

The reshaping of urban structure in South Africa through municipal capital investment: Evidence from three municipalities

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Abstract

Although Spatial Development Frameworks are regarded as the key spatial restructuring tool of local municipalities, the investment of public resources through the municipal capital budget is of equal importance. Public-sector capital investment plays a key role in the reorientation of spatial priorities by guiding private investment and restructuring historically inefficient spaces. The alignment of spatial development strategies and municipal capital budgets provide a potentially effective restructuring mechanism for local municipalities. This article analyses the degree of alignment of these instruments through the case-study investigation of three local municipalities: Johannesburg, Cape Town, and Rustenburg. The findings indicate that spatial development frameworks significantly influence budgetary capital spending patterns and address growth management and connectivity. However significant resources were committed in marginalised fragmented settlements, a trend that reinforced spatial inefficiencies.

DIE HERVORMING VAN DIE STEDELIKE STRUKTUUR IN SUID-AFRIKA DEUR MIDDEL VAN MUNISIPALE KAPITAAL BELEGGING: BEWYSE VANAF DRIE MUNISIPALITEITE

Alhoewel Ruimtelike Ontwikkelingsraamwerke as die belangrikste plaaslike ruimtelike herstrukturering instrument beskou word, is die investering van openbare hulpbronne deur middel van die munisipale kapitale begroting ewe belangrik. Die investering van kapitale uitgawes in die openbare sektor speel 'n belangrike rol in die ordening van ruimtelike prioriteite deur historiese ondoeltreffende ruimtes te herstruktureer en private sektor beleggings te oriënteer. Die belyning van die ruimtelike ontwikkelingstrategieë en munisipale kapitale begrotings bied 'n potensiele doeltreffende herstruktureringmeganisme vir plaaslike munisipaliteite. Hierdie artikel ontleed die graad van belyning tussen hierdie instrumente deur 'n gevallestudie-ondersoek in drie munisipaliteite: Johannesburg, Kaapstad, en Rustenburg. Die bevindings toon aan dat ruimtelike ontwikkelingsraamwerke die kapitaalbestedingpatrone wel sterk beïnvloed het en die bestuur van stedelike groei en ruimtelike skakeling aangespreek het. 'n Beduidende gedeelte van hulpbronne is egter ook in gemarginaliseerde en gefragmenteerde nederseffings belê, 'n tendens wat ondoeltreffende ruimtelike patrone bevorder het.

BOPO E FAPANENG EA DIBAKA KA HARA NAHA EA AFRIKA BORWA, KE MASEPALA: MEHLALA E TSOANG HO BO MASEPALA BA BARARO

Le ha tsela tsa mosebetsi oa tswelopele ea morero oa dibaka di bonoa e le tsona tse bohlokoa hore dibaka di reroe hantle ho masepala, chelete ea ho sebeletsa sechaba ke masepala le eona e bohlokoa. Chelete ea ho sebeletsa sechaba e bapala karolo e kholo diqetong tsa ho hore na sebaka se reroa joang. Lenane la bohlokoa ba hore na ho hloka ho rereloa eng sebakeng se feng le chelete e behilong ke masepala e beheloa ho rerela sebaka, ke tsona tse thusang hore masepala ho sebetse ka mokhoa oo phethahetseng. Serapa sena se shebisana le tsamaiso mmoho ea dintlha tsena e ipapisitse le bo masepala ba bararo e leng ba Johannesburg, Cape Town le Rustenburg. Diphumano tsa chebiso ena di bontshitse tsela tsa mosebetsi oa tswelopele ea merero ea dibaka e ama pokello le karolo ea chelete. Le ha ho le joalo ditlhoko tse khethehileng di tsamaisitsoe ho dibaka tse ne di di hloka haholo. E e leng ea baka hore merero ea dibaka e se ke ea sebetse hantle ho tloha moo.

1. INTRODUCTION

In 1994, the new South African government inherited an urban form which was spatially segregated, socially fragmented and in which a large section of the population was economically marginalised from full economic participation. In response, the state addressed these inefficiencies by implementing municipal planning mechanisms including Integrated Development Plans (IDPs), Spatial Development Frameworks (SDFs) and Municipal Budgets under the Municipal Systems Act 32 of 2000. These mechanisms were legislated to empower local municipalities to overcome the spatial legacy of apartheid through the spatial redistribution of resources. The intended goal of these mechanisms was to create a future inclusive and integrated society through shared, sustainable and equitable development (Oranje & Van Huyssteen, 2007: 4).

Yet, despite the implementation of these mechanisms, the widespread consensus among planners is that the spatial development policies in South Africa have, to a large extent, failed to achieve the desired spatial outcomes. The inherited spatial patterns of apartheid-era settlement types remain firmly entrenched, and the distribution of population and resources in South African cities continues to be more inequitable than most other countries (Boraine, Crankshaw, Engelbrecht, Gotz, Mbanga, Narsoo & Parnel, 2004: 260; Pieterse, 2004: 82). Given the significance of capital investment in restructuring cities, this study analyses the capital investment patterns in three municipalities in South Africa over a five-year study period. The study aims to determine whether municipal capital spending patterns are aligned to the strategic vision of the IDPs and SDFs. In addition, the article explores the applicability of the study methodology in analysing spatial transformation in other municipalities.

2. SPATIAL TRANSFORMATION THROUGH CAPITAL INVESTMENT

South Africa has a long history of inequitable development, originating from colonial and apartheid-era urban

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development policies. Forced removals, influx control and Bantustan settlement initiatives based on the Natives Land Act of 1913 and the Group Areas Act of 1950 spatially fragmented communities and economically marginalised the historically disadvantaged (Todes, 2006: 51). In 1994, the South African government inherited this highly dysfunctional landscape. Given these spatial inefficiencies, the need arose for a comprehensive spatial vision for the country.

Within this spatial vision, a strategic approach to the capital investment of South Africa's public resources was required in enabling the spatial transformation of South African cities (Pieterse, 2004: 100). State capital investment was to be implemented according to municipal integrated planning mechanisms and in accordance with the principles of sustainability, equality, efficiency, integration and good governance, as prescribed by the Development Facilitation Act 67 of 1995 (MALA, 2001). The intended outcome of these processes was the investment of public resources in a manner conducive to the development of dense, integrated and pluralistic communities.

A number of instruments were developed to achieve spatial restructuring within the integrated development planning framework. The most prominent impact on spatial planning at an urban level was the introduction of the IDP process through the promulgation of the Local Government: Municipal Planning and Performance Management Regulations in 2001 (RSA, 2001). Although the IDP is often viewed as a wish list, because it has a long-run strategic perspective, its usefulness lies in its position as a guideline for the implementation of state capital investment through the municipal budgetary process, and as a guideline to regulate private investment in a manner that is congruent to the outcome of the IDP (Harrison, 2006). These regulations also prescribe that the IDPs of municipalities must include a SDF and provide broad guidelines of the contents of the SDF.

However the most under-recognised instrument for spatial restructuring is the municipal budget itself. Although the budget is not a spatial directive or a strategic document as such, it should be implemented according to the directives of the IDP and the

SDF. Therefore, it is the most practical mechanism to implement spatial transformation. The municipal budget forms a key component in new public management, in which the SDF provides a spatial framework for implementation and the IDP a strategic guideline for allocation of resources. The budget itself fills the gap between the realistic and pragmatic SDF and the idealistic and strategic IDP (Pieterse, 2004: 100; Harrison, 2006: 329).

Among the mechanisms at the disposal of policymakers, the budgeted capital investment of public resources following the guidance of SDFs forms one of the most effective methods of spatial transformation. Private investment can also be guided to the locations where inequalities persist by leveraging public resources in these locations (Turok & Parnell, 2009). In effectively implementing the municipal budget, the state has a unique capacity to secure a consensus between public and private capital investment, enabling the achievement of multiple development aims such as economic development, employment creation and service delivery.

