# DETERMINING THE VITALITY OF URBAN CENTRES

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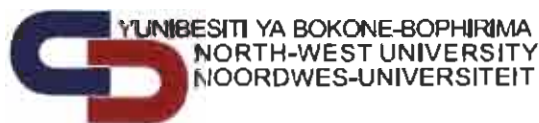
EXECUTIVE SUMMARY

This study was initiated to potentially provide an encompassing Index of Vitality for urban centres. The Vitality Index's goal is to evaluate and measure urban centres in terms of growth and general performance on various levels. This will enable measurement of the general economic, social, physical, environmental, institutional and spatial performance of towns within a region, ultimately reflecting the spatial importance of the urban centre in the region.

The main problem statement reveals a lack of integrated and encompassing indicators that reflect on the urban structure as an organic entity. This demands for the inclusion of a number of existing indicators into an encompassing index. Towns have been measured in terms of numerous indicators, mostly in connection with social and economic conditions, over an extended period of time. The lack of typical spatial indicators is identified as a shortcoming in the measurement of urban centres. Urban centres exist and function within a larger region, consequently all urban centres are interrelated. This study proposes the utilisation of a comprehensive index to measure the importance of an urban centre within a specific region.

The proposed Vitality Index reflects on a city's *vitality*. Vitality describes the ability of an organism to stay alive or work effectively. The proposed Vitality Index was developed on the basis of which an urban centre is measured by means of a number of indicators, indicating the ability of that urban centre to continue to exist, be viable, and function satisfactorily in order to provide for the basic needs of the community and to improve the lives of all residents in the long run. This Vitality Index includes social, economic, satisfaction and spatial indicators.

The Vitality Index is consequently tested in the proposed study area situated in the Northern Cape Province. The Northern Cape Province is sparsely populated and has very few large urban centres. The urban centres also occur at irregular intervals and the

geography of the area is fairly homogeneous. The area is, therefore, ideal for a study project such as this one since the geography will have less influence on the settlement of people. The specific study area is represented in each of the levels of the urban system, and thus includes urban centres in the *national*, *regional*, and *daily urban systems*. This contributes greatly to the study, due to the inclusion of Spatial Indicators in the Vitality Index. The study area furthermore fits into the core-periphery model (which is central to this study), with certain centres forming part of the core, while other centres and development corridors are included in the transition zone, and the periphery.

A main town is identified within each Local Municipality by means of the central place index and the functional classification of towns with regard to population size. The results obtained for each municipality is consequently related to the main town within the specific urban centre. The results allowed for interurban comparison and measurement as identified within the aims of the study. From the empirical study it is disclosed that Kimberley acquires prominence as the urban centre of greatest spatial importance within the study area, followed by Kathu, Kuruman, Barkley West, Jan Kempdorp, Bothithong and Warrenton.

This study contributes in a number of ways to the measurement of urban centres, including the classification of urban indicators into four broad categories, i.e. normative welfare, satisfaction, descriptive social and spatial indicators. This study also proposes the sifting of possible indicators by measuring them against certain prerequisites. Methods are proposed for calculating the Vitality Index, including the ranking and scoring of urban centres. It is proposed that shortcomings that are identified for the urban centres be addressed by policy initiatives, comprising a set of objectives and strategies to correct imbalances. The Vitality Index also provides a basis for structuring national and provincial growth policies, in the identification of urban centres with sustainable growth potential and vitality.

OPSOMMING

Hierdie studie het ten doel om 'n omvattende Vitaliteit Indeks van lewenskrag vir stedelike sentra te ontwikkel. Die doel van die voorgestelde Vitaliteit Indeks is om stedelike sentra te meet in terme van hul groei en algemene prestasie op verskillende vlakke. Dit maak die meting van algemene ekonomiese, sosiale, fisiese, omgewing, institusionele en ruimtelike prestasie van 'n stedelike sentrum binne 'n streek moontlik. Gevolglik sal die ruimtelike belangrikheid van 'n stedelike sentrum binne 'n streek gemeet kan word.

Die hoof probleemstelling verwys na die tekort aan geïntegreerde en omvattende indikatore wat die stedelike sentrum as organiese entiteit beskryf. Gevolglik word die insluiting van 'n aantal bestaande indikatore in 'n omvattende indeks voorgestel. Dorpe word oor die algemeen gemeet in terme van 'n aantal indikatore wat meestal verwys na sosiale en ekonomiese toestande en die verandering daarvan oor 'n tydperk. Die uitsluiting van ruimtelike indikatore word in die studie geïdentifiseer as 'n tekortkoming in die meting van stedelike sentra. Stedelike sentra bestaan en funksioneer binne 'n groter streek en alle stedelike sentra is onderling verbind. Die studie stel gevolglik die gebruik van 'n omvattende indeks voor om die belangrikheid van 'n stedelike sentrum binne 'n groter streek te bepaal.

Die voorgestelde Vitaliteit Indeks reflekteer 'n sentrum se lewenskrag. Lewenskrag verwys na die vermoë van 'n organisme om lewend te bly en effektiewe werkverrigting te behaal. Die voorgestelde Vitaliteit Indeks is ontwikkel vanuit die vertrekpunt dat 'n sentrum gemeet kan word na aanleiding van 'n aantal indikatore wat die vermoë van so 'n sentrum beskryf om volhoubaar voort te bestaan, lewensvatbaar te wees en op so 'n wyse te funksioneer dat in die basiese behoeftes van die gemeenskap voorsien word en die lewensomstandighede van inwoners oor die lang termyn verbeter. Die voorgestelde Vitaliteit Indeks sluit dus sosiale, ekonomiese, bevrediging en ruimtelike indikatore in.

Die Vitaliteit Indeks is gevolglik in die Noordkaap Provinsie as studiegebied getoets. Die Noordkaap is yl bevolk en beskik oor slegs 'n paar groter stedelike sentra. Die stedelike sentra kom wydverspreid voor en die provinsie beskik oor 'n homogene geografie. Die studiegebied is dus ideaal vir die studie aangesien die geografie die verspreiding van die bevolking in 'n mindere mate beïnvloed. Die spesifieke studiegebied is verder verteenwoordigend van alle vlakke van die stedelike sisteem (nasionaal, streek, en daaglikse stedelike sisteme). Dit dra grootliks by tot die studie in terme van die insluiting van ruimtelike indikatore. Die studiegebied is verder verteenwoordigend van die kern-periferie model aangesien sekere van die sentra deel vorm van die kern en ander deel van die oorgangsone en periferie uitmaak.

'n Hoofdorp is in elke Plaaslike Munisipaliteit geïdentifiseer deur middel van die sentraleplek indeks en die funksionele klassifikasie van dorpe in terme van bevolkingsgrootte. Die beskikbare data per munisipaliteit word gevolglik toegeken aan die hoofdorp in die spesifieke munisipaliteit. Die resultate laat toe vir die meting van individuele sentra asook die vergelyking van verskillende sentrums in die studiegebied. Uit die empiriese studie is vasgestel dat Kimberley die grootste ruimtelike prominensie besit in terme van die saamgestelde Vitaliteit Indeks. Kimberley word gevolg deur Kathu, Kuruman, Barkley Wes, Jan Kempdorp, Bothithong en Warrenton.

Die studie dra op 'n verskeidenheid wyses by tot die meting van stedelike sentrums, insluitende die klassifikasie van stedelike indikatore in vier breë kategorieë, naamlik normatiewe welstand, bevrediging, beskrywende sosiale en ruimtelike indikatore. Die studie stel ook die verfyning van indikatore voor deur dit aan sekere voorvereistes te meet. Metodes word verder voorgestel waarop die Vitaliteit Indeks gemeet kan word, insluitende die gradering van sentrums en puntetoekenning aan dorpe. Dit word voorgestel dat die tekortkominge wat in stedelike sentra geïdentifiseer word deur middel van beleidsinisiatiewe aangespreek word, bestaande uit doelstellings en strategieë om die geïdentifiseerde wanbalanse aan te spreek. Die Vitaliteit Indeks stel verder 'n basis voor waarop nasionale en provinsiale groeibeleide geformuleer kan word deur die identifisering van stedelike sentra met vitaliteit en die potensiaal vir volhoubare groei.

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INTRODUCTION

1.1 Research orientation

This study was initiated to potentially provide an encompassing Index of Vitality for urban centres. The Vitality Index will evaluate and measure urban centres in terms of growth and general performance on various levels. This will enable measurement of the general economic, social, physical, environmental, institutional and spatial performance of towns within a region, ultimately reflecting the spatial importance of the urban centre in the region. Numerous composite indexes have been developed to measure growth and development within urban centres. Not one of these indexes, however, includes spatial aspects or measures the spatial importance of towns in the surrounding region. This study, being a regional planning dissertation, will attempt to focus on numerous indicators that already exist, and incorporate these indicators with measures of spatial importance.

1.2 Problem statement

Various indicators have been designed and are recognised to provide a quantitative evaluation of an urban centre. Included are indicators describing economic growth, accessibility, sustainability, quality of life and environmental quality. In developing countries, basic indicators like access to engineering services, employment levels and availability of public transport form the main urban evaluation indicators. In developed countries, on the other hand, indicators used to evaluate and describe cities focus more on standards of living, environmental quality and accessibility.

In the course of time these indicators have also progressed through time in terms of focus. In general, at the time of the Industrial Revolution, cities were evaluated according to natural resource availability, labour resources and transport infrastructure.

These are mostly quantitative indicators. In recent times, the focus has shifted to some extent towards quality of living, although the main focus is still on economic growth and productionism. In the post-modern era, cities are generally analysed and evaluated by means of indicators reflecting sustainability, competitiveness, global impact and environmental quality. These are qualitative indicators.

In addition to the general trends in designing indicators over time and development levels, numerous technical and / or spatial planning indicators have also been compiled to aid in the spatial planning process (i.e. central place index, locality index, and income and labour indexes). These spatial planning indicators have not, however, been included in assessing the spatial importance and vitality of urban centres within a particular region. This disregard of spatial measures was identified by this study as a shortcoming in the measurement and assessment of urban centres within regions.

Most of the foregoing indicators refer to quantitative measurements. Arguably several qualitative issues also need to be taken into consideration, e.g. the sense of community and sense of place linked to a certain urban structure. The quantitative indicators do not necessarily reflect the total of the unique social characteristics of a city. This was also identified as a shortcoming by this study in existing indexes of growth and development of urban centres.

The main problem statement amounts to a lack of integrated and encompassing indicators that reflect on the urban structure as an organic entity, i.e. the inclusion of all the preceding indicators into an encompassing index. The proposed index will then reflect on a city's *vitality*. Vitality describes the ability of an organism to stay alive or work effectively. The Vitality Index will encompass indicators that represent the ability of an urban centre to stay alive, be viable, and function satisfactorily in order to provide for the basic needs of the community and improve the lives of all residents in the long term.

1.3   Research aims and objectives

It is the aim of this research study to analyse and evaluate a number of different indicators or measures of sustainability. Since the term *sustainable* in general refers to environmental, social and economic measurement, this study will attempt to attach a new meaning to the word *vitality*, i.e. ability to stay alive or work in an effective way.

In addition, this study will attempt to provide a number of indicators of vitality, including traditional measures, i.e. environmental, social and economic measures, also taking into account the soft issues concerning the social life of an urban centre. It is furthermore the aim of this study to assess a number of urban centres in a defined study area in terms of this *Vitality Index* to evaluate the long-term vitality of towns within the study area. The assessment of these urban centres in the said manner, will help convince potential investors to make a positive long-term investment in an urban centre with the necessary vitality.

The Vitality Index aims to identify relevant shortcomings within the urban centre, i.e. infrastructure, institutional capacity, economic growth or service delivery. The identification of these shortcomings will provide a basis for addressing such issues. Lastly, the Vitality Index will aim to provide a basis for regional comparison of urban centres. This regional comparison of urban centres will highlight differences and disparities among urban centres, which could be helpful to regional government to address issues, i.e. slow growth, lack of development, poor infrastructure and poor sustainability.

The detailed objectives of the study are the following:

- To include spatial indicators in a composite index

- To include qualitative indicators in a composite index

- To compile a Vitality Index from numerous indicators

- To use the Vitality Index in identifying inadequacies or problems within urban centres

- To utilise the Vitality Index in recognising spatial concerns within the region

- To utilise the Vitality Index to promote a specialised policy response for relevant government spheres.

1.5   Research methodology

This study will consist of two parts in terms of research, i.e. literature study and empirical study. The study of literature will include various sources on the structure of regions, and especially settlement theory will be investigated. This will include books, reports, journal articles, and internet resources. The second chapter of this study will entail an investigation on settlement theory, the urban centre and its surrounding region, the urban system and the urban hierarchy. It is the aim of this chapter to provide background on urban centres and the spatial role they play in the region.

The study will also seek to research a number of different indicators of growth, development and performance, or in this case the vitality of an urban centre. This includes physical, economic, social, and functional indicators, which will be divided into objective and subjective indicators. This will include measures used by world organisations such as the United Nations and European Union and measures determined by local institutions such as the Development Bank of Southern Africa and numerous national organisations. Throughout the study figures, tables, and diagrams will be utilised to illustrate, explain, and summarise information.

The empirical study will include the delineation of a suitable study area consisting of a sufficient number of urban centres, comprising of both central and non-central places to be measured in terms of their vitality. The study area and indicators utilised in the study will be visually presented on maps, figures and tables. Consequently the identified indicators will be utilised in assessing the urban centres in the study area to allow for a detailed comparison of urban centres. Data for measuring each indicator will be

identified and obtained from various institutions, i.e. Development Bank of Southern Africa (DBSA), relevant government spheres, surveys, fieldwork, and personal interviews with identified role-players. This study will conclude with various proposals and recommendations in terms of the Vitality Index and the utilisation thereof.

1.6   Arrangement of the study

The research document will consist of six chapters. The chapters will be arranged as follows:

Chapter Two: The spatial occurrence of urban centres

In Chapter Two, aspects such as the hierarchy of towns, central places, non-central places, nodal points, spheres of influence and the availability of infrastructure and social amenities will be given attention. In this chapter the classical settlement theories, including those of Christaller, Weber, Lösch and Pred will come under the spotlight. Discussions on the urban system, urban fields, development corridors, and urban hierarchy will follow. This chapter will provide the basis for determining how urban centres are measured in terms of spatial planning.

Chapter Three: Urban indicators: a basic review

Chapter Three will provide a number of quantitative indicators that have been used in the past to measure urban centres. Included are measures of economic growth, infrastructure, engineering service availability, employment levels and availability of natural resources. This chapter will classify urban indicators into four broad categories, i.e. physical, economic, functional, and social. Reference will be made to indicators used in both developing and developed countries, and primarily quantitative indicators will be discussed.

Chapter Four: Urban indicators: an integrated perspective

Chapter Four will describe and evaluate the more recent indicators, which not only include quantitative indicators, but also qualitative indicators. This chapter will be divided into two broad categories, according to the type of indicator discussed, i.e. objective and subjective indicators. Objective indicators include economic and environmental indicators, while subjective indicators will refer to the concepts of human perception, the human psyche and emotional attachment to a certain environment. These indicators will be taken into account when the Vitality Index is compiled, since qualitative indicators could have a significant influence on the measurement of performance and spatial importance. This chapter will conclude with a discussion on composite indexes and a short evaluation of indicators in general.

Chapter Five: Indicators of Vitality

Chapter Five will concentrate on filtering the indicators discussed in the previous chapters. This chapter will attempt to classify these measures into four broad categories and to identify a number of relevant indicators which will form part of the Vitality Index. In this phase of the dissertation a model and relevant indicators for measuring vitality within the urban centres of a region will be proposed. The Vitality Index will combine a number of qualitative measures, quantitative indicators, and spatial aspects of vitality that have been ignored in previous indexes.

In this chapter the Vitality Index will be applied to a region of urban centres. This entails the determination of a study area which includes a number of central and non-central places which are in regular interaction with each other. The Vitality Index will be utilised to determine the vitality of each of these places. The urban centres will be ranked according to the scores obtained in the Vitality Index.

Chapter Six: Synthesis and recommendations

The final chapter will summarise the main issues addressed as well as provide recommendations in terms of investment in urban centres within the study area. This chapter will attempt to highlight certain urban centres within the study area which may in future experience difficulty in displaying the required degree of vitality to qualify as a sound investment area. This chapter will also attempt to provide proposals for policy initiatives within each urban centre to address issues identified through the Vitality Index.

CHAPTER TWO

THE SPATIAL OCCURRENCE OF URBAN CENTRES

2.1 Introduction

In order to understand the spatial occurrence of urban centres attention will first be paid to a number of settlement theories that will be explained in this chapter. Consequently, attention will be directed towards general settlement theory and to the settlement of industries and industrial location. Industrial theory is of particular importance to this study due to a number of principles of industrial settlement that also apply to the settlement of any other economic entity, such as an urban centre and its relevant economic functions.

The discussion on settlement theory will be followed by an introduction to the pattern of settlements according to the urban fields and hinterlands that support urban centres. A review will then be given of the hierarchy of urban centres, i.e. what it entails and how a hierarchy of urban centres is measured.

The aim of this chapter is to provide a basis for understanding how urban centres have developed as well as how urban centres are classified in a quantitative manner by urban geographers and town planners. This is essential to the explanation of the existing classification of town and cities in South Africa and ultimately in the study area, as well as the current methods of measuring the level of development within urban centres. This chapter will also provide the basis for spatial analysis and measurement.

2.2 Settlement theory

Settlement theory or locational theory refers to a "body of theories which seek to account for the location of economic activities" (Johnston, Gregory, Pratt, Watts and Smith, 2000: 460). Settlement theory therefore seeks to focus on the arrangement of economic activity throughout space and time and can be broadly categorised into theories based on simplified assumptions, and theories taking into account the complexity of the real world.

These settlement theories will attempt to explain the origin of urban systems (see Section 2.4) as they are experienced today. Johnston *et al.* (2000: 882) refers to an urban system as a set of interdependent urban places. Once the settlement theories have been explained in broad outline, the interdependent relationship between these urban places will be given attention. Isard, Bramhall, Carrothers, Cumberland, Moses, Price, and Schooler (1960:3) correctly claimed that "the maze of interdependencies in reality is indeed formidable, its tale unending, its circularity unquestionable. Yet its dissection is imperative... at some point we must cut into its circumference". This study chooses to cut into the question of interdependent relationships with the functional classification of urban centres (see Section 3.3.3).

2.2.1 Simplified settlement theory

The term *location* is derived from the Latin word *locus*, meaning place, order, or rank, thus specifying to the relative occurrence in space (White & Renner, 1948: 587). This section will attempt to explain the relative spatial occurrence of urban centres. Smailes (1966:43) described the primary economic function of a town as follows: "Towns grow in particular places to discharge necessary functions, among which it may be that one is of primary importance, so that it may justifiably be regarded as the raison d'être of the town." This section will aim to investigate the raison d'être of towns, and will include a number of theories which attempt to describe the location, and subsequently the primary function of towns.

