases where poor planning, inaccurate prediction and a lack of understanding of dynamics have had long-term negative consequences which are not solved by later development. Stewart's (1996) study of first generation new towns planned around Cairo in the 1970s showed that reverse commuting had occurred due to the inadequacy and high cost of housing for workers, who commuted from the centre despite poor transport connections. Most new towns were too distant from Cairo and did not provide sufficient services and the social environment necessary to be attractive places to live. Some housing in new towns was bought by investors and remained empty. Firms, however, were attracted into new towns through tax incentives and low costs, but still retained head offices in Cairo. Towns closest to Cairo were most successful. More recent assessments (Gaborit 2013) suggest that the later new towns have tended to be private initiatives – speculative developments and gated communities aimed at higher income groups. The poor state of transport infrastructure and high housing prices however has made some of them unattractive even for higher income groups, and many remain empty. Although considerable public funds have been spent on new towns, only 3 per cent of the population lives there, raising questions about their value in a context where some 60 per cent of the population lives in informal settlements (Gaborit 2013).

The Chinese state has had greater control over land, the location of housing and economic activity than in many other countries, but even there, disjunctures and the limits of planning are evident. New towns planned in Shanghai from the 1950s to the 1970s attracted less than a third of the planned population (only 0.65m vs the planned 2.1m), and the central city remained crowded, with significant commuting (Jie 2015). Satellites attracted immigrants from surrounding regions instead of emptying out the centre. The new towns developed since the 2000s have attempted to create more attractive spaces for middle classes, professionals and for new economic activities as noted. Jie (2015) argues that after ten years of development, there has been a dramatic increase in both residential population and industrial employees in outer areas. Nevertheless, satellite towns have performed differently: distance from

central Shanghai, and levels of facilities and services, have made a difference, for instance Songjiang has had a strong economic foundation and has been able to attract population. Rising land prices have provided financial resources – in contrast to more remotely located Lingang, with poorer facilities and services, which has been less attractive to residents and investors. Property prices in Songjiang have however limited the availability of housing for working classes (Shen and Wu, forthcoming).

Creating ‘self-balanced’ and ‘self-contained’ development has not generally been a focus of the privatised new towns developed in Asia and Africa, and many of these places are highly reliant on commuting, particularly by car, increasing levels of congestion. For instance, employment is still highly centralised in Jakarta city, and public transport is poor, resulting in long commutes of up to two hours from satellite cities (Percival 2012, Firman 2009). Nevertheless, manufacturing employment is decentralising, and the city is becoming increasingly polycentric (Hadalalah et al 2013). Kilamba outside Luanda is a housing development aimed at the middle classes, but employment remains in the city centre, forcing residents to commute more than 90 minutes each way (Buire 2014). Even where economic activity develops in these places, cross-commuting still occurs since employment is not necessarily taken up by people living in the area. Contrary to assumptions that the private sector is necessarily better at addressing market needs, some of these real estate developments have over-estimated demand for middle and higher income housing significantly (Percival 2012), resulting in empty or over-supplied property, and considerable financial loss, for instance in the case of Muang Thong Thami, some 40km from Bangkok. Percival (2012) argues that the failure of some of these developments contributed to the Asian financial crisis of the 1990s.

Finally, it should be noted that while the older new towns attempted to create ‘social balance’, this has been elusive. Although levels of social balance did occur for a time in some of the older European new towns, Gaborit (2010) argues that many have become concentrations of lower income populations and migrants. By contrast, many of the new private developments in Asia are for the middle and upper classes, with little access for the poor. Even where there are attempts to create more socially mixed environments, they tend to be segmented enclaves. In India, where satellites have developed around a high-end industry and service economy, there are still low-end service activities, and so these new spaces attract

migrants at large scale, often visible in new slum-type developments (Bhattacharya and Sanyal 2011).

