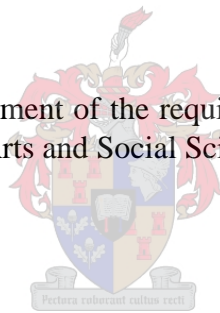


INVESTIGATING SOCIAL, DEMOGRAPHIC AND ECONOMIC DYNAMICS IN THE MAPUTO DEVELOPMENT CORRIDOR

WITNESS DZUMBIRA

Dissertation presented in partial fulfilment of the requirements for the degree Master of Arts in
Urban and Regional Planning in the Arts and Social Sciences at Stellenbosch University



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AUTHOR'S DECLARATION

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ABSTRACT

Years after being launched, the Maputo Development Corridor (MDC) is still facing a number of socio-economic challenges. The problems include: failure to create adequate employment opportunities; development processes that are biased towards urban areas; a top down functional approach which excludes ordinary citizens from decision making processes; and a focus on GDP growth rather than being people orientated. Apart from these problems, the MDC also suffers from a lack of clarity on key conceptual issues such as the extent of its area of utilisation and empirical assessment of the level of economic influence exerted by its nodes. The aim of this study was to empirically establish the area of influence of the MDC and to ascertain the statistical significance of the impact of the corridor over distance away from the N4 spine. In order to achieve this aim, census data for the urban settlements that lie within the 100 km buffer zone (50 km on either side of the N4 spine) was extracted. The variables that were used include access to services (water, electricity, sewerage), level of education and income levels. The process of ascertaining the economic influence of the nodes required GVA data hence data from CSIR was used. ArcGIS, standard statistical analyses and multivariate regression analysis were subsequently used to calculate the relative “strength” of subsets of the corridor and to determine the degree to which centres at different distances from the N4 spine were impacted by the corridor spine.

Key Words: Maputo Development Corridor, Development Axes, Growth Pole

OPSOMMING

Jare nadat dit ontstaan het word die Maputo Ontwikkelingskorridor (MDC) steeds deur sosio-ekonomiese uitdagings in die gesig gestaar. Die probleme sluit in: 'n versuim om voldoende werkgeleenthede te skep; ontwikkelingsprosesse wat stedelike gebiede bevoordeel, 'n ontwikkelingsproses gedrewe van bo sonder om gewone burgers sinvol by die besluitnemingsprosesse te betrek; en 'n fokus op BBP-groei pleks van mens-georiënteerde ontwikkeling. Afgesien van hierdie probleme, ly die MDC ook aan 'n gebrek aan duidelikheid oor belangrike konseptuele kwessies soos die uitbreiding van sy gebied van benutting en empiriese evaluering van die vlak van ekonomiese invloed van korridor op omliggende nodes. Die doel van hierdie studie is om die invloedssfeer van die MDC empiries te bepaal en om statisties beduidende verskille in die impak van die korridor se invloedssfeer weg van N4 ruggraad te bepaal. Ten einde hierdie doel te bereik is sensusdata verkry vir die stedelike nedersettings wat binne die 100 km buffersone (50 km aan weerskante van die N4 ruggraat) lê. Die veranderlikes wat gebruik is, sluit toegang tot dienste (water, elektrisiteit, riool), vlak van opvoeding en inkomste vlakke in. Die proses van die bepaling van die ekonomiese invloed van die nodusse vereis GVA data en in hierdie geval was daar van WNNR data gebruik gemaak. ArcGIS, standaard statistiese metodes en meervoudige regressie-analise was daarna gebruik om die relatiewe “strekke” van onderdele van die korridor te meet en om die mate te bepaal waarin die sentra oor verskillende afstande van die N4 ruggraad daardeur beïnvloed word.

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ABBREVIATION AND ACRONYMS

ANC	African National Congress
CBA	Cost Benefit Analysis
CVG	Corporacion Venezolana de Guayana
DBSA	Development Bank of Southern Africa
DTI	Department of Trade and Industry
EIF	Economic Impact Factor
GEAR	Growth Employment and Redistribution Programme
GVA	Gross Value Added
IDB	Inter-American Development Bank
IDZ	Industrial Development Zone
ILO	International Labour Organisation
IRR	Internal Rate of Return
LED	Local Economic Development
MDC	Maputo Development Corridor
NPDP	National Physical Development Plan
NPV	Net Present Value
NSDP	National Spatial Development Perspectives
PWV	Pretoria-Witwatersrand-Vereeniging
RIDP	Regional Industrial Development Programme
SACN	South African Cities Network
SADC	Southern African Development Community
SCIF	Secondary Corridor Impact Factor`
SDF	Spatial Development Framework
SDIs	Spatial Development Initiatives
SEZs	Special Economic Zones
SMMEs	Small, Medium and Micro-sized Enterprises
SPLUMA	Spatial Planning and Land Use Management Act (Act 16 of 2013)
TVA	Tennessee Valley Authority

SETTING THE SCENE

INTRODUCTION

Corridors and transportation networks of which the former could form a subset of the latter have been used as a tool to spatially organise and control the expansion of settlements and the distribution of resources to new markets since the 19th century. They have been regarded as tools to spatially structure and organise the economic and social space in which people live. More recently, corridors have been used as a means to promote and achieve global trade competitiveness, economic development and balanced regional development (Bundige et al. 2011; Chapman et al. 2003; Papadaskalopoulos 2005; Rodrigues et al. 2006; World Bank 2009). Corridor development theory is also linked to the theory of growth pole development. Growth poles are used as a development strategy to focus public investment initiatives in carefully selected locations with the aim of facilitating regional economic growth and spatial restructuring within a region (Parr 1999). The growth pole strategy hinges on Perroux's (1955) work who is famously known for his observations that growth does not occur in the same way across all spaces; growth occurs at poles, with varying intensities and diffuse growth over different areas, which ultimately affects the entire economy of a particular region (Tekeli 1975).

South Africa has a long history of policy initiatives aimed at intervening in the national space economy (Rogerson 2001). In the mid-1970s the government published the National Physical Development Plan (NPDP) made use of *growth points* and *growth poles* as its policy instruments, the former referring to as policy instruments to promote economic growth in the black reserves whilst the latter were intermediate seized cities that already have achieved significant industrial development and, even with minimal economic support could support a large population. The latter referred to locales that were identified to promote industrial development in peripheral area- mostly in NPDP however never fully considered socio-economic variables such as economic potential, market characteristics and labour requirements in the identification of the latter (Geyer 1989).

The NPDP (1975) identified a number of existing and future development axes and most of these started in the existing or planned metropolitan areas. Only one of the development axes ended in another metropolitan area whilst the rests extended over long distances ending abruptly or fade into neighbouring countries. (Geyer 1987). The development axes in the NPDP were subject to criticism. For example, the so-called future development axes were not anchored by an existing or future (planned) secondary development centre. Furthermore, it was argued that considering the nature of the growth poles that were included in the plan, Welkom-Virginia-Odendaalsrus might as well have been included. By the beginning of the 80s the government began to revise the NPDP. The revised plan brought in a number of improvements e.g. getting rid of the fictitious development axes and getting rid of the forced technical differences in terms used to describe development centres (Geyer 1987).

In 1981 draft development strategy for the PWV complex was published and it also promoted the use of development axes. The strategy outlined three alternatives for promoting growth. First was the trend strategy which involved the continuation of development patterns with minimum modifications. Second, was the corridor strategy which focused on urban development corridors and the last was the nodal strategy which indicated a number of commercial and industrial nodes within the metropolitan area. Strictly speaking, the second and third options are essential one

and the same thing as nodal points (development centres) are an integral component of the development axis concept (Geyer 1989).

The Good Hope Plan was announced in 1981. The plan covered a wide range of national issues ranging from constitutional reforms, housing and issues relating to the public service. Pertinent to this study, it also dealt at length with regional development issues. To this effect, the Good Hope Plan sought to regulate industrial development in metropolitan areas by the use of Physical Planning Act (Act 88 of 1967). Industrial development was to be allowed on the periphery of metropolitan area in what was called de-concentration points. It was also proposed to divide South Africa into 8 region and 20 development points were identified in the White areas and 27 points were proposed in the independent states. This plan was to be operationalised with the aid of an extensive incentive scheme (RSA 1981).

The Regional Industrial Development Programme (RIDP) of the early 1980s, which was strongly linked to the NPDP, identified growth points and de-concentration points with the intention to disperse economic activities to the peripheral regions across the entire South Africa, including the former homeland areas. The intention was to achieve balanced regional development, speed up industrial growth, to overcome high unemployment rates and improve the country's export capabilities. The RIDP included locational incentives such as concessionary electricity rates, lower interests' rates, subsidies, tax holiday regime etc. In 1985, the White Paper on Industrial Development Strategy was launched to assist the country to formulate policies that would achieve a more balanced regional distribution of economic activities and ultimately increase the economic growth rate, employment creation and social welfare. (Development Bank of Southern Africa [DBSA] 1989; Hartzenberg 2001). From the above, it is clear that many of the policies implemented to achieve regional economic growth were intended to benefit both white and black people as part of the apartheid policies but as it turned out, the growth pole policies were not successful.

The post-apartheid government pursued a number of policies and plans at national and regional levels to assist with identification and analysis of suitable intervention strategies in the space economy. Space economy, in this context, refers to spatial regions (spaces) that share common or related flows and markets for economic activities such as labour, land markets and infrastructure platforms (SACN 2013). The post-apartheid government introduced Spatial Development Initiatives (SDIs) programme in 1995 as a subcomponent of a broader Growth Employment and Redistribution Programme (GEAR). SDIs can be defined as a high profile attempts by South Africa and its neighbouring states to establish vibrant micro regions of activities in high economic potential regions. They are designed to be short term efforts to stimulate economic development through the setting up of competitive spatial entities by 'crowding in' private sector investment and state supported infrastructure development (Nogales 2014; Sihlongonyane 2012; Taylor 2003). The most known and advanced of the SDIs is the Maputo Development Corridor (MDC) (Anderson 2001; Rogerson 2001; Roodt 2008). This economic corridor is a joint venture between South Africa and Mozambique. The MDC runs from Witbank in Mpumalanga through Gaza and Maputo provinces in Mozambique.

The government unveiled the National Spatial Development Perspectives (NSDP) in 2003 and updated it in 2006. The NSDP was based on based on five broad principles. The first and second principles dealt with the need to create sustained inclusive economic growth as a way of poverty alleviation and the acknowledgement that the government has the constitutional obligation to provide basic services to all citizens wherever they reside respectively. The third principle

sought to encourage the government to invest in fixed infrastructure in areas with high economic growth rates and high economic potential. The fourth principle was meant to encourage the government to address past and present inequalities by focusing on people and not places. Localities that are characterised by high level of poverty were targeted and investment promoted therein. Two intervention approaches were proposed. First, if a particular locality demonstrated economic potential then infrastructure investment beyond a mere provision of basic services was to be made. In localities with low economic potential, apart from providing basic services, the government was expected to invest in human capital development.

The fifth principle dealt with the spatial mechanisms of overcoming the spatial distortion of apartheid. It required that future settlement and economic development opportunities should be located along activity corridors and nodes that are linked to main growth centres within South Africa and the SADC region. Together, these five principles were supposed to assist focus government investment and avoid ‘watering-can’ scenarios that are characterised by haphazard, wasteful and uncoordinated investment in infrastructure under the guise of spatial equity (RSA 2006).

The government adopted the Regional Industrial Development Strategies (RIDS) in 2006. RIDS were adopted as a means of encouraging greater economic participation of previously marginalised citizens and regions. The policy sought to promote growth of industrial activities in lagging regions which are afflicted by underdevelopment, poverty, unemployment and inequality. RIDS were designed to disperse economic activities from a few metropolitan and urban core, create an integrated and linked network of industries that serve international, national, regional and local markets and finally, to broaden the participation and ownership base in the economy (DTI, 2014). By 2014 the government adopted the Special Economic Zones (SEZs). In South Africa the concept ‘Special Economic Zones’, as a government policy tool, is fairly new and has been popularised by the passage of Special Economic Zones Act (Act 16 of 2014). The act seeks to enable the gradual maturation of Industrial Development Zones (IDZs) into Special Economic Zones (DTI, 2014). This thus implies that all IDZs are currently being transformed into SEZs.

The DTI (2012) identified the different types of SEZs as Free Port, Free Trade Zones, Industrial Development Zones and Sector development/ Specialised Zones. Industrial Development Zones are purpose-built industrial estates linked to an airport or sea port that leverages domestic and foreign fixed direct investments in value-added and export-oriented manufacturing industries and services (SA Business Guide Book, 2006). ILO (2003) defined Free Trade Zones as industrial zones with special incentives set to attract foreign investors, in which imported materials undergo some degree of processing before being re-exported. Free Port refers to an area adjacent to a port of entry where imported goods may be unloaded for value adding activities within the SEZ for storage, repackaging or processing, subject to customs import procedures. Unlike the other zones mentioned above, sector development zones are narrowed towards a specific economic sector and output is intended for the export market (DTI, 2012). A number of these SEZs are already established and operational in South Africa. These include four traditional IDZs, (Coega, East London, Richards Bay and Saldanha Bay) and the IDZ Dube Trade Port designated in 2014.

The government launched the National Development Plan (NDP) in 2010. This policy document dealt with a number of socio-economic sectors of the economy and the society in general but also dealt at length on transforming human settlement and the national space economy.

Regarding the need for transforming human settlement and national space economy, the NDP proposed three spatial intervention strategies; responding strategically to alter spatial patterns that worsen socio-economic inequality, pursue catalytic interventions that facilitate spatial transformation and achieve a balance between spatial equality, economic development and environmental sustainability. It identified the main categories of spatial challenges as transforming national space economy, inequalities in rural areas, urban inefficiencies, housing back log and weak framework for spatial governing. The NDP acknowledges that while it is important to continue to support centres of competitiveness (metropolises and large cities), it is equally important to unlock opportunities in lagging regions. This is expected to be achieved through, amongst other things, investing in connective infrastructure to integrate lagging regions with core areas.