A number of theorists have attempted to explain the spatial occurrence of urban centres by simplifying the complexity of the actual space economy. A number of assumptions (Dicken & Lloyd, 1990: 15-16) made in this regard include the following:

1. The land surface is an unrestrained homogenous plain, where transportation costs are proportional to the distance travelled by means of a single uniform transportation system. This assumption presupposes that all physical resources are distributed evenly over the surface in question.

2. The second assumption describes the population as being distributed evenly, with identical incomes, demands and tastes. The population also has perfect knowledge and acts in a rational way.

In making these assumptions only one factor remains to be considered - the friction of distance. The following section will deal with theories based on the foregoing assumptions.

2.2.1.1 Central place theory

The most well-known and thoroughly researched spatial order model is probably that of Walter Christaller, the central place theory. The theory of central places (Christaller, 1966) provides a partial framework which has proved to be of great value in the understanding of regional structure and order.

This theory is mainly used in regional planning as a supportive tool to derive hierarchical order in terms of places or nodes. Christaller's central place theory evolved from the concept of centralisation as an ordering principle. Christaller (1966:14-27) proposed that if the centralisation of mass around a core is an elementary form of order, then the same centralistic principle can be equated to urban settlements. The model of Christaller proposed a hierarchical arrangement of settlements and conceptualised the model with hexagonal arrangements. The hexagon best replaced a circle for maximum coverage and some of the problems of overlap within circular arrangements were removed from hexagonal arrangements.

A central place is described as an urban node with the primary function of providing for needs and desires of the population of the surrounding area. Christaller (1966: 18) furthermore distinguished between central places of a higher order and central places of a lower order; the former referring to places with central functions that extend over a larger region in which other central places of less importance exist. The latter refers to towns which have only local central importance to the immediate vicinity.

According to the Christallerian theory the variety of consumer goods and services offered by establishments in cities and towns determines the range of the place. *Range* refers to the maximum distance the dispersed population would be willing to travel to purchase a particular commodity offered at a central place. The further the range of a central place, the greater the importance that place will have. Pred (1977:17-18) maintained that whenever a city cannot meet a given demand for goods and services, the commodity must be obtained from the nearest more populous city which does supply the commodity required. The market areas of cities of each size class are nested into the market areas of higher order centres until the entire country or region falls within the market area of the single largest urban unit.

This notion gave rise to the hexagonal market areas of Christaller`s theory. Christaller (1966: 66) identified seven levels in all. At each level the larger central place contains all the functions, and more, of the place of lower order. This theory is based on the assumption that all parts of the region are supplied with all conceivable central goods from the minimum possible number of central places. This principle is called the market principle.

Figure 2.1   System of central places: Marketing regions
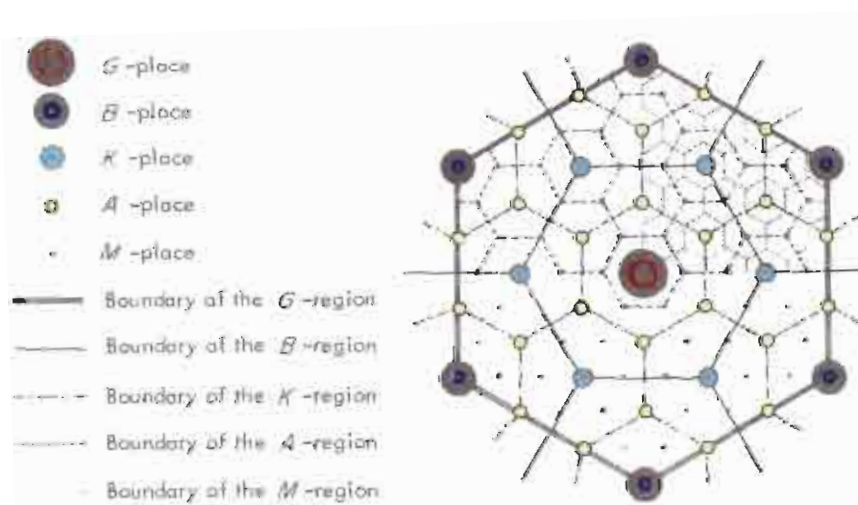
Source: Christaller (1966: 66)

From the preceding figure it is evident that, according to Christaller, there will always be a greater number of places of a lower order i.e. towns of lesser importance and smaller in size, but as the size and importance of places increase, the number of places decreases. Thus, surrounding a larger place (B-type), are a number of smaller A-places and even more M-places of the smallest size. As ones moves further away from the central place, a number of larger towns or K-places appear surrounded by their own number of A-places and M-places.

In his theory Christaller implies a set relationship between each level of the urban centre in the hierarchy, resulting in a standard, very rigid, and distinct level hierarchy of centres in which the correlation between levels is identical throughout.

2.2.1.2 Lösch on central places

Lösch (1954) refined Christaller's theory even further, also using hexagonal service areas but allowing various systems to coexist. He attempted to incorporate a greater measure of realism into the rigid theory of Christaller. Lösch rejected the least-cost viewpoint of Weber (see Section 2.2.2.1) as well as the alternative of seeking the site at which revenue is at the maximum. Lösch (1954: 8) argued that the ideal location is one where profit is at the maximum, therefore where the total income exceeds the total expenditure by the largest amount.

An attempt was made to explain the size and shape of the different market areas by considering the spatial system as a continuous distribution of settlements, and not as a discontinuous hierarchy of settlements (the approach Christaller followed). On account of the market-area determination principles used by Lösch, urban size does not automatically define which goods and services are locally available, taking the interdependence between service areas into account.

This discussion has borne out that the central place theory is relevant to urban and regional planning because a hierarchical system provides an efficient means of administering and allocating resources to regions. Major central places are often the key points of growth in a region and determine the rate of economic development in the region as a whole.

2.2.2 A heterogeneous land surface

In the previous section simplified theories of settlement were explained, and although only the effect of distance was taken into account it was observed that spatial variability occurs in the space economy. The following section will attempt to describe a number of theories that take into account not merely distance, but a number of other factors as well in an attempt to explain the spatial occurrence of urban centres.

2.2.2.1 The concept of least effort

One of the traditional locational models available for a study in locations is the one developed by Alfred Weber. Weber (1929) attempted to put forward a reliable theory of industrial location. He attempted to "seek for a general theory of location; that is to say, we wish to resolve the seeming chaos of the local distribution of production into theoretically general rules." His theory presented a number of theoretical and practical weaknesses, but nonetheless provides a useful starting-point in understanding the question of location.

The essential argument in Weber's theory of the location of industries is that the position of a site is selected in order to minimise transportation costs (movement), implying the minimisation of distance, mass and effort (Weber, 1929: 41). In his theory Weber (1929: 37-38) made the following additional three basic assumptions to simplify the spatial system: first that the physical occurrence of raw material is set; in the second place that the places of expenditure (market) are set in terms of location and size; and finally that only a number of fixed locations for manual labour exists.

Weber suggested that three factors influence the location of industries (Smith, 1981: 70). He included transport and labour costs (regional factors), and the forces of agglomeration or deglomeration (local factors). Weber (1929: 49) used the locational triangle to demonstrate the derivation of the least-transport-cost location (see Figure 2.2). In the space economy one point of consumption (C) is illustrated, as well as the most useful deposits of two raw materials (M_1 and M_2). Each angle of the triangle exerts a pull on the point (P) for the location of the industry. The least-transport-cost location (L) is the point at which the total number of ton-miles concerned in transporting materials to a place of production and the final product to the market-place is the lowest.

Figure 2.2   Locational triangle

C = point of consumption
M_1 = source of material 1
M_2 = source of material 2
L = a cheap-labor location
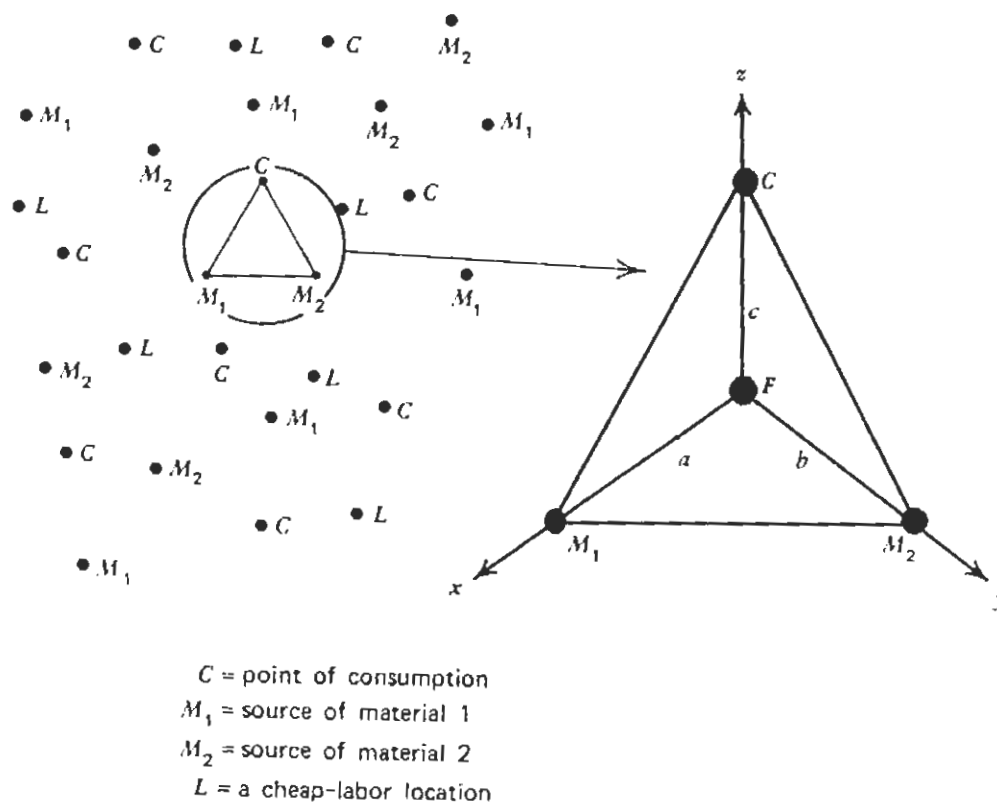
Source: Adapted from Weber (1929: 49)

Weber (1929: 49-52) resumed his theory by investigating a number of different situations, i.e. cheaper labour costs and different transportation modes in certain locations. This gives rise to a number of different locational triangles for different situations. Weber's work thus shows that an industry that needs gross localised materials will settle close to the resource sites in order to minimise transport costs.

2.2.2.2 Non-central places

Richardson (1973:172-175) criticised the theories of Lösch (see Section 2.2.1.2) and Christaller (see Section 2.2.1.1), especially in terms of the uniform plain both of them used as point of departure. Richardson argued that this uniform plain is too far removed from reality, and that the point of departure of such theories should be of a spatial structure of an economy preceding industrialization. In such an economy a number of nodes already exist, which are called *locational constants*.

Locational constants are defined as constants that, because of their immobility, impose constraints on agglomeration; and are fundamentally helpful in the promotion of understanding the dispersion process. Richardson (1973:173) described these constants as "...fixed locations that act as a focus for the agglomeration of population." Locational constants tend to establish the economy's spatial structure (Richardson, 1973: 173) and can be divided into three categories:

- An immobile natural resource, i.e. area of mineral deposits
- A long-established city
- Sites with particular advantage (heterogeneity of land, potential nodal location of site.)

Locational constants perform certain important functions within regional analysis. First, it simplifies the task of constructing a spatial development model by pre-identifying a number of key locations (this makes spatial pattern prediction possible). In the second place, it affects the number of urban centres in a region and, in turn, the agglomeration pull effect of that region. Finally, this theory explains why industries and people do not

necessarily accumulate in one major centre only, but choose isolated development patterns.

In this connection, Richardson (1973: 172-175) explained that this theory also sheds light on the production pattern of certain goods. If goods are hierarchically classified according to the size of the market area in which they are traded, a certain relationship exists. Lower goods, e.g. loaves of fresh bread, are produced locally as this restricts the scope for agglomeration, and should thus be supplied in all centres, regardless of their size. Higher order goods, e.g. vehicle manufacturing, tend to enhance the scope for agglomeration and are thus only supplied in centres of higher order and larger size.

Whether a node acts as a central or a non-central place it will have a surrounding region which supports the node and the services and goods of that node. In Section 2.3 the concept of influence sphere as an area served by a specific node or place will be discussed.

2.2.2.3 The behavioural approach

Allan Pred (1966) developed a theory explaining the behavioural approach to industrial location. As mentioned in the introduction, industrial theory per se is not relevant to this study, but the underlying principles of settlement of economic entities will be applied in this study. It is especially important to take note of this theory since it is the aim of this study to identify a number of key factors that influence the individual's choice of town, whether they be quantitative or qualitative (behavioural). Pred (1966: 5) identified the need for "a body of theory (that) would embellish existing (economic) location theory by taking into account irrational behaviour, imperfect knowledge, other psychological variables, socially dictated constraints, and the impact of existing patterns on subsequent patterns".

Pred (1966: 24) argued that every locational decision is viewed as occurring under circumstances of changing information and capacity, ranging from null to complete knowledge of all alternatives, and as being governed by the varying abilities of the decision-maker. Each individual thus has access to varying degrees of information, and each individual has a different approach to using this information, i.e. even though two people have access to the same information, their choices may vary due to their capability to utilise information.

Pred (1966) explained this notion on the basis of a behaviour matrix, as illustrated in Figure 2.3. A position in the lower right-hand corner depicts a good level of knowledge as well as a good ability to use this information in the choice of location. As knowledge and the ability to use it decrease (top left corner), the probability of making a good choice in terms of location also diminishes.

Pred used this matrix to test the relationship between proposed good locations of industries and the knowledge and ability to use this knowledge to make a choice of location. In this figure three areas are shown which are potentially good locations for industries. The optimal locations are shown as O, while the choices of location of thirteen different industries are shown as black circles. Each of the industries is connected to a point in the matrix showing the availability of knowledge and the use of that knowledge. From the figure it is apparent that choices of locations within the demarcated areas can be linked to the lower right-hand corner of the matrix (marked with a 1), while choices that fall outside the demarcated areas can be linked to the upper left corner of the matrix (marked with a 2).

Figure 2.3   Behaviour matrix and the location of industries
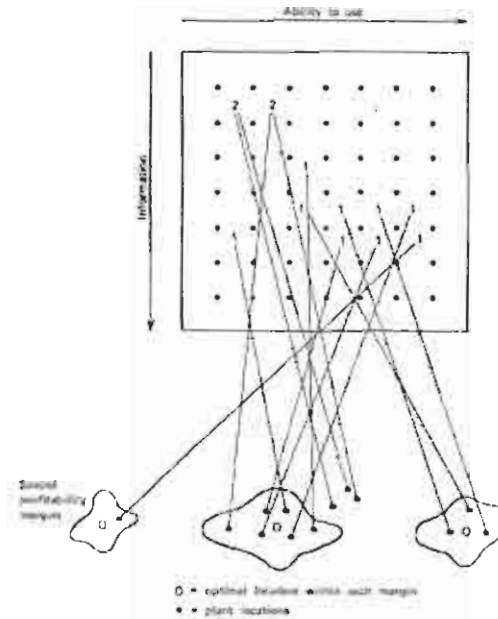
Source: Smith (1981: 119)

Pred (1966: 91) maintains that "the apparent chaotic qualities of the spatial distribution of most manufacturing production at any one date is ascribable to the fact that the real-world is populated by a broad spectrum of bounded rational, satisficing locational actors and not by undifferentiated profit maximisers". The significance of this model by Pred is, however, restricted according to Smith (1981:120) due to the fact that actual locations cannot be predicted even if numerical scales could be attached to the matrix.

This criticism should, however, be evaluated in the context of industrial location. Consequently this will not necessarily impact on the individual's choice of urban centre. The choice of settlement of the individual will also be influenced by behavioural aspects, such as the availability and application of knowledge. Individuals who are more knowledgeable about a number of aspects of an urban centre, and have the ability to use this information will be able to make a more informed choice of settlement. Behaviour thus plays an important role in settlement theory (see Section 4.4), and can be regarded as a qualitative indicator.

2.2.2.4 The substitution principle

Isard (1956(b)) built upon Weber's (see Section 2.2.2.1) theoretical statements and attempted to enhance them by placing in the context of substitution analysis. His basic idea was that location theory can be further developed by applying the substitution approach. Greenhut (1956: 4) explained it as the theory of industrial location being one segment of economic theory, resting on the principle of substitution. The degree to which employment can be replaced by capital or land and vice versa is basically the same problem as the choice of an industrial location from alternative locations; both decisions attempt to maximise the ends. Greenhut (1956: 4) was of the opinion that the goal is accomplished when the limited means are positioned among competing ends in the most favourable manner.

Isard (1956b) suggested the use of a transformation line, which depicts the line of all possible substitutions between the market and the raw material. This is represented in the following figure.

Figure 2.4   Transformation line: Two-point location
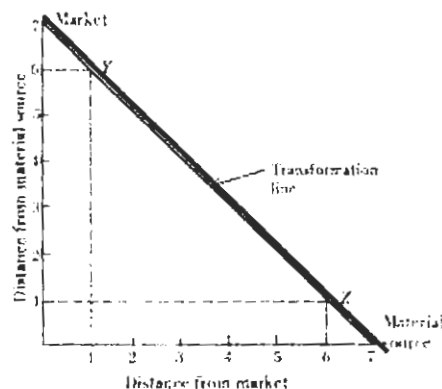
Source: Adapted from Isard (1956b: 97)

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The preceding figure only represents the case of one material being used. Isard (1956b: 98) also investigated the situation where two materials were used to supply a product to the market. Transformation lines for distance from the market and the two input materials can take a number of forms, as suggested in the following figure.

Figure 2.5   Transformation line: Three-point location
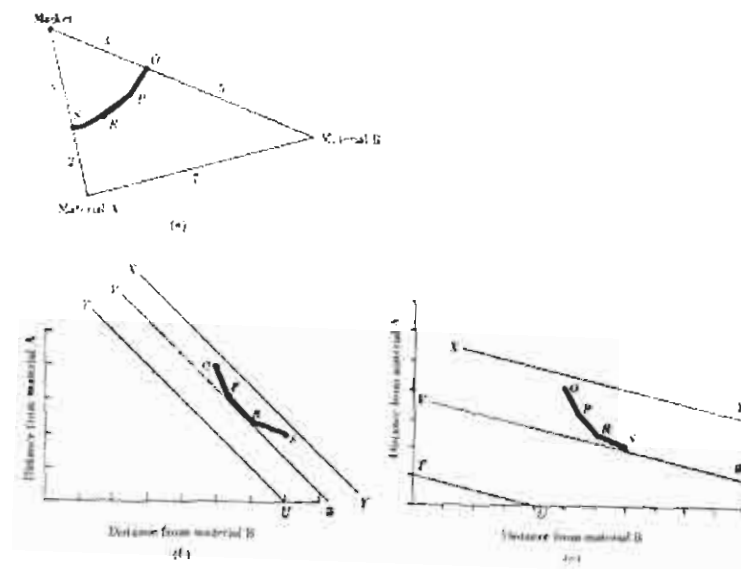
Source: Adapted from Isard (1956b: 98)

This figure covers all the possible substitution possibilities, and the overall minimum-cost point can be found by identifying the point at which total mileages are at their lowest for each of the three individual sets of transformations. The location of the industry in the foregoing figure can occur at any of the points O, P, R, or S along the arc.