One of the key insights from the international literature is that context really matters. The rationale for, and outcomes of, satellite development in a high-density East Asian city may be very different to that of a low- to medium-density city, for example. Likewise, the prospects for satellite city development may be very different in temporal and spatial contexts of rapid economic growth, than in contexts of weak to moderate growth. Given the size and rapid growth of East Asian cities, some form of planned satellite development might offer a way of accommodating both population growth and the need for new types of economic space to house new growing sectors. As the case studies showed, the prospects for forms of balanced development, including economic activity and employment alongside residential development, were much higher in periods of rapid growth in the 1960s in Europe than in the recessionary years that followed. And some forms of satellite growth driven by the private sector in Asia have included new economic sectors in periods of growth. However, there seems to be little rationale for satellite city development in cases such as South Africa where both population and economic growth rates are relatively low, and where growing economic sectors are locating primarily in relation to more central areas as the GCRO map shows (see Figure 3, Ballard and Rubin 2017, this issue), or to new high income areas (Gotz and Todes 2014). While experience is quite contextual, the lessons arising from the international cases raise serious doubts about the prospects for economically sustainable satellite settlements on the Gauteng periphery. Rather, they suggest that there are serious risks that employment creation will be limited or short-lived, perpetuating long distance commuting patterns. In the section below we move closer to the context of Gauteng's proposed new megaprojects by considering previous experience in Gauteng with satellite city development.

### **Lessons from the histories of the Gauteng City-Region**

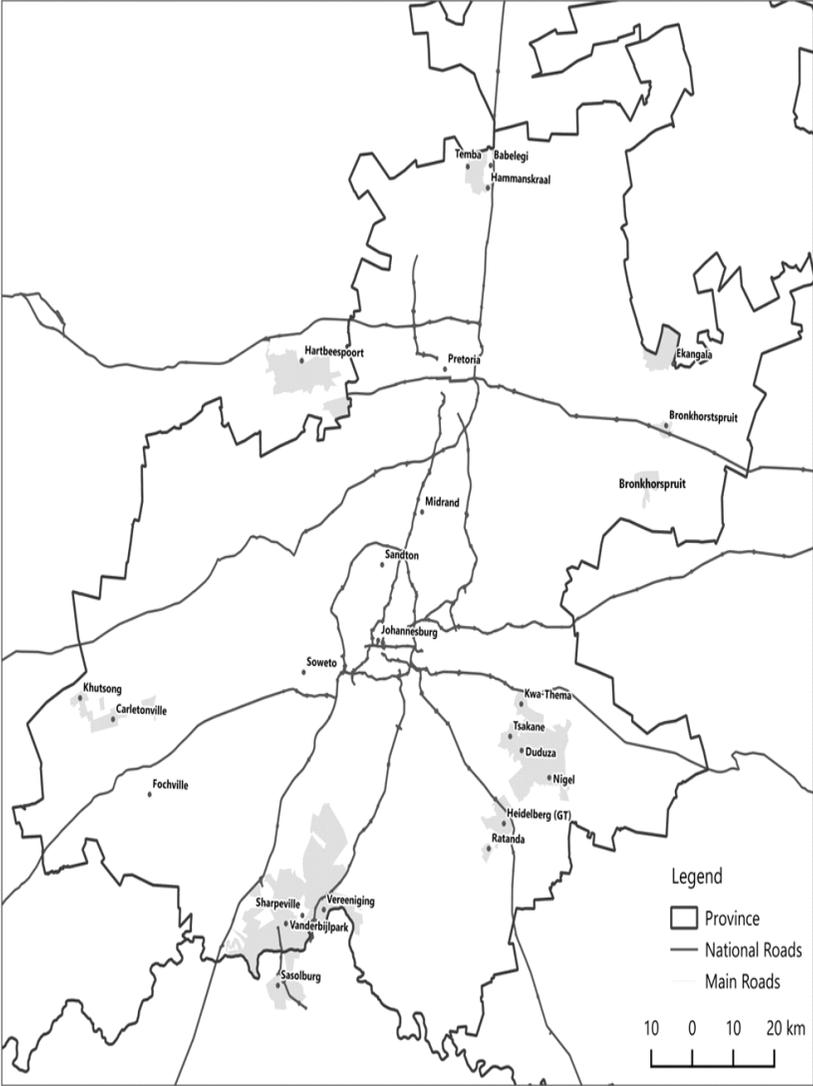
The following section of the paper considers the Gauteng experience of satellite city development, focusing in particular on the economic dynamics of satellite cities and towns, and their evolution over time. It draws on a detailed study of the edge of the city-region that uses multiple sources, including interviews of local actors and articles from the national and local media (see Harrison and Dinath 2017).