The NDP further advocates for the creation and implementation of a National Spatial Framework that should deal with spatial issues of national importance. The framework is supposed to aid investment in space by identifying three broad areas. First, identifying and investment in national competitiveness corridors. Corridors of logistics hubs, road, rail, and fuel are considered important for the future economy. Second, promote growth and development in clusters of localities that account for at least 5% of the GDP or have higher than average growth rates. Lastly, invest in development of transnational development corridors within SADC to stimulate growth and trade. In line with this, the NDP identifies the first set of priorities to stimulate socio-economic development and these include, amongst others, the Durban-Free-State-Gauteng logistics and industrial corridors, south –eastern nodes and corridor development that improves Eastern Cape access into KwaZulu- Natal and the Saldanha- Northern Cape development corridor (National Planning Commission [NPC] 2011).

Numerous studies on the MDC has been undertaken and they vary in focus and intensity. Mitchell (1998) focused on what one might call profiling of the initiative. He gave a detailed description of the proposed projects, their location how they were supposed to play a role in alleviating poverty. In terms of geographical coverage of the MDC, he argued that the initiative starts at Balmoral, 20km from Witbank to Maputo Harbour. A significant amount of work on the MDC was also done in 2001 by Anderson, Rogerson, and Soderbaum and Taylor. Anderson (2001) gave a detailed historical dispensation of the MDC from its peak as a logistical corridor in the 1970s to its revival in 1995 at the end of civil unrests in both South Africa and Mozambique.

Apart from profiling the MDC projects like Mitchell (1998) and Rogerson (2001), Anderson (2001) made inquiries into the credibility of the institutions that are used to govern the MDC. Soderbaum and Taylor (2001) looked at the MDC within the context of a globalising world and argued that the initiative was essentially calculated to attract transnational capital. Rogerson (2001) looked at the SDIs in general before narrowing at the MDC. Like Soderbaum and Taylor (2001), Rogerson (2001) also saw the MDC initiative as an effort by the government to fit the economy into a globalising world. He identified the neo-liberal economic theory behind the initiative and explained its potential short comings in meeting the initiatives objectives.

Although his work lacked a quantitative model to evaluate the MDC, Roodt's (2008) study weighed the achievement of the initiative in terms of job creation, poverty alleviation and building credible local institutions. The study acknowledges some level of success but outlined the need for improvements especially in job creation. Harrison et al. (2008) looked at the initiative as a form of regional planning and also acknowledged that the initiative could fit into

the growth pole strategy. The theoretical underpinnings of the MDC were dealt with at length by Sihlongonyane (2012). He too, questioned the efficacy of neo-liberal economics (a theory upon which the MDC is framed). Observing that the initiative is based on natural resource competitiveness, he challenged its sustainability.

This study takes an empirical stance to ascertain the impact of distance from the N4 corridor spine on other socio-economic variables like level of employment, access to housing, level of education and access to services. The study positions the development corridor as a subset of the growth pole theory and as a spatial and socio-economic tool in regional planning. By approaching the MDC in this fashion, the author believes that it enables a broader view of looking at development corridors. This in turn, should enable in-depth analysis of vantage points of looking at the corridor concept and consequently enable credible policy formulation for, not just corridor problems, but for spatial and socio-economic issues that manifest at a regional scale.

PROBLEM STATEMENT

The MDC has been lauded for achieving many successes, but it has also been criticised for failing in certain regards. The MDC has been praised for assisting the local municipalities that lie along the corridor to achieve faster economic growth rates than those further away (Khoza & Willemse 2013). The corridor initiative is said to have played a role in improving the flow of freight by revamping the N4 toll route. By promoting growth in the tourism, construction and manufacturing sector, the initiative created employment opportunities (Soderbaum & Taylor 2001). Mitchell (1998) noted that it had already created 7000 employment opportunities by then. Through targeted procurement processes, Anderson (2001) and Rogerson (2001) agreed that the MDC promoted the establishment and growth of SMMEs. Equally important, the MDC facilitated increased participation of the private sector in the economy. Mitchell (1998) argues that facilitating the flow of South African capital into southern Mozambique could potentially be regarded as one of the main achievement of the MDC initiative. Whilst Roodt (2008) concur that it is difficult to establish a link between the MDC initiative and many of the projects that took place in its service area, (some projects could have happened anyway without the initiative), he argues that it cannot be disputed that the initiative improved the attractiveness of the MDC service region to investment.

Despite these successes, the MDC is criticised for failing in a number of ways. First, its top-down management structure and implementation did not consider the local residents' inputs into its creation; thus, its outputs did not necessarily benefit the local residents' overall welfare (Mitchell 1998). Related to this are the contradicting goals associated with attracting transnational private investment and empowering local communities resulting in Soderbaum & Taylor (2001) arguing that the primary goal of the MDC was facilitating growth of GDP through export initiatives and not necessarily a people-orientated development. Secondly, the lack of definitive clarity over the geographical coverage of the MDC complicates efforts to evaluate the full demographic, economic and service-delivery changes that have occurred in the region (and in growth nodes located on and/or close the route) as a result of the establishment of the MDC. Stated differently, it is difficult to establish the full impact that the MDC had on the surrounding communities, if there is no clarity about how much adjacent land actually forms part of the MDC.

For instance, Rogerson (2001) loosely defines the MDC as the catchment area on either side of the N4 spine between Witbank and Maputo, while Mitchell (1998) suggests that 50 km on either

side of the N4 route forms part of the MDC as adopted by the Mpumalanga provincial government. On the other hand, Hauptfleisch et al. (2009) indicates that the geographical coverage of the MDC increases along larger urban nodes, but no indication is provided for the actual distances associated with the geographical coverage. Differences in these views demonstrate the need for a fundamental look at the corridor concept and its link with development axis or corridor concept. Both matters will be dealt with in greater detail below.

The third criticism of the MDC relates to the second; development of the MDC mostly seem to have occurred along pre-existing capital markets and stronger performing urban areas, thus resulting in uneven development, with former white areas receiving most of the economic opportunities, while former black homelands received less opportunities (Mitchell 1998; Rogerson 2001). Khoza & Willemse (2013) found that there is a growing disparity between the socio-economic performances of municipalities that are located along the MDC. The municipalities with an export base that performed well in terms of their socio-economic development in 2001 (Emalahleni, Steve Tshwete and Mbombela continue to prosper in 2011), while the poorer municipalities (Nkomazi, Victor Khanye and Emakhazeni) continued to perform poorly. It is also highly unlikely that the aforementioned situation will change drastically in the near future because the bulk of the infrastructural developments have already been implemented.

Fourthly, the MDC did not promote economic growth and investment at the rate that was hoped for. The job opportunities offered by the MDC were mainly in capital intensive industries (not labour intensive industries), implying that the region experienced mostly jobless growth. Hence the initiative had little impact in addressing the challenges of unemployment, poverty and inequality (Anderson 2001; Luiz 2003; Soderbaum & Taylor 2001). In the cases where jobs were created, the pace was slow and it was mostly in the form of highly-skilled labour, which was not readily available in the local labour market (implying that the people that ended up getting the jobs resided mostly outside the MDC region – thus the locals did not really benefit from the job opportunities that became available). Additionally, the majority of the jobs created were mostly male-orientated jobs, resulting in little impact in female employment (Mitchell 1998; Roodt 2008). The initiative is also criticised for not achieving anything substantive in upgrading of local infrastructure, access to services and facilities including local roads, footpaths, water drainage systems, water, sanitation, health care and education facilities (Crush & Rogerson 2012; Taylor 2003). Lastly, the closure of the Maputo Corridor Company in 2003 also resulted in many bottlenecks at the border posts, rail and road links, port / harbour crossings (Roodt 2008).

RESEARCH QUESTIONS

The research wants to establish the level of economic impact exerted by the nodes of the MDC Corridor and ascertain the impact of distance from the corridor on other socio-economic variables in the corridor area

AIMS AND OBJECTIVES

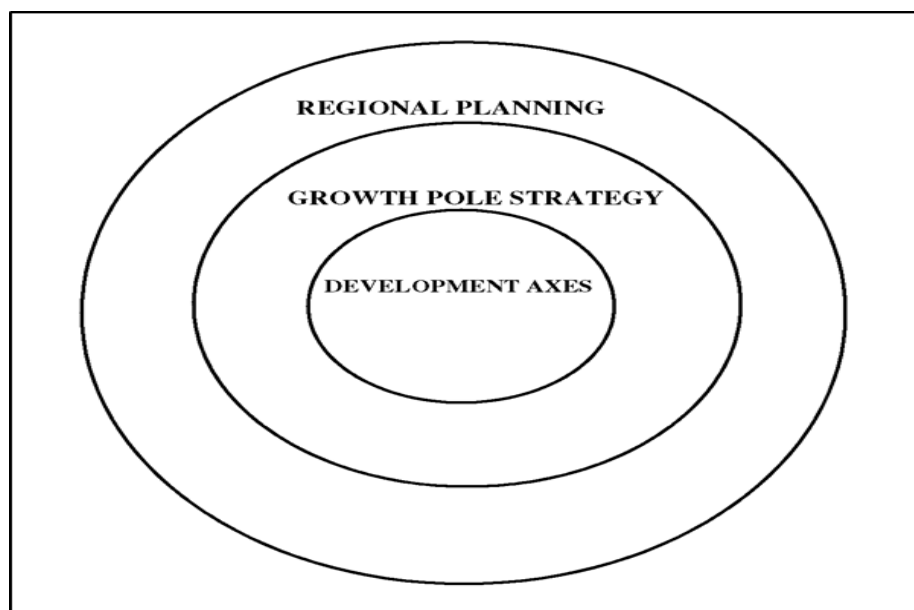
The aim of the study is first, to establish the level of economic impact exerted by the MDC and to determine whether distance from the N4 influences the socio-economic variables of the towns and cities in its area of influence.

LITERATURE REVIEW

INTRODUCTION

A corridor can be seen as a linear system of urban nodes linked by communication axes. Alternatively, corridors can be defined as ‘bundles of infrastructure’ connecting two or more urban nodes (Albrechts & Coppens 2003; Furundzic & Furundzic 2012; Priemus & Zonneveld 2003). After a synthesis of the definitions of development axes by Friedmann (1966), Tuppen (1977:4) and Draft National Development Plan of South Africa (South Africa 1984), Geyer (1988) defined the development axis as, “the linear concentration of development phenomena which come into being when the interaction on a communication axis between two mutually dependent primary development centres creates a favourable milieu on and in the vicinity of the axis for further physical development” (Geyer 1988; Geyer & Steyn 1988). From these three definitions, it is clear that two issues are at stake here: the linear development consequences of corridors and the application of the growth pole concept in its operation as a planning instrument.

Geyer’s (1988) argued, “...that no clear morphological distinction can be made between the development axis and the development centre from which it originates; one forms part of the other”. Elsewhere, Geyer (1987) argues that given the development axis comes into being as a result of interaction between two development centres, the two are thus closely related. Tekeli (1975) agrees that the growth pole theory can be expanded to Pottier’s concept of growth axes. Srivastava (2011) observed that regional corridors have been discussed extensively in urban planning in context of growth poles or transport corridors. Kwon (n.d) noted that the growth pole theory is increasingly becoming an umbrella term triggering a myriad of other related theories that seek to address problems of regional development. In line with these observations, it is suggested to approach the concept of development axes as a component of the broader growth pole strategy within the context of regional planning as illustrated below.



Source: Author

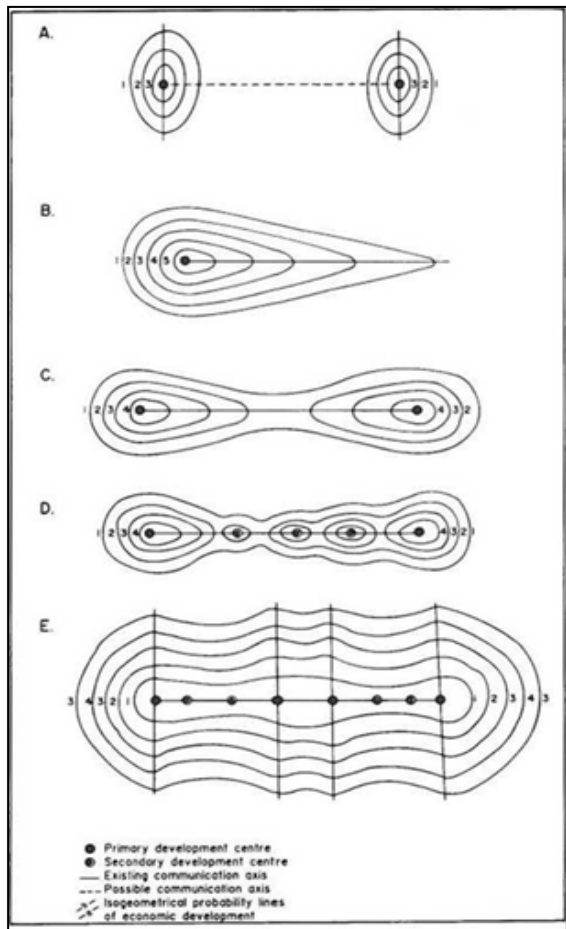
Figure 2.1 Theoretical framework for interpreting development axes

LINEAR DEVELOPMENT

In terms of scale, the corridor concept is elastic. It can, for example, refer to a continuous link between two metropolitan nodes that provides a focus for public transport services at the regional scale (Blazek & Netrdova 2009; Warnich & Verster 2005). At smaller scale it can be applied to a precinct plan, local municipality, metropolitan/ city regions spatial plans and at higher levels of spatial scale it can consist of transnational corridor. The concept can even apply to corridor at the continental or supranational scale such as the corridors in Europe (Romein et al. 2003). At the latter level of spatial aggregation, mega corridors are seen as multi-nodal concentrations of infrastructure consisting of bundles of motorways, rail links, inland waterways and glass fibre cables (Romein et al. 2003). Various terms can be used to refer to development axes e.g. build up axes, connecting axes, concentration axes, development zone, industrial axes, urban axes, and development lines (Geyer 1988).