Capital investments in long-term physical and social infrastructure form the basis for the spatial restructuring initiatives. Studies indicate that spatial fragmentation has a strong negative influence on both the access to employment and the working conditions of low-income populations (Benit & Morange, 2005: 17). Healey (2007: 20) states that spatial strategies form the structuring parameters whereby specific investments in physical developments and infrastructure are made. Over time, these shape the material opportunities and concepts of place into those which later generations experience as real functional landscapes. It has been argued that effectively targeted capital investment is potentially more powerful in shaping the spatial structure of cities than spatial policy itself (Todes, 2008: 11).

Another feature of capital investment as a distribution good is that it creates lasting physical assets which can be transferred to multiple generations. It has a long-run economic value, increasing productivity and improving living quality (Atkinson & Marais, 2006: 35). The location of capital investment is thus an important factor in achieving long-run economic growth and welfare, as well as overcoming the

negative economic externalities of apartheid-era planning.

Yet, a need to understand the socio-economic dynamics of the city and its spatial implications underlie effective capital investment through municipal budgeting (Todes, 2008: 12). The challenge of effective capital investment is in aligning budgetary spending with the directives of spatial strategies. "Understanding the 'where' [of development] is not a simple matter" (Atkinson & Marais, 2006: 32). Not only should capital investment address historic spatial fragmentation, but it should also be responsive to administrative and policy fragmentation between different departments and different spheres of government. The planning and budgeting of capital investment should be conducted in a holistic manner with stronger engagement between administrative parties for better alignment and collaboration in policy development (Van Huyssteen, Biermann, Naudé & Le Roux, 2009: 96).

3. AN ANALYSIS OF THE ALIGNMENT OF MUNICIPAL CAPITAL BUDGETS AND SPATIAL PRIORITIES IN THE STUDY AREAS

3.1 Approach to data analysis

Given the size of the available capital budget and the relevance of capital investments for spatially restructuring South African cities, it is essential to analyse the level of alignment of the municipal budget to municipal spatial strategies over the study period. The study presents a comparative case-study analysis of the alignment of the municipal budget expenditures with the spatial priorities of the IDPs and SDFs in three selected municipalities: City of Johannesburg Metropolitan Municipality (CoJ), City of Cape Town Metropolitan Municipality (CoCT), and Rustenburg Local Municipality (RLM) between the 2007/2008 and 2011/2012 budget years. The municipalities were selected based on the size of their capital budget, and the potential of capital investments for spatially restructuring the spatial structure of the respective cities. The municipalities were also selected to represent a collection of various types of urban structures and based on the number and differentiation of wards in the municipality for comparative analysis. CoJ and CoCT are large metropolitan municipalities, with the

CoJ an exclusively urban municipality and CoCT a large metropolitan city with adjacent satellite cities and a rural periphery. RLM is a primarily rural local municipality consisting of a rapidly growing intermediate-sized city and densely settled tribal authority areas in its hinterland. Although other smaller municipalities were analysed, the limited size of their budgets and the limited size and structure of the wards prevented effective evaluation of the alignment between capital budgets and spatial objectives.

In order to determine the extent of alignment and integration between municipal policy and the municipal capital budget, a quantitative assessment was performed by analysing the alignment between the strategic directives of the IDPs and SDFs and the spatial distribution of the budgeted municipal capital expenditures for the total five-year analysis period for each study area. The capital investment patterns were also analysed individually for each of five investment categories (see Tables 3, 4, and 5) to enable the identification of different investment patterns in different categories. Spatial statistical analysis of the budgeted municipal expenditure at ward level was used to derive an estimated evaluation of the amount of categorised capital investment per area (km²) to determine the spatial prioritisation of features in the study municipalities. The budgeted municipal capital expenditure was categorised into five broad investment categories:

- Economic investments: Tourism and market-related developments such as tourism information offices, fresh-produce markets, informal trading markets, and property-development initiatives.
- Social investments: Health care, safety and security, parks, hospitals and clinics, sports facilities, arts facilities, libraries, cultural facilities, recreational facilities, zoos, parks, cemeteries, theatres, vehicle-testing and -licensing centres, fire and rescue stations, and municipal policing.
- Housing investments: Government-assisted housing development such as subsidised housing, peoples housing process developments, and social housing developments.
- Basic services infrastructure: Including municipal roads, storm-water drainage facilities, electrical networks, water and sewerage

networks, refuse removal, and public transportation.

- Total investment: The sum of all of the above investments.

The specific features analysed in the study included:

- Activity corridors: Key transportation corridors in which public transportation, commercial development and high-density residential development are prioritised.
- Development nodes: Key investment centres in which commercial development is prioritised. Nodes are primarily located at transportation interchanges, enabling rapid movement towards these centres.
- Marginalised development areas: Locations, in which many of the households are poor, have high rates of deprivation, and public services are underdeveloped. Development is prioritised in these areas to enable social and economic integration.
- Non-prioritised areas: Remaining areas within the municipality that do not include the aforementioned categories.

In the spatial statistical analysis, feature prioritisation was determined by calculating the percentage gross investment (%GI), percentage of gross area (%GA), feature ward average expenditure (FWAE), feature weighted average expenditure (FWA) and the prioritisation rate (PR) as follows:

$$FCI = \sum_{j=1}^n (CI_j * FA_j)$$

$$FWAE = \sum_{j=1}^n (CI_j) / n$$

$$FWA = (FCI * FA)$$

$$\% GI = (FCI / CI)$$

$$\% GA = (FA_j / MA)$$

$$PR = FWA / FWA_x$$

where FCI is the sum value of the categorised capital investment in the feature; CI_j is the categorised investment in ward j per km²; CI is the total categorised investment; FA_j is the spatial extent of the feature in ward j in km²; FA is the total size of the feature in km²; MA is the total size of the municipality in km², and FWA_x is the

feature weighted average expenditure of non-prioritised features.

Percentage gross investment (%GI) is the investment in the feature as a percentage of the sum categorised investment. Percentage of gross area (%GA) is the feature area as a fraction of the gross municipal area. These indicate whether investment in features is proportionally higher than in non-prioritised areas. The feature ward average expenditure (FWAE) is the average categorised investment per km² in wards intersected by a feature. This value was used to determine whether investment in wards containing a certain feature (e.g. node) was prioritised over wards without these features. The feature weighted average expenditure (FWA) is the average categorised capital investment per km² in the feature. This value determined whether categorised investment in the feature was prioritised over investment in other features or non-prioritised areas. The prioritisation rate is the investment per km² in the feature as a percentage of investment in non-prioritised areas.

Data from the municipal capital budgets were mapped according to ward boundaries, as defined by the Municipal Demarcation Board. Budgetary data was analysed at ward level, the lowest spatial level of analysis available for municipal budget data provided. The data analysis is based on budgeted figures and not actual expenditure data due to the challenges of obtaining accurate expenditure figures. This does not significantly affect the study outcomes as the objective is to evaluate intent rather than measurable outcomes. Although the municipal financial statements of some of the municipalities contained some areas of concern, as reflected in their audit reports, there was no substantial variation between allocated budget figures and actual budget expenditures, and all budgets conformed to generally accepted accounting principles, according to the consolidated general report on the audit outcomes of local government (AGSA, 2012).