The Gauteng City-Region (GCR) has a legacy of large-scale developments on the spatial edge – both private- and public-sector led – that add to the collective of insights internationally, and also offer contextually related lessons for proposed developments in the GCR currently. There were, historically, three major forms of megaproject type development in the region now referred to as the GCR. First, there were the private-sector led mining-related developments. While the deep-level mines of the Witwatersrand were, in themselves, megaprojects, involving massive capital investments, they were also associated with large-scale residential developments, including the mining hostels for African labour and company towns for white labour. Secondly, there was the planned development of new towns, in support of state-created industry, in the area to the south of Johannesburg which became known as the Vaal Triangle. Thirdly, there were the new towns (or townships, as they were called) established in the apartheid era behind the homeland boundaries on the edge of the GCR.

The first two forms of residential development were led by, and tied to, large economic investments. The new towns were intended to support the economic activity and were clearly intended to be self-contained. The third form, however, is ambiguous in terms of intention. Verwoerd's grand scheme was the removal of as many black Africans as possible from 'white South Africa', and this required a series of residential megaprojects involving relocations and new town development. The contradiction however was the continued requirement for African labour from white households and white-owned enterprises within commuting distance of 'white cities'. The apartheid ideal may have been economic self-sufficiency behind homeland borders, but pragmatic reality required an acceptance of commuting. The compromise was a programme of industrial decentralisation which was intended to relocate industry from cities to areas near – and later, *within* homelands: to reduce African residence within, and commuting to, 'white cities' to the required minimum.

In the section below we explore these three forms of satellite-type development, using the specific examples of Carletonville (mining), Vanderbijlpark-Sasolburg (heavy industry), and Babelegi (decentralised industry).

**1: Satellite Developments in Gauteng** (source: Harrison and Dinath 2017)



***Carletonville: a mining satellite***

Initially, from the late nineteenth century, the mines were developed within the Central Witwatersrand, creating the impetus for the development of Johannesburg as a major city with a large and diversified economy. However, as the more profitable ore bodies in the central areas were depleted, gold mining companies began prospecting further and further afield, along the Far East Rand and Far West Rand, and eventually into the Northern Free State. As large new mines were opened, so new settlements were created, or existing settlements massively expanded. In the earlier cases, towns and cities developed somewhat organically around the mines, and around small company-owned mining villages. However, from the 1940s, influenced by British new town development, there were comprehensively planned new towns in the mining belt including Carletonville, Stilfontein and Welkom (Brockett 1996).

These settlements were, of course, directly linked to an economic base, and there was no initial question about the economic support for this growth. However, the nature of mining as an economy raises crucial questions of long term sustainability, and of resilience in response to volatile commodity markets. Mining-based towns provide a forceful illustration of the risks in assuming that early self-sufficiency and economic stability will necessarily continue into the longer-term. There are a number of mining towns around the GCR at different stages of the mining cycles, and with different levels of success in responding to the specific challenges posed by an extractive economy.

An instructive case is the town of Carletonville on the Far West Rand. Carletonville was started as a company town in 1948, planned and financed by Gold Fields Consolidated. It was established to serve the cluster of mega-gold mines that were developed in the 1940s following the discovery of the Wits West Line, a hugely lucrative extension to the Main (Gold) Reef. It was intended for white workers; the black workers being housed in compounds on the mines. But in the late 1950s Khutsong was developed by the state as a township to house black Africans who were attracted to the area but were living as squatters on farms. In 1959, Carletonville graduated from being a company town to being an independent municipality (Harrison and Dinath 2017, van Eeden 1992).

There were high hopes for Carletonville which was said to be the fastest growing town in South Africa in the early 1960s, and the possible core of

a large new city (van Eeden 1992). In the early 1960s, apart from the large-scale employment on the mines, there was also a cluster of small-scale manufacturers. However, the dewatering of the dolomitic compartments in this geologically unstable area by mining companies produced a local disaster. In 1964 two houses in Carletonville vanished down a dolomitic sinkhole, taking with them a family of five. The municipality immediately froze all new development, and national government even mooted the possibility of evacuating all of Carletonville. Although mining activity continued to thrive, other investors were scared off, and firms that had established closed down (Harrison and Dinath 2017, van Eeden 1992).