This section of the chapter attempted to illustrate the main relevant contributions to location theory. A number of theorists made other contributions to location theory, especially with regard to industrial location theory. These have not been discussed since it was the purpose of this section to give merely an overview of general location theory. This section will be followed by a discussion on the appearance of urban fields, how they are delineated and the relationship between an urban centre and the surrounding region.

2.3   Urban centres and the surrounding region

As pointed out in the previous section an urban centre exerts influence on its surrounding region (see Sections 2.2.1.1, 2.2.1.2, and 2.2.2.2). This sphere of influence was noted by a number of the settlement theorists as the market area, service area, umland, tributary area, hinterland, city region or the catchment area. Every town owes its existence to the surrounding area or urban field, which supplies the centre with a work force and buying power.

This complementary relationship between a town and its surrounding region was first noted by Jefferson (1931) who stated that "cities do not grow of themselves. Countrysides set them up to do tasks that must be performed in central places". Jefferson (1931) made this comment two years before Christaller`s central place theory (see Section 2.2.1.1) was first recorded.

The following section will attempt to explain the concept of urban fields and the influence these have on the existence of urban centres. This section is important to this study and later an attempt will be made to explain what factors and characteristics draw potential consumers to a specific urban centre.

2.3.1 Central place

Perroux`s (1950) contribution to unbalanced growth development theory was the first of a French dominated field of research. Perroux`s theory stated that growth occurs in certain places and gravitates from that point outwards. Perroux (1950: 98) explained that "...growth does not appear everywhere and all at once; it appears in points or development poles, with variable intensities; it spreads along diverse channels and with varying terminal effects to the whole of the economy." In support of the theory of Perroux (1950), Boudeville (1966: 112) described this regional growth pole as a number of growing industries situated in an urban area and kindling further development of economic activity throughout its sphere of influence.

Perroux (1950) described the economic space "...as a *field of forces*, economic space consists of centres from which centrifugal forces emanate and to which centripetal forces are attracted." In Perroux`s theory, distinction is made between *leading industries, polarisation* and *spread effects. Leading industries* refers to propulsive firms which dominate other economic units. *Polarisation* is seen as the process of rapid growth of these leading industries which, in turn, leads to the polarisation of other economic units. Perroux also introduced the concept of *spread effects* which states that in time the dynamic propulsive qualities of the growth pole will radiate outwards to the surrounding spaces.

Growth pole theory has been used successfully in a number of growth policies and strategies (Glasson, 1978:180) and serves as policy tool to not only generate development but also to guide investment to growth points where returns will presumably be larger. The spread effects caused by this investment also help in solving problems within depressed regions. Lastly, Boudeville (1966) expanded on the original, economically orientated theory of Perroux to include more comprehensively the geographical dimension of the theory; he, in turn, referred to growth poles as *growth centres* or *growth points,* implying spatial location.

2.3.2 Core-periphery model

Friedmann (1966:20-39) developed the core-periphery model in an attempt to explain the economic growth process in spatial terms. In this model he identified four phases through which an economy passes to reach industrial maturity.

The first phase is that of a pre-industrial economy in which no hierarchy of towns exists. In this phase all centres are independent. In phase two, or the transitional phase, a single strong centre exists to which the migration of skilled workers occurs. A stagnant periphery with little or no development exists (see Figure 2.7).

In the industrial development phase the single national centre prevails, but is supported by a strong peripheral subcentre. The periphery is thus reduced to more manageable intermetropolitan peripheries. In the last phase of development, that of industrial maturity, a functionally interdependent system of cities exists. This phase is characterized by "organized complexity", in which national integration takes place and maximum growth potential is reached.

In the course of time the polarisation process initiates a pattern of core and periphery, the core dominating over the periphery. This process of domination mainly occurs in six ways (Friedmann, 1966):

- Dominance effect – This implies that the transfer of resources from the periphery to the core weakens the periphery.
- Information effect – Innovation tends to start where a large number of people and functions concentrate together, thus strengthening the core even further.
- Psychological effect – The information effect creates even more favourable conditions in the core for further innovation.
- Modernisation effect – Change needs to be adjusted to, therefore social values, attitudes and behaviours will change.
- Linkage effect – Innovation serves as a breeding ground for further innovation.
- Production effects – Greater growth in the core is stimulated by agglomeration and economies of scale.

This study will attempt to utilise the level of interaction between a town and its urban field to assign values of spatial importance to each urban region.

Figure 2.7   Core-periphery model: Phases of development

Pre-industrial pattern

Transitional phase

Industrial development phase

Industrial maturity

	Periphery		Primary centre
_____	Communication axis	O	Secondary centre
———	Functional interaction	•	Tertiary centre
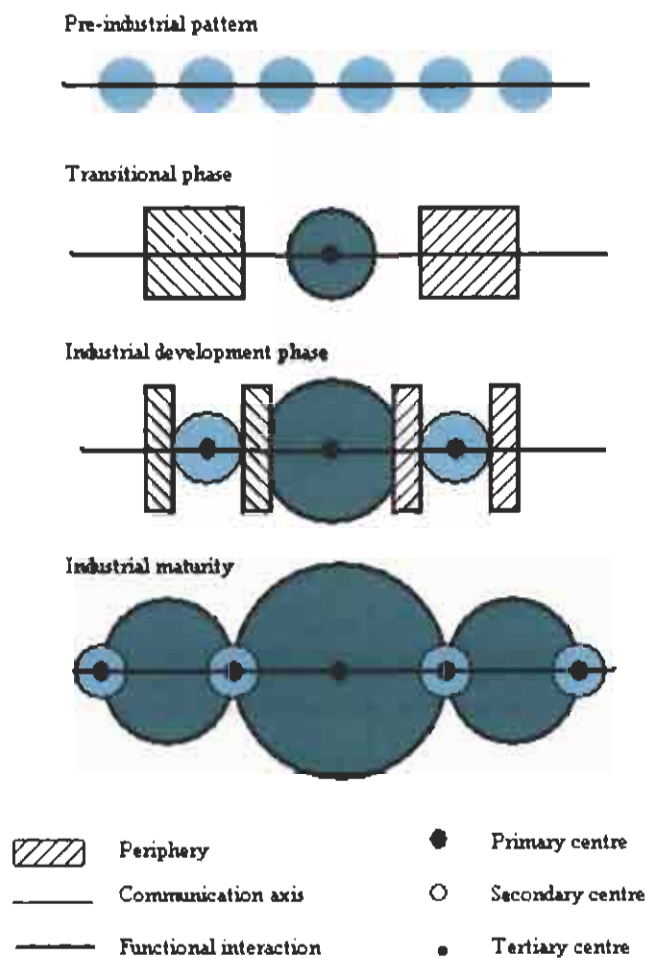
Source: Drewes (1993:35)

Based on the core-periphery model, Richardson (1973) promoted his own development theory after taking Richardson's and other theories into account. His motivation for this step was: "Too many economists borrowing heavily from international trade theory, macro-economics and neo-classical resource allocation models have ignored the importance of intra-regional spatial differentiation". He then summarises his development theory as follows, "The characteristics of the model are easily summarised. The growth rate in regional income depends upon: agglomeration economics; location preferences; the size and spatial distribution of the capital stock; the rate of natural increase; the

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relative rates of return to capital and labour; and measures of the region's capacity to absorb innovations first introduced elsewhere and the strength of the region's channel of communication with the outside world" (Richardson, 1973:85).

2.3.3 Urban fields

Within towns a number of establishments, offering diverse goods and services, occur; each supplying to a *market area*. Synonyms often used for market area are the *service* or *trade area*, *hinterland* or *complementary region* of the centre. Similarly, the maximum distance which consumers are willing to travel to the centre is often called the *economic reach* or the *range* of the establishment (Berry, 1967:15). This concept relates to that of *urban field*, which describes a sphere around a central or non-central place which is serviced by that node.

Richardson (1969:67-69) was one of a number of authors to have made significant contributions to the study to influence spheres. He acknowledged that within the national space one finds agglomerations of economic activity at particular locations, and accordingly agglomerations of people. These locations act as dominant centres in the national space, and as the nodal points within a specific region. Each centre thus has economic significance within the region. Such regions are known as polarised regions. They are composed of heterogeneous centres which are functionally interrelated. Richardson (1969: 69) suggested that these functional interconnections are revealed in flow phenomena, and that these flows do not occur at even rates over space. The heaviest flows tend to polarise towards and from the dominant node. Around each node there will thus be a *zone of influence* or *spatial field* in which interaction takes places. Distance plays a role in the force of this spatial field, as movement further away from the node weakens the force. These flows vary directly with the size of the node and inversely with distance (Richardson, 1969:67-69).

Expansion of economic activity at a growth centre or growth pole will lead to the concentration of employment multipliers and other spread effects within the target urban itself and its trading hinterland, or *zone of influence*. This view corresponds with Perroux's (1950) early growth-pole theory (see Section 2.3.2) writings, which were structured in terms of an abstract *economic space*, or *field of forces*.

2.3.4 Relationship between a town and its urban field

From the discussions in this section it is evident that every town has a certain relationship with its urban field or influence sphere. Dickinson (1964: 91) attempted to divide the relationships between an urban centre and its urban field into four categories:

1. Trade relations, which include different trading activities incorporating retail and wholesale. It is important to note that shops carrying everyday articles such as newspapers, sweets and tobacco have their own smaller urban fields. Specialised shops, such as furniture stores or jewellery shops have a much wider influence area.

2. Social relations, including entertainment and cultural activities.

3. Commuting relations, taking into account settlements around a town or dormitory towns through which people pass on their way to and from work. This area could also include small recreational resorts which local people visit.

4. Agricultural relations refer to agricultural activities such as dairy farming and other small-scale farming activities within the range of the city.

Apart from the classification by Dickinson, Hudson (1976: 312) also mentioned another relationship between a town and its urban field. This is called the industrial relations and refers to factories concerned with processing raw materials produced within the urban field e.g. meat-packing plants, dairies and steel works. This relationship closely relates to the *agricultural relations* as mentioned by Dickinson.

From the above it is apparent that a town will interact with its urban field in a number of ways, depending on the service or function concerned. A town does not exist to provide only for those within its boundaries, but also for those in the surrounding regions. In the following section the delineation of a town's urban field will be discussed.

2.3.5 The size and shape of urban fields

It was mentioned in Section 2.2.1.1 that the main function of central places, as described by Christaller, is to provide services for people living in the surrounding area. It is thus correct to remark that the larger the central place, the more functions and services it will provide to the surrounding area, and thus the larger its urban field will be. The urban fields thus vary directly with the size of the node and inversely with distance (Richardson, 1969:67-69). The size of an urban field is subsequently directly proportional to the number of services the urban centre provides.

Figure 2.8   Spheres of influence in theory
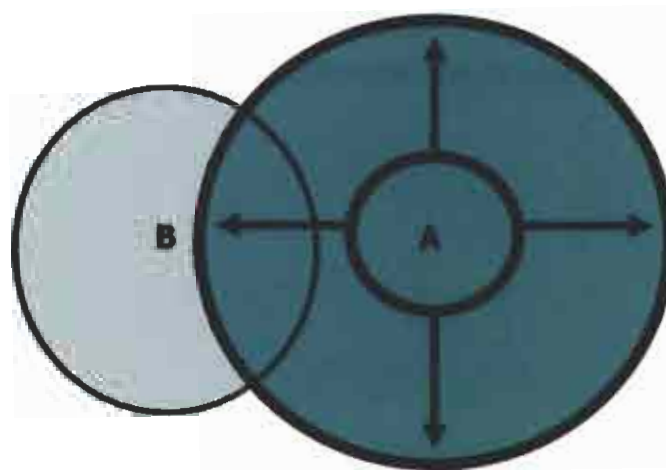
Source: Own deduction

According to Hilhorst (1971:55), Smailes (1966: 147), and Christaller (1966: 66) the boundaries of a town's influence sphere tend to change in the course of time. This phenomenon could be attributed to reasons such as place A being better equipped for

competing at its periphery, resulting in the periphery of place A expanding, whereas that of a similar place B is shrinking. This change in sphere size could also be attributed to new resource development within place A's sphere resulting in an increased sphere for place A. Lastly, an influence sphere around place A could also increase in size as a result of technological change e.g. a new transport route near place A (see Section 3.3.1.2). Hilhorst (1971) also pointed out that these spheres of influence are hazy and do not represent a definite boundary. Furthermore, a single place can have more than one sphere of influence e.g. social influence, economic influence or administrative influence. According to the indexes utilised, the borders of a town's different fields will not coincide, but will in most cases correspond closely to allow for a generalised urban field (Smailes, 1966: 138).

The areas served by urban centres vary greatly in accordance with the particular service or function (see Section 3.3.3), so that the influence of a town on an area has a gradient character (Smailes, 1966: 138). This implies that an urban centre will have the strongest influence on areas closest to it and that the strength of an urban field will reduce as one moves further away. The following figure illustrates the influence spheres of Aliwal-North and Burgersdorp (South Africa) based on two different delineation methods.

Figure 2.9   Spheres of influence in practice
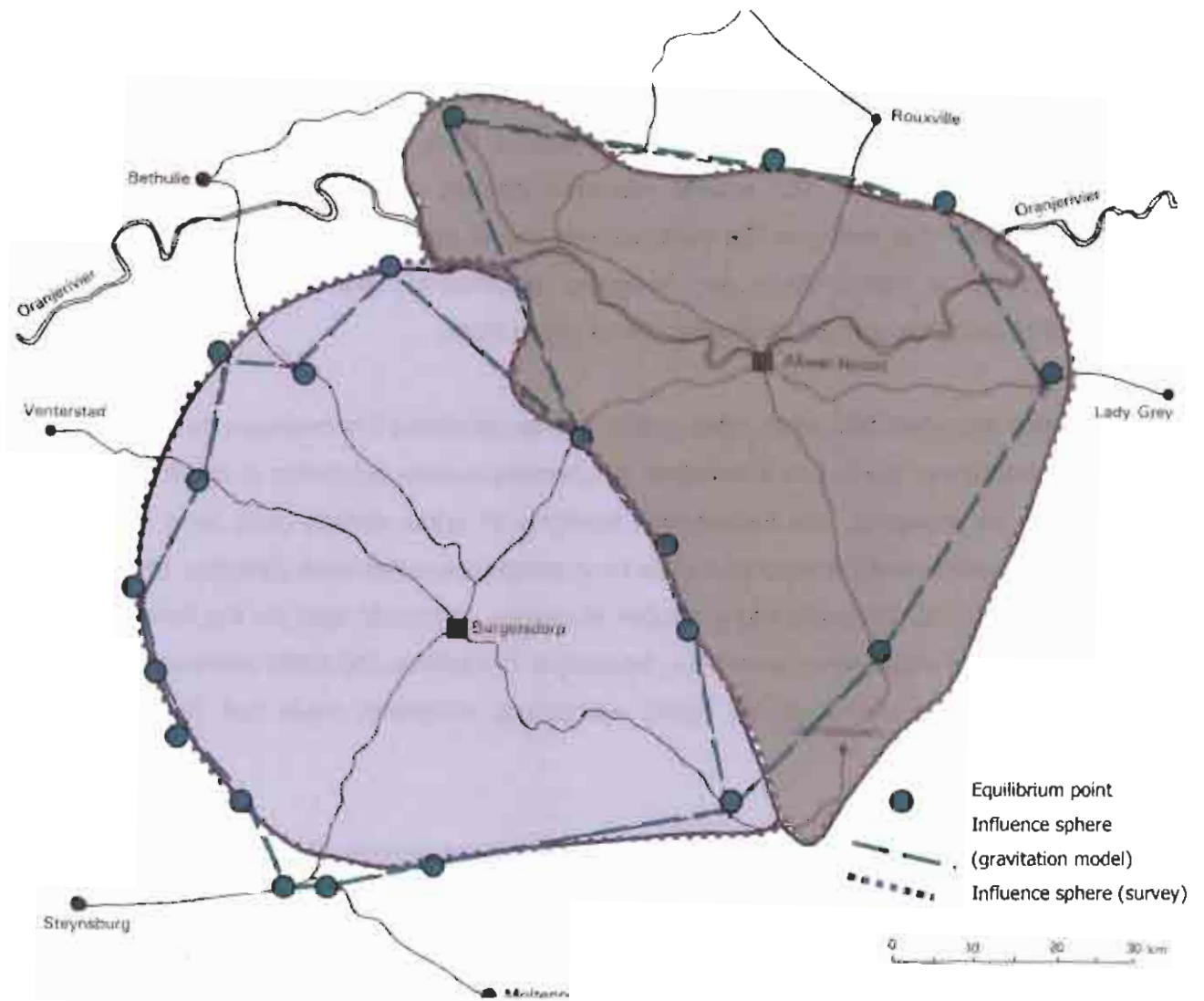
Source: Van der Merwe (1983: 99)

It is apparent from the preceding information on the nature of urban fields that their limits are rarely clear-cut lines. The relationship between a town and its urban field is essentially fluid, with margins that are zones, rather than lines, which tend to fluctuate (Smailes, 1966: 146).

2.3.6 Delimitation of urban fields

Based on the previous sections it has been established that a town provides services to its surrounding region. The question now arises how urban fields are delineated. Urban fields cannot be delineated as definite lines (Smailes, 1966:146), and the relations between a town and its surrounding region are essentially fluid. Urban fields do not in reality separate a country into equally restricted parcels. Hudson (1976: 312) correctly commented that owing to the more general use of private vehicles, the movements of people in a central town are becoming progressively more multidirectional, thus complicating the process of demarcation of urban fields.

Before the urban field of an urban centre can be calculated it is necessary to decide upon the indexes to use in this delineation. In choosing indexes according to which the urban fields are measures, the fundamental functions of urban centres must be a governing consideration, and the indexes chosen must imitate these functions (Smailes, 1966: 131). Hudson (1976: 312) refers to a number of indexes commonly used for the delineation of the fields of urban areas, namely (a) newspaper circulations, (b) public transport, (c) retail and wholesale deliveries, (d) higher educational catchment areas and (e) commuter range.

The urban fields for towns will thus differ in accordance with the method of delineation, as well as with the different services and functions provided. It is usually the case (Smailes, 1966: 138) that the service areas for an assortment of functions match sufficiently to allow broad identification of general urban fields. The general field closely corresponds with the position of the urban hierarchy of towns (see Section 2.5).

Accordingly, the urban field will play a role in the hierarchical order of a town. The following section will focus on the hierarchy of towns. The process of urban hierarchy closely corresponds with the aim of this study to develop an index by means of which the vitality of towns can be measured, both quantitatively and qualitatively.

2.4   Urban systems

The previous two sections focussed on the town or urban centre (see Section 2.2) and also on the region surrounding the urban centre (see Section 2.3). Consequently, it is necessary to investigate the town and region within a broader context, that of the national space. According to Bourne (1975: 11) "the cities and urban regions of a modern industrial economy constitute a set of interrelated subsystems nesting in a complex hierarchy of increasing scale upward from individual urban areas to a national urban system". Accordingly, the national spatial system of any country consists of a number of subsystems on different levels, which are linked with each other. This section will present a short discussion on the levels of urban systems as well as the corridors of development that exist between the urban subsystems.