Table 1 indicates that municipal capital expenditure of the case-study municipalities is in the range of 15%-21% of the total municipal budget over the study period. The largest capital expenditures are on basic services infrastructure, with aggregate municipal expenditures at 81.4% of total capital expenditure. Significant capital expenditures on housing are

Table 1: Capital budgets for the case-study municipalities for the period 2007/2008 to 2011/2012

Municipality	CoJ1	CoCT2	RLM3	Total
Municipal budget 2007/2008-2012/2013 (R'mil)	132.900	113.800	11.652	259.224
Capital expenditure (R'mil)	20.542	24.408	1.942	47.036
Capital expenditure (% of municipal budget)	15.5	21.5	16.7	18.1
Economic capital expenditure (% of Capex)	2.4	1.2	1.1	1.8
Social capital expenditure (% of Capex)	4.4	5.8	7.2	5.3
Housing capital expenditure (% of Capex)	10.2	8.1	3.1	8.9
Infrastructure capital expenditure (% of Capex)	81.1	81.4	86.6	81.4

Sources: CoJ, 2007/2008; 2008/2009; 2009/2010; 2010/2011; 2011/2012
CoCT, 2007/2008-2009/2010; 2008/2009-2010/2011; 2009/2010-2011/2012;
2010/2011-2012/2013; 2011/2012-2013/2014
RLM, 2007/2008-2009/2010; 2008/2009-2010/2011; 2009/2010-2011/2012;
2010/2011-2012/2013; 2011/2012-2013/2014

Table 2: The distribution of capital expenditures within particular wards and citywide

Municipality	Capital expenditure within a particular ward (R'mil)	Capital expenditure within wards (% of municipal budget)	Capital expenditure distributed citywide (R'mil)	Capital expenditure distributed citywide (% of municipal budget)
CoJ	13.969	68.0%	6.573	32.0%
CoCT	11.690	47.9%	12.718	52.1%
RLM	1.438	74.0%	504	26.0%

Sources: CoJ, 2007/2008; 2008/2009; 2009/2010; 2010/2011; 2011/2012
CoCT, 2007/2008-2009/2010; 2008/2009-2010/2011; 2009/2010-2011/2012;
2010/2011-2012/2013; 2011/2012-2013/2014
RLM, 2007/2008-2009/2010; 2008/2009-2010/2011; 2009/2010-2011/2012;
2010/2011-2012/2013; 2011/2012-2013/2014

also recorded, with housing comprising a range of between 3.1% and 10.2% of capital expenditure. Capital expenditures on economic and social goods are the lowest, with social capital expenditures averaging 5.3% and economic capital expenditure averaging only 1.8% of total municipal capital expenditure.

Table 2 distinguishes between capital expenditure allocated within particular wards and citywide capital expenditure. This indicates that a significant portion of capital investment is spent in specific locations, thus enabling an authoritative reflection on whether capital expenditure was

allocated according to the directives of the SDF and other spatial policies. Citywide capital expenditure was equally distributed between all wards in each municipality for analysis purposes.

The general capital expenditure trends in the case-study municipalities during the five-year period indicate that the largest capital investments were concentrated in or near municipal CBDs and were mainly motivated by regeneration projects and public transportation infrastructure developments. Investments outside core areas were generally allocated to new housing projects, settlement

upgrading and basic services infrastructure development according to municipal budgets.

4. OVERVIEW OF RESULTS

4.1 City of Johannesburg

To evaluate the alignment between public-sector capital investment patterns and the spatial directives, the prioritised spatial policy directives for CoJ are outlined in Table 3. Of particular importance is the prioritisation of municipal capital investment in specific spatial features. These include activity corridors, development nodes and historically marginalised areas. Accordingly, Figure 1 presents the total capital investment in the features described in Table 3 and analyses the level of municipal investment in specific features. In addition, the study also analyses the specific alignment of categorised budgetary investment categories in certain features in Figure 2. These include the level of infrastructure investment along designated activity corridors; economic investment in nodes where agglomeration benefits and spillovers can best be realised; social investment in historically marginalised areas where higher rates of deprivation and lower access to resources occurs, and the spatial proximity of housing investment to nodes and corridors where access to employment and public services can be maximised.

Figure 1 depicts the spatial distribution of the gross municipal budget expenditure patterns. An analysis of total budgeted capital expenditures reveals that wards containing prioritised features, as identified in the SDF, generally attracted higher levels of capital investment compared to wards without these features. Wards containing corridors received nearly double the average investment per km² compared to wards containing non-prioritised areas, while wards with nodes

Table 3: SDF priorities for the City of Johannesburg

SDF strategies	Description
Corridor development	Prioritise public investment in selected nodes along the East-West Development Corridor (EWDC) and the North-South Development Corridor (NSDC). Public transportation management areas are designated as high-priority investments.
Nodal development	Assess mixed use and industrial nodes according to their attributes and develop individual nodal development strategies for each node. Ensure adequate levels of infrastructure to support development and densification in defined nodes and integrate these with the public transport and movement system. Optimise mixed land use and proximity to urban opportunities through densification in growth nodes within the investment footprint.
Marginalised areas	Marginalised areas are designated as high priority investment areas.

Source: CoJ, 2006

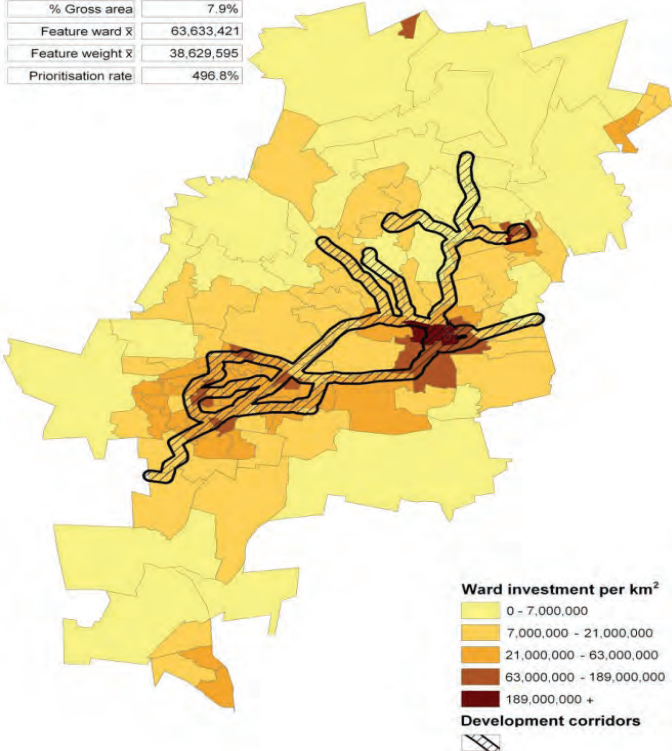
received nearly 44% more investment than wards containing non-prioritised areas. In terms of weighted expenditure, prioritised features including corridors, nodes and marginalised areas received significantly more investment per

km² than in non-prioritised areas. The average investment per km² in corridors was 496.8% higher, average investment in nodes 397.4% higher and the average investment in marginalised areas 245.6% higher than the average investment in

non-prioritised areas. Figure 2 indicates the spatial distribution of categorised municipal investment. The amount of infrastructure investment (as opposed to total investment) per km² inside corridors was 380.8% higher than investment

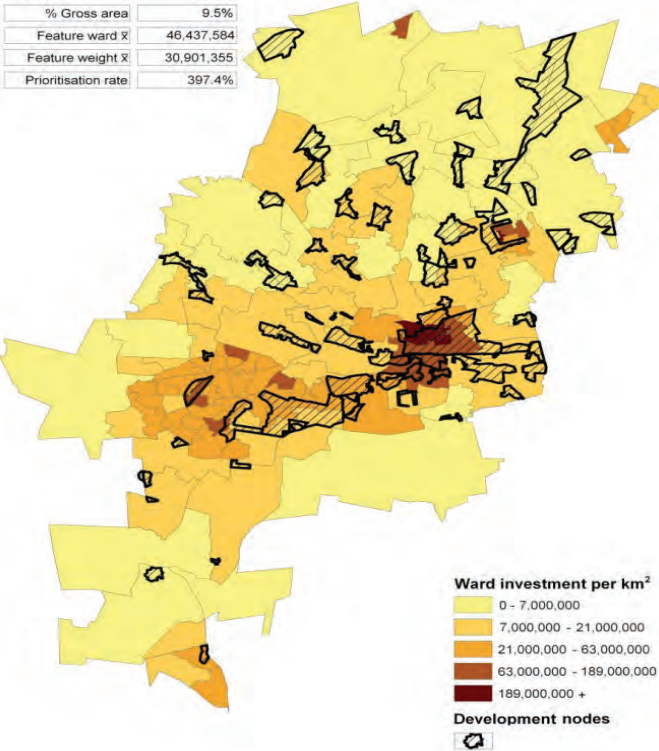
Total investment in corridors 2007/8 - 2011/12