There was some recovery in the 1970s but no significant economic diversification, and there is no way of knowing whether a more diversified economy would have developed if the sinkhole had not appeared. By the early 1980s, local actors became increasingly aware that mining is not permanent, and that the long-term future of the town was not assured until replacement industries were developed. There was a local attempt to develop an industrial park but national government did not lend support as Carletonville was not near a 'homeland' (bantustan), and industrial development in the town would attract more black people into a white area. By the late 1980s, the locality had finally developed a large industrial estate but by this time the national economy was in a deep recession and investors that may have come to Carletonville were scared by the conflicts in a town that had fallen under the control of the extreme right-wing Conservative Party (van Eeden 1992).

The Carletonville-Khutsong complex was unprepared for the steady decline in mining which began in the 1990s which, ironically, happened as South Africa transitioned to a non-racial democracy. Faced with rising costs, six large mines consolidated into a single mine, saving the industry, but leading to extensive job shedding. Unemployment rose sharply, and the severe social stress in the locality, combined with a creeping environmental disaster (van Eeden 2012) and a violent conflict over a government proposal to transfer Khutsong from Gauteng into North West Province, created one of the tragedies of post-apartheid South Africa (van Eeden 2010). Carletonville was an illustrative case for a volume focussed on violence and disorder in the 'post-colony' (Morris 2006).

There were belated attempts by mining companies to support the diversification of the local economy, but the efforts were generally trivial in relation to the challenge of finding activities of the scale needed to

replace mining. The future is bleak, although there are still possibilities for a revival of mining – linked to new technologies for deep-level extraction – which could provide the breathing space for the development of alternative industries. The population of the district is in decline, although many job seekers are apparently remaining in the area in the hope that new employment will materialise (Harrison and Dinath 2017).

In its mining heyday, Carletonville was a largely self-sufficient settlement. In the 2001 census a question was asked whether employed individuals worked within the municipality within which he or she usually resides. The figure for the Westonaria Municipality within which Carletonville is located was 82.9 per cent, significantly more than the 51 per cent for Gauteng as a whole and the 50.4 per cent for the City of Johannesburg. While more recent figures are not available, it is possible that the level of self-sufficiency has declined as mining employment has dropped (Quantec 2016). In terms of economic linkage, Carletonville is, however, a branch economy with the economic power residing in Johannesburg where the major investing companies, AngloGold Ashanti and Gold Fields, are headquartered, and where these companies have their primary stock listings. The third company, Harmony Gold, is headquartered in Randfontein on the West Rand although the real power also resides in the Johannesburg corporate economy.<sup>4</sup>

Carletonville is a sobering case but there are more hopeful examples. The town of Nigel on the Far East Rand, for example, experienced a collapse in its mining economy in the 1960s and 1970s but it was arguably saved by the industrialisation that happened in the 1940s and 1950s. The political elite in Nigel were then well connected to the national political elite who had the muscle to draw in national and foreign investment to the town.<sup>5</sup> For example, a large Australian company established a factory in Nigel in 1959 which produced almost all the locomotive coaches for the South African Railways for decades (Dunn 2006). Nigel did not perform well in later decades, losing out to the more centrally located towns along the East Rand, but it did at least sustain a reasonable economic base post-mining (Harrison and Dinath, 2017).

### ***The Vaal Triangle: a heavy industrial satellite complex***

The origins of the large satellite industrial complex known as the Vaal Triangle are in the entrepreneurial skills of the early Lithuanian immigrant, Sammy Marks, and in the links he established with the succession of Boer,

British and Union governments. Marks established the town of Vereeniging in 1892 and the first steel mill in South Africa on the Vaal River in 1911. He also persuaded the government to build the railways, dams and power stations needed to support industrialisation in the area (Trapido 1984). It was on this base that the state ventured into new megaprojects in the Vaal Triangle from the 1940s. The Smuts administration responded to the wartime demand for steel by developing a specialist steel mill, with state funding, in 1943. In 1947, the state-owned Industrial and Steel Corporation (ISCOR) began construction of a fully integrated steel plant which was completed in 1952. ISCOR's property arm, VESCO, built the town of Vanderbijlpark to house the mainly managerial and high-skilled technical white workers in the plant, with the townships of Bophelong and Boipatong established for the largely unskilled and semi-skilled black workers (Hallowes and Munnik 2006).