Before attempting to describe the role that is played by corridors as part of the growth pole strategy, it is important to analyse their structure and ascertain their functional methods. Brand et al. (2015) regarded development corridors as the product of interaction between development centres. The term axis in this context implies the presence of central and axial-orientated forces of development existing between interacting development centres. In this regard, the corridor is a manifestation of interaction of complex socio-economic and administrative forces between two primary development centres. The flow of trade along communication axes is the driving force of linear urban development. From the foregoing explanation some key distinctive components of the corridor concept can be ascertained. For development axes to yield meaningful results, Band et al. (2015), Hanekom (1982) and Srivastava (2011) outlined the importance of two vibrant end nodes, the need for intermediate space to have inherent economic potential (natural and human resources) and that the intervening distance must be relatively short relative to the total area of the national space of which it is part of. The end nodes must be mutually dependent and their interaction must promote further development. Hence development axis can be regarded as an extension of the nodes or 'poles' along the axis between them. If the nodes are in close proximity eventually they will combine giving rise to linear metropolitan region. However, if the two centres are further apart, an urban system connected by numerous smaller development centres is likely to be formed. Such a system is called regionopolis (Geyer 1987). To this end, it can be seen that the transport networks are comprised of nodes and links as two important elements. What constitutes a node is dependent on scale of analysis. Hence nodes could be cities, street intersections or cluster of various land uses.

It is equally important to understand the formation and transformation processes of corridors. Brand et al. (2015) observed that in the initial stage, communication axes serves as merely transport routes between two or more nodes. With time, the communication axes generate more traffic and 'energy' thereby giving rise to agglomeration economies of scale. The resultant fall in transport cost leads to sustained increase in industrial and commercial activities which in turn, leads to urban agglomeration economies. This transforms a communication axis into a development axis (Brand et al. 2015; Geyer 1987). Refer to the diagram of the transformation process of the development axis provided below.

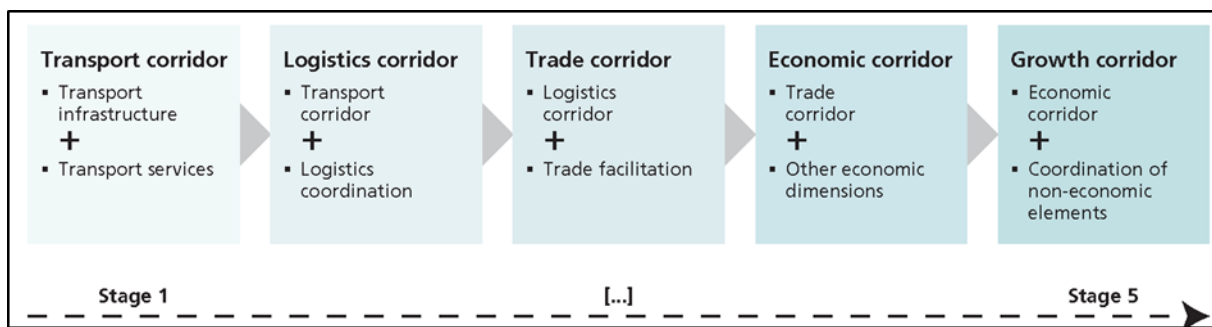


Source: Geyer 1988

Figure 2.2 The evolution of development axes

The Figure 2 shows how the development axes transform over time. At the initial stage 'A', there are two end nodes that are connected by a communication axis. Stage 'B' shows a development finger and the axis is still in its infancy stage. The next stage shows fully matured end nodes but with no intermediary nodes between them. Stage 'D' show a matured axis with a number of secondary nodes in-between. If the centres are in close proximity, then the outcome is a metropole region. In the last stage 'E', the development axis is said to have lost its axial character (Geyer 1988).

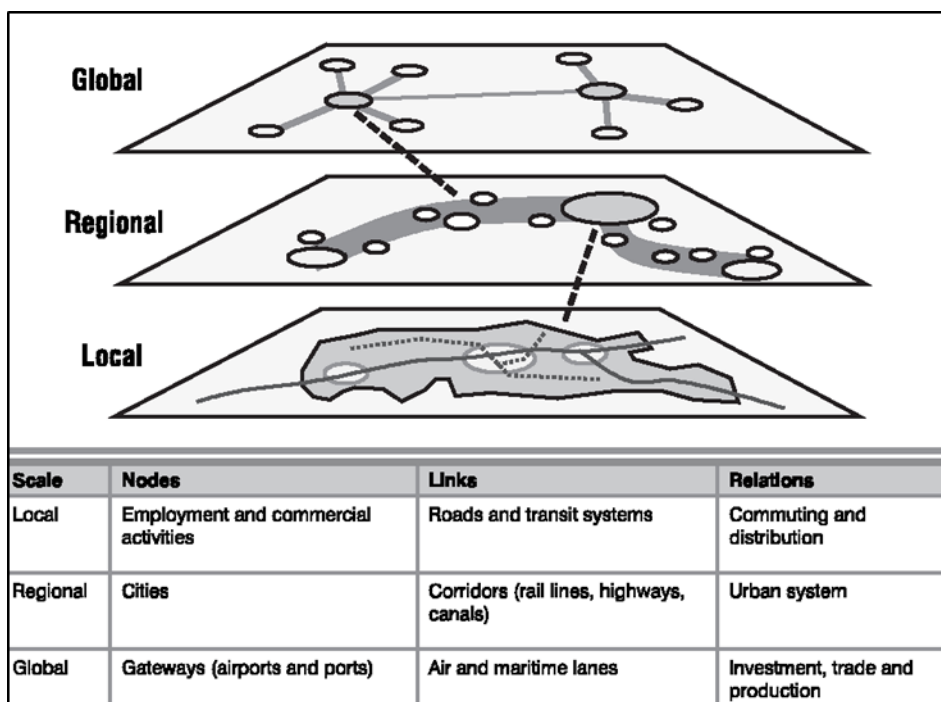
This transformation process of corridors advanced by Geyer (1988) has close resemblance by the one postulated by Srivastava (2011). Srivastava (2011) and Nogales (2014) argued that regional development axes transforms through a series of the sequential stages; a pure transport corridor, transport and trade facilitation corridor, logistics corridor, urban development corridor and finally economic corridor. They noted that there are no clear boundaries between stage two and stage 5 and that this taxonomy, in its entirety, is not informed by any explicit theoretical underpinnings. Refer to the schematic presentation of types of corridors.



Source: Nogales (2014)

Figure 2.3 Potential development path for corridors

Nogales (2014) further regarded each of the step identified in Figure 3 as a type of corridor with its own distinctive features. She identified 4 types; transport, logistics, trade and economic corridors. Transport corridors can be viewed from two stand points; physical and functional dimensions. From a physical standpoint the corridor is a transport route that connects large urban centres with smaller nodes. They can be unimodal, bimodal and multimodal. In functional terms, transport corridors enable efficient transport services in terms of time, economic and environmental costs (World Bank 2005). Transport corridors are a product of aggregate flows and infrastructure of various modes that is linked to economic, infrastructure and technological processes. If these processes involve urban development, the result is urbanisation corridors. Transportation, apart from stimulating economic growth, also helps structure space (Rodrigue et al. 2006). The relationship between transportation and spatial organisation can be analysed at three scales; global, regional and local. Refer to figure 2.4 below.



Source: Rodrigue et.al. (2006)

Figure 2.4 Scales of spatial organisation for transportation

Bohm and Peterson (1975) observed that industrial location theorists place more weight on transport costs as a factor of determining location. In this line of reason, the development of a highway system is expected to influence the location of economic activity and hence the

distribution of the population. If any change lowers the cost of producing and distributing a product, then it can be a source of economic growth. If such change is geographically differentiated, then the growth impulses will be likewise distributed (Bohm & Patterson 1975). The resultant economic growth falls into two classes; the first is net growth i.e. that would not have happened in the absence of lower transport cost inducements. The second growth will be a result of relocation of firms from high cost localities to lower cost ones. It should be expected also to witness the conversion in the use of resources e.g. conversion of agricultural land into industrial districts. The processes described above, are expected to induce further industrial concentration, for instance, establishment of firms in the same line of trade (industry) and enlargement of labour markets (Bohm & Patterson 1975).

Logistics corridors need not physically connect areas or regions. They are essentially a form of institutional arrangement pertaining logistics that include binding legal points. There is contention on what constitutes a trade corridor (Nogales 2014), but the general agreement is that they seek to facilitate trade flow by connecting adjoining countries and providing access to the sea especially for landlocked countries. Trade corridors emphasise on bilateral or multilateral institutional arrangement to streamline and simplify trade and custom procedures. Economic corridors are comprised of analytical and policy dimensions. They can be defined as conceptual and programmatic models for policy intervention into the spatial and socio-economic responses framed on linear agglomeration of economic activities and people along transport infrastructure (Nogales 2014). Economic corridors are useful in facilitating access to markets, encouraging growth of trade and investment, boosting productivity and promoting agglomeration effects. In so doing, they encourage private investments in productive assets and create employment opportunities. Economic corridors facilitate inclusive growth by expanding economic opportunities in lagging regions and creating linkages between cities, towns, urban centres and industrial clusters (De & Iyengar 2014).

Economic corridors can be divide into three broad categories which in turn, can be subdivided into subcategories as illustrated below.

Geographic scope	<ul style="list-style-type: none"> ▪ Urban corridor vs urban-rural corridor ▪ Subnational-level corridor ▪ Transnational or regional (supranational) corridor
Sectoral scope	<ul style="list-style-type: none"> ▪ Monosectoral corridor (e.g. agriculture and transport) ▪ Multisectoral corridor
Driver	<ul style="list-style-type: none"> ▪ Public-led corridor ▪ Donor- or international financial institution (IFI)-led corridor ▪ Private-led corridor ▪ Multistakeholder partnership corridor or public-private partnership (PPP) corridor

Source: Nogales (2014)

Figure 2.5 Types of Economic Corridors

As indicated in Figure 2.4 above, corridors can be categorised into geographic, sectoral and driver classes. Each one of the main category consists of subcategories. In the geographic category, corridors are further distinguished by scale and administrative authorities governing them. Hence there are local, subnational regions and national corridors. Some corridors, like the

MDC, extend into neighbouring countries and become transnational or supranational corridors e.g. Greater Mekong Sub-region (GMS) economic corridor. A typical transnational corridor serves an area characterised by dynamic spatial and socio-economic rhythms in a globalising world. This class of corridors require special and evolving regional institutional frameworks in terms of transport and trade facilitation (Nogales 2014).

Similarly, geographic corridors can be classified as urban and rural. Urban corridors are cities of various sizes that are connected through transport networks in a linear manner. They help to improve connection between cities and diffuse development and growth in the surrounding hinterlands (Rodrigue et al. 2006; United Nations Human Settlement Programme [UN-Habitat] 2013). The configuration of urban corridors helps to improve regional economies and trigger patterns of economic activities. These corridors require setting up of strategic infrastructure systems e.g. water and sanitation that is required to enable urban growth. A regional government for such corridors must have a long term strategy for integrated development of industrial, agriculture and mixed-use land uses (Nogales 2014).

The second category of corridors is based on the dominant economic sector. Generally, the majority of corridors are multi-sectoral. There are, however, instances of mono-sectoral corridors in which there is one dominant economic activity alongside transport infrastructure development. Examples could include high tech, industrial manufacturing mining and tourism corridors. Agro-corridors specialising in agribusiness are prominent in developing countries in which they are expected to be engines for growth (Nogales 2014). The last major category is based on who manages the institutions that govern the corridor. Generally, many corridors are top-down i.e. governed by public authorities while a few are managed by international donor institutions. There is however an increase in bottom up economic corridors that involve the civil society as well as private interest through Public-Private-Partnership (PPPs).

Given the descriptions of economic corridors above, the author regards the MDC as transnational corridor (because it serves regions in South Africa and Mozambique), urban corridor (if one considers the government's efforts to promote development of cities and towns along it, and how development impulses from these cities are expected to diffuse in the surrounding rural areas), multi-sector corridor (if we consider the presence of mining, industrial and agricultural activities along it) and lastly as a multi-stakeholder (the presence of Maputo Corridor Logistics Initiative (MCLI) (a PPP body that governs the corridor) and the government funding of the initiative).

The credibility of the corridor concept in town and regional planning is a point of contention. In relation to corridors' ability to attract economic development, it is argued that the greater the distance between nodes the stronger these nodes must be for an axis to be effective in propelling economic forces. It could be expected that the corridors assist nodes to grow in socio-demographic, socio-economic and service delivery terms, but it has been shown, in some instances, that provision of a good road network which provide good interaction with the hinterlands, led to decline of economic activities in small towns (Hauptfleisch et al. 2009). Hence the spatial outcomes of corridors are not always favourable. European countries have not agreed on adopting corridors as spatial planning tools because of reservations that they result in ribbon development (Priemus & Zonneveld 2003). In countries like the Netherlands, it is considered a taboo to use corridors as a planning concept (de Vries & Priemus 2003). Given these reservations about corridors in Europe, mega corridors or Euro corridors are typically used as an analytical concept instead of spatial planning policy (de Vries & Priemus 2003).

South Africa, on the contrary, places emphasis on corridors as planning instruments. In addition to the national policy documents discussed earlier on, it is now established in the 2014 Spatial Planning and Land Use Management (SPLUMA) Act that corridors should be adopted as a planning tools. It is expected that municipal Spatial Development Frameworks (SDFs) must identify development corridors, activity spines and economic nodes and promote public and private investments in these areas (Spatial Planning and Land Use Management (SPLUMA) Act 2014). In Cape Town the corridor concept is already being used as a planning instrument to bring about urban densification in particular areas in the cities (Cape Town SDF 2012).

Between 2006 and 2014, the KwaZulu Natal (KZN) provincial government used a policy document called Provincial Spatial Economic Development Strategy (PSEDS) which identified strategic nodes and activity corridors within the province where investments efforts could be concentrated to promote economic growth and development. The corridor concept was used as an instrument of stimulating economic development and a means of alleviating poverty. The policy identified different types of nodes ranging from primary, secondary, tertiary, quaternary and level five nodes in accordance to their economic potential. A primary node was regarded as an urban centre with high economic growth potential and providing service to the provincial and national economy. Secondary node referred to an urban centre with high growth rate and contributed significantly to the regional economy. Tertiary and quaternary nodes provided services to the sub-regional economy and localised economy respectively. Level five nodes provided services to a ward. Using these classification eThekweni and Pietermaritzburg were classified as primary and secondary nodes respectively. Corridors were also classified into primary and secondary categories. A primary corridor was one with very high economic growth potential in all sectors whereas a secondary corridor is one serving localities with high poverty levels but with considerable economic development potential (KZN 2006).