%Gross investment	24.5%
% Gross area	7.9%
Feature ward \bar{x}	63,633,421
Feature weight \bar{x}	38,629,595
Prioritisation rate	496.8%



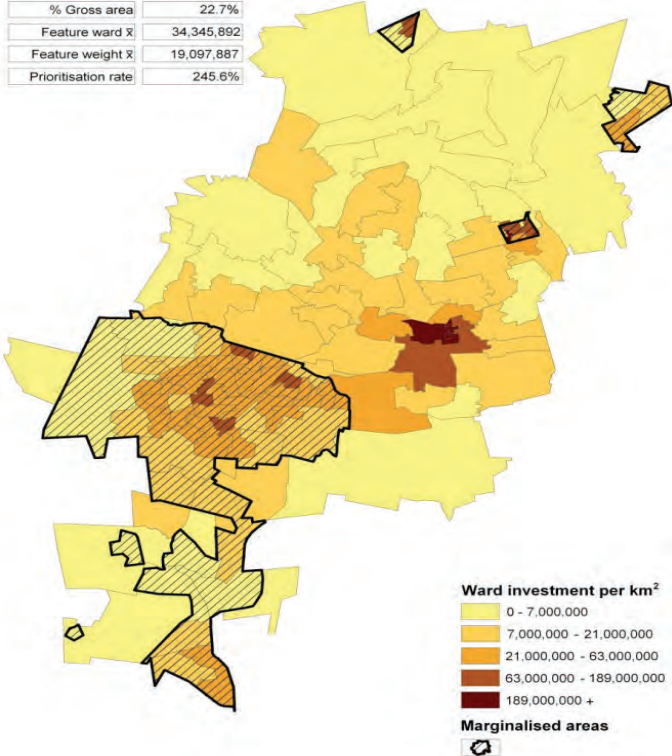
Total investment in nodes 2007/8 - 2011/12

%Gross investment	23.5%
% Gross area	9.5%
Feature ward \bar{x}	46,437,584
Feature weight \bar{x}	30,901,355
Prioritisation rate	397.4%



Total investment in marginalised areas 2007/8 - 2011/12

%Gross investment	34.8%
% Gross area	22.7%
Feature ward \bar{x}	34,345,892
Feature weight \bar{x}	19,097,887
Prioritisation rate	245.6%



Total investment in non-prioritised areas 2007/8 - 2011/12

%Gross investment	41.3%
% Gross area	66.3%
Feature ward \bar{x}	32,272,490
Feature weight \bar{x}	7,775,677

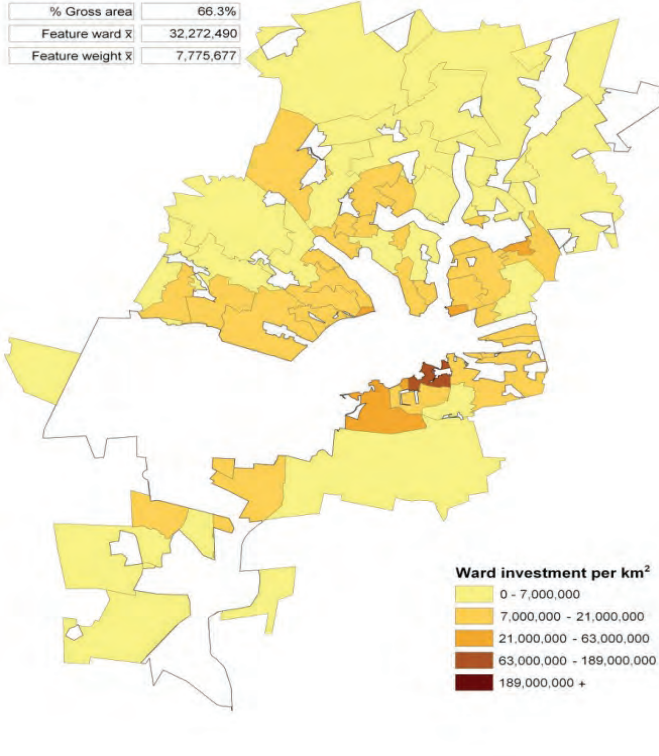


Figure 1: CoJ gross capital expenditures per feature between 2007/2008 and 2011/2012
Source: Own calculations, 2013

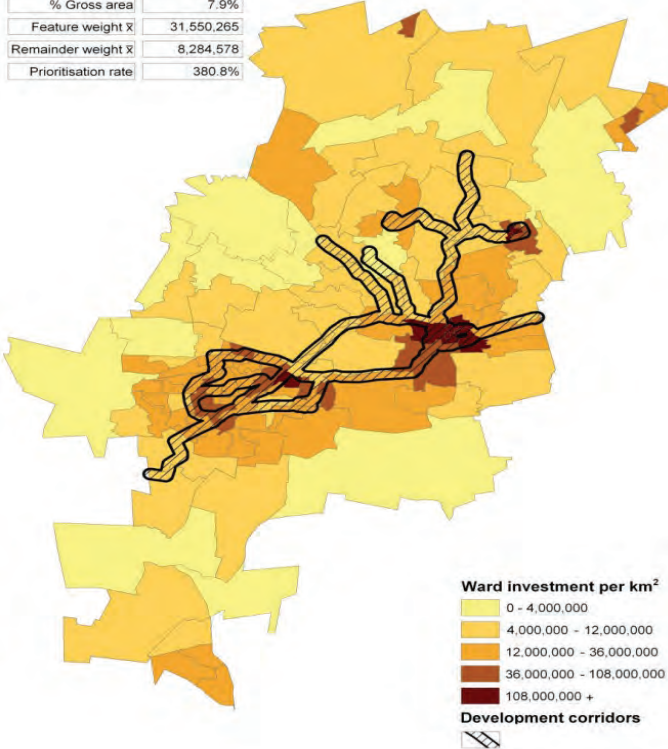
outside corridors. Similarly, economic investment in nodes was 407.7% higher than outside nodes. Social investment in marginalised areas was proportionally 276.6% higher than outside marginalised areas, and housing investment in nodes

and corridors was proportionally double that of investment outside nodes and corridors. In summary, prioritised features in the SDF including corridors, nodes and marginalised areas received higher levels of investment than non-prioritised

areas, particularly in nodes and corridors. Similarly, the concentration of infrastructure and economic investment in corridors and nodes was respectively higher than social investment in marginalised areas. Although housing

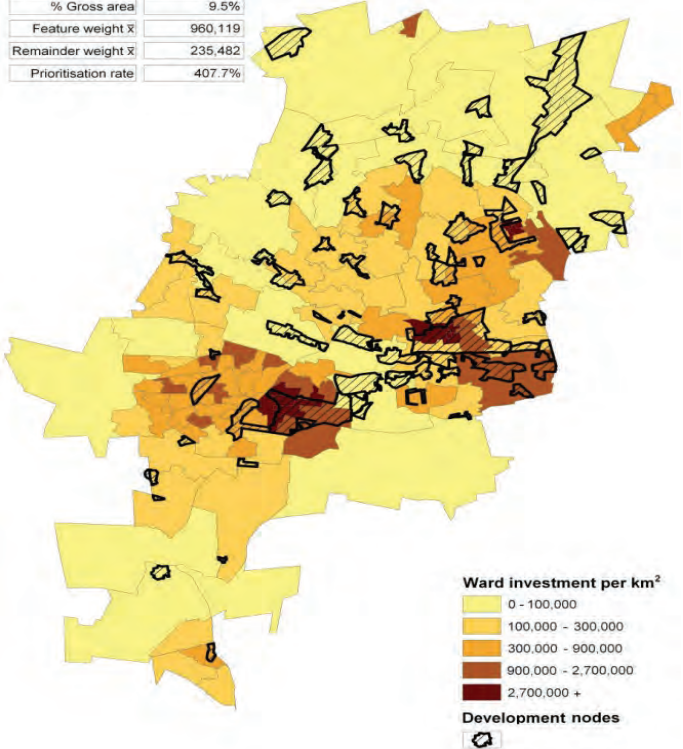
Infrastructure investment in corridors 2007/8 - 2011/12