2.4.1 Levels of urban systems

According to Bourne (1975: 12) the national geographic space can be divided into three levels. First, there is the *national spatial system* which is dominated by one or more metropolitan centres, and which is characterised by a hierarchy of urban centres (see Section 2.5). The larger centres occur less frequently whereas a larger number of the smaller centres occur within the national space (see Section 2.2.1.1). The second level is that of the *regional level of subsystems* (Bourne, 1975: 12), which refers to cities displaying a similar hierarchical arrangement which is less rigid than that of the national hierarchy. The regional subsystem is mostly concentrated around a single metropolitan centre, with relatively smaller cities than in the national system, and which drop off more quickly than in the national system. The final level of urban system includes the *daily urban system* (Bourne, 1975: 12), which is contained within the regional subsystems. The daily urban system represents the living space of urban residents which develops as the influence of each centre which it reaches, absorbs and reorganises the adjacent territory (see Section 2.3).

The following figure depicts a schematic, generalised description of the three levels of systems that exist within the national space.

Figure 2.10   Hierarchical and spatial levels of the urban system
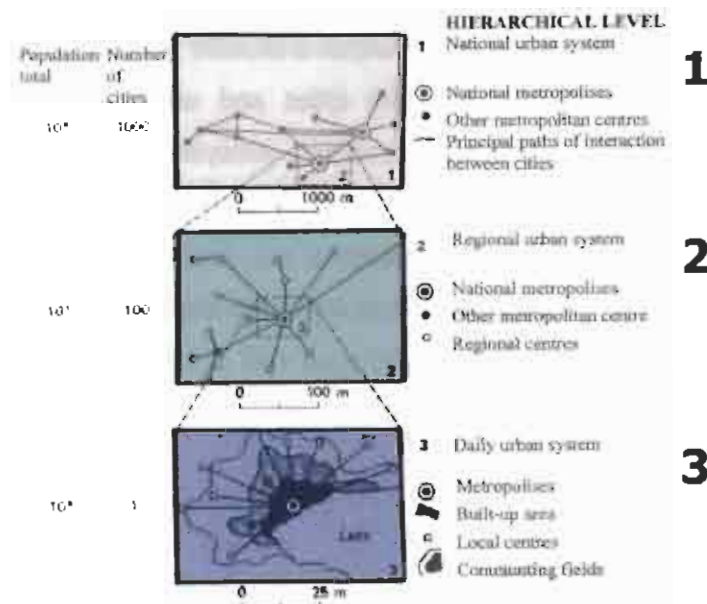
Source: Adapted from Bourne (1975: 13)

The essence of the urban system network can be explained as the relations and paths of interconnection that form the foundation of modern civilisation. The levels of relations will differ in scale and composition at different levels of urban hierarchy. According to Berry and Horton (1970: 56), at national level the relations may primarily involve economic linkages, exchanges of ideas and information. At regional level, on the other hand, social service connections, road traffic, telephone calls or regional hospital administration may dominate. In each case the linkages may be either one-sided or mutual, as well as direct or indirect.

From this section it is apparent that urban centres and their surrounding influence spheres do not exist in isolation, but are interconnected with other urban centres and their urban fields. This interconnection leads to the development of an urban system network of sub-systems. The urban systems and the position of the urban centres in the urban system could be utilised in measuring a town's regional importance on a spatial level.

2.4.2 Development corridors

As indicated in the previous section a number of urban system networks exist within the national spatial system. These different levels of system networks are connected with corridors of development, as will be discussed in this section.

Development corridors were defined by Friedmann (1966: xv) as a "type of upward-transitional area connecting two or more core regions". According to this definition of Friedmann, development axes can be described as a type of region referring to the upward-transitional area that links two core regions. This could be interpreted as an entity in its own right, and not as part of the urban centre. The development axes thus form part of the urban subsystems (see Section 2.4.1) as a whole, due to their ability to be classified as a type of region. It is important to keep in mind that the development axes cannot be separated from the urban centres (Geyer, 1986:6) and should be seen as a functional unit together with the urban centres. This interdependence between development centres is also described by Richardson (1987: 217) who stresses that two individual growth centres will have reinforced viability when linked with a development axis, or when located at the end point of such an axis.

Geyer (1986: 120) concluded that a development corridor must have the following traits to be considered a development corridor:

- It must at least have a primary growth centre at both ends with a communication axis linking the two centres.

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- The growth centres on the corridor must be mutually dependent in order to maintain communication on the axis.

- Interaction on the axis must generate potential for additional development.

- The corridor must be expanding both economically and physically.

The development corridor can thus be regarded as a region of development and growth between two growth poles (see Section 2.3.1), each of which should be linked with a communication axis and both should be dependent on each other. The interaction that takes place along the corridor will, in turn, lead to potential growth and development along the axis, which will lead to its physical and economic growth. This development axis forms part of the regional subsystem (see Section 2.4.1), and also of the economic viability of a region. The development axis is of specific significance to this study as it is used to determine the role of certain centres and their position on the development axis within a region. Urban centres that form part of the development corridor will play a larger role within the economy of the region, due to their importance within the regional subsystems, and will thus be regarded as more viable centres for future development.

This section focussed on aspects of the urban system as well as the development corridor that form part of the regional subsystem. Both of these could ultimately assist in measuring the spatial importance of an urban centre. The following section will discuss the concept of urban hierarchy and how this is determined within a region or country.

2.5   Urban hierarchy

Urban hierarchy implies the link of city systems in successive increasing orders of classes on the basis of criteria like centrality, functions or population (Van der Merwe, 1983: 83). Such a hierarchy is thus a form of city classification. The hierarchy of a town refers to its relative position or importance within towns in a particular region. The hierarchy of a town can thus be linked to its urban field, whereas the size of the urban field of a town will be

directly proportional to its hierarchical order. The larger a town's zone of influence, the higher it will be ranked among other towns in the region.

The hierarchical class system implication is an integral part of the spatial model of central places, developed by Christaller (Berry & Garrison, 1958:146). According to the model (see Section 2.2.1.1) central places fit into one or another class of subsets. Each class possesses specific groups of central functions and is characterised by a discrete population level of its centres. Christaller's (1966) model further indicates that the higher the order of central functions the fewer the number of centres providing them and the farther consumers are willing to travel to obtain them.

The following section presents a discussion on urban hierarchy. This method of classification can be regarded as a quantitative measure of an urban system.

2.5.1 Delineation of urban hierarchies

The determination of urban hierarchies, generally limited to between three and six classes (Hudson, 1976: 123), has been based on a varied list of criteria, depending on the size of the urban field served (see Section 2.3.2). Christaller (1966) made use of an index of number of telephones per 1 000 residents in the central places of Germany. In this study Christaller identified market hamlets, small township centres, county seats, district cities, small state capitals, provincial capitals and regional capitals (see Section 2.2.1.1).

In his turn Dickinson (1964:105) distinguished between four different hierarchical levels of urban centres in France, including the *market town* with fewer than 2 000 people; the *local centre* with an average 5000 people; the *chief-lieu of a department* with 30 000 - 50 000 people, and finally the *regional capital*. In addition a number of theorists made use of diverse criteria to establish a hierarchy of urban centres. This includes the number of bus services, telephone directories, or the general institutions and functions of a city. In most cases the different indexes used had roughly the same results (Hudson, 1976: 123).

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Zipf (1949) made use of the rank-size rule to explain his theory of urban hierarchy. This model by Zipf is an excessively rigid (Hudson, 1976:126) arbitrary classification of cities based on their local or regional significance. He suggests that, broadly speaking, there is a tendency for the populations of cities to descend recurrently and gradually according to their ranking number, thus the second largest city should have half the inhabitants of the largest, the twentieth should have one-twentieth of the largest, the fiftieth one-fiftieth of the largest, and so on (Hudson, 1976: 126). If the population size of every urban centre is plotted against rank, the relationship appears as a downward-sloping line (Dicken & Lloyd, 1990: 43). This is illustrated in the following figure, which shows a comparison between the observations made in USA and Canadian cities as measured in the early 1980's (Dicken & Lloyd, 1990: 44).

Figure 2.11   Rank-size relationships
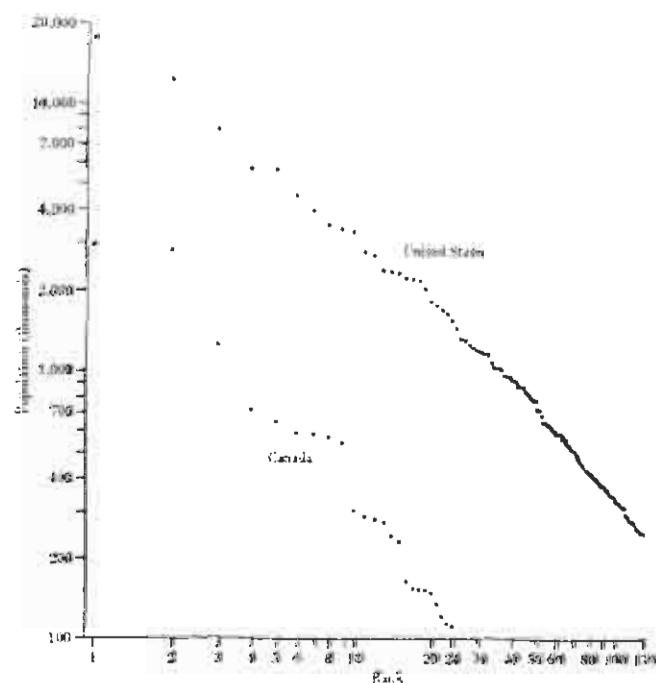
Source: Dicken and Lloyd (1990: 44)

Studies of hierarchy in South Africa have been carried out by Davies and Cook (1967; 1968). They made use of 55 central place functions for 601 urban centres to measure the urban hierarchy in South Africa, and identified eight hierarchical levels (Davies, 1967: 13) based on their findings. They are:

1. Primate metropolitan areas
2. Large metropolitan areas
3. Metropolitan areas
4. Large towns
5. Towns
6. Small towns
7. Local service centres
8. Lowest order service centres.

A number of other studies were also carried out to determine the hierarchy of towns in South Africa. The National Physical Development Plan (SA, 1975) analysed the towns in South Africa's *central place status* – the latter term referring to the concept that towns are functionally compared in terms of their areas of influence, its population size, service levels, distances between towns, and various other criteria (see Section 2.2.1). All towns and cities do not develop at the same rate; therefore different areas contain cities and towns of different sizes in terms of population, city size and centre size. Urban settlements can be classified into different functional types, according to the number and types of services provided by each.

The characteristics of the central functions of a settlement determine position of that settlement within the hierarchy of settlements. The characteristics of a settlement include the number and type of different functions in the specific settlement. In one of the earliest contributions to marketing science, Reilly (1931) developed the *laws of retail gravitation* according to which market area patterns can be summarised. Reilly used the so-called *breaking-point* equation, in accordance with the market area boundary between two centres, A and B, is equal to:

$$= \quad 1 + \sqrt{\frac{\text{Distance between A and B}}{\frac{\text{size of A}}{\text{size of B}}}}$$

In most applications Reilly used population as an index of size, but the number of central place functions can also be employed since it is a fundamental measure of the attractiveness of a centre (Berry, 1967: 40).

Based on the central-place study it is possible to derive a hierarchy of all the towns in the study area which will be utilised in this specific study. Urban settlements of a higher order normally offer a larger variety of functions and services to a larger area of influence. According to Richardson (1969:67-69) urban fields vary directly with the size of the node and inversely with distance (see Section 2.3).

The process of determining the urban hierarchy of a centre includes categorising the different types of functions (see Section 3.3.3), i.e. government, education, service functions, retail, specialised, professional, financial, transport, and industries. The next step entails a physical count of all the functions that belong under each of the above-mentioned categories. The basic methodology is set out in Box 2.1.

Box 2.1   Central Place Index Methodology

The total for each category of the study area as a whole is calculated. The largest total is assigned a value of "1" while the values for the other categories are calculated by means of the following formula:

Function value =Largest Σ / Σ of each different category

The next step entails the calculation of weighted values for each category in each town by means of the following formula:

*Weighted value = Weight of function * Σ of function*

Accordingly the towns can now be placed in a hierarchy with the aid of the following formula:

*Town hierarchy = (Weighted value of town / largest weighted value) *100*

The largest town (central place) will have a value of 100, while the remaining towns are represented as percentages of the central place.

A **following phase** in determining the hierarchy of towns is the delineation of spheres of influence. Using the gravitational model of Huff these spheres of influence can be delineated.

$$Cut\text{-}off\ point\ from\ A\ (km) = \frac{Distance\ from\ A\ to\ B}{1 + \sqrt{\dfrac{Population\ B}{Population\ A}}}$$

Source: Derived from Bracey (1953)

The result of the foregoing indicates the distance which people from place A are willing to travel to satisfy their needs. Settlements with a higher order as calculated in the central-place study will have a larger sphere of influence; residents will thus be willing to travel further to a place of this order.

Figure 2.12   Graphic representation of hierarchy in South Africa
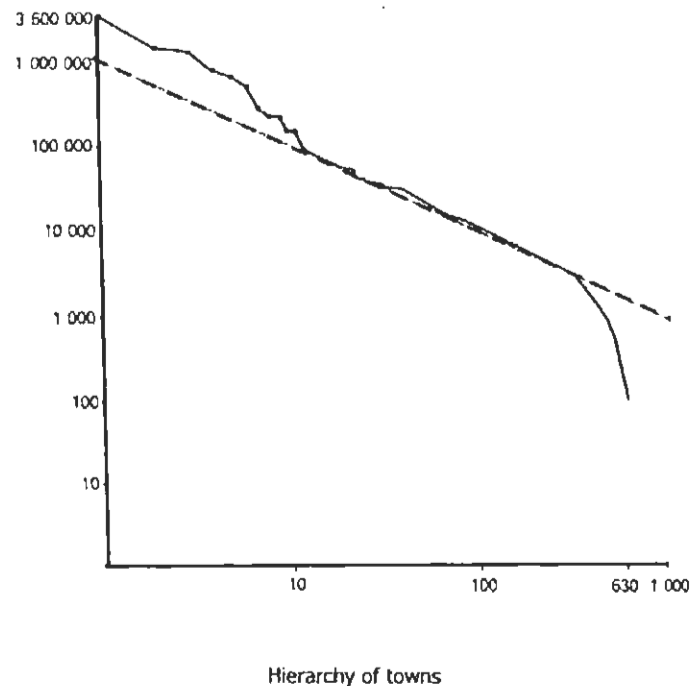
Hierarchy of towns

Source: Van der Merwe (1983: 92)

This section on the hierarchy of urban centres has shown a number of different quantitative measures that exist for determining the spatial importance of a town in relation to its surrounding area. One of these hierarchical measures could be utilised in determining the spatial importance of an urban centre.

2.6   Conclusion

This chapter attempted to provide a broad background to the spatial occurrence of urban centres in the space economy. In the first place attention was given to a number of settlement theories (see Section 2.1) in order to offer a perspective on why urban centres are situated at a particular location. The locational theories were explained in two categories, namely those theorists who made use of a number of simplifying assumptions, and those who attempted to provide theories of real-world situations. Consequently the

central-place theories of Christaller (1966) and Lösch (1954) were discussed, both providing for a system of hexagonal service areas, and also referring to urban hierarchy.

In the discussion on heterogeneous surfaces (see Section 2.2) reference was made to Weber (1929) and his theory of least effort which implies that an industry, and by implication an individual, will locate at the point where least effort (including distance and mass) is required. This section also called attention contributions made by Richardson (1973) on non-central places, and by Isard (1956) on the location theory with his substitution principle.

The second part of the chapter was dedicated to exploring the concept of urban fields (see Section 2.3); what they entail, their size and shape and the delineation of the influence sphere of a town. From this section it was clear that the urban field of a town has a direct bearing on the number of functions and services of the town. The urban field will also influence the hierarchical order of a town, which led to the discussion on urban hierarchy in the final section of this chapter.

The following section (see Section 2.4) was dedicated to the development of urban systems which occur on national, regional and local level. It became apparent that every urban centre forms part of a larger urban system of cities. Urban centres are thus all interlinked. Urban centres of significant position and growth can also form part of a development axis, which constitutes a link of development between two growth poles. Centres on development axes show possibility for future growth and development, and carry greater significance within the region.

It was shown that the urban hierarchy (see Section 2.5) of a town can be determined by means of various different methods, of which Zipf`s (1949) contribution with the rank-size rule was discussed. Of the various methodologies to determine the hierarchy of urban centres, the methodologies used in South Africa were mentioned in some detail. This methodology determines the town with the largest number of a certain function, all other towns in the region or country are measured against this particular town. This gives rise

to the delineation of the influence sphere of the town, and consequently reflects the importance or Central Place Index of the town.

This chapter intended to provide a background to the spatial occurrence and introduced a number of quantitative measures used to determine the spatial importance of a town. These spatial measures will be taken into account when a composite index of performance and spatial importance is to be proposed. The next chapter will attempt to present a detailed investigation into a number of urban indicators of urban importance, which will ultimately assist in the compilation of an index of indicators to incorporate into the measurement of urban centres.

CHAPTER THREE

URBAN INDICATORS: A REVIEW

3.1　Introduction

The aim of the previous chapter was to provide broad background information on the origin of and reasons for the settlement of urban centres, concentrating mainly on the central place settlement system. In Chapter Two it was noted that urban centres exist mainly to provide a service to a surrounding region or market-place. This chapter also presented a brief description of the delimitation of the hierarchy of urban centres.

Further to this background, it is the purpose of Chapter Three to give an overview of the classification of urban centres. "To the practical man of affairs a region is simply an area with certain characteristics, in virtue of which is a suitable unit for some particular purpose of business or administration. To the scientist, and above all to the geographer, a region is an area which is homogeneous in respect of some particular set of associated conditions, whether of the land or of the people, such as industry, farming, the distribution of population, commerce, or the general sphere of influence of a city" (Dickinson, 1964: 3). He further maintained that geographers classify regions according to a set of particular conditions, namely industry, population distribution, commerce, and sphere of influence. It follows that urban centres can also be distinguished between and classified according to a number of indicators, including physical, economic, functional and social indicators. This chapter will attempt to discuss a number of urban indicators according to which urban centres are classified into broad categories. The classification of urban centres within a region will ultimately contribute towards measuring the spatial performance of an urban centre. This will be part of a combined index of growth and performance of urban centres.

This chapter will be presented according to urban indicators which are generally used for research purposes. Consequently, the chapter will provide a concise background to settlement analysis, and will also focus on the aims of settlement analysis. This will be followed by a discussion on the first indicator, i.e. physical indicators, employed in the classification of towns. The second indicator has a bearing on the classification of cities on the basis of the economic context. The third indicator of urban centres is based on the services delivered by the specific town. The last means of classification relates to the social context of a town and its interaction with the surrounding region.