At the heart of promoting the use of corridors and nodes as planning tools in South Africa is the desire to restructure the country's space economy (SACN 2013). Efforts to restructure the nation's space economy are in essence, effort to promote regional development. Regional development can be defined as efforts to reduce regional disparities by supporting economic growth and development in lagging regions (peripheral regions). It is an exercise of resource configuration to stimulate economic activities in targeted area. Amongst a number of regional economic policy objectives include improving gross regional product per worker, improving industrial efficiency and improving distribution of income (Hall & Tewdwr-Jones 2011). Regional planning's primary focus, in South Africa, is to coordinate development between spheres and sectors of government over space (DTI 2014; Harrison et al. 2008). The SDIs are viewed as part of regional planning (Sihlongonyana 2012).

The main objective behind regional planning is promoting industrial growth in lagging and depressed areas. In Britain, for example, the Distribution of Industry Act of 1945 was essentially aimed at achieving that. Hence it is established that the single most important element of policy intervention at national and regional scale is creation of employment and reducing the rates of outmigration from the depressed region (Hall & Tewdwr-Jones 2011).

It is important to note that the 1960s RIDP in South Africa was running concurrently with similar regional policy in the UK. A brief discussion of the UK regional policy is desirable as it might shed light on the underlying reasons of the outcomes or expected outcomes of the MDC SDI as a regional policy strategy. Although the general consensus is that the UK's mid 1970s

policy had achieved very little to change the overall picture, the effort is however regarded as worthwhile as the situation could have been worse. The Distribution of Industry Act banned the location of industries in London and the immediate surrounding regions by limiting issuance of industrial development certificates. However, the London area continued to experience growth due to growth of the service sector jobs and other industries that fell outside the regulations (Hall & Tewdwr-Jones 2011).

The overall impact of the policy could have been compromised by spreading funds too thinly over large sparsely populated areas (Hall & Tewdwr-Jones 2011). The UK's approach to regional development during this period was not necessarily corridor orientated but there are strong similarities to the MDC initiative in South Africa. Hall and Tewdwr-Jones (2011) asserted that the central idea was to identify part of the region with potential industrial growth and concentrate public infrastructure (in transport, communication, and power lines) there. This approach resonates well with the MDC methodology as attested by Anderson (2001, Rogerson (2001), Roodt (2008) and Sihlongonyane (2012) observations about the MDC.

Was the British regional policy successful? The programme might not be rated successful because of the reason outlined below, but it was indeed helpful (Hall & Tewdwr-Jones 2011). Economists regard the programme to have been pernicious. Efforts to create or keep employment high led to retention of inefficient labour-intensive industries that paid poor wages. This kept a large percentage of the population in low income job and inevitably high income inequalities between regions. However, there is general consensus that the policy created jobs. In addition, these jobs translated into lower unemployment benefits pay out and higher tax yields hence the cost to the state remain negligible (Hall & Tewdwr-Jones 2011).

The practice of regional development planning in South Africa was inspired by similar development approach by the European Union (Crush & Rogerson 2012). Theories of regional economic development and geography seek to influence the location patterns of industries (Hartzenberg 2001). It is evident that there is close relationship between planning for regional economic development and growth pole strategies (Luiz, 2003). The purpose of regional development is to create a polycentric, integrated and linked cluster market place while improving the welfare of communities they are located (DTI 2014).

Regional development and planning is important for both economic and environmental sustainability. Romein et al (2003) argue that excessive concentration of economic and demographic growth in Northwest Europe is unsustainable from an ecological perspective and EU's economic competitiveness. This argument is strengthened by Roberts (2014) who observed that overconcentration of economic activities in one or two large cities increases vulnerability of the national economy. A classic example is the 2011 Bangkok floods. On the contrary, he asserts that countries with balanced urban growth (in terms of geographic spread of economic activities) are efficient and competitive. Correcting imbalance in geographical distribution of economic activities at national level requires strong government support and policy initiatives (Roberts 2014).

To this end, Papadaskalopoulos et al (2005) observed that public capital investment is the cornerstone of regional economic development. Emphasise must be placed on transport infrastructure which is regarded as key in economic growth and overcoming the challenge of spatial disparity (Papadaskalopoulos et al. 2005). In South Africa, the regional question is

important because the government has a constitutional obligation to provide basic services and improve the welfare of all citizens wherever they are (principle two of the NSDP) (RSA 2008)

The importance of regional development, regional planning and restructuring of the national space economy has been dealt with. The next question should be; what mechanisms are used in regional planning to achieve its purported goals? Growth Pole strategy is typically used to focus investment at a limited number of locations (de-concentration) in order to promote economic development and improve the welfare levels of a region (Parr 1999). As Parr (1999) observed, the inquiry into the credibility of the growth pole strategy is important because it is at the centre of regional economic planning and has serious implications on all policies that require intervention at a regional scale. The primary mechanism for growth pole strategy is the establishing of propulsive industries or stimulant industry which is expected to attract other similar and related industries at the planned pole which in turn will diffuse to the zone of influence. The underlying objective of the growth pole strategy is improvement of the general welfare of the chosen region (Parr 1999; Roberts 2014).

THE GROWTH POLE CONCEPT

As mentioned earlier, the growth pole strategy borrows heavily from the seminal work of Perroux (1955) on development pole theory. His theory was widely accepted because of its appeal to economic growth, interregional equilibrium and promoting growth in lagging areas. In its original form, Perroux's theory had no linkage with geographical space. To Perroux, the 'pole' was a firm that exerted centrifugal and centripetal forces. It attracts people and economic resources into its space and disperse them too. The modification of Perroux's original ideas into the geographical space was done by Boudeville. Boudeville translated the abstract space (economic) into geographical space (Serra 2003).

The growth pole can be defined as a regional and industrial planning model for growing industrial units located in urban areas while inducing further development of economic activity in the surrounding hinterlands (Hite 2004). Kwon (n.d) and Srivastava (2011) defined a growth pole as a set of expanding industries located in the urban area that diffuses economic growth and development in its area of influence. The propulsive industries act as stimulants for regional spatial organisation. Growth is spread spatially within a regional urban system in an unequal fashion. The core benefits first and the periphery last. In the growth pole theory, transport enables accessibility and strengthens the role of poles (Rodrigue et al. 2006). Development and growth in this context are seen as a product of agglomeration economies in the industry that propels further development through backward and forward linkages in the urban area and in the surrounding areas of influence (Hite 2004). Although growth and development are used interchangeably they are slightly different concepts. Growth refers to sustained increase in the index of an economic entity e.g. Gross Domestic Product (GDP) whereas development is the total of social changes and mentalities achieved by the population's ability to utilise production devices to achieve adequate growth.

The main driving force of economic development and growth at a growth pole is the presence of propulsive industries. These are firms that agglomerate in an urban node and generate spread effects e.g. through increase in income and employment in the environment. The propulsive industries hence attract migrants who would otherwise have opted for congested urban centres. There are two opposing forces that are associated with the growth pole strategy. These are the backwash and spread effects. The 'back-wash' effects regard the growth pole theory as naïve in assuming that the relationship between a pole and its hinterland will result in growth and

development within the region. Back-wash effects are an outcome of flourishing centres and exploited peripheries (Kwon n.d). The most devastating of the back-wash effect is the highly selective migration of hinterland population and capital to the poles. The spread effects are the pillar of the growth pole strategy. Spread effects are growth impulses that are infused into the urban centre from the propulsive firm. The urban centre in turn diffuse the spread effect into the surrounding hinterland. Examples of such spread effects are attraction of new population to cities, hence creating demand for food from the countryside and the generation of growth mentality (in psycho-social terms) (Kwon n.d).

Douglas North proposed that regional economic growth occurs when there is external demand for regional resources. He divided the regional economy into two sectors, basic and residentiary. The basic sector played a role in supplying inputs in the national economy while bringing outside wealth into a region. The multiplier effects from the basic sector economic activities would empower development of local service through linkages in the production chain system (Todd 1974; Weaver 1978). The basis of the growth pole strategy is the realisation that although the region is endowed with natural resources, there is deficiency in the region's ability to make the most of these resources and promote economic growth and development. This deficiency can be cured by activating a system of planned poles aligned to specific spatial configuration in size, hierarchical level, frequency and location. The mostly favoured parts of the regions for planned poles are near very poor communities inflicted by unemployment, low income and low level of human capital development (Parr 1999).

Todaro and Smith (2015) argued that cumulative processes in income inequality within nation states could be corrected by the growth pole strategy. The stagnant and lagging region could be assisted by the government through a combination of legislation, taxes, transfer payments, subsidies, social services and regional development initiatives. Amongst the prominent adopters of the growth pole strategy are India, Brazil, Kenya and Venezuela (Hite 2004; Sridhar 2006). In India, for example, the growth centre strategy was adopted to address substantial interstate and intrastate disparities in income distribution in per capita terms. India promulgated 71 growth centres and the government furnished the centres with basic industrial infrastructure and banking services to attract investment. In the case of Kenya, growth centres were implemented to assist in rural development and curb excessive concentration of people in urban area (Sridhar 2006).

The promotion of the growth pole strategy is actually an exercise in reconfiguration the nation's urban hierarchy. Serra (2003) and Hite (2004) observed that this urban-oriented framework of growth pole strategy had a dual effect of rearranging a functional urban hierarchy and the urban hinterland surrounding each city/ growth pole. The idea was to allow percolating of innovation from high order centres to low order ones. With reference to the Venezuela's growth pole strategy, Hite (2004) argued that Ciudad Guayana demonstrate the challenge of promoting the pole strategy and reconfiguring of urban hierarchy basing on comparative advantages in natural resources.

Hite (2004) further makes reference to the work of Friedmann (who was the principal planner of Venezuela's growth pole Ciudad Guayan) advocating for engineering places or nodes to enable balanced urban and industrial development. His key argument is that development and growth impulses would percolate downward from the growth poles in primate cities. In this way, it is hoped that the entire region's urban hierarchy would expand growth opportunities and enable national integration. The same strategy was pursued in Chile and Mexico with the latter seeking to create and increase urban and industrial corridors and enhance inter-urban linkages. Chile

created 12 growth centres that were supposed to integrate with the regional hinterland and in the process, create a functional hierarchy of linked urban centres (Hite 2004).

Likewise, Sdasuk (1976) emphasised the importance of growth poles to take a form of economic regions, nodes and centres which then constitute an urban hierarchy of systems of agricultural and industrial regions, regional urban systems etc. A network and hierarchy approach prevents growth poles from becoming social, economic and ecological islands of development in a sea of underdevelopment (Hite, 2004). The promotion of systems of urban hierarchy is desirable as it enable the trickle down process of modernisation from cities through a system of towns and market centres to rural areas (Sdasuk 1976).

DEVELOPMENT AXES AS INSTRUMENTS IN GROWTH POLE STRATEGY

It has been demonstrated that the creation and growth of a development axis is a function of the magnitude of the two poles economic sizes relative to the distance separating them. To this end one can discern a morphological distinction between the development axis (which comes into being as a result interaction between two centres and a development finger (which originates at the centre of the pole and fades with increasing distance from it) (Geyer 1987).

It was outlined in the introduction to this chapter that development axis, as a strategy of growth pole, plays a significant role in promoting socio-economic development. Currently the National Land Transport Transition Act (Act 22 of 2000) has the most serious influence on development axes. It requires that transport axes be integrated with land use, socio-economic planning and corridor development. The act also requires nodal development, infilling densification and mixed use land uses. (Brand et al. 2015; National Land Transport Transition Act (Act 22 of 2000)). Geyer (1988) acknowledged that although the development axes are not the only important factor in furthering socio-economic development, it has been demonstrated that they assist in commercial development. Citing the example of Japan, Geyer (1987) postulated that outstanding economic success (in relation to industrial centres) was registered at the development centres on the development axis between Tokyo, Nagoya and Osaka. It has been proven that development corridors play a role in aiding the concentration effect on industrial and commercial development (Geyer 1987). In line with the foregoing exposition of the desirability of development corridor it has been recommended that industrial incentives should be used to attract the agglomeration of industries along the development axis. The effect of such a policy is stimulation of industrial, commercial and service in intermediate size urban centres.

Brazil used natural axes of penetration in the Amazonia and centre-west region of the country to execute the growth pole strategy. This approach is most prominent in the geo-economic region of Brasilia where cities like Cuiba, Campo Grande, Dourados, Macapa, Boa Vista and Rio Branco where developed along the Brasilia- Anapolis-Goiania axis. There is similarity in the approach used in the MDC with the approach used in Brazil. Serra (2003) observed that in Brazil the growth pole strategy focused in provision of basic services infrastructure and intermediate or heavy manufacturing industries that focused on iron and steel, aluminium, petrochemicals and heavy engineering (Serra 2003).

The influential writings of Walter Isard (founder of Regional Science Association) who achieved a feat of combining German location studies with neo-classical economics, proves that location problem can be solved by developing an urban network of nodes and linkages as contemplated earlier by Losch (Weaver 1978). The argument is that regional economic problems can be solved by promoting growth and development of an urban system and linkages

to connect city to city and sub centre to sub centre. These linkages were regarded as the central subject matter of regional planning (Weaver 1978). Weaver does not explicitly mention the phrase 'growth axes' or 'development corridor' but his writings appear to be consistent with the development corridor concept.

Further evidence of adoption of development axes as development instrument can be seen in Hite (2004) who identified a system of development poles in forms of industrial points along coastal corridors from the Pacific to the Gulf near Jalisco (Latin America). Speaking rather unfavourably on the concept, he argued that growth centres serving as development axis, mostly in Latin America were unqualified failures (Hite, 2004). Sdasuk (1976) probably has the most elaborate argument of development axes as growth poles. With special reference to third world countries, he observed that development tended to be concentrated along 'lines of penetration' out of major seaports. These lines of penetration grew and transformed into corridors of growth (development). Corridors of growth appear as belt-like space along main transport routes that linked the largest and growing centres. As the growth centres continued to be supplied with infrastructure they matured into systems of towns that are characterised by high growth rates. He further observed that major projects gravitated towards these towns (Sdasuk 1976).