%Gross investment	24.6%
% Gross area	7.9%
Feature weight \bar{x}	31,550,265
Remainder weight \bar{x}	8,284,578
Prioritisation rate	380.8%



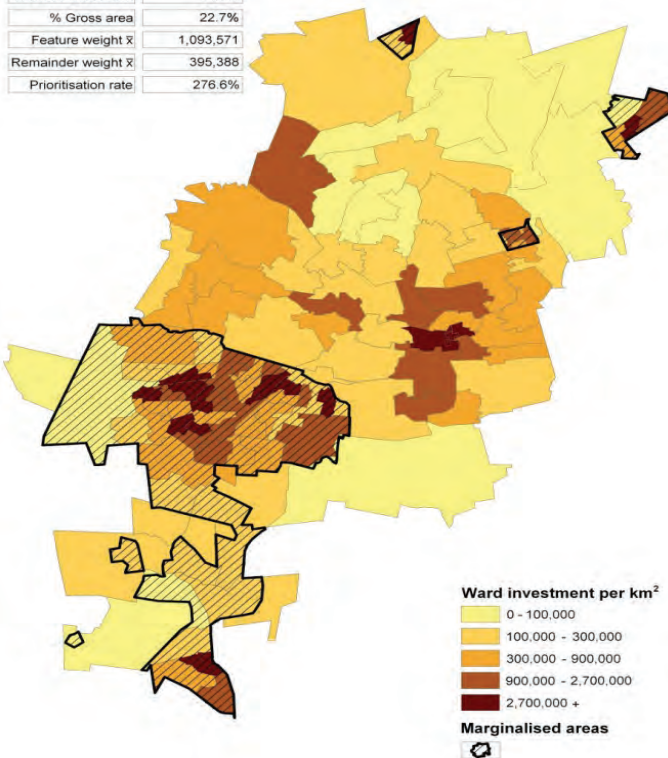
Economic investment in nodes 2007/8 - 2011/12

%Gross investment	29.9%
% Gross area	9.5%
Feature weight \bar{x}	960,119
Remainder weight \bar{x}	235,482
Prioritisation rate	407.7%



Social investment in marginalised areas 2007/8 - 2011/12

%Gross investment	44.9%
% Gross area	22.7%
Feature weight \bar{x}	1,093,571
Remainder weight \bar{x}	395,388
Prioritisation rate	276.6%



Housing investment in nodes and corridors 2007/8 - 2011/12

%Gross investment	26.3%
% Gross area	15.2%
Feature weight \bar{x}	2,206,836
Remainder weight \bar{x}	1,104,537
Prioritisation rate	199.8%

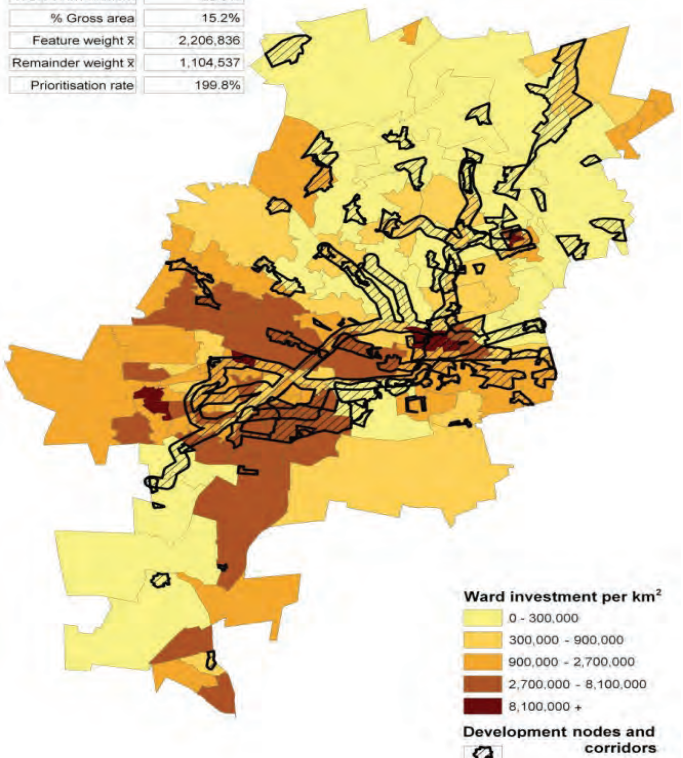


Figure 2: CoJ categorised capital expenditures per feature between 2007/2008 and 2011/2012
 Source: Own calculations, 2013

Table 4: SDF priorities for the City of Cape Town

Strategies	Description
Corridor development	Invest in local infrastructure capacity by maintaining and upgrading existing infrastructure and investment along developmental corridors. Integrate land-use, economic and transport planning through high-density development along developmental nodes and corridors.
Nodal development	Establish economic linkages between established economic cores. Support the upgrade and development of harbours and airports with high-density land-uses surrounding port development.
Marginalised areas	Address economic development in designated areas of spatial economic imbalances. Address imbalances in the distribution of residential development and transform townships and informal settlements.

Source: CoCT, 2011b

investment was proportionally higher in nodes and corridors than in the rest of the municipality, only a quarter of housing investment occurred in preferable locations.

4.2 City of Cape Town

A similar assessment was conducted for the CoCT by comparing the main SDF priorities and the spatial distribution of budgeted municipal capital expenditures for the total five-year study period. The priority spatial policy directives, summarised in Table 4, and the results of this analysis are reflected in Figures 3 and 4. Although the terminology in their respective SDFs differs, the CoCT essentially prioritises similar features to those of CoJ, with particular importance placed on corridor development, nodal development and investment in marginalised areas. The overall spatial spending patterns have remained relatively constant over the study years, and the majority of investment occurred within the prioritised areas. During the statistical analysis, the Green Point Stadium development was not included, as it forms an outlier that skews the study outcomes.

Figure 3 indicates that the weighted average expenditure per km² in priority areas was higher than in non-priority areas. The proportion of the budgeted capital expenditure in designated activity corridors per km² was 376.4% higher than investments in non-prioritised areas, and in designated nodes 434.4% higher than in non-prioritised areas. Total budget

expenditure in designated marginalised areas was proportionally 708.2% higher than in non-prioritised areas.

Figure 4 presents the spatial distribution of categorised municipal investment during the study period. Infrastructure expenditure in development corridors was proportionally 329.3% higher than in the rest of the study area, while economic expenditure in prioritised development nodes was 791.4% higher than in the rest of the study area. The weighted average social investment per km² in marginalised areas was 769.2% higher than in the rest of the study area, and housing capital expenditure in corridors and nodes was proportionally 362.5% higher than in the rest of the study area. When compared to the SDF prioritisation in Table 4, it appears that budgeted capital investment spending patterns are strongly influenced by features prioritised in the SDF.

In summary, the highest investment per km² occurred in marginalised areas, followed by investment in nodes and in corridors. Weighted, both social investment and economic investment were highly concentrated in marginalised areas and nodes, respectively. Infrastructure investment in corridors and housing investment in nodes and corridors was also significantly higher than investments outside these designated features.

4.3 Rustenburg Local Municipality

Table 5 summarises the spatial development priorities of the Rustenburg Local Municipality and Figure 5 presents the spatial distribution of municipal capital investment

patterns. Similar to CoJ and CoCT, the RLM SDF also prioritises spatial development in designated nodes and corridors. However, no specific marginalised areas are identified, as most of the designated nodes consist of historically marginalised settlements. Figure 5 thus only analyses the spatial distribution of the gross budgeted municipal investment in nodes and corridors. Categorised investment is analysed in terms of infrastructure investment in corridors, social and economic investment in nodes, and housing investment in nodes and corridors.