3.2   Settlement analysis

In order to analyse a region, or settlement within a region, it is important that the measurement be taken according to a specific uniform criterion. Dickinson (1964: 6) referred to criteria that include "the intensity of economic intercourse, as reflected by the interchange of goods between one district and another, banking and credit relations, communications and accessibility; as well as common cultural elements – religious ties, traditions, the influence, past and present, of a dominant city, similarities of habits, standards, knowledge and skills." It is thus possible that a settlement can be analysed by using a combination of criteria, i.e. by compiling a comprehensive index, or a single criterion, i.e. population growth.

The question now arises as to which methodology of settlement analysis and comparison of urban centres should be used. Rondinelli (1985: 36) mentioned ten different stages in spatial analysis of which the following three are of particular relevance to the analysis of urban centres:

- An overall regional resources analysis and socio-economic and demographic profile that serve as a baseline study for monitoring and evaluation.

- An analysis of the existing system of settlements, describing its elements, the hierarchy of central places, and the distribution of and patterns of association among functions within regions.

- Description and analysis of the major socio-economic, organisational and physical linkages among centres located in other regions of the country.

In the stages as identified by Rondinelli (1985) the socio-economic and demographic indicators are particularly relevant. These are followed by the hierarchy within the broader region and the spatial location of the specific centre. In conclusion Rondinelli (1985) mentioned the organisational and physical linkages among centres.

The preceding section has described the stages of spatial analysis. The following discussion in this section will focus on the methods of settlement analysis. Rondinelli (1985: 99) noted that the following three methods are generally used by geographers and planners to analyse settlement systems:

- Morphological classifications that attempt to distinguish urban and rural communities on the basis of demographic and physical characteristics.

- Population size classifications that seek to categorise settlements into metropolitan areas, cities, towns, villages and hamlets based on the number and density of residents within their boundaries.

- Functional classifications that attempt to distinguish between settlements on the basis of the types, combinations and diversity of social and economic activities located in them.

This closely correlates with the stages in spatial analysis as identified by Rondinelli (1985), as both include the demographic and physical characteristics, as well as the services rendered or functions delivered by the specific urban area. The stages of spatial analysis described in the previous section, attempts to give only a broad overview of the region as a whole, while the methods described above refer to the detailed classification of urban centres.

Bracey (1953: 96) expressed the opinion that the problem of settlement analysis may be approached from two angles. In the first place, a town could be measured on the basis of the number of shops, services and professions (see Section 2.5.1), i.e. a town's functions. Secondly, towns should be characterised in terms of the main services they provide, primarily the specialised services the town offers. Bracey thus recommends that a town should be measured according to the number of services / functions it provides to its residents and those of the surrounding region, or should be classified according to the specialised services the specific town is able to render.

It is also possible to categorise cities according to a number of city types. In this connection, Siddall (1961: 124) stated that the three main types of cities which have been recognised by urban geographers are the specialised city, the transportation city and the central place city. He described the specialised city as "one in which various specialised activities are performed. It does not necessarily have any close relations with its immediately surrounding territory but rather draws its support from a larger area." Siddall (1961: 124) further describes the transportation city as a city of which the primary purpose is to serve as a break-bulk point where freight is transferred between ocean-going and river barges. The last type of city refers to the central place city (see Section 2.2.1.1), which may be regarded as a city which exists to serve its urban field as a collecting and distributing centre. The primary city also acts as a cultural, social, and administrative centre. It is closely related to the urban field and is the sole reason for the existence of the urban centre (see Section 2.3). Once again it is clear that these

cities are measured in terms of the function they provide to the immediate population as well as to the broader region.

Urban centres can also be described in accordance with the nature of their functions. "Cities differ in many ways. The literature is replete with efforts to reduce the complexity of the differences by classifying urban centres into relatively uniform types, in the belief that a typology aids in sampling and in generalisation and prediction from sample evidence. Best known and most frequently used are the so-called functional classifications, developed from data on the economic specialities of cities." (Berry, 1972: 11) The question now arises what classification will be suitable to express the importance of an urban centre. Dickinson (1964: 21) pointed out that three aspects describe the nature of a city. The first is that the city has distinguishing functions; in the second place it has typical forms or physical structures, and finally it has characteristic models of spatial arrangement and organisation.

The first distinctive aspect refers to the distinguishing function of an urban centre. The three main functions of a city have been established as cultural, administrative, and economic functions. Dickinson (1964: 21) stressed the fact that it is a severe gross to regard the economic function as an exclusive criterion of the make-up of a city. He pointed out that the administrative function refers to the activities that are located in a town in order to govern the area around it. The last main function of a city is commerce which entails regular retail and trade.

The second distinctive aspect of the urban centre is that its functions are reflected in its distinctive building forms, which comprise the individual buildings and the way in which they are grouped together. The grouping of centralised services occurs in a cluster to form the essence of the town and the core of its existence. The third and last aspect of the city that receives special emphasis is its organisation (Dickinson, 1964: 23). The organisation of a city refers to the fact that every agglomeration of establishments and

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people needs some level of spatial organisation. This organisation should take place in the town as a whole and in its various establishments. Dickinson (1964: 23) states that "municipal organisation, zoning legislation, and the city and regional planning... are the major kinds of spatial organisation of the city."

Thus, measurement can be taken with a range of indicators (Dickinson, 1964; Rondinelli, 1985; Siddall, 1961; Bracey, 1953). These indicators can, in turn, be grouped to include socio-economic, physical, functional and morphological criteria. The classification of these criteria is discussed in the following section, which will attempt to identify a number of general criteria by means of which the performance and thus importance of an urban centre in the region is measured.

3.3   Classification of urban indicators

The preceding sections focussed on the vast number of indicators that exist to describe the arrangement of urban centres in a region. It was pointed out that the study of the classification of cities is one of great importance and that is given much attention. It is not the aim of this study to analyse the different aspects and methods of city classification, but rather to provide a broad understanding of the various measures that do exist. Consequently, a number of indicators will be highlighted in the following sections. These are the physical context, the economic context, the services context and lastly the social context. These criteria have been selected on the basis of the preceding sections where each of these aspects and the important role they play in settlement analysis consistently came under the spotlight. These four criteria will interconnect closely with each other, but an attempt will be made to discuss each criterion individually as well as the different indicators that exist for each category.

3.3.1 Physical context

For the purpose of this study, the physical context of the urban centre will refer to both the physical form of the urban centre and the availability of physical services such as engineering services and transport networks. Todaro (1982: 108) emphasized that the investment in social and economic infrastructure, i.e. roads, electricity, water, sanitation, and communication, facilitates and integrates economic activity, which ultimately leads to economic growth and development.

3.3.1.1 Infrastructure

Towns with closer and easier access to basic services and infrastructure grow faster and more efficiently than towns removed from these services (Van der Merwe et al., 1988: 55). Towns with easier access to amenities such as water, electricity, sanitation, and communication will have an advantage over urban centres with poor access possibilities. It is thus important to take into account the availability of services and basic amenities when comparing the growth of different urban centres. Infrastructure also ranks high in drawing and retaining migrants (Richardson, 1987: 213), as it develops attractive destinations, and guarantees a better quality of life (Bos, 1987: 354). Infrastructure is therefore an important indicator of the growth within an urban centre, and the availability and provision of basic services within a town.

Hirschman (1958) described a theory of unbalanced growth within a region which closely relates to Perroux`s growth-pole theory (see Section 2.3.1). According to this theory economic growth occurs at different rates within different sectors and different regions within a country. He ascribed these different tempos of growth and development to two factors, namely the demand and supply factors and then resumed: "On the demand side the market can absorb 'unbalanced' advances in output because of cost-reducing innovations, new products, and import substitutions, so we can have isolated forward thrusts on the supply side as inputs are redistributed among users through price changes" (Hirschman, 1958: 62). Development can thus take place through

technological advances that occur continuously on the supply side of a region or urban centre.

Hirschman (1958: 84) stated that non-economic factors also play a role in the growth of urban centres. He argued that government could encourage growth and development in two ways. Firstly, government could encourage development by being proactive. This could be achieved by establishing operations within centres with the necessary potential for development, or by establishing the necessary infrastructure in a centre to attract entrepreneurs and enable them to establish new enterprises. This is called Direct Productive Activities (DPA). Secondly, development could be encouraged by implementing reactive measures. These measures, or Social Overhead Capital Investment (SOC), comprise measuring the potential and development tendencies within urban centres, and establishing infrastructure within centres with the necessary potential. Infrastructure is supplied in order to encourage further development initiatives within the centre. Hirschman (1958: 84) described SOC as the basic services in the absence of which productive activities cannot be performed, such as public services, i.e. education, transportation, communication, water supply, public health and law and order.

This theory of unbalanced growth and the interference of government through DPA or SOC, has established that growth and development can be ascribed to the availability of infrastructure. In both cases, of DPA and SOC, government promotes and initiates development either directly by providing the necessary infrastructure, or by investing in social infrastructure in centres with growth potential. It is thus of great importance to take into account the availability of infrastructure within urban centres when considering the prospects of an urban centre are being considered.

According to the DBSA (2001: 29-34) the provision of infrastructural services such as water, sanitation, transport, electricity and telecommunications is a precondition for improved economic growth, welfare, quality of life and productivity of people. The provision of well-planned and controlled infrastructure leads to the creation of economic

opportunities. On the other hand, the non-provision or decline of services has a harmful effect on the effectiveness of a region's economy. Infrastructure thus plays a dual role in the economic system, namely to bring about an improvement in economic activity and an improvement in living conditions.

It has been established that the performance and growth of an urban centre can be influenced to a great extent by the availability and standard of engineering services. The occurrence of deficient basic services is one of the most common characteristics in the determination of slum areas worldwide (UN, 2003: 11). Lack of access to sanitation facilities and safe water sources is the most important feature, as well as the absence of rainwater drainage, surfaced roads, street lighting and electricity. The DBSA (2001: 29-30) further recognises that:

- Economic activity within a region or country is dependent on the availability of infrastructure since infrastructure is required by producers. The availability of infrastructural services raises the productivity of users by, for example, reducing the time and effort needed to obtain water, or commute to work. The ability of a region to compete is also to a great extent determined by the availability of adequate and reliable infrastructure. Infrastructure investment, by itself, does not, however, guarantee continued economic growth.

- The provision of infrastructural services can also contribute significantly towards the improvement of the wellbeing of households in a region. The non-provision of services can detract from the economic quality of life, e.g. the procurement of food and water takes time and valuable time is wasted on these activities. This time could have rather been spent on activities aimed at earning an income.

Engineering services are measured in terms of availability to all residents and the standard of services. Engineering services are thus one of the main criteria to consider when compiling a settlement analysis, as it has proved to exert an influence on a number of factors, including the productivity and indirectly the welfare of residents. The availability and standard of infrastructure also affects the ability of a town to participate significantly in the economy of the region, and will therefore be indicative of the importance of the regional performance of a town.

3.3.1.2 Transport networks

The availability of infrastructure is not the only determining physical factor of development; another aspect to take into account when measuring growth and performance is transport networks. Rondinelli (1985: 141) commented that "a region is not only a system of functionally diversified settlements but also a network of social, economic and physical interaction. The processes of interaction are shaped by linkages among settlements." It is therefore important to give attention to the construction of a transport network in and between urban centres as a possible indicator of the importance of a particular settlement within the region.

Bendavid-Val (1991: 139) also regarded the linkages between towns as important since the linkages between the various urban centres and the flows associated with them are the mechanisms through which regional income and employment are multiplied. According to Dicken and Lloyd (1990: 142) an efficient transportation system is the lifeblood of economic systems since it serves as a means for the friction of space to be overcome. Bendavid-Val (1991: 141) mentioned a number of linkages that exist, such as transportation, communication, natural resources, economic, social, public services and institutional. Each of these plays an integral role in the development of a town and the measurement of this development. Technically, the linkages and flows discussed interlink with each of the other classification indicators that will be discussed, and will therefore be given attention in the subsequent sections. Bendavid-Val (1991) classified these linkages into the following categories:

Table 3.1   Categories of intraregional linkages

Category of linkages	Elements and flows included
Transportation	Road, water, rail, and air transport routes, infrastructure and fleet stock including major types of cargo, patterns of use, ownership and control, services offered.
Communication	Telegraph, newspaper, and other communication media networks, types of infrastructure, patterns and types of use, ownership and control, services available; other important formal and informal methods of information dissemination, including locations and types of principal dissemination points and audiences.
Natural resource	Natural resource systems such as rivers, drainage systems, wind currents, agro-climatic zones, and also interventions in these systems such as irrigation networks that create interdependencies among sub-areas of the region.
Economic	Final and intermediate market chains and goods flows; production linkages; consumer shopping patterns; patterns of economic ownership and control; income flows, including transfers and remittances; capital flows; formal and informal financial systems; communication; seasonal employment migration.
Social	Ethnic and religious affinity group patterns; kinship patterns; class linkages.
Public service	Utility networks; education and training networks; specialised research and information dissemination systems; personal transportation services; health service linkages; voluntary association networks.
Institutional	Public administration linkages; budget allocation systems among different administrative levels; political decision chains; authority-approval-supervision patterns.

Source: Bendavid-Val (1991: 141)

Rondinelli (1985: 160) regarded transport connections as among the most vital means of connecting settlements within regions, and of providing access for rural individuals to town-based services and amenities. The United Nations (UN, 1979: 185-204) suggested that certain transport-linked information is conducive to the study of urban centres, such as the following:

- Density of road systems
- Access needs of the population
- Quality of the road system
- Average distance among settlements within the region
- Classification of the road hierarchies, including national roads, regional roads, and local roads
- Modes of transport and the suitability of these
- Road conditions and level of maintenance
- Origin and destination of traffic.

Transport linkages appear to make a contribution to the prominence of an urban settlement in a region, since the lack of adequate transport linkages can lead to the isolation of parts of a region.

From this section it is apparent that the physical aspects, such as the infrastructure and transport network of a town play a significant role in the spatial assessment of urban centres. The following section will attempt to explain the importance of a town in a region on the basis of its economic context.

3.3.2 Economic context

The previous section focused on the provision of physical infrastructure and transport networks in order to stimulate the development of growth within a region. The following section will give an overview of the economic context in which measurement of urban centres can occur. This will include the basic-nonbasic relationship, as well as the economic structure and performance of an urban centre.

Urban history shows that people come together in cities for wealth creation, and the creation of income has been considered to be the prime measure of success until fairly recently, when quality of life concerns (see Section 4.5.1) became more prominent (UN,

2003(a)). At the macro-economic level the state of the economy is usually measured by making use of the following criteria (Mohr, 1998: 3):

- Economic growth

- Full employment

- Price stability

- Balance of payment stability

- An equitable distribution of income.

Todaro (1982: 109) described three major factors of economic growth, i.e. capital accumulation (investment) (see Section 3.3.1), growth in population (see Section 3.3.4.1), and technological progress. The following discussion will highlight economic growth as an indicator of growth and development within urban centres. Other factors of economic development will also be discussed, such as employment and income indicators (see Sections 3.3.4.1 and 3.3.4.2).

3.3.2.1 The basic-nonbasic relationship

Towns are commonly classified and measured according to their economic context in the region as a whole, as described by Berry (1972: 56) who explains that "the economic base of urban centres tend to act independently of other urban structural features and, to the extent that there is geographic specialisation based on locational factors other than market orientation, each broad economic function will lead to its own distinctive economic town type".

Alexander (1954: 246) commented that the economic connection between an urban centre and the surrounding region is the strongest tie that exists. The economic life of an urban centre is inextricably entwined with the economic life of the surrounding region. Alexander (1954: 246), one of the first geographers to differentiate between the basic and nonbasic services in urban centres, explained that a portion of the goods and services produced within a city is supported by non-local demands. The local people also

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have a need for these services and produce. A city thus provides for the needs of non-local people and organisations, as well as for the needs of the local community.

Aurousseau (1921: 574) expressed his opinion on this subject as follows, "It is well known that towns have an extraordinary power of growth. This appears to be due to the relationship between the primary occupations and the secondary occupations of the townsfolk. The primary occupations are those directly concerned with the functions of the town. The secondary occupations are those concerned with the maintenance of the well-being of the people engaged in those of primary nature."

The *basic* services of a town are described as those functions that supply money to the city, therefore all the goods that the town exports to other regions (Alexander, 1954: 246). The *nonbasic* services are those services that serve the demands of the local community, and involve an exchange of money which the basic services have already supplied. Harris and Ullman (1945: 7) commented that a city depends not on the services and goods it produces for the local community, but on the services and goods provided to the surrounding region. Dickinson (1964: 68) referred to the basic services as the city-forming activities, and the nonbasic services as the city-servicing functions. This stresses the importance of the basic services provided by an urban centre, and underlines its dependence on the surrounding region for growth.

The contribution made by the study of basic and nonbasic services is substantial, according to Alexander (1954: 251) since it allows for the classification of cities according to the function they perform in the region. Urban centres are subsequently more accurately classified by their basic economy than by their total economy base because the basic services indicate the service a city renders to its region. Alexander (1954: 252) went so far as to comment that it is even possible that the structure of nonbasic activities is to a great extent very similar in every urban centre, implying that the measurement of the regional importance of a city could be solely based on the basic

services rendered by a town. This notion has not been applied in the examination of enough urban centres to produce much proof of the nature of basic-nonbasic relations.

3.3.2.2 Economic structure and performance

The basic-nonbasic indicator of the economic base of an urban centre is not the only measure of economic activity. It is also necessary to take into account the economic performance within an urban centre when the growth and development in a region is being measured. Performance refers to both positive and negative growth and development within a centre.

The economic performance of a town or region is generally measured by the Gross Domestic Product. The GDP will be discussed in more detail in the following chapter (see Section 4.3.1). In this section a short discussion will follow on the diversification of an economy as measured by the tress-index. This section concludes with an overview of the measurement of the comparative advantage of a certain economic activity within a region or town.

A useful method for measuring the economic performance within an urban centre or region is the investigation of the sectoral composition of economic activity by means of the tress-index (DBSA, 2001: 22). This will give an indication of the level of diversification or concentration of a town's or region's economy. The tress-index indicates the totally diversified economy as 0, and a concentrated economy as 100. The closer the index is to 100 the more concentrated the specific economy is. The increase of the tress-index of a region reflects an increase in the dependence of the local economy on a single or a few economic activities. The lower the index the more diversified the economy is, thus reflecting an economy dependent on various economic activities. The sectoral composition of an economy will be a useful measure to determine the stability of the local economy as well as the welfare of the community. This, in turn, will provide for a useful indicator of economic stability in the region since centres mainly

dependent on the primary sector are more vulnerable to international demand and supply (see Section 3.3.3).

The final method which to be discussed is that of the comparative advantage (CA). "The comparative advantage of a region indicates relatively more competitive production function for a product or services in that specific economy than in the aggregate economy" (DBSA, 2001: 23). In the case of a region or town with a comparative advantage of one production function, the specific region or town will concentrate on producing the specific product. The comparative advantage of a region or town is measured by means of a location quotient. According to the DBSA (2001: 23) "a region's economy, for instance, has a location quotient larger (smaller) than one or a comparative advantage (disadvantage) in a particular sector when the share of that sector in the specific economy is greater (less) than the share of the same sector in the aggregate economy". The CA indicator could be utilised to determine and investigate a centre's strengths and weaknesses in terms of production, and also assist in the functional classification of the town in question (see Section 3.3.3).