The resultant spatial-economic image of such development process is regions of nodes (poles) and centres of growth, corridors of growth linking nodes and new poles of growth that reflect existing and potential future productive forces distribution (Sdasuk 1976). Finally, Todd (1974) also provided evidence for usage of the concept of development axes as a 'growth pole'. He asserted that the interaction between growth poles is the key explanatory variable in the functioning of development axes. The idea of development axes was developed by Pottier (1963) to explain the linearity of spatial growth. The concept is a derivative of international trade theory which says that interaction between two trading poles would trigger scale economies on the transport routes linking the two (Todd 1974).

Can we regard the MDC as a growth pole? Harrison et al (2008), argued that if the MDC is analysed within the context of its aluminium and steel plants (propulsive industries) then it can be argued that it follows the growth pole strategy. If we consider the MDC in terms of its nodes (city hierarchy system) and efforts to promote growth in these nodes (poles) then the MDC qualifies as a strategy of growth poles. Roberts (2014) categorises types of secondary cities and how they drive economic growth in the urbanising world. The last of the three categories that he identified is corridor city systems. This category is defined as economic trade corridors i.e. urban growth centres or poles growing along major transport corridors (Roberts 2014). By interpretation, it can thus be argued that the MDC fits in the growth pole strategy.

POTENTIAL WEAKNESSES OF THE GROWTH POLE STRATEGY

Despite having been adopted by a number of countries, the overall effectiveness of the growth pole is questionable (Serra 2003). In many countries, elaborate growth pole plans had been formulated but very few of these were implemented. Part of the problem is the political difficulty of selecting poles. Politicians could not resist the temptation of pursuing many poles. This hindered the possibility of securing agglomeration scale economies (Geyer 1987; Serra 2003). If we look at the MDC within the 50km buffer on either side of the corridor spine (N4 route) as stipulated by the Mpumalanga provincial government, the outcome is Nodes. Such an impressive number of nodes could result in spreading the funds too thin, assuming that funds are evenly distributed. In the United States, for instance, the US Department of Commerce applied the growth centres strategy as generators of spread effects. The result of the policy was

dispersing of assistance instead of focusing on areas with potential for self-sustaining growth. It is recorded that over a third of public works funds went to towns with less than 2 500 people. No economic activities operated efficiently in such small towns (Hansen 1975).

The strategy was also different from the approach favoured by Perroux who preferred strengthening and encouraging existing poles. On the contrary the strategy has been twisted into creating new poles in disadvantaged areas or as Geyer and Steyn (1988) observed, carelessly transplanted to developing countries. To this effect, Serra (2003) argues that the failure of the growth pole strategy is not failure of Perroux theory but it's distortion by his disciples, notably Boudeville. Similarly, when the strategy was applied within the context of recreational facilities in promoting regional development, the strategy lacked nodal emphasis resulting in widespread facilities with absolutely no economies of scale (Parr 1999). In the case of South Africa, the same conceptual errors were witnessed in the 1975 NPDP's designation of the development axes. Hanekom (1982) argues that if the hard and fast rules of regional science are used to weigh the so called development axes, most of them will be found wanting. Out of a list of 5 designated development axes, Hanekom (1982) argued that the PWV-Durban was the only acceptable development axis.

One of the criticisms of the growth pole strategy has been its reliance on the trickle-down effect. It is often argued that growth centres failed to adequately spread economic growth and development. Hansen (1975) contends that considering evidence at hand, it is difficult to justify the growth pole strategy in depressed areas on the basis of trickle-down effect. In addition to a potential decline of small scale traditional industries (due to competition from Transnational Corporations [TNCs]), the purported spread effects are likely to suffer fatal leakages and multipliers captured by industries and financial institutions from further afield. To this end, the general view is that growth centres entrenched a pattern of spatial underdevelopment. Equally important, the strategy was usually executed by central governments with little or no participation of the stakeholder communities. It is generally believed that when functional economic power is removed from the local authority and communities, social and geographical disparities are worsened (Geyer 1987; Hartzenberg 2001; Hite 2004; Weaver 1978).

Hite (2004) criticised the Brazilian growth centre approach for being heavily biased towards economic growth hence neglecting social development. By so doing, the strategy unwittingly prioritized the interests of foreign investors and local elites. He however praised the Venezuela's approach for balancing industrial and urban development. Propulsive industries that are characteristic of growth poles are usually owned by Transnational Companies (TNCs). It is argued that TNCs usually have leverage over the state and hence growth poles are characterised by lowered tax revenues, huge profit repatriation, weak environmental controls and lax labour standards. Ultimately the heavy investments in infrastructure and generous concessions to attract investment by state planners translate into mere subsidies to TNCs to extract and exploit local resources (Hite 2004; Serra 2003).

Regarding intra-regional trade flows, a successful planned pole could still have devastating impacts on its zone of influence. The incoming large-scale, low cost firms at the pole that service extra-regional markets may lead to failure of small scale firms that had survived by supplying the regional niche markets. This problem can be exacerbated by a possibility of consolidation or vertical integration of the production value chain systems at the pole. This could eliminate existing imports from the sphere of influence and hence creating unemployment (Parr 1999). Similarly, communication axis has been accused for undermining the development

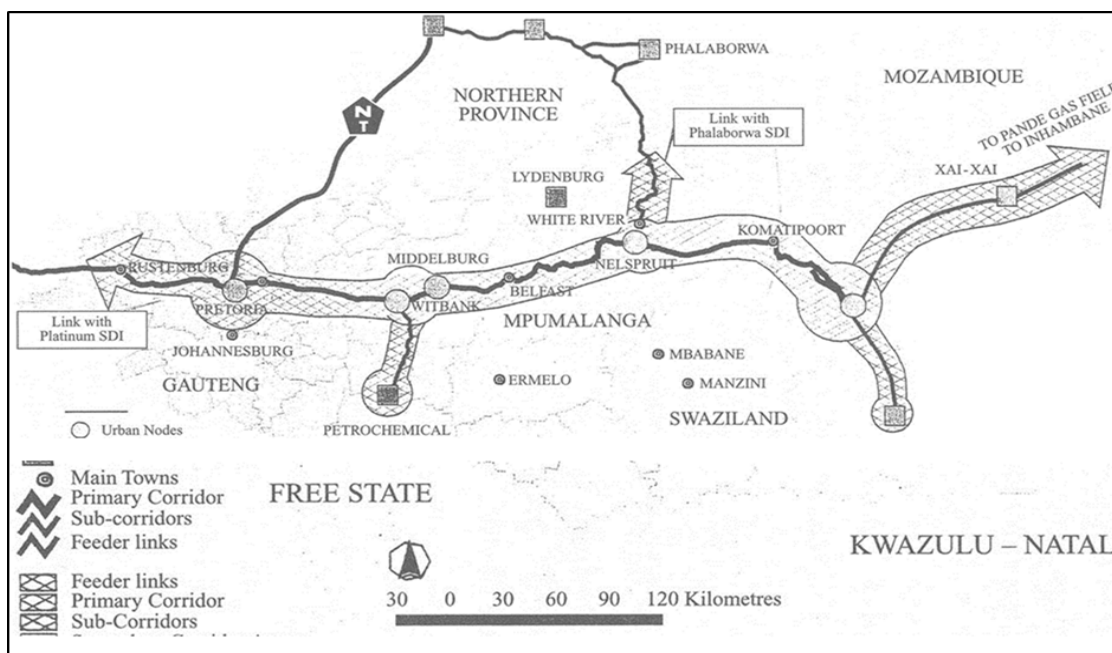
of peripheral areas, especially in situations where there is absence of an equally vibrant end node. This occurs when economic activities start to gravitate towards the nearby node as a result of improved ease of access (Geyer 1987).

Parr (1999) regarded the strategy as having been unsuccessful since its inception in the 1960s. One of the key weakness of the strategy was its assumption that conditions associate with natural growth poles could be easily replicated for planned ones. On a similar note, Geyer (1989) criticised the simplistic belief that mere provision of transport infrastructure between the core and the periphery would trigger development process. Geyer (1989) observed that complex industrial plants that are associated with growth pole strategy do not necessarily create a lot of employment opportunities because of mismatch between required and available labour skills.

THE MDC: AN ANALYSIS

THE ECONOMIC THEORY BEHIND THE MDC

The economic region that falls in what was then proclaimed as the Maputo Development Corridor in 1995 has been in existence and active prior 1995. Hence strictly speaking, the MDC SDI is actually a revival of a once vital corridor linking South Africa's economic heartland with the nearest ocean port, the Maputo Port. The corridor had suffered neglect during decades of military and political unrests in the two countries. By 1975, the Maputo Port was the main gateway to international trade for South Africa. In 1995 the transport ministers of South Africa and Mozambique agreed to resuscitate the road and rail infrastructure to revive the corridor area (Anderson 2001; Rogerson 2001; Soderbaum & Taylor 2001). Refer to the figure 3 below that shows the geographic coverage of the corridor.



Source: Soderbaum & Taylor 2001

Figure 3.1 The MDC and its sub-corridors

The MDC is framed on neo-classical economic theory which places emphasis on the dominance of private capital and very minimum government regulation in the markets. Neo-classical economics is based on capitalist ideological framework of perfect markets, consumer sovereignty, automatic price adjustments, decision made on marginal basis, private-profit and the role of interplay forces of demand and supply to achieve equilibrium in the markets (Todaro & Smith 2015). The theory places heavy emphasis on 'trickling-down effect' (Sihlongonyane 2012). The trickling down effect regard development as an economic outcome of gain in the overall and per capita GNI that would trickle down to masses of people as jobs and social benefits. In this manner problems of poverty, discrimination, unemployment and income distribution will be solved (Todaro & Smith 2015).

The initiative should be seen as an extension of the ANC's neoliberal Growth Employment and Redistribution (GEAR) policy (Taylor 2003). The major criticism of the neo-liberal economics is that priority is given to growth and the redistribution is seen as a consequence of growth not its precursor (Rogerson, 2001). Soderbaum and Taylor (2001) contend that the neo-liberal forces behind the corridor's inception promote privatisation with the state being side-lined to a mere

transmission belt for capital. The strategy promotes maximum profitability and pays scant attention to addressing social and ecological issues. (Soderbaum & Taylor 2001).

The MDC, like other SDIs and indeed all initiatives that fall under the growth pole concept, relied on the mechanism of backward and forward linkages to expand economic prospects of a given locality. Backward linkages occur when the location provides high demand for the firm's products. This improves the lives of local residents while facilitating the growth of the firm. Forward linkages occur when the firm uses inputs from other companies that are located in the same area. Backward and forward linkages encourage growth of agglomeration scales at the pole which in turn promote even more growth (Nogales 2014). However, Bond (2002) argued that backward-forward linkages were either not happening or were inappropriate. He observed that due to the SDI's export orientation, there was no substantial supplying to firms. No employment was being created this way. Bond (2000) further argued that the main backward linkages were confined to packaging and rudimentary engineering inputs which hinders technological learning necessary to propel further growth and development.

In the final analysis, the theoretical foundations of the MDC appear to be at odds with its stated objectives. For the MDC to fully achieve its socio-demographic, socio-economic and redistributive goals there is need for contractual obligations between stakeholders and a strong labour bias for projects to benefit the disadvantaged persons (Soderbaum & Taylor 2001). The bias of the MDC towards the urban area could be blamed on markets preferences of urban markets against the rural ones (Mitchell 1998). The practicality of the role of the 'tricking down effect' in poverty alleviation should be questioned in the light of its weaknesses as exposed by Hansen (1975) above.

The next question that could be asked pertains to the functional methods that the MDC SDI adopted to achieve its goals. The main method adopted by the MDC and all SDIs in general is 'crowding in' of private sector public-private-partnership for establishing of key propulsive industries (Crush & Rogerson 2012; Taylor 2003; Hartzenberg 2001). The initiative also relied heavily on strategy marketing, innovative delivery of public infrastructure and a high level coordination of different tiers of government. In order to achieve the goal of employment creation and broadening the ownership base in the economy, the MDC adopted the targeted procurement approach in which SMMEs owned by previously disadvantaged groups were given preferences. Example of such SMMEs work include road marking, plant hire road signs and truck hire (Rogerson 2001; Roodt 2008). The initiative placed heavy emphasis on resource based industrial projects e.g. chemicals, petrochemical, iron and steel and food processing plants. Given that the region receives a significant number of tourists, investment in hospitality industry featured prominently too (Rogerson 2001). In terms of Local Economic Development (LED) initiatives, there was one positive project linked to the MDC between Komatiapoort niche town in South Africa and Ressano Garcia in Mozambique. This LED project involved the promotion of economic opportunities within the borderlands by promoting tourism projects (Rogerson 2001).

The main thrust of the MDC is the creation of physical infrastructure systems, which in turn is assumed to enable integrated, equitable diversified and sustainable economic development (Anderson 2001; Mitchell 1998). The MDC had approximately 180 potential projects with an estimated value of US\$7 Billion that included two classes of projects; primary and secondary. The primary projects included the revamping of Witbank Maputo N4 toll road, the rehabilitation of Port of Maputo, southern Mozambique rail network and Ressano Garcia/ Komatiapoort border

post. The secondary projects included Mozambique Aluminium Smelter, Maputo Iron and Steel Project, and Pande/ Temane Gas. Both Mpumalanga and the Maputo province are characterised by prime agricultural land suitable for fruits and vegetable production which can be easily exported to the world markets (Anderson 2001).