According to Figure 5, the proportional budgeted capital investment per km² in wards containing designated nodes received 44% higher levels of capital investment compared to wards containing non-prioritised areas. The weighted municipal expenditure per km² in corridors was 744.3% higher than the average investment in non-prioritised areas, and the weighted municipal expenditure in nodes 1317.2% higher than in non-prioritised areas. Infrastructure per km² in corridors was 643.1% higher than in non-prioritised areas, social and economic investment in nodes was 953% higher, and housing investment in nodes and corridors was 309.6% higher than the average investment outside these features.

In summary, wards containing nodes received far more investment than wards containing corridors and in non-prioritised areas. The weighted municipal expenditure per km² in nodes was also significantly higher

Table 5: Summary of Rustenburg spatial development priorities

Priorities	Description
Nodal development	Promote settlement in growth clusters. New residential development should be located within the urban edge and should be guided by the availability of bulk services, social amenities and economic opportunities, public transportation.
Corridor development	Mixed use development, high-density residential development, commercial densification and infill development is prioritised along the N4 Corridor, Rustenburg-Kanana-Tlaseng Corridor, and Phokeng-Robega Corridor. For higher residential densities; cost-effective provision of infrastructure; and efficient use of public transport. Develop an Integrated Rapid Public Transport Network along the corridors.

Source: RLM, 2011b

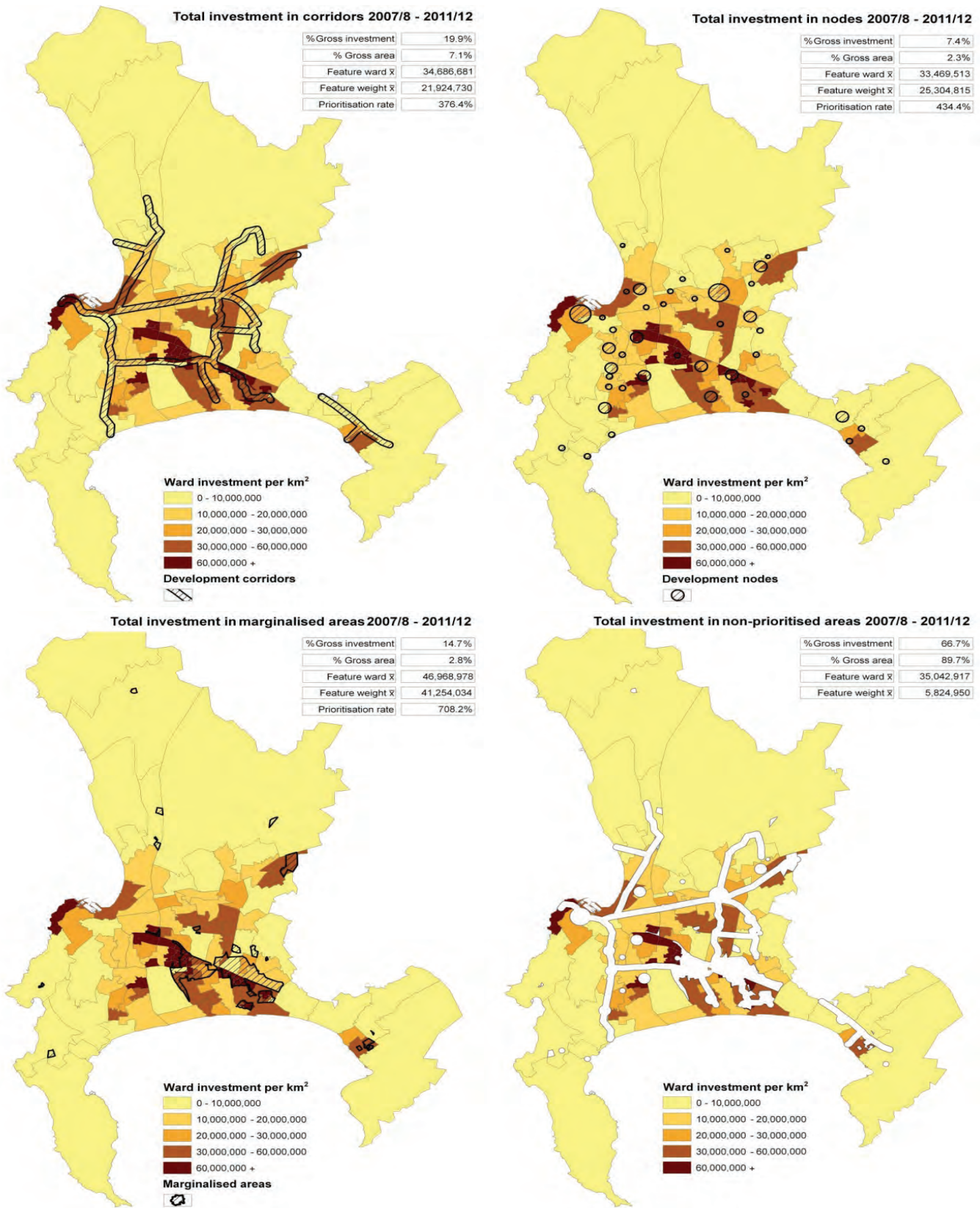


Figure 3: CoCT gross capital expenditure per sector between 2007/2008 and 2011/2012
 Source: Own calculations, 2013