The next state-led megaproject in the region was the development of an oil-from-coal plant using a combination of German (Fischer-Tropsch) and American (Kellogg) technologies. In the early 1950s, the fully state-owned South African Coal, Oil and Gas Corporation (SASOL) built the SASOL I plant immediately south of the Vaal River. The town of Sasolburg was planned and built for the white workers, and Zamdela, notoriously downwind of the chemical plant, for the black employees. The planning and development was undertaken by a full subsidiary of SASOL, namely SASOL Townships Limited (Brockett 1996).

The new towns were developed using planning principles developed mainly in the UK. However, unlike the UK there was no policy imperative to create satellite towns. They were simply the by-product of a national economic project to ensure greater national self-sufficiency in strategic industries. The performance of the settlements followed the fortunes of the founding industries, and at first these were mainly positive.

During the economic boom of the 1950s and 1960s domestic demand for steel grew steadily and Vanderbijlpark did well. Even in the 1970s, in the context of a more turbulent national and global economy, ISCOR continued with its expansion plans. Vanderbijlpark had the advantage of state support and did better than neighbouring Vereeniging which relied on privately-owned steel mills and did poorly after the 1973 oil crisis (Simkins 2010).

By contrast, SASOL and Sasolburg had a troubled start. The project nearly failed in the first decade due to both a major flaw in the American

technology upon which it was based and a global oil glut. However, by the 1970s the technology had been largely perfected, and the rising oil prices from 1973 created a windfall for SASOL which had become a source of national pride for white South Africa (Sparks 2012).

However, by the late 1970s, ideological shifts globally, and in apartheid South Africa, resulted in a transition from state- to private ownership. In 1979, SASOL became the first of the large state-owned enterprises to be privatised. It was a corporate success, going global by entering into joint venture partnerships across the world. Sasolburg also did well. A petrochemical complex developed as downstream industries clustered around the SASOL I plant, and also around the Natref Oil Refinery which was established in the early 1970s. Although SASOL was investing heavily elsewhere in the world, Sasolburg established a niche in specialised products, including wax production.<sup>6</sup> There are, however, vulnerabilities within the current context as the low global oil prices are placing huge pressures on SASOL, and skilful corporate strategy will be required to sustain the success. Furthermore, Sasolburg no longer enjoys the cosy relationship it had with its mother company. SASOL headquarters were moved from the town to Rosebank, Johannesburg, and has recently moved again to Sandton. The town now exists as an independent municipality, although one which is still largely dependent for its success on decisions made in corporate boardrooms.

ISCOR has taken a different trajectory. It was privatised later, in 1989, and since then has been severely buffeted by the chill winds of the global economy. The major crisis came in the mid-1990s when South Africa joined the WTO and tariff levels for imported steel were reduced from 30 per cent to 5 per cent. This forced a major restructuring in the highly inefficient ISCOR, with the overall reduction of ISCOR's workforce nationwide from 44,000 to 12,200 (Hallowes and Munnik 2006). Vanderbijlpark's population which had grown modestly in the early 1990s contracted sharply with an annual change of negative 7.29 per cent for the period 1996-2001 (Simkins 2010).

There was a period of corporate restructuring from 2001, which finally led to the transnational steel giant, Arcelor Mittal, taking direct control of ISCOR in 2006, to form Arcelor Mittal SA. This South African subsidiary began well as global steel prices reached an all-time high in 2004, but there was a severe slump during the global financial crisis of 2008 and, after a short recovery, there was a further slump to new lows in 2014/15

as the Chinese market became sated with home production. South Africa's domestic market was flooded by cheap steel imports. Arcelor Mittal warned of the possible closure of the Vanderbijlpark plant, demanding tariff protection from the South African government. As we write, the Vanderbijlpark industrial complex faces a deeply uncertain future although government has agreed to raise tariffs on imported steel to 10 per cent.

Data suggests that the steel-making complex in the Vaal Triangle did not achieve self-sufficiency. In 2001, 53.9 per cent of employed persons in Emfuleni local municipality worked in the same municipality that they usually lived in, only slightly more than the provincial average of 51 per cent, and the 50.4 per cent for the City of Johannesburg. With further economic decline, this figure could reduce further as progressively large concentrations of people around Vereeniging-Vanderbijlpark-Sebokeng may find themselves increasingly trapped locationally, or forced into long distance commuting relationships. The situation in Sasolburg is however different with 83 per cent of individuals working locally, and so Sasolburg may be regarded as a largely self-contained town.