In spite of heavy criticism, Parr (1999), Hite (2004), Weaver (1978), there are instances where the growth pole strategy was successful. It is important to discuss such incidents briefly as they could be instructive to practitioners in regional planning. Weaver (1978) asserts that starting point is to admit that the exploitative relationship of the core vs. the periphery must be ended. For this to happen, both the government and the regional communities must play a significant role. Weaver (1978) suggests three approaches. First, he outlines that jobs could be created through local initiatives using local skills but he failed to provide an elaborate prescription on how to achieve that. Second, he emphasised on the importance of regional infrastructure and institutions. Bond (2002) observed that electrification reduces reproductive rates by altering social relationships (women in electrified localities put emphasis on children education and see them less as economic agents) and generate economic opportunities, education has high social return, access to health care services results in fewer days lost to illness and improved productivity and SMMEs can be hampered at the onset by absence of water and electricity. In this context, the regional infrastructure prescriptions by Weaver could be valid. Lastly he argued on the importance of regional institutions in forms of producer and consumer cooperatives, democratic planning mechanisms within a framework of regional government and result-orientated research institutions focusing on regional problems (Weaver 1978).

Hite (2004) evaluated Ciudad Guayana, a city in Venezuela, in the context of its role as a growth pole and regarded it as having been successful. The case of Ciudad Guayana shows strong evidence of deviation from traditional growth pole models characterised by foreign capital pursuing resource extraction without wholesale transformation of the lagging regions. In contrast to the Brazilian profit orientated growth poles, Venezuela promoted both industrial development and large scale urbanisation by offering high industrial wages, training and modern lifestyles to poor, uneducated migrant workers. A regional development agency, Corporacion Venezolana de Guayana (CVG), was formed and its objectives, beyond profit, included growth of multiple economic sectors, giving preference to local inputs, focusing on very long-term capital intensive investment and setting up of plans to ensure everyone in the city benefited. The initiative is largely state-owned and as a strong beneficiation bias which grows employment opportunities and increase revenue collectable from exports (Hite 2004). Hite (2004) argued that the long term presence of CVG enabled backward linkages by diffusing sectorial growth. SMMEs specialising in construction, maintenance and subcontracting grew in number too. Apart from these economic successes, Ciudad Guayana also consolidated physical and social infrastructure, improve communication, social and economic connectivity with other development centres and diversified the local economy.

Another regional development initiative that is worth a review is the Tennessee Valley Authority (TVA) which is a United States federal owned corporation that was created to invest in and rapidly modernise the Tennessee valley economy. Geographically the TVA service area incorporates 163 counties, spans through several states and large portion of Kentucky, Alabama and Mississippi. The criteria used to choose the areas that should be included in the TVA service area include areas that are heavily rural, lacking electricity, prone to periodic flooding and experiencing misguided land uses, lacking in social facilities (libraries, health facilities and schools) and are within reasonable transmission distance from the power plants. The most

conspicuous infrastructure investment in the TVA is dams that were used to generate electricity. Electricity generated was expected to attract industrial and agricultural investment and ultimately create employment opportunities. To this effect, the federal government invested approximately \$20 billion to the TVA between 1934 and 2000. It is estimated that 73% of this amount was transferred between 1940 and 1978. Besides the 12 dams built to generate electricity, other mega infrastructure projects included navigable canal, extensive network of roads and flood control systems (Kline & Morette 2013).

The TVA programs were meant to direct public resources to disadvantaged areas thereby reducing regional disparities. The initiative is probably the best known example of big push programs that are premised on the belief that growth and development exhibits threshold effects thus huge public investment in lagging regions may generate increases in productivity and welfare (Kline & Morette 2013).

A couple of key issues can be seen in these two cases. First, is the prominent role played by the state. This means it could be a misconception to believe that the private sector alone (or with minimum government intervention) can go a long way in solving regional issues. To address regional problems there is need to depart from pure neo-classical economics approach and allow the government to play a big role by focusing beyond profit margins. Second is the time frames. Regional development initiatives must be allowed to run for a long time to achieve substantial outcomes. The TVA had been in existence since 1934 up to today. It will be expected to vary the strategies over time but prolonged government commitment is still required. This contrast sharply with the MDC initiative which, being launched in 1995, the government was already withdrawing support by 2003 (Roodt 2008).

METHODOLOGY

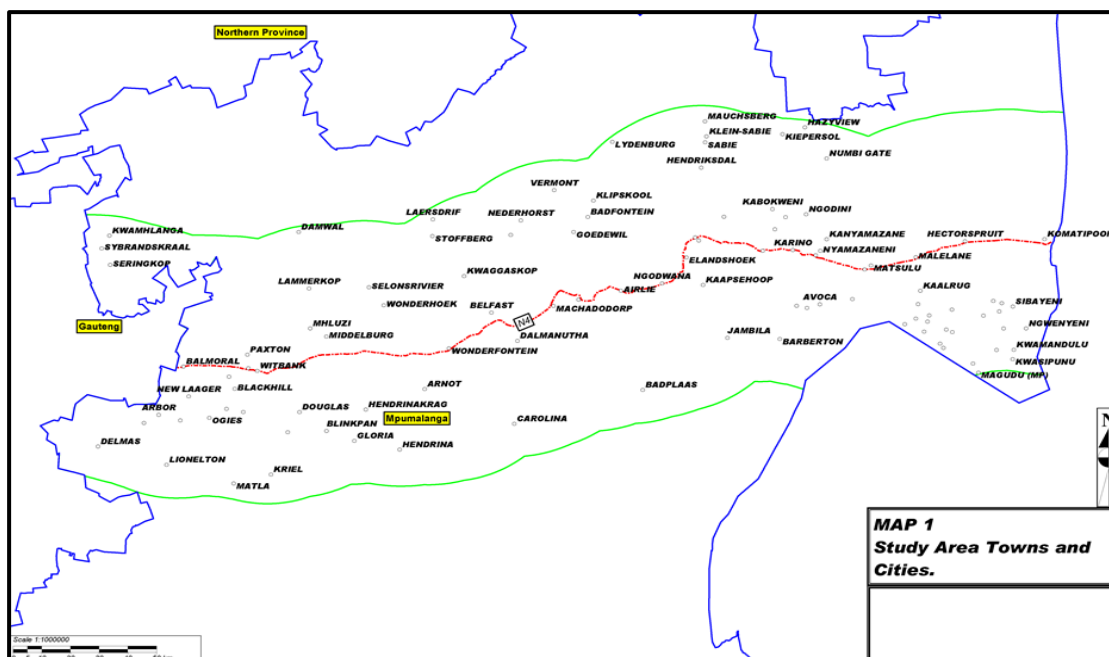
This section explains the research techniques that were adopted to understand, measure and make inferences about the MDC as an instrument of spatial and socio-economic development. As the World Bank (2000) observed, impact evaluation is critical especially in developing countries where resources are scarce and development practitioners seek maximum impact. Emphasis of the methodology of analysis is on impact evaluation which the World Bank (2000) defined as a process of ascertaining whether a program had the desired effects on individuals, households or institutions and whether the effects can be attributed to the intervention strategy.

The approach includes literature review, analysis of census data between 2001 and 2011 (socio-economic variables) and ascertaining the extent of influence exerted by the MDC in its area of influence. The literature was approached within a framework of acknowledging that development axes can be regarded as a component of the growth pole strategy, which in turn is a tool of regional planning. Hence the literature review section covered these three concepts within the backdrop of their symbiotic relations. Briefly, the literature review started with definitions of growth axes, discussed how they are initiated, transformed and end up differently.

Acknowledging that the development axes concept falls within the broader framework of the growth pole concept, the literature also explored the growth pole concept and discussed its strength and weaknesses. Literature to justify development axes as instruments in the growth pole strategy was also explored. The last section of the literature review focused on the study area, the MDC. This section sought: to understand the economic theory behind the MDC; identify and critique methods in which the MDC functions in order to achieve its goals; create a profile of MDC projects; and concluded by looking at case studies in which the growth pole

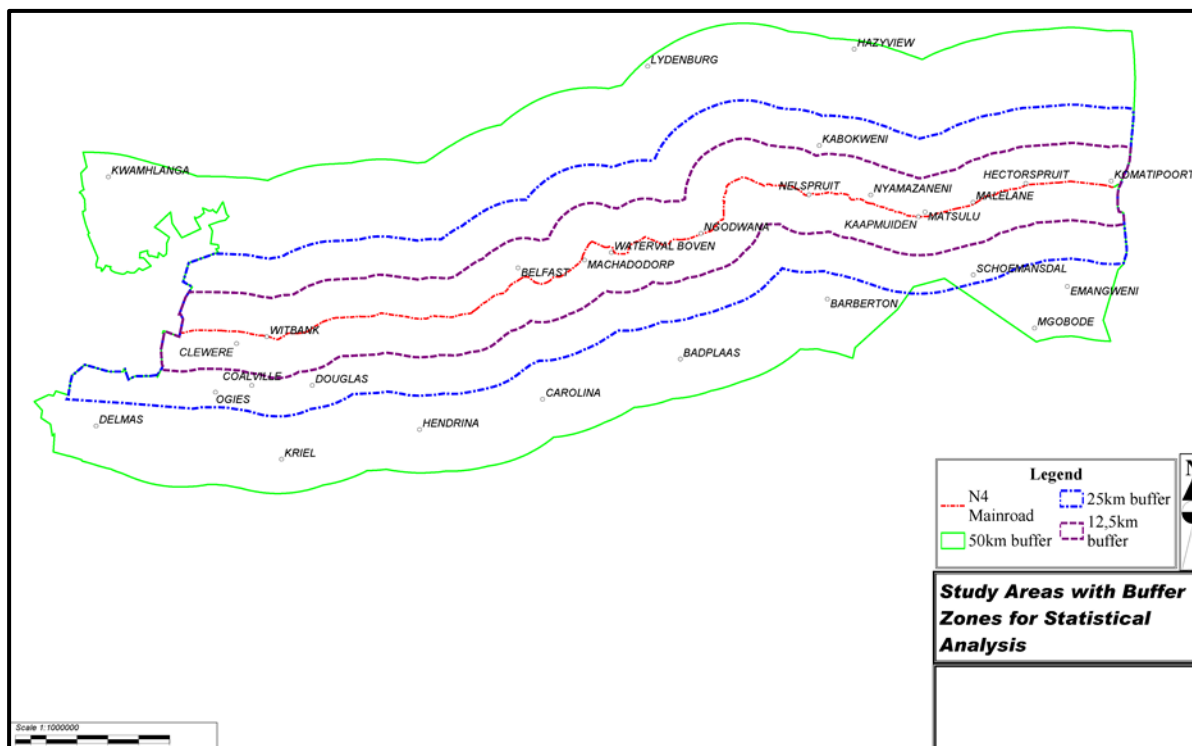
strategy was deemed successful. Ciudad Guayana (a growth pole in Venezuela) and Tennessee Valley Authority (a regional development initiative in United States) were explored to expose key lessons that need to be learned and implemented in order to make the MDC more successful. The choice of these two case studies is premised, on the observation that inquiries into the growth of 'poles' along main transportation routes in (on a regional scale) socio-economic and demographic terms (urbanization corridors) (Rodrigue et al. 2006) assists the government to refine intervention strategies that achieve expected growth patterns.

ESRI's ArcGIS was used to select the nodes (cities and towns) that lie along the corridor's spine (N4 route). A buffer of 100 km (50 km on either side of the N4, in accordance to Mpumalanga's provincial government standard as outlined by Mitchell (1998)) was created and settlements that fall within the buffer area were selected and filtered. Figure 3.3 shows all the settlements that falls within the buffer zone (both rural and urban). Settlements that exhibited an urban character were selected using the CSIR 2003 settlement typology. The outcome of the settlement filtering was 1 (section of a) city region, 6 regional service centres, 4 cities and 19 local or niche towns. Buffer zones for 50km, 25km and 12.5km were created to capture the position of the filtered urban settlements in relation to the N4 spine route as described above. The purpose was to enable statistical analysis of the impact of distance as one moves away from the corridor spine. The outcome is reflected on figure 3.4 below.



Source: Author

Figure 3.2 Study area settlements

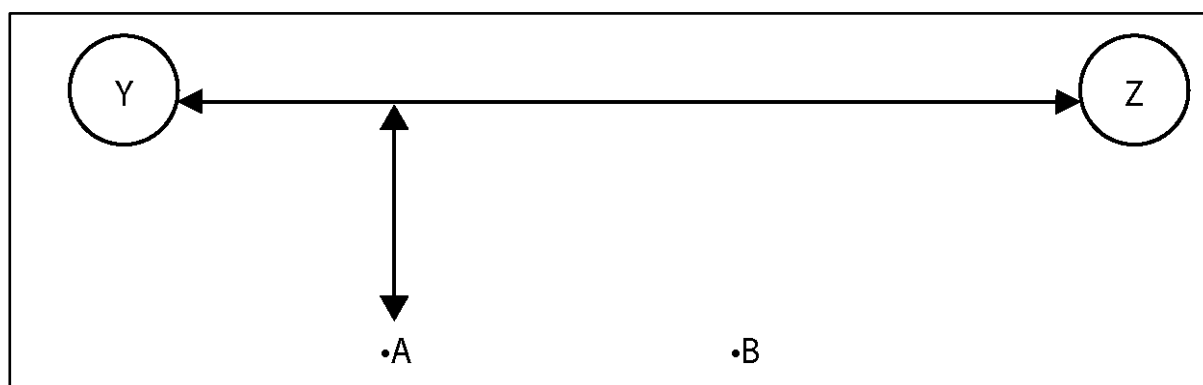


Source: Author

Figure 3.3 Study area with buffer zones

MEASURING CORRIDOR DEVELOPMENT

There is a glaring need to justify the 100km buffer zone (50km on either side of the N4) that was adopted by the author, therefore a look into the work of Srivastava (2011) is desirable. Srivastava (2011) noted that despite the popularity of development corridors in promoting regional economic development, it is often difficult to pin point the corridor's content and implications. This difficulty is further compounded by the observation that regional corridor development inherently encompasses a wide array of activities and stakeholders. He proposed a framework for evaluating the extent to which they are national or regional (regional in this context was referring to cooperation between nation states) and ascertaining their area of utilisation or influence. The approach was geared to establish an appropriate methodology for assessing the performance of regional corridors. Concentrating on ascertaining the area of utilisation of the corridor, Srivastava (2011) distinguishes between the narrow and broad corridor concepts as depicted by the figure provided below.