Economic progress is an essential component of development and growth, but not the only one. Todaro (1982: 87) describes development as a multidimensional process, involving reorganisation and reorientation of the entire economic and social system, and involving changes in institutional, social and administrative structures. This section consequently called attention to the economic context of an urban centre or region. It was pointed out that the economic performance of a centre can be measured in a number of different ways, viz. basic-nonbasic, GDP, tress-index or comparative advantage. All of these measures are commonly used to measure the economic structure and performance of regions and urban centres. The economic performance of an urban centre will be determinant in measuring the importance of an urban centre within a region.

3.3.3 Functional context

The functional context of towns in this study will relate to the functional classification developed by a number of authors. The functional context or functional classification of an urban centre entails a large number of factors, including the economic base, social context and physical linkages. This study regards each of these as a different indicator, and not as only one encompassing functional index. It is, therefore, necessary to keep in mind that most of the indicators discussed in this chapter form part of the functional context. A substantial number of variables – such as the number of inhabitants, size of urban labour force, and employment levels – are highly correlated reflections of the total *functional size* or aggregate economic power of cities, or more generally of the status of the towns within the nation's urban hierarchy (Berry, 1972: 17).

A number of authors have attempted to classify towns according to the functions they perform. This section will attempt to provide an overview of these classifications. Aurousseau (1921:569), who made the first attempt to classify towns according to their functions, identified six functions that towns perform. These are the functions of administration, defence, culture, production, communication and recreation. This led to the functional classification of towns according to the abovementioned functions. The classification is discussed in greater detail below (Aurousseau, 1921: 569-571).

- The capital city is a town that exists for the purpose of administration, which should be, but often is not, centrally located with regard to ease of communication, strategic advantage and climatic conditions.

- The second functional type of city is that of defence, where the city is situated in a particular place owing to tactical advantages of that location and in specific relation to borders and transport routes (Aurousseau: 1921: 570). These towns are small and otherwise unimportant. They are not always unifunctional, but can also be significant centres of industry.

- Another type of functional town classification is that of the cultural centre, which entails university towns, centres of art and religion, and *cathedral towns*. These

towns do not have a regular distribution, but many of them occur at junctions of important roads. As a class these towns are characterised by a remarkable capacity for retaining their vitality through long periods of time.

- A fourth type of functional classification is cities concerned with production, and which are important for their bulk manufacturing. The locations of these towns are dictated by sources of authority and by the presence of the necessary raw materials required (see Section 2.2.2.2).

- Towns are also classified according to their position to act as links and chains of communication. The functions of these towns include all activities of transit, either travel or the transportation of goods (see Section 3.3.1.2). Aurousseau further classifies the communication towns into three groups, viz. collection centres, transfer centres and distribution centres. The classification is based on the main function of each specific town in terms of communication, be it collection (handling of primary products), transfer (acting as break-of-bulk) or distribution (export and import).

- The sixth class is established for the purpose of recreation, which includes health, tourist and holiday resorts. Aurousseau (1921: 571) describes these towns as "points offering some strong or novel attraction of climate, scenery, or social conditions."

The following table lists the different types of towns in each functional classification according to Aurousseau (1921: 572)

Table 3.2   Functional classification of towns

Class I: Administration	Class II: Defence	Class III: Culture	Class IV: Production	Class V: Communication			Class VI: Recreation
Capital cities, revenue towns.	Fortress and garrison towns, naval bases.	University and cathedral towns; art, pilgrimage and religious centres.	Manufac-turing, craft centres	Collection	Transfer	Distribution	Health, tourist, and holiday resorts.
				Mining, fishing, forest, and depot towns.	Market, fall-line, break-of-bulk, and bridgehead towns.	Export, import and supply towns.	

Source: Aurousseau (1921: 572)

Following Aurousseau`s classification Harris (1943) also supplemented a number of criteria used to classify towns. This classification was specifically developed for cities in the United States. His criteria and classification closely correlate with those of Aurousseau`s. The classification developed by Harris' (1943: 88) pertains to eight different functional towns, including manufacturing cities, retail centres, diversified cities, wholesale centres, transportation centres, mining towns, university towns and resort and retirement towns. Aurousseau`s (1921) classification takes into account all the functions identified by Harris, but describes and arranges them into different classes.

Nelson (1955) used a classification of nine types of cities for his study of the towns and cities of the United States. The types (Nelson, 1955: 190) of cities are manufacturing; transportation and communication; wholesale trade; retail trade; finance, insurance and real estate; personal services; and public administration. His functional classification is based on the "proportion of the labour force of a city engaged in performing a service" (Nelson, 1955: 189)(see Section 3.3.4.1). Nelson's (1955) classification closely correlates with the functional classification proposed by Aurousseau (1921) and Harris (1943). This shows that numerous functional classifications exist for urban centres, due to the vast

number of different functions a city performs. The classifications of each of the authors correspond to some extent. Different classifications exist mainly because of differences in the importance of functions in the different regions.

Bendavid-Val (1991) illustrated the classification of urban centres according to their economic function. He referred to this classification as a "settlement typology scheme" and described it as "nothing more than a characterisation of the urban places in a region according to their principal economic functions" (Bendavid-Val, 1991: 164). He described the process of determining the settlement typology by identifying three to five types of activities, i.e. retail trade, crafts, manufacturing, transportation services, mining, and agricultural, that represent the top categories of employment in each town (Bendavid-Val, 1991: 164). Codes are assigned to each type of activity and the services in each category for each town are scored and noted. The principal aim of this exercise is to categorise the regional settlement system in terms of the dominant functions and their orders of magnitude in the central places (see Section 2.2.1.1).

Figure 3.1   Settlement typology scheme

Urban places	Urban functions												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Town A	X	X	X	X	X	X	X	X	X	X	X	X	X
Town B	X		X		X	X	X		X		X		X
Town C	X				X		X			X			
Town D		X		X		X	X	X	X				
Town E	X						X		X				X
Town F			X				X						
Town G	X				X		X	X	X				X
Town H	X						X						

Source: Adapted from Bendavid-Val (1991: 165)

This table illustrates the relative importance attached to each town in terms of the number of functions it provides to its hinterland (see Section 2.3.1). A town typically scores an X if it performs or provides a specific service or function. The more functions a town performs, the more diverse its functional base. The fewer functions the town performs, the more concentrated the economy of the specific town (see Section 3.3.2.2). This classification is greatly simplified since it does not take into account the size of the service, or the quality of service provided. It is merely a physical count of all the services and functions provided within the urban centre.

The functional classification of towns provides an overview of the various services that are available. The more services a town performs, the greater its urban field will be, thus providing a large number of services to the surrounding region (see Section 2.3.3).

The European Union (EU) has introduced a legal framework for the geographical division of the territory of the EU in order to harmonise the collection, transmission and publication of national and community statistics (EU, 2006). The Nomenclature of Territorial Units for Statistics (NUTS) classification divides the economic territory of the member states, into parts that cannot be assigned to a given region such as air space, territorial waters and the continental shelf. The NUTS classification is hierarchical and attempts to subdivide each member state into three levels, viz. NUTS levels 1, 2 and 3. The second and third levels are subdivisions of the first and second levels respectively. Member states may decide to take it even further in terms of hierarchical levels by subdividing NUTS level 3 (EU, 2006).

Territorial units are defined in terms of the existing administrative units in the member states. An *administrative unit* marks out a geographical area for which an administrative authority has power to take administrative or policy decisions in accordance with the legal and institutional framework of the member state (EU, 2006).

The NUTS level to which an administrative unit belongs is determined on the basis of population thresholds:

Table 3.3   Levels of NUTS classification

Level	Minimum population	Maximum population
NUTS 1	3 million	7 million
NUTS 2	800 000	3 million
NUTS 3	150 000	800 000

Source: EU (2006)

If the entire population of a member state as a whole is below the minimum threshold for a given NUTS level, the member state itself constitutes a NUTS territorial unit of that level (EU, 2006). If, for a given level in the classification, there are no administrative units of an adequate size in a member state, that level is to be established by aggregating an adequate number of smaller neighbouring administrative units. The resulting aggregated units are to be known as *non-administrative units* (EU, 2006). The NUTS classification can also be regarded as a type of functional classification on regional level. Even though this classification is not applicable to South Africa, it was deemed necessary to provide an example of the classification of urban centres on an international level.

This section provided an overview of the broad classification of towns within a region. In this section it was established that certain towns perform certain functions more extensively than others, and therefore they cab be characterised accordingly. In the functional classification the dominant function of a town is determined whether it be it economic or social. Aurousseau (1921), Harris (1943), and Nelson (1955) all identified a number of functional classifications for towns, which are basically the same. A short overview was also provided of the classification of towns and regions on an international level, as compiled by the EU. This classification of towns and regions in hierarchical

classes will assist in the categorisation of urban centres to determine spatial importance. The next section will provide information on social indicators within a town or region.

3.3.4 Social context

In the following section an attempt will be made to explain a number of social variables which could be utilised as urban indicators when measuring the overall performance and importance of an urban centre within a region. The social indicators comprise aspects such as the demography, including income, population density, population size and employment levels. This section will also focus on the institutional capacity of the relevant government authority of the town in question. The institutional capacity of a town or municipality is of great importance to the town's ability to compete and grow with the rest of the region, since the management of the urban centre is crucial for growth and development.

3.3.4.1 Demography

The demographic composition of an urban centre does not only pertain to the inhabitants of a town but also to the services rendered by the centre. Berry (1967: 91) commented that the size of urban centres varies according to changes in population density. Population density plays a role in the comparison of different urban centres or regions, but additional forces also play a role. Additional forces entail income differences (demand) and industrial organisation (supply). From this perspective it is evident that the size of the population and the income levels has a marked influence on the town as a whole, as well as on the position of the relevant town in the regional hierarchy (see Section 2.4). Brush (1953:382) commented that the "usual measure of the importance of a place is its population. The advantage of the measure is that it reduces all the diverse elements in a settlement to a single common denominator". The population size is not the only factor that influences the composition of the services sector of a town; the income of people likewise plays a role. As people's incomes increase the number of

shopping-goods stores will increase, whereas the number of convenience-goods stores will decrease (Berry, 1967: 91).

Population composition, in turn, is determined by a number of factors, as noted by Todaro (1982: 215-216). He pointed out that migration of population is the result of a number of reasons:

- Population movement is stimulated mainly by rational economic considerations of relative benefits and costs, mostly economic but also psychological.

- Migration is further stimulated by the expected earning differences as well as the probability of success in obtaining employment.

- The probability of obtaining employment can be related to the unemployment rate of the centre.

In other sections the importance of economic (see Section 3.3.2), psychological (see Section 4.4), income (see Section 3.3.4.2) and employment aspects (see Section 3.3.4.2) is discussed. The view taken by Todaro directs attention towards the importance of the economic, psychological and employment issues. Without these contributions, migration would not occur, and unless populations were established and population movement occurred development could not take place.

The Development Bank of Southern Africa (DBSA, 2001: 6-12) describes the importance of each aspect of social analysis. The DBSA regards the population size and, in particular, the number of households as determinants of the needs of the community. These needs are expressed in the demand for infrastructural and social services, including water, sanitation, electricity, housing and hospitals (DBSA, 2001: 6). The size of the population thus serves as an indicator of the social needs of people, and could assist in establishing either the availability or the lack of services. Todaro (1982: 109) commented that traditionally population growth has been considered a positive factor in economic growth. He warned against this notion, however, since a rapidly growing population, and therefore labour market, could also exert a negative influence on

economic growth, depending on the ability of the economic system to absorb and employ the growing labour force.

Another social indicator to take into account is the population growth rate for future projections and planning. A low or below average population growth rate can indicate the out-migration of people due to the lack of opportunities for economic development, which, in turn, leads to the loss of jobs in the urban centre or region as a whole (DBSA, 2001: 6). It follows that the population growth rate of a town or region could act as an important indicator to analyse the future prospects of a town. If an above average growth rate is experienced the prospects for the future existence of the town are bright. It is also important to take into account the age and gender composition of a town. A town with mostly older inhabitants does not hold out prospects of economic growth and development (DBSA, 2001: 6) since these people are close to retirement and will not in future be able to contribute to the growth of the economy as much as the younger generation would.

Household income is also essential to the prospects of a town, as it is one of the most important determinants of welfare in a region. According to the DBSA (2001: 8) the ability to meet basic needs, i.e. food, clothing and shelter is mainly determined by the household income. The Minimum Living Level (MLL), as defined by the DBSA (2001: 9) as the "minimum amount a household needs to earn to meet its basic needs", is also significant when the household income of a town is measured. A comparison of the household income in a town underlines the gap that exists between the poor and the rich. Making use of an average income could, however, mask these disparities.

Another factor that has a direct correlation with the household income is the level of education of the population. The higher the level of education a person has, the better is his ability to provide for the needs of his family. The level of education in a town also reflects on the indirect effects on health, fertility and life expectancy, and increases the

value of other forms of social and physical investment (DBSA, 2001: 9). Indicators which could be used in determining the level of education in the community are the literacy rate, the teacher-pupil ratio, the classroom-pupil ratio and the extent of training facilities in the specific area (DBSA, 2001: 9). These indicators could also assist in the future planning of infrastructure for schools and training facilities.

All of the foregoing factors can be combined in a single index, that of Human Development. The Human Development Index (HDI) is based on a number of factors, including life expectancy, literacy and income and therefore measures a person's ability to live a long and satisfactory life during which he can provide for all his needs. This indicator will be discussed in more detail in the following chapter (see Section 4.5.2).

3.3.4.2 Labour and employment

Whenever a town's socio-economic composition is examined, it is important to also take into account the labour force, levels of employment, and labour market within the town in question. Labour and employment can be measured in a number of different manners, including the supply and demand thereof. The supply of labour pertains to the economically active population within a town, whereas the demand for labour refers to the availability of employment opportunities within the town (DBSA, 2001: 12). A town with a high demand for employment thus indicates a growing economy. The difference between the supply and demand of labour is referred to as unemployment. The labour force of a town thus consists of the formally employed, the informally employed and the unemployed, as set out in the following diagram.

Figure 3.2   Composition of the labour force
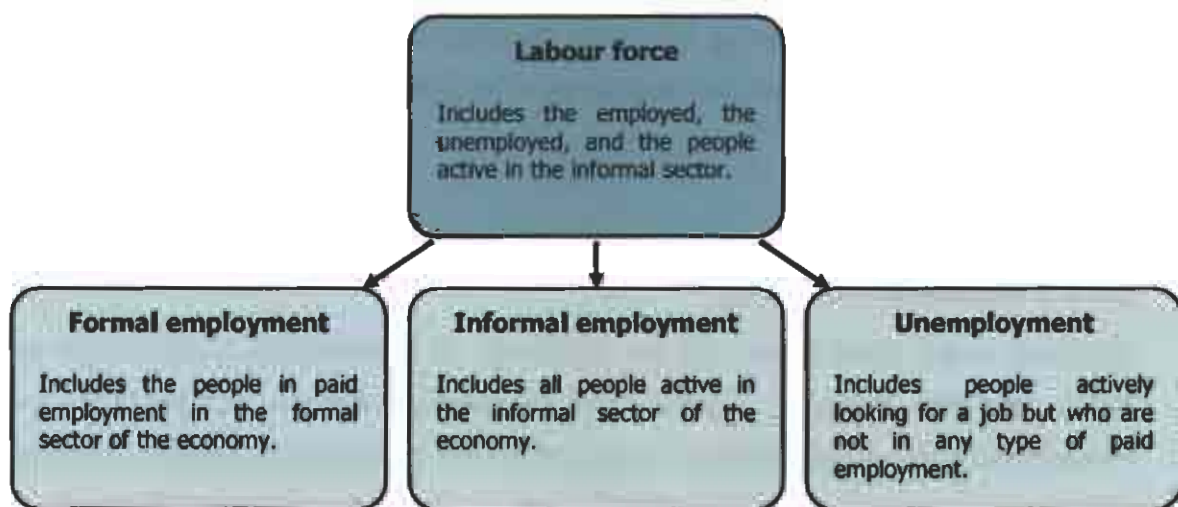
In developed countries unemployment levels are possibly the major indicator of the health of the economy (UN, 2003(a): 98). Unemployment is also seen as a primary indicator of spatial disadvantage in developed countries. According to the UN (2003(a): 98) the inability of people to join the core economy is seen as a sign of *social parasitism*. It is important to note that unemployment has a negative economic impact (DBSA, 2001: 16), since it reduces output and erodes human capital. Unemployment can also lead to crime, and therefore has negative social implications. Harris (1943: 87) commented that "employment figures are of high value, since they include only true industrial establishments and since they separate retail and wholesale trade". The labour force is subdivided into the sectors in which they are employed, which gives a clear indication of the dominant providers of employment opportunities in a town. According to the DBSA (2001: 15) in certain regions the primary sector (viz. the agricultural and mining sectors) is, for the most part, the dominant employer. A situation where people are mainly employed in the primary sectors creates a degree of vulnerability of the employment situations, since these sectors are extremely sensitive to exogenous variables, i.e. climate and the international prices of commodities (DBSA, 2001: 15). From this statement it follows that a higher degree of diversity in employers is

preferable (see Section 3.3.2.2). The higher the diversity of employers or sectors in the economy, the less dependent the region is on a single employer, and the slimmer the chance of the economy suffering from price fluctuations and other economic changes. The sector of employment can thus also serve as an indicator of future stability within a town or region.

3.3.4.3 Institutional capacity

According to the DBSA (2001: 25) the availability of infrastructural services such as water, sanitation, transport, electricity and telecommunications is a prerequisite for improved economic growth, welfare, quality of life and productivity of people. Providing well-planned and supervised infrastructure will result in the creations of economic opportunities. It is thus of the utmost importance for a town to have the relevant and credibility necessary to provide for and manage infrastructural needs. The non-provision of these services, or the mismanagement thereof could have a negative impact on the town's economy.

It must be acknowledged that political aspects could also be regarded as indicators of the stability of a town and its future prospects. It is a difficult task to assess the sustainability of towns in terms of institutional capacity and financial credibility, and very few measures exist. In this regard the Development Bank of Southern Africa (Steyn, 2005) has developed an assessment method for the specific purpose, by means of which the creditworthiness of municipalities is measured. The assessment is based on the ability of the municipality to repay loans obtained from the DBSA. Once a municipality defaults on a loan it is ranked low on the scale. Municipalities with a good record of repayment are ranked higher, and will be able to obtain loans in the future. This rating is known as the CA-rating of the municipality and ranges between 0 and 10; 0 being the lowest score to be awarded (Steyn, 2005). This rating provides a base according to which a municipality can be measured in terms of its management capabilities and institutional capacity to promote and maintain economic development.