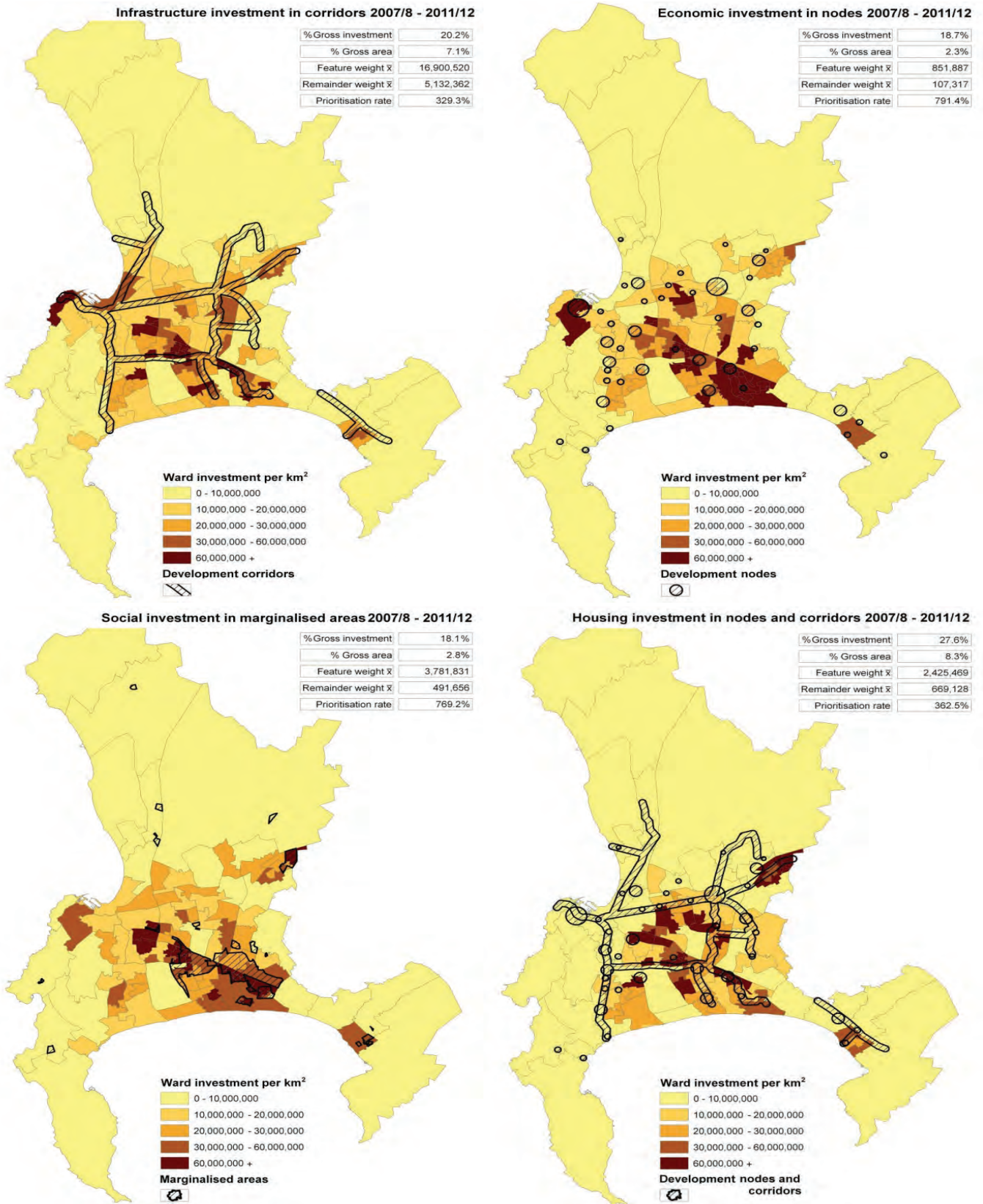
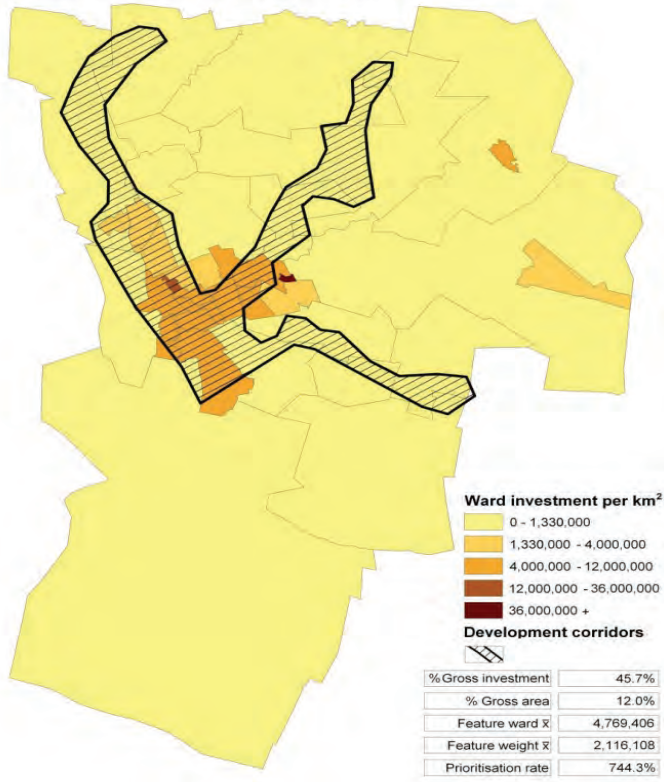
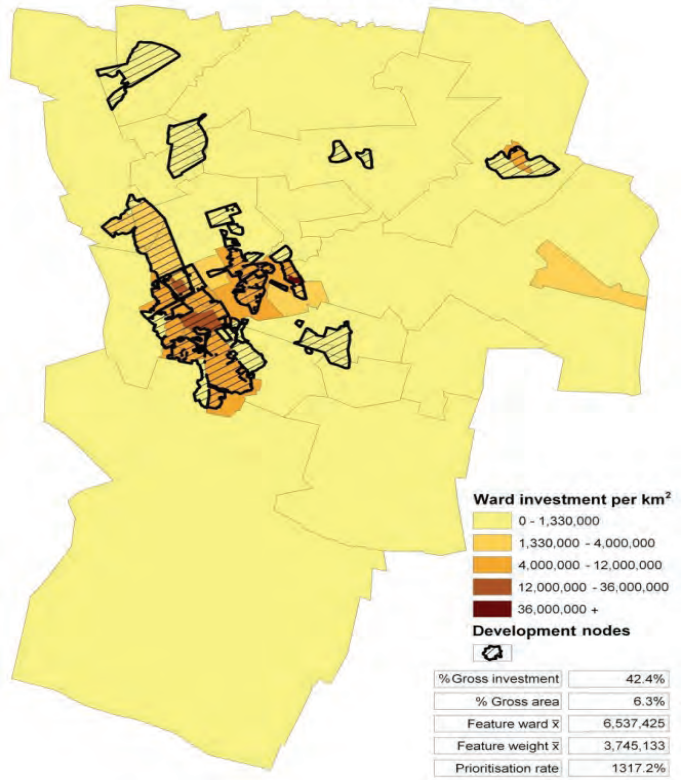


Figure 4: CoCT categorised capital expenditure per sector between 2007/2008 and 2011/2012
 Source: Own calculations, 2013

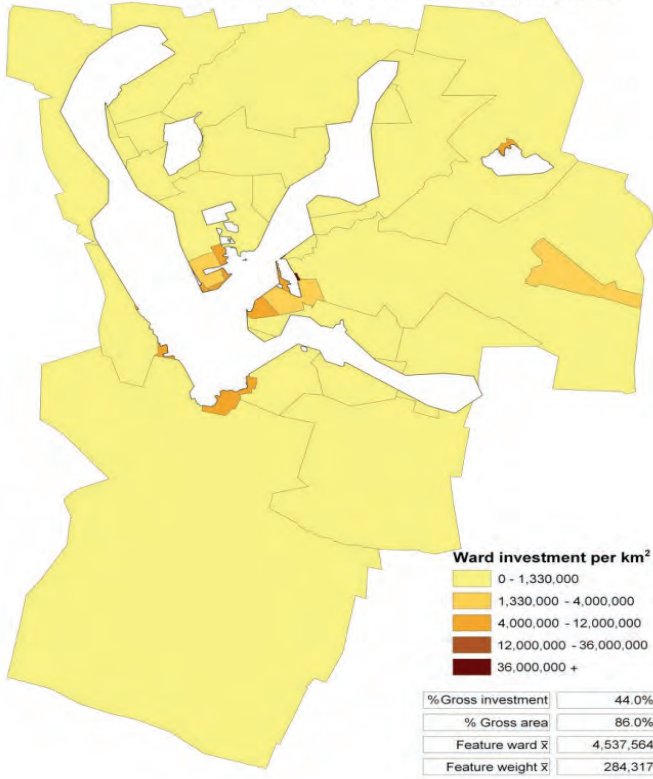
Total investment in corridors 2007/8 - 2011/12



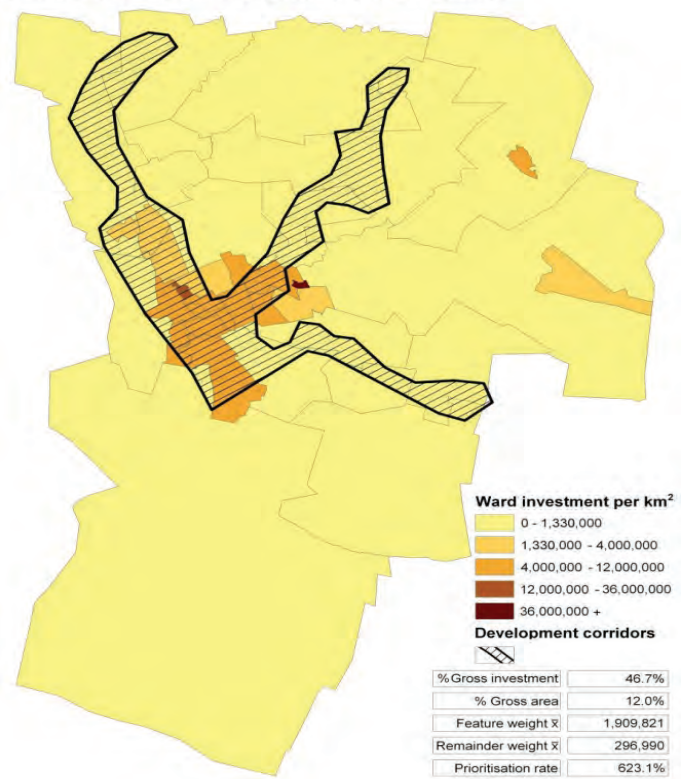
Total investment in nodes 2007/8 - 2011/12