Source: Srivastava (2011)

Figure 3.4 Narrow vs. Wide Corridor

The narrow corridor is the ‘dumb bell’ consisting of Y and Z, two centres and the connecting highway forming the corridor. In the model above, points A and B lie some distance from the highway. Assuming that C_A is the cost of moving from A to the highway and C_B be the same for point B. The cost of moving from A to the highway is a function of the distance between the points, speed and time of travel, availability of transport vehicles etc. The movement from A to B is achieved by going directly across (from A straight to B) or from A to the highway, then travel along the highway then go to B. Assuming the cost of moving directly from A to B is C_{AB} and that of travelling on the highway is C_H , then it is better to go from A to B via the highway if:

$$C_A + C_B + C_H \leq C_{AB}$$

He asserts that all points off the highway (like A and B) that conform to the relationship above must be regarded as part of the corridor (Srivastava 2011). Although his work is instructive in giving guidelines for ascertaining the area of influence of the corridor, it does lack computational models for the actual assessments of corridor socio-economic impact. It does however justify the thinking that the area of utilisation of a development corridor could extend beyond the highway. Refer to the European view of one of the development axes in the figure below.



Source: EU (2015)

Figure 3.5 An example of the extent of a development axis in Europe

Determining such degree of economic impact exerted by the corridor in its sphere of influence was another important aspect of this work. To do this, the works of Geyer and Steyn (1989) and Brand et al. (2015) were consulted. The approach by Brand et al. (2015) was used, although slightly modified to suit a regional development corridor. First, the Economic Impact Factor (EIF) of each node along the MDC was considered. The entire corridor length was then divided into ‘secondary corridors,’ i.e. parts of the communication axis between two nodes. The economic weight of such a secondary corridor was calculated using a Secondary Corridor

Impact Factor (SCIF). The argument behind this is that the combined secondary corridor economic impact factor reflects the strength of the entire primary corridor. The cumulative impact of the secondary corridor was used to determine the economic impact of the primary corridor (the entire MDC).

The model acknowledges that the growth of a city (or node) is not only dependent on its own mass (requirement of its population) but directly on its interaction with other establishments outside the city and inversely with the distance between them. The use of population size in the model is preferred because it (population size) is known to intermingle with other agglomeration forces. Gross Value Added (GVA) is also a promising qualitative measure because it enables comparison of different productivity capacities of the urban communities, enables identification of leading sectors and comparisons of sectors themselves. Together, population size and GVA reflects the size of agglomeration forces exerted by development centre (Geyer & Steyn 1988). The Economic Impact Factor (EIF) of each city was calculated as follows:

$$EIF_i = \left(\frac{\frac{PE_i}{PT_i}}{\frac{PE_g}{PT_g}} \right) * \left(\frac{GVA_i}{GVA_g} \right)$$

Where:

EIF = Economic Impact Factor of city, i , ($i = 1...n$),

PE = Economic active population,

PT = Total population,

GVA = Gross value added product, g = all the nodes along the MDC, i = GVA of node i .

The EIF for all the selected nodes along the MDC produced a contour map showing the nodes' economic sphere of influence. The coordinates of the nodes gave the location and the EIF scores were z-values. Secondary Corridor Impact Factor were calculated as follows:

$$SCIF_{ij} = \left(\frac{EIF_i * EIF_j}{D_{ij}} \right)$$

Where:

$SCIF_{ij}$ = Secondary Corridor Impact Factor of corridor between cities i and j , ($i, j = 1...m,n$),

D_{ij} = Distance between cities, i and j

The cumulative impact of the secondary corridors was calculated using:

$$CCIF_{in} = SCIF_{ij} + SCIF_{jk} + \dots + SCIF_{mn}$$

Where:

$CCIF_{in}$ = Cumulative Corridor Impact Factor of section i to n of the entire MDC

The outcome of the calculations are reflected below in tables 3.1 and 3.2.

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OUTCOMES OF THE CORRIDOR'S IMPACT FACTOR EVALUATIONS

Table 3.1 The schedule of calculations for economic impact factor

Town/City	PE_i	PT_i	$\left(\frac{PE_i}{PT_i}\right)$	$\left(\frac{\frac{PE_i}{PT_i}}{\frac{PE_g}{PT_g}}\right)$	GVA_i	$\left(\frac{GVA_i}{GVA_g}\right)$	$\left(\frac{PE_i}{PT_i}\right) * \left(\frac{GVA_i}{GVA_g}\right)$
Badplaas	231	582	0.3969	1.0789	219.3647	0.003729387	0.0040
Barberton	4050	11997	0.3376	0.9177	2018.37966	0.034314177	0.0315
Carolina	4641	16846	0.2755	0.7489	1425.45936	0.024234026	0.0181
Clewer	1704	4569	0.3729	1.0137	763.94557	0.012987727	0.0132
Coalville	506	1513	0.3344	0.9090	371.87162	0.006322135	0.0057
Delmas	2802	7399	0.3787	1.0295	1448.28499	0.024622081	0.0253
Emakhazeni	1465	47216	0.0310	0.0843	195.95645	0.003331427	0.0003
EMalahleni	55055	108673	0.5066	1.3772	14149.013	0.240545295	0.3313
Emgwenya	1512	6178	0.2447	0.6652	285.23405	0.004849222	0.0032
Emjejane	1288	3096	0.4160	1.1309	272.02276	0.004624619	0.0052
Entokozweni	45	1342	0.0335	0.0911	240.85777	0.004094788	0.0004
Hazyview	2030	4236	0.4792	1.3027	2094.86155	0.035614434	0.0464
Hendrina	867	2359	0.3675	0.9990	315.79825	0.00536884	0.0054
Kaapmuiden	59	270	0.2185	0.5940	92.56025	0.001573603	0.0009
Kabokweni	6996	21905	0.3194	0.8683	880.46186	0.014968603	0.0130
Kanyamazane	9845	34593	0.2846	0.7737	883.64363	0.015022696	0.0116
Komatipoort	2460	4683	0.5253	1.4280	1316.32258	0.022378607	0.0320
Kriel	453	2145	0.2111	0.5739	4182.40333	0.071104426	0.0408
KwaMhlanga	6884	25727	0.2676	0.7274	1783.67708	0.030324032	0.0221
Lydenburg	15620	41577	0.3757	1.0213	1163.81997	0.019785933	0.0202
Malalane	1683	3486	0.4828	1.3124	1281.75044	0.021790851	0.0286
EMangweni	2978	22948	0.1298	0.3529	175.15376	0.002977763	0.0011
Matsulu	10474	47306	0.2214	0.6019	356.68117	0.006063884	0.0036
Mbombela	42795	58672	0.7294	1.9828	9037.09848	0.153638386	0.3046
Mgobode	652	10113	0.0657	0.1786	65.99214	0.001121923	0.0002
Middelburg	36967	87348	0.4232	1.1504	5052.66072	0.085899544	0.0988
Ngodwana	2028	3483	0.5823	1.5829	3836.23498	0.065219268	0.1032
White River	7637	16639	0.4590	1.2478	3840.89116	0.065298427	0.0814
Ogies	569	1230	0.4626	1.2575	791.32413	0.013453185	0.0169
Schoemansdal	4288	23257	0.1844	0.5013	278.85138	0.004740711	0.0024
Total	228584	621388			58820.58	1	

Table 3.2 The schedule of calculations for secondary corridor impact and cumulative corridor impact factor

Schedule of Calculations: Secondary Impact Factor				
Secondary Corridor	$EIF_i * EIF_j$	D_{ij} (in km)	$\left(\frac{EIF_i * EIF_j}{D_{ij}}\right)$	$CCIF_{in}$
<i>Secondary corridors with centers close to or along the N4</i>				
KwaMhlanga-Witbank	0.0073	96.6	0.000076	0.000076
Delmas- Ogies	0.0004	57.4	0.00000697	0.00008297
Ogies- Clewer	0.0002	27.3	0.000007326	0.000090296
Clewer- Witbank	0.0044	23	0.000191	0.000281296
Witbank- Belfast	0.0001	93	0.0000108	0.000292096
Belfast- Machadodorp	0.0000012	27.4	0.000000043	0.000292139
Machadodorp- Water Boven	0.00000128	16.9	0.000000075	0.000292214
Water-Boven- Ngodwana	0.0010	47.8	0.00002092	0.000312504
Ngodwana- Nelspruit	0.0314	48.2	0.0006515	0.000964004
Nelspruit- Nyamazane	0.0035	26.3	0.000133	0.001097004
Nyamazane- Kaapmuiden	0.00001044	20.8	0.000000501	0.001097505
Kaapmuiden- Matsulu	0.00000324	5	0.000000648	0.001098153
Matsulu- Malalane	0.00010296	35	0.000002941	0.001101094
Malalane- Hectorspruit	0.0001	16.7	0.0000059	0.001106994
Hectorspruit- Komatieport	0.0001664	29.2	0.000005698	0.001112692
<i>Secondary Corridors with centres some distance from N4 (mainly between the 50km and 25km buffer zone, South)</i>				
Ogies- Kriel	0.0006895	37	0.0000186	0.001131292
Kriel- Hendrina	0.000220	66.1	0.000003328	0.00113462
Hendrina- Carolina	0.00009774	41.6	0.000002349	0.001136969
Carolina- Badplaas	0.0000724	49.5	0.000001462	0.001138431
Badplaas- Barberton	0.000126	75	0.00000168	0.001140111
Barberton- Schoemansdal	0.0000756	97	0.000000779	0.00114089
Schoemansdal- Mgobode	0.00000048	35.8	0.000000013	0.001140903
Mgobode- Emangweni	0.00000064	52.8	0.000000012	0.001140915
<i>Secondary Corridors with centres some distance from N4 (mainly between the 50km and 25km buffer zone, North)</i>				
Lydenburg- Hazyview	0.00093728	104	0.000009012	0.001149927
Hazyview- White River	0.003777	46.3	0.000081576	0.001231503
White River - Kabokweni	0.0010582	14.5	0.000072979	0.001304482
Kabokweni- Nelspruit	0.0039598	28	0.000141421	0.001445903

The outcome of the table above gives an impression of the economic contribution of the centres that falls within the corridor area. In terms of GVA, Emalahleni and Mbombela contribute approximately 24% and 15% respectively to the economy of the corridor area. The Economic Impact Factor (EIF) of the two cities is 33.3% and 30.5% respectively. This implies that they are major nodes in-between the two primary nodes (Pretoria and Maputo). Ngodwana, Middelburg and White River have relatively high economic impact factors of 10.3%, 9.8% and 8.1% respectively. These nodes could potentially continue to grow with moderate government investment directed to them. If one looks at the EIF values of all the nodes within the backdrop of the growth pole strategy, the growth of Schoemansdal (KaMatsamo), Mgobode and Emangweni nodes is highly desirable as they are surrounded by high density rural settlements. These nodes (in line with the growth pole theory) could be endowed, with industrial manufacturing plants which in turn could diffuse some growth impulses to the surrounding high density rural hinterlands. Apart from investment in hard infrastructure, the government could invest in soft infrastructure e.g. skills development, improve the operating efficiency of local government institutions.

From the foregoing discussion, we can then relate this outcome with some key questions raised in the literature review section. For example, does the development corridor concept (as a component of the growth pole strategy) result in improvement in livelihoods of the population in the subject region or it is meant to improve the GDP index only. From the outcome in the table 3.1 the answer is linked to ‘where in the corridor’ is the investment efforts focused. In the case of the MDC, if the authorities choose to invest in the major nodes (Emalahleni, Middelburg and Mbombela) then one might as well argue that the intention is to grow the regional GDP. On the other hand, if the targeted nodes are Schoemansdal (KaMatsamo), Mgobode and Emangweni then one would expect a higher diffusion of the growth impulses into the surrounding rural region which implies that the investment effort is deliberately tilted to improve livelihoods.

The result of the Secondary Corridor Impact Factor (SCIF) are very negligible. This is largely due to low EIF value of many nodes and large distances between the nodes. The EIF values appears to have a dominant impact in the subsequent SCIF values. Consider, for example, the secondary corridor between Matsulu- Malalane has a distance factor of only 5km but the SCIF is very low at 0.000002941 largely because both Matsulu and Malalane have low EIF values. In conclusion, one can argue that the low SCIF and CCIF values in the MDC are largely due to low EIF values of the nodes which has been worsened by large distances between them. As mentioned earlier, the outcome reiterates the need for strong nodes and short distances for the corridor concept to yield better results. In order to promote growth and development in the MDC, the government and the private players must promote investment in the smaller (but strategic) ‘poles’ especially those surrounded by high density rural settlements to try and improve the economic strength of development centres. This should be executed keeping in mind the importance scale agglomerations.

OUTCOMES OF THE MULTIVARIATE REGRESSION ANALYSIS

Multivariate correlation analysis showed that there is very weak (positive and negative) relationship between distance from the N4 spine and the other independent variables (employment, access to water, electricity, level of education and nature of housing). However, the Pearson’s correlation coefficient was -0.209, -0.210 and -0.218 for percentage employed, access to piped water inside dwellings and no access to piped water respectively. Although this could still be considered as a weak relationship, it does show that centres that are close to the N4 spine are relatively better off than those further away. Again, with an exception of communal

refuse dump and monthly income of between R1-R400, all the other variables yielded negative correlation coefficients. The interpretation is that settlements that are closer to the N4 are better off than those further away in terms of service delivery, level of education, employment and access to formal housing. The outcome shows that although the growth and development impulses generated by the communication axis are generally weak, they tend to fade with distance from the corridor's spine. Refer to table 3.3 below for an extract of the multivariate regression analysis showing Pearson Correlation coefficients.