The DBSA (DBSA, 2006(a)) developed another means of classification to measure institutional capacity. This classification attempts to identify key institutional risks and is measured in terms of a point scale. The maximum score that can be obtained by a municipality is 200. The scorecard consists of three broad categories, i.e. governance environment, service delivery, and financial management and administration. Governance environment is subdivided into four categories, i.e. external environment, governance structures, management and leadership and systems, policies and practices (DBSA, 2006(a)). This assessment is made by the DBSA for internal use only, and is therefore regarded as confidential. The scoring is illustrated in the table below:

Table 3.4   Institutional assessment

Key institutional risk indicators	Max score
Governance environment	**80**
• External environment	6
• Governance structures	31
• Management and leadership	10
• Systems, policies and practices	33
Service delivery	**80**
Financial management and administration	**40**
Total	**200**

Source: DBSA (2006(a))

Points are scored on the basis of a detailed questionnaire, and calculated as a percentage. The different municipalities are then ranked according to a risk rating level, and categorised into risk classes, i.e. low risk, medium risk and high risk. The municipalities are then subdivided into scoring categories, which represent a finer classification of risk assessment (DBSA, 2006(a)).

Table 3.5   Risk rating classes

Risk level (%)	Risk rating class	Scoring category
100	Low	AAA
93 – 99	Low	AA+
85 – 92	Low	AA
81 – 84	Low	AA-
73 – 80	Low	A+
65 – 72	Low	A
61 – 64	Low	A-
53 – 60	Medium	BBB+
45 – 52	Medium	BBB
41 – 44	Medium	BBB-
33 – 40	Medium	BB+
25 – 32	Medium	BB
21 – 24	Medium	BB-
	High	B
	High	CCC
	High	CC

Source: DBSA (2006(a))

This assessment and categorisation of municipalities assist in risk assessment in terms of the institutional capacity of the local government in categories as described above. Such a categorisation of institutional capacity is important in measuring the performance and growth prospects of a particular town. Development and growth is stimulated by a capable local government, whereas an incompetent local government can reduce possibilities for development. The provision of basic services is also important to achieve higher rates of satisfaction within the community, and has an influence on the quality of life (see Section 4.5.1).

3.5   Conclusion

The preceding chapter attempted to investigate a number of indicators in urban centres which could be utilised in measuring the importance of a specific town, as well as the future development prospects of that town within the region. The objective of this

chapter was to focus on a number of quantitative measures that currently exist, and which have been used in the past to assess, measure and classify urban centres. This assessment, measurement and classification of towns will be used in the compilation of a comprehensive index to measure the overall performance and importance of an urban centre within a region.

The chapter consequently attempted to organise the existing indicators into a number of classes or contexts in which they could be discussed. First of all it was necessary to explain the concept and objectives of settlement analysis. From this analysis, it has become apparent that towns are mainly measured according to their socio-economic status, their physical form and status, and their functional service delivery status. The chapter proceeded to discuss indicators within each of these broad categories of measurement.

The physical context was discussed in accordance with the availability and status of infrastructure and transport networks. From this section it is evident that transport linkages play a significant role in the prominence of an urban settlement in the region, since the lack of adequate transport linkages can lead to the isolation of parts of a region. Engineering services are also one of the main criteria to include when a settlement analysis is developed, as this aspect has proved to have an influence on a number of factors, including the productivity, and indirectly the welfare of residents. The availability and standard of infrastructure also play a role in the ability of a town to participate significantly way in the economy of the region.

In Section 3 a town's economic context came up for discussion. It was concluded that towns are generally classified and measured according to their economic context in the region as a whole. This measurement of a town's economic context can occur in a number of different ways, including the basic-nonbasic ratio which is regarded as the most accurate regional classification of towns in terms of their function. A second measure is that of the GGP of a region or town. This indicator measures the economic

growth or performance of a town. The tress-index is employed to investigate the sectoral composition of economic activity in a region or town. To conclude, a brief overview was given of the comparative advantage of a town or region with regard to a specific production function. All of these measures are commonly used to measure the economic structure and performance of regions and urban centres.

The functional classification of towns is the most common and widely used classification method for urban centres. This method attempts to classify a centre according to the core service or function it provides to the surrounding region, whether it be an administration, defence, culture, production, communication or tourist centre. This section attested to the fact that certain towns perform certain functions to a greater extent than others. They can be characterised accordingly.

The last section of this chapter was devoted to the social context of a town. This section explained the importance of the social and economic composition of a town's inhabitants and its future prospects. From this section it appeared that factors such as age and gender composition, level of education and employment make a significant contribution to the assessment of a town. All the foregoing factors have an influence on the relative importance of a town in the region, as well as the future growth and economic development of the specific urban centre. This chapter concluded with a brief discussion on the institutional capacity and the measurement (or lack) thereof. This is regarded as an important indicator since the management capabilities of the relevant government institution are of vital importance for the growth of a town.

This chapter attempted to provide a comprehensive background on quantitative indicators of the overall performance of a town, be it physical, economic, functional or social. These indicators will be used in assessing urban centres within a region in order to classify these centres in terms of overall performance and growth. The next chapter will focus on qualitative social indicators. Chapter Four will form the final theoretical

discussion on urban indicators before an attempt will be made to compile a broad index to measure the overall performance and importance of towns in a region.

CHAPTER FOUR

URBAN INDICATORS: AN INTEGRATED PERSPECTIVE

4.1   Introduction

In the previous chapter, attention was given to a number of indicators traditionally employed in assessing urban centres. These indicators included physical, economic, social and functional classifications of towns within a particular region. This chapter will be devoted to explaining a number of more recent indicators of development and growth by means of which measurement of urban centres can occur. In this chapter attention will be directed towards objective and subjective social indicators, focussing on human perception, economic, and environmental indicators. This chapter concludes with a brief discussion on a number of composite indexes that currently exist. The goal of this chapter is to further investigate existing indexes of growth and development in order to measure urban centres. This will guide and assist in the development of a vitality index.

4.2   Social indicators

In the mid sixties a growing dissatisfaction with the availability of quality social information prompted the "social indicators movement" (Carley, 1981: 1). This was due to the growing concern of too much attention being directed to economic performance and indicators. The term *social indicators* encompassed a wide variety of indicators of socio-economic well-being and quality of life. *Social indicators* can be defined as a comprehensive term describing the general well-being, measure of satisfaction and also the quality of life experienced by a community.

4.2.1 Characteristics of social indicators

A large number of definitions exist for *social indicators* since this term describes various aspects of the daily life of a person or community. Knox (1975: 8) described social indicators as "aggregate or composite measures of well-being, or of some element of it", adding that they are "generally designed to facilitate concise and comprehensive judgements about levels of social welfare". Miles (1985: 16) on the other hand, defined social indicators as "instruments which use social data to represent developments in the operation of social processes and the realisation of goals". These definitions therefore imply that social indicators can be seen as encompassing instruments which measure social data in order to facilitate the achievement of certain targets. The term *social indicator* can, consequently, refer to a single indicator of development and growth, or to an index comprising a number of different indexes.

Carley (1981: 2) commented that it is important to distinguish between two noteworthy characteristics of social indicators. First, social indicators are described as being *surrogates* and, in the second place, social indicators are described as being *measures*. The fact that social indicators act as *surrogates* implies that they cannot be used in isolation. A social indicator must always refer back to the immeasurable concept of which it is a substitute. As *measures*, social indicators are concerned with information which cannot be expressed on some ordered scale. Social indicators therefore have a dual purpose, viz. on the one hand they act as representative of the immeasurable indexes of well-being and development. On the other hand, they represent certain information that cannot be expressed on a regimented scale (see Section 4.4).

It follows that indicators should have certain characteristics to qualify as useful social indicators. An indicator which does not have these qualities may not be useful, or representative of reality. Knox (1975: 9) identified the following prerequisites for social indicators:

- They should be comprehensive measures of social conditions.

- They should be available as a time series.

- They should refer to the outputs of the system, rather than the inputs.

- They should relate to public policy goals.

Apropos of these prerequisites a definition can be developed for social indicators: social indicators are thus output-based measures of social conditions calculated within a certain geographical area and a certain time period, with the aim to attain public policy goals.

Liu (1975: 5) has also undertaken research on social indicators and added the following prerequisites for social indicators:

- They should be universally applicable.

- They should be easily understood.

- They should be flexible so as to relate to any lifestyle followed by individuals at different places and times.

- They should be adaptable to changing social, economic, political and physical conditions.

From the prerequisites for social indicators it is apparent that a number of factors will have to be taken into account when deciding upon indicators. Indicators which are not relevant to a specific problem or goal should be discarded to include only relevant facts and to prevent the misinterpretation of data (Liu, 1975: 5). It is also important that social indicators may be utilised in different situations and changing social conditions. Social indicators should thus not be time- or place- specific, but universally applicable and relevant.

Social indicators can be utilised in a number of different ways, as described by Miles (1985: 75). They can be used to set targets for social development, and to monitor the consequences of policies. Social indicators can also form part of forecasting techniques, and be used for the comparative evaluation of policies. Social indicators are most widely utilised for the purpose of urban analysis in an attempt to identify growth and development within urban centres (Miles, 1987: 76), as will apply to this particular study.

Carley (1981: 130) identified three different uses of social indicators, i.e. intra-urban indicators, inter-urban indicators, and performance indicators. Intra-urban indicators are indicators of social and economic well-being between subgroups within a single urban centre. These indicators are as a result utilised to distinguish between different groups of people and services within a certain town, whether it be a social, economic or service delivery distinction. While inter-urban indicators measure the differences and similarities between different towns or urban centres, this type of inter-urban indicator is also utilised to identify similarities and differences between a number of towns, and not within a single town alone. The third type of indicator, performance indicators, measures the performance of service delivery in a city. Performance indicators primarily measure the availability and quality of service delivery within a town to identify poor service delivery in order to address these issues.

In this study reference will be made to the three uses of social indicators. Towns will not only be measured in terms of their performance, but will also be compared to surrounding towns (inter-urban), and between different services within a single centre (intra-urban) will also be compared. This will ultimately enable this study to compare urban centres within a particular region in terms of growth, development and future growth prospects. Distinction is not only made between the uses of indicators, but also between different types of indicators, which are discussed in the following section.

4.2.2 Types of indicators

Social indicators can be divided into a number of broad classifications, of which the distinction between objective and subjective indicators is probably the most widely used. According to Carley (1981: 35) objective indicators are measured by physically adding up the number of occurrences of a certain phenomenon, while subjective measurements are based on reports from individuals about their own perceptions, responses and feelings. Therefore, most social indicators can be categorised as being either subjective, representing an individual's perception, or objective, referring to a quantifiable variable.

Liu (1975: 11) also differentiated between subjective and objective indicators. Subjective indicators are described as being psychological perceptions, and objective indicators as being social, economic, political or environmental perceptions. This chapter will present a discussion of each of the different objective and subjective indicators. It is important to distinguish between the different types of indicators since the objective indicators are easily quantifiable, while subjective indicators, representing an individual's perception, cannot easily be measured according to a specific scale. This is a problem and point of criticism concerning social indicators identified by authors (see Section 4.6). This aspect has a significant impact on the empirical chapter as to how immeasurable indicators are to be measured (see Chapter 5).

Rapley (2003: 11) identified a number of objective and subjective indicators generally utilised in measuring the overall economic, social, and institutional performance and status quo of urban centres. The following table lists these indicators.

Table 4.1   Objective and subjective social indicators

Objective social indicators	Subjective social indicators
Life expectancy	Sense of community
Crime rate	Material possessions
Working hours per week	Sense of safety
Unemployment rate	Happiness
GDP	Satisfaction with 'life as a whole'
Poverty rate	Relationships with family
Perinatal mortality rate	Job satisfaction
School attendance	Class identification
Suicide rate	Perception of distri-butional justice

Source: Adapted from Rapley (2003: 11)

This table illustrates the difference between objective and subjective indicators. The objective indicators act as measures, and can easily be expressed as a percentage, a per capita count, in years or in hours. The subjective indicators act as surrogates (see Section 4.2). The table refers to subjective indicators as being a *perception*, a *sense* or a *feeling* of an indicator. These descriptions cannot be expressed on a scale or as percentages; a subjective allocation of numbers to each feeling or perception is necessary to quantify a person's feelings.

Hilhorst and Klatter (1985: 30) proposed a number of instruments measuring social well-being, adding that levels of social well-being be measured indirectly. This is done through the identification of different factors, and the identification of suitable indicators under each factor, viz. objective indicators of social well-being. This objective measurement of well-being thus implies that wealth is not measured directly on the basis of income, but through an indirect indicator such as *leisure time*. The researchers in question also mentioned the subjective approach to measuring the quality of social well-being, in order to measure the degree of satisfaction people have with their lives as a whole, as well as with various other aspects of their lives. The subjective approach implies that a person will be asked directly to indicate his own perception of satisfaction with his life. Consequently, social well-being can be approached from two angles, i.e. either by making assumptions about a person's satisfaction through an objective measure, such as income; or by directly asking a person how satisfied he is (subjective).

Social indicators can also be subdivided into normative welfare indicators, satisfaction indicators, and descriptive social indicators according to Land (1983: 1), as illustrated below. Normative welfare indicators closely correlate to objective indicators since they refer to direct measures of welfare and are subject to the interpretation that if they change in the right direction while other things remain equal, things have improved or people are better off. This could typically refer to an indicator such as income, e.g. if a person's income increases and the price of products remains the same, he is better off. Satisfaction indicators in turn, are psychological measures of a person's happiness and life fulfilment. Satisfaction indicators relate to subjective indicators as mentioned previously, since they use subjective surveys in order to obtain data indicating a person's satisfaction with his circumstances and with life as a whole. Lastly, the descriptive social indicators, according to Land (1983: 1), are the most inclusive category. Descriptive indicators refer to indexes of social conditions and changes therein. Descriptive indicators are thus an encompassing index of a number of indicators which measure social conditions within an urban centre or among urban centres (see Section 4.2).

Figure 4.1   Types of social indicators
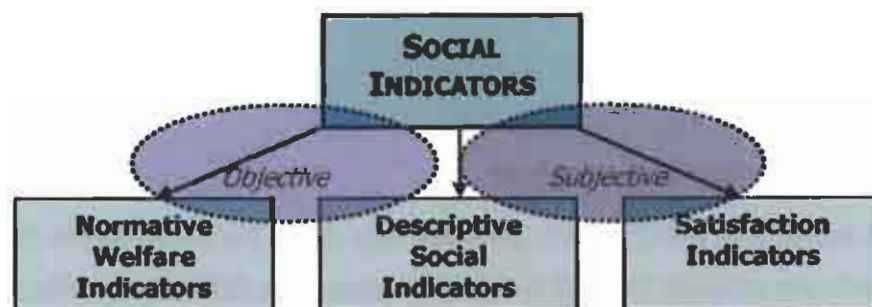
Source: Own representation

From this section it was evident that social indicators are in the main divided into two groups, viz. either objective, and therefore directly measurable indicators, or subjective, referring to the psychological measurement of how an individual perceives his life to be. The question thus arises whether objective or subjective indicators, or a combination of both should be used. The following section will attempt to summarise and categorise a large number of possible indicators into the two groups identified, i.e. objective and subjective indicators. Economic, social, environmental and spatial indicators will be under discussion.

4.3   Objective social indicators

In the previous section, attention was directed towards social indicators as a whole, including a number of prerequisites, characteristics and typical problems encountered when dealing with social indicators. Whereas in the previous section the two main types of social indicators, objective and subjective indicators, were mentioned, this section will concentrate mainly on objective indicators which are easily measurable. Particular focus will be placed on economic indicators and their applications. This section will also incorporate the criticism against economic indicators as well as their applications in measuring well-being, growth and development. Environmental indicators are also

recognised as objective indicators (Liu, 1975: 1), and will therefore be included in this discussion on objective measures.

4.3.1 Economic indicators

4.3.1.1   Gross Domestic Product

The general public and policymakers generally rely upon the Gross Domestic Product (GDP) as a primary measure the well-being of a nation. The GDP can be defined as "the total value of all final goods and services produced within the economy in a given period" (Van der Merwe *et al.* 1988: 36). The GDP is measured in terms of monetary value at current prices, but can also be measured at constant prices, comparing the value to a base year in order to determine growth in the value of goods and services produced. GDP thus refers to the value of goods and services produced within a certain geographic area, which is normally the total area of a country. It is also possible to estimate the total value of production in other geographic areas such as different regions or provinces. This is known as the Gross Geographic Product or GGP (Mohr, 1998: 20). For this particular study of certain towns within a region, the GGP will be more accurate in terms of regional conditions. Since the GDP and GGP are inherently the same indicators, but on different scales, it must be kept in mind that when the GDP is referred to the same will apply to the GGP.

According to Van der Merwe *et al.* (1988: 36), the GDP is most widely used as a measure of total domestic economic activity. The GDP forms the basis of the national income accounts. The GDP can be measured in three ways, i.e. according to the production method, the income method, and the expenditure method. The production method estimates GDP by adding the contribution of each industry to GDP, while the income method adds up all the income received by the factors of production. The expenditure method focuses on determining the total spending by households, firms, the government and the rest of the world on final goods and services produced in the

domestic economy. These measures will all yield the same results as the GDP per capita is concerned.

One of the major problems experienced in the measurement of the GDP is that a significant portion of income, production and expenditure is not recorded officially. According to van der Merwe *et al.* (1988: 38) the off-the-record activities include smuggling, drug-trafficking and prostitution, as well as activities performed by housewives in their homes for which they are not paid. Owing to these exclusions the GDP is not a hundred percent representative of the economy, but still gives a good indication of the economic activity within a country.

From the above it is clear that the GDP cannot be regarded as an encompassing measure of well-being or quality of life, since it reflects only one aspect, that of economic activity. It has to be kept in mind that a larger flow of goods and services does not necessarily increase the national well-being and the quality of life that people lead (Van der Merwe *et al.*, 1988: 39). The GDP does not take into account externalities such as increasing pollution, congestion, noise and psychological stress which all intensify as production increases. These externalities have a negative impact on the quality of life that residents are leading. Cobb, Glickman and Cheslog. (2001: 1) commented that the "GDP merely tallies monetary transactions on an annual basis. It makes no distinction between economic transactions that add to − or diminish - our well-being". Mohr (1998: 34) addressed yet another issue, namely, that the GDP makes no allowance for the depletion of natural resources and also does not take the purpose of production into account. For example, R100 million spent on military equipment is treated in the same way as R100 million spent on education or health. This gives rise to an unrealistic picture of an economy. In addition, Mohr (1998: 34) also pointed out that the GDP does not take into account the changes in the quality of products and services, i.e. whether quality is improving or deteriorating. No allowance is made within the GDP to measure the value of increased or reduced leisure time, and it can therefore not be regarded as a measure of well-being.

As an economic measure, the GDP is thus a successful indicator of the production of goods and services. But as a measure of well-being, the GDP fails to take into account the externalities of production as well as numerous other aspects as mentioned above, and can therefore mask societal and economic problems within a country.

4.3.1.2   Genuine Progress Indicator

Due to the occurrence of numerous problems in the use of the GDP as measure of well-being and the numerous shortcomings in this connection (see Section 4.3.1.1), the Genuine Progress Indicator was developed. The Genuine Progress Indicator (GPI) attempts to address the shortcomings of the GDP that were discussed in the preceding section. Where the GDP only measures the production of goods and services, the GPI attempts to also take into account externalities caused by production, as well as other social issues. The GPI is thus an attempt to measure whether or not a country's growth, increased production of goods, and expanding services have actually resulted in the improvement of the welfare (or well-being) of the people in the country.