### ***Babelegi industrial estate and displaced urbanisation***

From the late 1950s, the apartheid state created new towns behind the homeland borders. In the case of the GCR these were satellites of the urban core, and involved long-distance commuting to the core. They were initially constructed and funded by the Department of Native Affairs (DNA), and later by homeland development corporations. On the edges of the GCR they included Temba (late 1950s), Mabopane (established in 1963), Ga-Rankuwa (1965), Soshanguve (1974), and Ekangala (1980s). The DNA was not the usual sectoral department. It was, in fact, dealing with all facets of the lives of black African people, and so had the ability to co-ordinate multi-sector interventions, involving, for example, physical infrastructure, housing, and services such as education and health (provided at a far lower standard than in white residential areas).

Many of the residents had been relocated from central areas in the GCR and were forced into long-distance commuting arrangements, which were also costly for the state in terms of bus and rail subsidies. There was no existing economic base for these settlements, but there was a retrospective attempt to create local industry through the industrial decentralisation programme. The first of the new industrial estates in the GCR was Rosslyn, established as a 'border industrial point', to direct commuters

from the emerging Mabopane-Ga-Rankuwa-Soshanguve complex to the northern edge, rather than centre, of Pretoria. Rosslyn developed successfully as a hub of the motor manufacturing industry, continuing to expand after the industrial decentralisation incentives were removed, although it benefits from the Motor Industry Development Programme through which the motor industry enjoys an unusual level of state support. Today, Nissan, BMW, Renault and Tata have production plants in Rosslyn with a related and growing cluster of other motor-related service providers (Rosslyn 2017). This may be regarded as a highly successful instance of satellite development, but it is arguably an immediate extension of Pretoria, rather than a new node or satellite industrial estate.

By contrast, the Babelegi industrial estate was opened in 1970 *within* the homeland, and immediately adjacent the residential areas of the Temba-Hammanskraal complex. It was an apparent early success supported by a combination of generous state-provided incentives, low cost, non-unionised labour and, relative accessibility to the markets of Pretoria and the Witwatersrand. The ambition was to create 40,000 manufacturing jobs by 2000, and there was progress towards this target, with 17,000 jobs by 1994. Self-sufficiency was always however an unlikely outcome as economic success of the locality drew in increasing numbers of people from more marginalised areas, maintaining the imbalance between people and jobs.

Although there were local benefits, the decentralisation programme was a political project that did not survive South Africa's transition to democracy. The special incentives for industry were withdrawn after 1994, at a time also when the mainly labour-intensive industries drawn to the homeland industrial estates were facing the effects of import competition as tariffs were reduced to meet WTO requirements.

Babelegi declined sharply. The North West Development Corporation, which took over the administration of the estate from Bophuthatswana, reported that 6,050 workers were employed in Babelegi in June 2012, dramatically down from the 17,000 in 1994 (Tiro 2014). This was not total collapse,<sup>7</sup> unlike the case of Dimbaza in the Eastern Cape where only three of 200 factories remained open after the removal of incentives (Tiro 2014). Nevertheless, the local consequence of this decline was severe, with Tiro (2014: 37) writing that 'the residents have watched in horror as the industrial complex wilted and, to all intents and purposes, became something of a ghost town'.

The story however is not a simple one of state-induced growth and then decline. After the sharp contraction in the late 1990s, there was a mixed story of continued decline and some growth. There was new hope for the industrial estate in 1999 when Tiger Wheels built a large factory, although the plant closed in 2008, unable to compete with production in Poland (Ganley and Mills 2011). The Swiss transnational corporation, Nestlé, which also invested in Babelegi in 1999 was more successful, opening a further two new plants in 2012 (*Financial Mail* August 23, 2012). There have also been other recent investments seemingly associated with the improved management of Babelegi after the industrial estate was transferred from North West Province to Gauteng, and also into the jurisdiction of the Tshwane metropolitan council (Harrison and Dinath 2017).

The Babelegi story is also broadly replicated in Ekandustria which was established in 1984 as the industrial base for the kwaNdebele homeland. It was successful in attracting investors, especially from Taiwan, with 10,000 jobs created by the early 1990s. It also suffered sharp decline when incentives were withdrawn, leaving the residents of Ekangala township stranded, but there is also an apparent current renewal of interest in the area with the development of a small chemical and metal products hub (Harrison and Dinath 2017).