Total investment in non-prioritised areas 2007/8 - 2011/12



Infrastructure investment in corridors 2007/8 - 2011/12



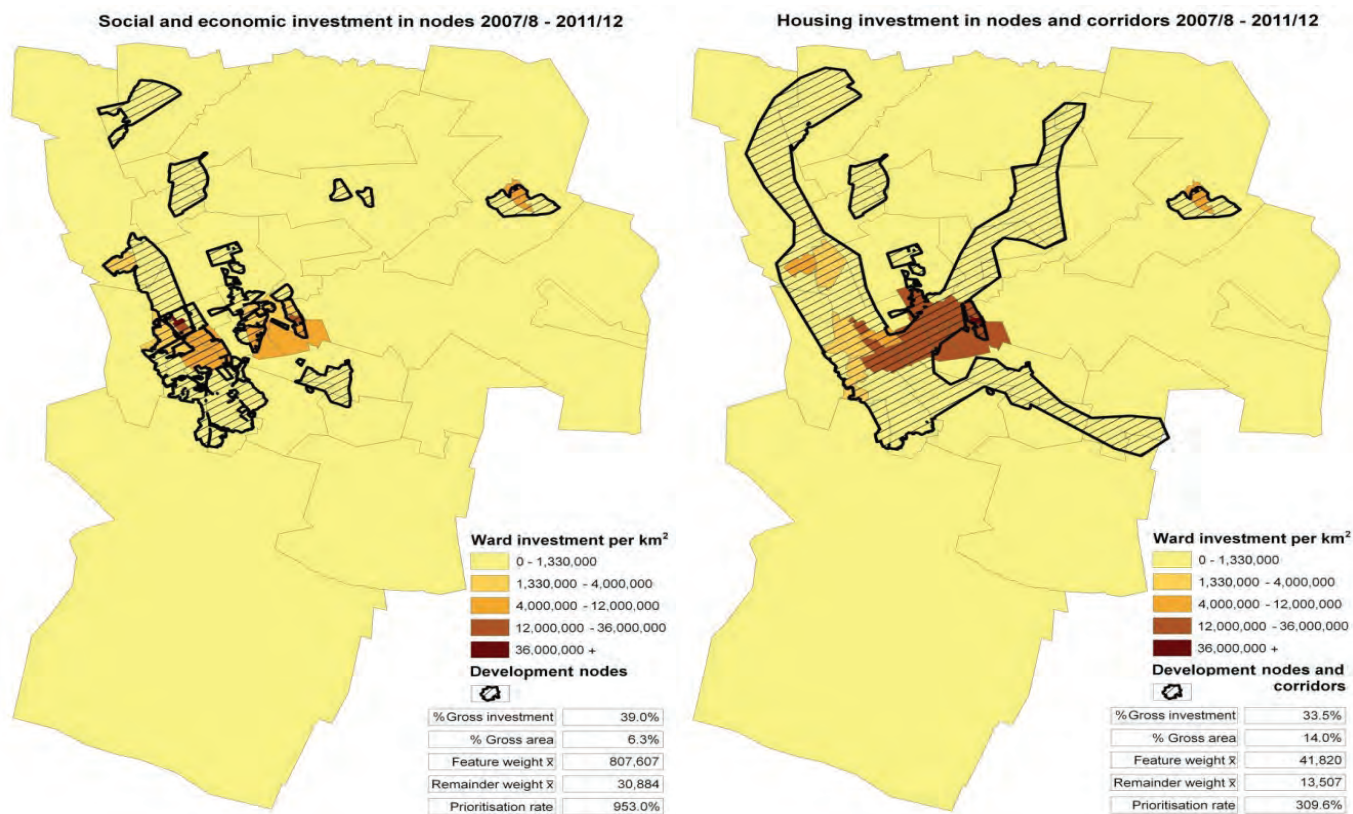


Figure 5: RLM gross and categorised capital expenditure per feature between 2007/2008 and 2011/2012
Source: Own calculations, 2013

compared to expenditures in non-prioritised areas. Social and economic investment in nodes was proportionally higher than infrastructure investment in corridors. It is interesting to note that a third of housing investment occurred in preferable locations, indicating that RLM was the most successful of the three municipalities in achieving sustainable housing outcomes relative to the main components of the SDF.

5. CONCLUSION

The case-study investigation indicates that the spatial development frameworks did indeed positively influence capital spending patterns between 2007 and 2012. In general, the investment resources were proportionally more highly concentrated in prioritised areas compared to non-prioritised areas in all three municipalities. The order and magnitude of priorities differ, however. In the case of CoJ, the highest proportional concentration of investment occurred within corridor development, followed by nodal development and marginalised areas. The investment patterns in CoCT reflect the highest relative levels of investment in marginalised areas and,

in the case of RLM, within the identified development nodes. These emerging spending patterns also highlight the challenge of balancing economic objectives and social imperatives in terms of what Hall (2010) refers to as the tensions between the objectives of 'equity' and 'efficiency'. While all the municipalities did focus on resources in prioritised areas consistent with national directives, the unique situational characteristics of the different municipalities resulted in different responses.

The results presented must, however, also be interpreted within the context of some technical and methodological constraints. First, the aggregation and analysis of investment data and trends at ward level carries with it the inherent problems of the well-known modifiable aerial unit problem described as the variation in results when data for one set of spatial units are increasingly aggregated into less and larger units. The spatial analysis of the investment patterns thus creates the impression of equal distribution within the spatial units of analysis (wards, in this instance) which is not necessarily the case.

A second related problem is the scale and impact of large capital projects

that have an impact wider than the ward within which the investment is located (e.g. bulk infrastructure components such as water reservoirs).

Thirdly, the proportion of the investment described in the budget information as "citywide investment" has been equally distributed between all wards; this is not necessarily a true reflection of the actual distribution of this component.

Finally, it should be noted that the analysis focused on the levels of alignment between investment patterns and the high-level conceptual elements of the SDFs at metropolitan and municipal level. It did not consider the more detailed spatial proposals and planning concepts applied at a subregional or local level within the municipalities. Notwithstanding these shortcomings, the results do provide some empirical evidence of the extent of alignment between the high-level SDF concepts and municipal capital investment patterns.

Despite the encouraging trends, there remains significant scope to further improve spatial integration and policy alignment. Given the country's long history of spatial distortions, an integrated approach to capital investment is required. It calls for strong

alignment of the spatial development framework and the capital investment budget. A strong case can be made for the spatial management of municipal financial data, specifically for the correlation of the precise location of capital investments to the spatial feature where investments occurred. It suggests the use of innovative methods for the creation of an integrated geo-statistical information system from the municipal to the national level that delivers lower levels of statistical denominators, below the level of the municipality, needed for planning in South Africa.

A significant challenge in aligning policy and capital investment is delineating standard geographical boundaries and levels to which data can be referenced. Ward boundaries changed three times during the study period, making an alignment of spatial policy difficult. This also posed challenges in aggregating the capital budget data for the entire study period to a consistent spatial unit. The project also highlighted the need for individual project-level data to be embedded in a logical spatial structure which can be aggregated to various geographical levels such as enumeration areas, wards, suburbs, regions, and municipalities. This emphasises the need for an integrated geo-statistical information system for planning that contains the main framework geographies, including cadastre, and addresses data with standard identifiers and classifiers. Such a system would enable alignment of mechanisms through the interactive updating and integration of municipal budgetary information (at individual project level) with alternative data sources, including departmental administrative data, aerial photography, census data, and other core spatial datasets.

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