Table 3.3 Pearson's Correlation Coefficient for all towns and cities from the multivariate regression analysis

Independent Variables	Distance as percentage to the 50km Buffer Boundary (r)
Distance as % to 50km boundary	1
Employed	-0.209
Unemployed	-0.092
Grade 12 Qualified	-0.178
Access to electricity	-0.150
Removed waste by local government at least once a week	-0.161
Communal refuse dump	0.059
No rubbish disposal	-0.107
Flush toilet	-0.167
Bucket Latrine	-0.086
Piped water inside dwelling	-0.210
No access to piped water	-0.218
Formal dwellings	-0.175
Informal Dwellings	-0.048
No monthly income Month	-0.135
Monthly income between R1-R400	0.149

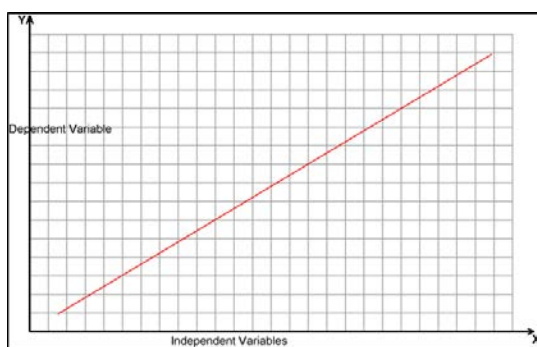
An alternative way of looking at the impact of distance is to divide the settlements into two groups. The first group being those within 0- 12.5 buffer zone and the second group being those between the 12.5km and the 50km buffer. After performing the multivariate regression analysis, the outcome of Pearson's correlation coefficient of distance vs. other variables is given below in table 3.

Table 3.4 Pearson's Correlation Coefficient for towns and cities in different buffer zones

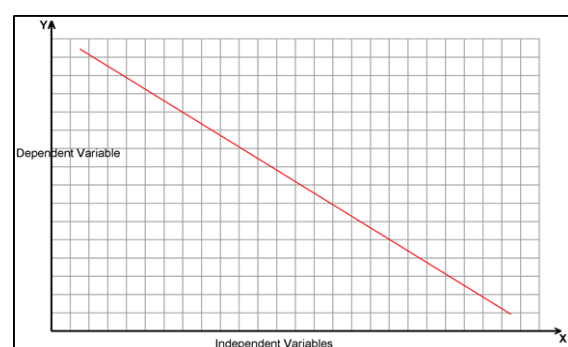
Independent Variables	Distance as a fraction to the 50km Buffer Boundary (0 km-12.5km) buffer (r)	Distance as fraction to the 50km Buffer Boundary (12.5km to 50km) (r)
Distance as % to 50km boundary	1	1

Employed	0.235	-0.123
Unemployed	0.164	0.053
Grade 12 Qualified	0.233	-0.134
Access to electricity	0.275	-0.051
Removed waste by local government at least once a week	0.199	-0.001
Communal refuse dump	0.128	0.143
No rubbish disposal	-0.079	0.029
Flush toilet	0.170	-0.010
Bucket Latrine	0.518	0.217
Piped water inside dwelling	0.178	-0.173
No access to piped water	-0.036	-0.191
Formal dwellings	0.230	-0.114
Informal Dwellings	0.212	0.271
No monthly income Month	0.217	-0.080
Monthly income between R1-R400	0.179	0.094

The result of the 0-12km buffer zone, generally reflects a positive correlation between distance and the other variables. On the contrary nodes that falls into the 12.5-50km buffer exhibit a general negative correlation. The 0-12.5km buffer relationships are relatively stronger than the 12.5-50km ones. One can capture the transformation in relationship between the dependent and independent variable across the buffer zone on a Cartesian Plane as illustrated below.



(a)



(b)

Source: Author

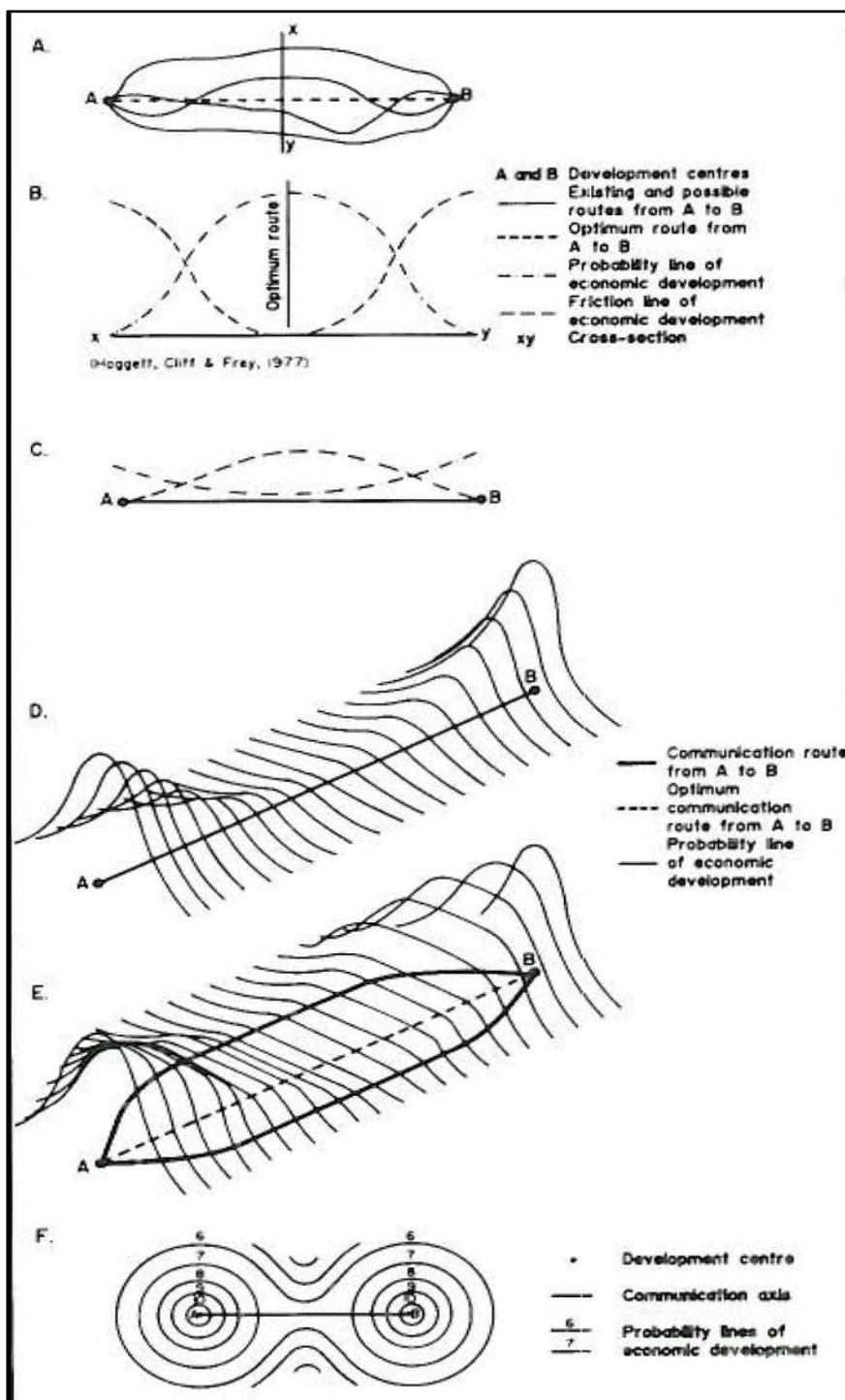
Figure 1.6 General correlation behaviour between dependent and independent variables in (a) 0-12.5 buffer zone and (b) 12.5-50km buffer

The overall interpretation of the findings is that employment opportunities and access to municipal services is stronger in the 0-12.5km buffer zone and improve slightly as one moves away on either side of the N4 before they start to fall again.

Potential Policy Proposal and Implication of the Study

In this last section, we seek to, first, relate the outcome of data analysis to the corridor concept's theoretical underpinnings. Does the outcome confirm or challenge the existing theoretical framework? Second, we attempt to discern the spatial development policy implications of the study by relating it to South Africa's previous policies; key debates raised in the literature review section; and the case studies that we explored. The goal is to give context to the empirical outcomes and hence assist in policy formulation and implementation in South Africa. This is important considering that the policy document that will continue to guard policy making in South Africa in the near future, the NDP, is advancing and strengthening the development corridor strategy. The lessons learnt in this study should serve as a guide for future policy formulation.

In terms of theoretical underpinnings, this outcome aligns with one of the rules of the corridor concept which says that the greater the distances between two nodes, the stronger (in economic terms) the nodes must be in order to make a significant impact along the corridor axis (Brand et al, 2015; Geyer, 1987; Hanekom, 1982; Srivasta, 2011). For example, the SCIF of Nelspruit-Nyamazane is 0.000133 which is amongst the highest in the group because Nelspruit (Mbombela) has a high EIF value. The fall in access to services, housing and employment opportunities that was proven by the multi-variate regression analysis is consistent with the theoretical work of Geyer (1988). Refer to figure 3.7 below.



Source: Geyer 1988

Figure 3.7 Spatial dimensions of a development axis

The figure shows the impact of friction of distance on two dimensions, away from the axis (Figure 3.7B) and along the axis (Figure 3.7C). Figure 3.7B is consistent with Srivastava's (2011) observations that the area of utilisation of a corridor extends beyond the corridor spine. Figure 3.7C shows that the potential of economic development rises as one gets closer to the nodes but falls as one moves away from it. Figure 3.7C on the other hand shows that economic potential levels decrease in inverse relation to the friction of distance with increasing distance from the axis. Thus implies that the potential reaches maximum at the axis. The empirical outcomes of the multi-variate analysis are consistent with this relationship.

In interpreting the outcome of the data analysis and seeking policy response to the MDC initiative, lessons from the Regional Industrial Development Programme (RIDP) of the 1980s could be useful. For instance, the RIDP had a differential intervention strategy. Growth poles and growth points were classified according to the special characteristics identified in each case resulting in unique development strategies for each class. This contrasts sharply with the MDC in which the whole corridor area is administered under a single policy strategy. The result of the EIF values point to the need for a refined intervention approach according to the development circumstances of each class of nodes. For example, the nodes could be classified according to EIF value weight. Those with EIF value between 0.3- 0.4 could be called secondary nodes and those between 0.1- 0.2 could be called tertiary nodes etc. Assuming that these categories are comprised of nodes with similar socio-economic conditions (which they should), that would help formulate 'class specific' intervention strategy. The rudimentary aspects of this approach appear in the KZN Provincial Spatial Economic Development Strategy (described in section 2). Apart from describing socio-economic characteristics of the nodes, like the KZN PSEDs, a similar strategy on the MDC should include detailed policy prescription to aid decision making. The approach would be similar to the structure of the NSDP.

The NSDP profiles regions in socio-economic terms and categorises them according to their socio-economic characteristics and prescribes refined spatial intervention strategies for each case. This approach is absent in the MDC strategy hence Emalahlani with an EIF value of 0.33 risks being treated like Hendrina with EIF value of 0.0054. An issue closely related to the foregoing discussion is the absence of integration of the project with other provincial policy documents. The Mpumalanga Provincial Growth and Development Strategy (PSDS) (2004-2014), for instance, have very scant information about the socio-economic development role of the MDC in the greater mix of things in Mpumalanga. Mention of the initiative occurs only with reference to improvement in infrastructure and discussions are limited to how that improved flow of consumers from Mozambique. This gives an impression that the project was a once off infrastructure development initiative. If the initiative's goal included growing some of the nodes along the axis, then the case of Venezuela's Ciudad Guayan (outlined in section two) show the need for conscious sustained effort that goes beyond mere physical infrastructure provision. In Ciudad Guayan, the CVG focused on growing multiple economic sectors, state supported industrial development with a strong beneficiation bias. There was a strong urban bias, focusing on improving access to services, housing schemes and skills transfers. Although evidence of these items appear in the literature on MDC, there is lack of prescriptive policies to achieve specific goals. The broad and generalized policy pronouncements stated in the initiative are difficult to implement.

Another equally important point is the role played by the government in these regional development initiatives. In both Ciudad Guayan and TVA case studies, the national

governments, through an agent board (CVG and TVA) played a major role in executing the initiatives. There was less reliance on private sector capital. While the involvement of private capital is desirable, it must be noted that development agenda and markets do not always pull in the same direction. Yet there appears to be an overemphasis on private capital in the MDC methodology. As attested by Rogerson (2001), Sihlongonyane (2012) and Soderbaum and Taylor (2001) in section one, neoliberalism and the ‘trickle-down effect’ may not yield the expected social development goals because of its narrow focus. The case studies point to the significance of continued government involvement in the MDC.

The initiative’s time frames are also important. As mentioned earlier on, Hite’s (2004) comments that the long term presence of the CVG enabled backward linkages by diffusing sectorial growth. The same can be seen in the Tennessee Valley initiative which has been in existence for over 100 years now (Kline & Moretti 2003). Such a long presence and continued financial support resulted in stronger employment growth in the manufacturing sector although employment in agriculture reversed back once the government support was withdrawn.

In addition to the time framework issue, institutional arrangements of the MDC require modifications. The Ciudad Guayana and Tennessee Valley Programme were administered by Corporacion Venezolana de Guayana (CVG) and the Tennessee Valley Authority (TVA) respectively. These two authorities might be regarded as the equivalent of Maputo Corridor Logistics Initiative (MCLI). However, the MCLI appears to be limited to facilitating logistics and are therefore unlikely to have the same impact the CVG and TVA had on development in their areas of jurisdiction. This is confirmed by closure of the Maputo Development Company in 2003 (Roodt, 2008). As in the case of the CVG and TVA, results obtained in this study suggests that further detailed investigations should be done into the need and specifics for the expansion of the development role of the MCLI from mere logistics facilitation to facilitation of socio-economic development

CONCLUSION

It can be concluded that, generally, centres along and near the N4 spine are in a better shape in terms of access to services, employment opportunities, income levels and access to formal housing than those further apart. The same can be said about the nodes’ economic impact factor. Those along or close to the N4 spine exert great economic strength than those further apart. In the aggregate however, the secondary corridor impact factor and cumulative corridor impact factor of the corridor is weakened by numerous centres with low economic impact factor values and the large distances between the nodes. It is recommended that nodes near high density rural settlement be promoted in order for them to act as growth poles. This however has to be done carefully to avoid missing out on agglomeration scales.

The study results also indicate the need for greater integration between development features of the MCD and related development policy documents. This should be accompanied by a detailed analysis of precise policy prescriptions related to different nodes along or near the axis.

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