While it is doubtful that self-sufficiency was ever the intention of the satellite development behind homeland boundaries, it is clear that these remain largely commuter-based settlements. The 2001 figures for work travel within the same community were Ga-Rankuwa (33.2 per cent), Mabopane (28.2 per cent), Soshanguve (28.8 per cent), Hammanskraal (44.2 per cent), and Temba (51.5 per cent) (Quantec 2016). The figures of local employment for the Ga-Rankuwa-Mabopane-Soshanguve complex are extremely low. This is a dormitory satellite complex serving the employment nodes in Pretoria (including Rosslyn). The somewhat higher figures for Temba-Hammanskraal, may reflect residual and new industrial employment in Babelegi.

### ***Insights from the Gauteng City-Region***

The history of large scale development on the spatial peripheries of the GCR confirms the critical relationship between settlement and the economic base, adding key insights into the temporality of the relationship. In the case of settlements established around mines and heavy industries,

there was an economic base and a high degree of settlement autonomy from the beginning. The question was one of long term sustainability. Settlements created around mining face a special challenge, as an extractive industry is temporally limited. Settlement futures are dependent on the extent to which economic diversification is achieved during the life of the mining industry. The best chance of success is diversification during the peak of a mining cycle when the resources are available to nurture new economies but this is often when local actors are least concerned about the future.

Settlements built around heavy industry have their own challenges of sustainability as global and national markets continually shift. While state ownership buffered new towns such as Vanderbijlpark and Sasolburg from market turbulence this did not last permanently and, after privatisation, the fortunes of these towns depended largely on the specificities of sector and industry performance and corporate strategy. The overarching lesson is that early success in achieving a stable economic base for a settlement is not a predictor of long term achievement, as the international experience of new towns also shows.

Ironically, given the vastly different ideological and political context, the settlement projects of the apartheid era may provide the best lessons for current megaproject initiatives. Unlike the case of the mining towns or the Vaal Triangle, there was no major economic pole around which to develop the settlements. The question is whether it is possible to build, and then sustain, the necessary economic base as the settlement develops. Again, the history of the GCR does not provide a simple answer but does suggest that it is extremely difficult to do this, and that it may be highly risky to proceed with a major development on the assumption that it can be achieved. Rosslyn is certainly an example of impressive achievement, but it is located fairly centrally within the city-region, and does not resolve commuting challenges. Babelegi and Ekandustria, on the other hand, had a period of success, although they experienced a sharp contraction with changes in macro-economic and regional policy after apartheid. These settlements may yet rebound in the future, but outcomes remain extremely uncertain.

Can state-directed policy lead to economically sustainable settlement growth beyond the boundaries of the core cities? The Gauteng experience suggests that it may be possible for a period, at least, but it will generally take an extraordinary effort, and outcomes are extremely uncertain. This

point is consistent with the international cases which show how difficult it has been to create sustainable economic bases in new towns on the urban periphery.

### **Conclusions and implications for Gauteng human mega-settlements**

The discussion above, drawing on both international and local histories, shows that the experience of creating new towns has had varying outcomes, but also that there are considerable risks associated with attempting to create satellite new towns as a way of managing metropolitan growth. New towns developed by both the public and private sector are very costly enterprises with uncertain outcomes. Although there are successful examples, many new town programmes have struggled to attract the targeted population and economic activity or to maintain these over time. Creating a full range of services and facilities attractive to potential residents and businesses has been important in the more successful cases, but is by no means guaranteed or easy. While new towns often experience deficiencies in this regard in the early years, some continue to offer poorer facilities than other areas, limiting their appeal (Gaborit 2010). There are, of course, places internationally where there is significant dynamism on the metropolitan edge, and new town development may be a means of structuring this growth with satellite settlements being gradually or rapidly absorbed into a contiguous urban footprint. In the GCR however this is unlikely as the metropolitan edge is a zone of economic vulnerability and even decline. The probability here is that satellite towns will simply be left stranded as separate urban entities feeding a commuter flow into the city.

Programmes specifically focused on economic development have been important in developing successful economies in new towns, but this has not been central to the Gauteng human mega-settlements proposals. If these proposals do go ahead, much greater attention needs to be given to strengthening existing economies close to these areas, or to exploring the real prospects for new economic activities, and providing space for informal economies. This would require the exploration of private sector interest in these areas, and might involve forms of public-private partnerships around economic development, but is likely to be challenging in the current economic environment. Developing housing alone is insufficient to enable economic development. Residential-only developments have tended to result in a reliance on commuting, unless

there is a later focus on economic activity.

Creating and sustaining local economies is not easy. New town economic development has generally been more successful in periods of rapid economic growth. However, even where economic growth occurs for a time, satellite new towns are vulnerable to economic restructuring and broader economic shifts, particularly since they are often narrowly focused in economic terms. Creating more diversified economies in larger centres closer to the main cities may help to avoid some of these problems, but the Gauteng human mega-settlements are generally very small, and several are in quite distant locations with unclear economic prospects.

The literature suggests that the prospects of creating self-contained new towns that are not reliant on commuting is small – that new towns generally operate as part of the broader metropolitan region. Smaller towns and ones closer to the city are also more likely to operate in this way, but where jobs are limited, even more distant places become part of the commuter zone. From this perspective, creating good transport links and networks is important. This has also not been addressed in the Gauteng human mega-settlements proposals, but will be critical to address if the proposal goes ahead.

The review of the new town satellite city experience has a broader set of implications. It is evident that this way of planning for the future growth of cities does not help to improve urban resilience: rather it is vulnerable to inadequately projected or shifting demographics and economies. While these kinds of developments may be inevitable in the very large, dense and rapidly growing cities of Asia, they are not appropriate in contexts such as Gauteng, where growth rates are not so high, are slowing, and where cities are already quite low-density and sprawled. From this perspective, the creation of satellite cities without realistic plans to develop economic bases, or ones which are distant from economic nodes, should be avoided in Gauteng. The broader comment made by several authors that satellite city policies do not assist in addressing the general problems in the core city remains an important insight, relevant to the Gauteng region. In the end, it is not possible to escape the existing city. Housing and planning efforts need to continue to focus on improving conditions, opportunities and access across the existing city, including within its spatially marginal places.

## Notes

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2. Gauteng Province includes the metropolitan cities of Johannesburg, Tshwane (Pretoria) and Ekurhuleni (East Rand) as well as smaller cities and towns in municipalities along the West Rand and in the heavy manufacturing-dominated Vaal Triangle. It is the 'economic heart' of South Africa accounting for one-third of the national Gross Domestic Product. Although the economy was founded on mining, it is now dominated by tertiary activities, with mining mainly on the metropolitan periphery. Together with urban areas spilling over into neighbouring provinces, Gauteng Province forms part of what is now referred to as the Gauteng City-Region (GCR).
3. As several authors have noted (eg Jie 2015, Percival 2012), the literature on new town satellite cities is quite uneven over time, across space and in its focus. For instance, there was considerable literature on the older state created new towns in the 1970s and 1980s, but much less since then (but see Gaborit 2010 for a recent discussion of European new towns). The contemporary literature focuses largely on private new town developments and those in Asia, including China. The physical design of new towns has been a strong focus, with less work on economies and questions of self-balance and self-containment.
4. Johannesburg is where the command-and-control resides. However, the West Rand is also part of a wider corporate network. AngloGold Ashanti has listing in New York, Accra, London, Paris and Brussels; Gold Fields in New York; and, Harmony in New York, Berlin and Brussels. In terms of shareholding the Americans, and especially New York-based banks, dominate AngloGold Ashanti and Gold Fields, and are a close second to South Africa for Harmony Gold. American billionaire, John Paulson, living in New York, is a major shareholder in both Gold Fields and AngloGold Ashanti. After the USA and South Africa, the third largest concentration of shareholding is the UK and especially London.
5. The Member of Parliament for Nigel was, for example, the powerful BJ Vorster, later prime minister.
6. *Engineering News*, April 16, 2014. This success was revealed, somewhat ironically, during street protests in Zamdela township in January 2014. The community was protesting against attempts to incorporate the poorer communities around Parys into their local authority (*Business Day*, January 30, 2014).
7. There were claims however that the Babelegi estate reached a low point of only 2000 workers (eg Bloom 2011).

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