Smolko, Strange and Venetoulis (2006: 14) explained that national, regional or local accounting should incorporate both market and non-market products and services, and should not only focus on market services, as is the case with the GDP. Cobb *et al.* (2001: 1) defined the GPI as a "comprehensive measure of national health expressed in economic terms". The GPI includes the economic contributions of household and volunteer work, while subtracting factors like crime, pollution, and family breakdown. These adjustments allow the GPI to give a more accurate representation of the progress made by a nation. The GPI portrays a more balanced picture of the quality of economic development, rather than the quantity of economic development (Smolko *et al.*, 2006: 15). The following representation illustrates the difference between the GDP and GPI growth rates, and in particular draws attention to the failure of the GDP to reflect the accurate social costs of economic activity. For example, rising fossil fuel use adds to the

GDP, but reduces the GPI due to the GPI taking into consideration the negative externalities of the rise in use of fossil fuel. The GPI considers that the increased use of fossil fuel is exhausting non-renewable resources, polluting the atmosphere with factory and vehicle emissions, increasing traffic congestion and accidents, and contributing to climate change (Cobb *et al.*, 2001: 1).

Figure 4.2 Per capita GPI and GDP for 1950-2000 – USA
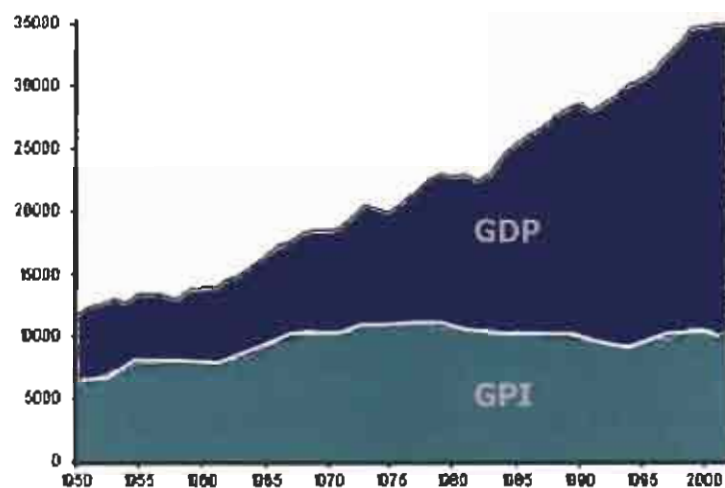
Source: Cobb *et al.* (2001: 1)

The GPI thus provides a more accurate presentation of the economic and, in a sense, the social well-being of a country than the GDP does. The GPI is calculated by using the personal consumption component of the GDP (see Section 4.3.1.1), excluding capital investment, government spending, and net exports. The GPI, in turn, attempts to include factors such as social, environmental, and economic occurrences that either reduce or increase the quality of life. The GPI considers who benefits from economic escalation by including measures of social growth or decline, i.e. revenue distribution and unemployment rates. The GPI also makes adjustments for other quality of social life indicators, such as the cost of crime and family breakdown. Cobb *et al.* (2001: 2) also mentioned the ability of the GPI to extract significant long-term trends from short-term

accounting variations. Each of the benefits and externalities is represented as a monetary value. The following table represents the calculation of the GPI by adding benefits to and subtracting externalities from the personal consumption. A monetary value represents the GPI of the country or region.

Table 4.2   Calculating the GPI

The starting point of the GPI
• Personal consumption

Costs ignored by the GDP that are subtracted from the GPI

Economic costs

- Adjustments for unequal income distribution
- Net foreign lending or borrowing
- Cost of consumer durables

Social costs

- Cost of crime
- Cost of automobile accidents
- Cost of commuting
- Cost of family breakdown
- Loss of leisure time
- Cost of unemployment

Environmental costs

- Cost of household pollution abatement
- Cost of water pollution
- Cost of air pollution
- Cost of noise pollution
- Loss of wetlands
- Loss of farmlands
- Depletion of non-renewable resources
- Cost of long-term environmental damage
- Cost of ozone depletion
- Loss of old-growth forests

Benefits ignored by the GDP that are added to the GPI

- Value of housework and parenting
- Value of volunteer work
- Services of consumer durables
- Services of highways and streets
- Net capital investment

Total: The Genuine Progress Indicator

Source: Adapted from Cobb *et al.* (2001: 3)

This table indicates exactly how far the GPI has developed in taking into account a large number of externalities, as well as benefits not mentioned in the GDP. The GDP, in other words, does not reflect the true status of the growth and development within a country due to a number of reasons (see Section 4.3.1). The GPI, on the other hand, provides a more realistic and holistic monetary view of the status of a nation and its residents.

The GDP and GPI are the most widely used economic indicators of well-being. An indicator used in other countries is the Measure of Economic Welfare (MEW). The MEW also attempts to "adjust GDP data for non-market production of 'goods' and 'bads', as well as for changes in the amount of leisure people enjoy" (Van der Merwe *et al.*, 1988: 39). Very few countries have made use of the MEW, and even in countries where it is common use, the data are not published on a regular basis. So far, no attempt has been made to measure the MEW of South Africa.

4.3.2 Environmental indicators

The previous section attempted to explain the GDP and GPI as objective indicators of urban development. This section focuses on a number of environmental indicators (natural) that could possibly be taken into account when an urban centre is being measured. First the concept of sustainability is discussed, followed by the ecological footprint.

4.3.2.1 Sustainability

The concept of sustainability has received much attention over the past few decades and remains a relevant issue. Sustainability refers to development that meets the need of present generations without compromising the capability of future generations to meet their needs (Bell & Morse, 2003: 2). Development should thus take place in such a manner so as not to deprive any future generations of resources.

Sustainable development seeks to improve the human condition, but does not focus on economic growth and production (Bell & Morse, 2003: 3). Sustainable development attempts to promote the use of natural resources in such a way that what is done at present to improve the quality of life should not degrade the environment or the ability of future generations to provide for their needs. Sustainable development is not only seen as the sustainable use of resources, but as the interface between environmental, economic and social sustainability, as depicted in the figure below.

Figure 4.3   Sustainable development as interface
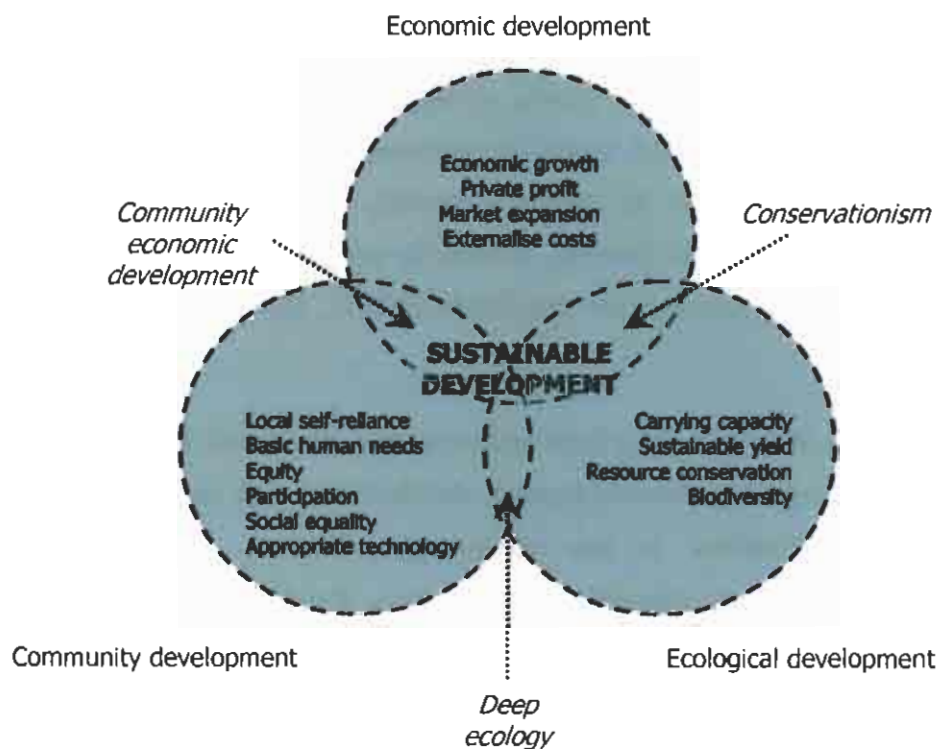
Source: Bell and Morse (2003: 4)

Wackernagel and Rees (1996: 134) differentiated between two types of sustainability, viz. ecological sustainability, and socio-economic sustainability. Ecological sustainability refers to the sustainable use of the available natural resources, while socio-economic sustainability is a more difficult concept to explain. It is described as "everyone being able to attain a material standard sufficient for them to enjoy an emotionally and spiritually satisfying life" (Wackernagel & Rees, 1996: 134). Another sustainability concept was added by Maclaren (1996(a): 184). This is the concept of urban sustainability, which is described as a desirable state or set of conditions that persists over time. Maclaren (1996(b)) also differentiated between the concept of *urban sustainability* and *sustainable urban development.* Sustainable urban development is defined as a process by which sustainability can be attained. Urban sustainability is characterised by "intergenerational equity, intragenerational equity, (including social equity, geographical equity, and equity in governance), protection of the natural environment (and living within its carrying capacity), minimal use of non-renewable resources, economic vitality and diversity, community self-reliance, individual well-being, and satisfaction of basic human needs" (Maclaren, 1996(b): 18).

Urban sustainability indicators differ from environmental, social and economic indicators in that they are integrating, forward-looking, distributional, and developed with input from multiple stakeholders in the community (Maclaren, 1996(a): 186-188). Sustainability indicators are integrating in the sense that they endeavour to reveal linkages between the economic, environmental and social dimensions of sustainability. Urban sustainability indicators are also characterised by the fact that they are forward-looking and can thus be utilised in measuring progress. Maclaren (1996(b)) also mentioned that urban sustainability indicators should be distributional in the sense that it should take into account the distribution of social, economic and environmental conditions within a population as well as across different geographic regions. Finally urban sustainability indicators are characterised by the way they are developed with the input from a broad range of participants. This leads to the conclusion that urban sustainability is a long-term goal to be achieved and, specifically in this study, urban sustainability will be taken into account when urban centres are assessed.

Sustainable development has been taken into account in this section due to the importance of sustainability in the future of an urban centre. Urban centres need to be measured in terms of sustainability to determine how long, or if it will be able to sustain the current and future population. This discussion will be continued in a subsequent section.

4.3.2.2 Ecological footprint

The concept of *ecological footprint* was first introduced by Wackernagel and Rees (1996). Based on the notion of carrying capacity, it broadly refers to the maximum load people can impose on the environment. As explained by Van den Bergh and Verbruggen, (1999: 63) "every individual, process, activity, and region has an impact on the earth, via resource use, generation of waste and the use of services provided by nature".

According to Bell and Morse (2003: 14) a spatial unit (urban land, country) can be described in terms of its impact on the land required to support it, or its ecological footprint (EF). Venetoulis and Talberth (2005: 2) described the EF as a measure of the demands a population makes on nature. The EF is usually expressed quantitatively as a plot of land area required to uphold the unit and is used to "calculate the land area needed to sustain human consumption and absorbing its ensuing wastes" (Venetoulis & Talberth, 2005: 3). The larger the EF, the more resources are required to maintain the unit's existence. A town with a larger footprint thus requires more resources to provide for its needs than a town with a smaller footprint. The EF of a city will be proportional to both population and per capita material consumption (Wackernagel & Rees, 1996: 1). It is thus possible to determine the total EF for the earth and compare this to all the available resources in order to measure the earth's capability to provide resources in a sustainable manner.

The EF provides a very useful tool to determine whether a given population's consumption is sustainable. If the EF is smaller than the available biocapacity, it is sustainable. The EF assists in monitoring progress towards (un)sustainability, i.e. maintenance (loss) of natural capital. Once the EF of a region or city is determined it will be possible to determine how issues of unsustainability can be addressed and resources managed in a more efficient way. The EF of towns should be taken into account when measuring the growth and development of the town, since this will be indicative of the availability and sustainability of resources in a town. The availability of resources will, in turn, influence a community's perception and feeling of well-being.

The next section will attempt to investigate the subjective indicators of human perception of environment and social quality in general.

4.4   Subjective indicators

The previous section attempted to provide information on the objective economic indicators and objective environmental indicators. Based on this information, this section will shed more light on the nature and use of a subjective indicator, viz. human perception of the environment. As has been mentioned earlier the measurement of subjective indicators is much more complicated and more difficult to assess than that of objective indicators (see Section 4.3).

The perception of humans of nature and their surrounding environment (including the urban environment) differs from person to person. No two people will have the same perception of the space they live or work in due to the inherent difference of nature between human beings. The question may arise why this section deals with human perception in the study of the measurement of urban centres. A person's life does not solely entail, and is not solely influenced by economic and social activities. It is also important to take into consideration a person's psychological experience in the measurement of urban centres in order to determine why people tend to settle in a

certain town rather than another. This section will attempt to explain that this choice is not influenced solely by economic aspects, but also by the quality and sense of a certain urban centre.

Topophilia is described by Tuan (1974: 93) as a neologism to broadly include all of the human being's affective ties with the material environment, which will differ in intensity, subtlety and mode of expression. Topophilia thus refers to a person's feeling towards a certain place or environment, natural or urban. This closely relates to another aspect which is important in human perception of nature, called *genius loci*. In Roman mythology *genius loci* was regarded as the protective spirit of a place. In contemporary usage, *genius loci* usually refers to a location's distinctive atmosphere, or a *sense of place* (Norberg-Schulz, 1980: 7). Sense of place is a characteristic that some geographic places have whereas others do not. Tuan, (1979: 4) has defined the term geographic place as "centers of felt value where biological needs, such as those for food, water, rest and procreation, are satisfied". Sense of place is often defined as those characteristics that differentiate one place from another and make it distinctive or unique, as well as those that promote a sense of true human connection and belonging.

Tuan (1974: 93) attempted to describe the different responses a person may have towards an environment, be it aesthetic, tactile or a certain feeling one experiences in a certain environment. Aesthetic responses to the environment refer to the pleasure one derives from a view, the beauty that one experiences at that point in time. Tactile responses, on the other hand, refer to the delight experienced in the feel of air, water or earth. Lastly the feelings that one has toward a place because it is home, the locus of memories, and the means of gaining livelihood, can also be expressed as topophilia. Topophilia thus refers to an individual's bond with and love for the environment, even though, as Tuan (1974: 113) pointed out, "environment may not be the direct cause of topophilia but environment provides the sensory stimuli, which as perceived images lend shape to our joys and ideals".

This section has thus established that many different aspects may have an influence on the way in which a person perceives his surrounding environment. Certain factors distinguish a given town from another; this is referred to as the sense of place of a given town. It can be concluded that *sense of place* is that inexplicable feeling of a place which distinguishes it from other places. That perception that attributes a unique identity to a place could be a sentimental attachment or visual trigger within the town.

This section attempted to explain the concept of *sense of place*, which influences a person's perception and feeling of a certain urban environment. This study is of the opinion that the sense of place will also play a prominent role in the measurement of urban centres, especially in terms of a community's well-being and life satisfaction. The following section will give attention to yet another type of social indicators, the environmental indicators, which link up closely with this section on human perception of the environment.

4.5   Composite indexes

The preceding sections of this chapter concentrated on single indicators of development, viz. economic, human perception and environmental indicators. Each of these has proved to be an important and relevant indicator of well-being and growth. This section will concentrate on providing background to two composite indexes which have been developed, being the quality of life index, and the human development index. Each of these indexes attempts to combine a number of indicators, such as those described in the preceding sections, to create a single index of development. This can also be referred to as a descriptive social indicator (see Section 4.2.1).

4.5.1 Quality of Life Index

The concept *quality of life* has been widely used over the past decade or longer, since problems with the GDP have been highlighted as a measure of well-being (see Section 4.3.1.1). The Quality of Life index (QOL) attempts to measure and include all the aspects that the GDP does not take into account, to create a single descriptive index.

Liu (1975: 3) pointed out that three general types of QOL definitions are often used:

- Precise definition of what constitutes quality of life, e.g. happiness, satisfaction, wealth, life style etc.

- Definitions through the use of social indicators, e.g. GDP, health and welfare indicators and educational indicators.

- Indirect definition by specification of components or factors affecting quality of life, e.g. a group of social, economic, political and environmental indicators represented by different types of indexes.

This section will attempt to explain the existing indexes used to represent and measure quality of life.

A QOL index is based on a unique methodology (Anon, 2005:1) that links the results of subjective life-satisfaction surveys to the objective determinants of quality of life (see Section 4.2.1). The subjective life-satisfaction surveys attempt to determine the average satisfaction a person experiences with his life as a whole. This is accomplished through subjective surveys which directly ask how satisfied the respondent is with his life (very satisfied, fairly satisfied, not very satisfied, or not satisfied at all). These subjective surveys have proved to correlate highly with more sophisticated tests (Anon, 2005: 1).

The QOL index is derived from assigning weights to the various determinants of quality of life, in order to calculate an objective index. The weights are related in a multivariate regression to various other factors that have borne out their association with life

satisfaction. The Beta coefficients of each of these factors are determined and the final weights of the factors are derived. It was found that the most important indexes, in order of importance, are the following:

- Material well-being (measured in GDP per person)

- Health (measured in life expectancy at birth)

- Political stability and security (measured in stability and security ratings)

- Family life (measured in divorce rate)

- Community life (measured in rate of church attendance or trade union membership)

- Climate and geography (measured according to the latitude)

- Job security (measured in unemployment rate)

- Political freedom (measured in political and civil liberties)

- Gender equality (measured as a ratio of average male and female earnings).

These variables are the most important indexes of quality of life according to the study (Anon, 2005: 2), but other variables such as education level, rate of real GDP growth and income inequality (Gini coefficient) may also be included. This study has also established that the GDP per person explains more that 50% of the inter country disparity in life satisfaction; in 24 out of 28 countries material well-being is recognised as the decisive factor of life satisfaction.

The study of quality of life has led to numerous contributions being made to possible variables, including that of Smith (1973: 70). He identified the following six broad quality of life categories:

- Income, wealth, and employment

- The environment

- Health

- Education

- Social disorganisation i.e. crime, alcoholism, and drug addiction

- Alienation and political participation.

It is the opinion of Schneider (1976: 301) that "any complete study of quality of life would have to include at least one key variable from each of the above categories". Liu (1975: 3-4) represented QOL in the following symbolic form:

$QOL = f(PS, PH)$

$PH = f(S, E, P)$

$S = f(Individual\ Status,\ Individual\ Equality,\ Living\ Conditions)$

$E = f(Economic\ Status,\ Technological\ Development,\ Agricultural\ Production)$

$P = f(Health\ \&\ Welfare,\ Educational\ Development,\ State\ \&\ Government)$

In this equation, **PS** and **PH** respectively represent psychological and physical inputs. **S**, **E** and **P** are socio-environmental, economic and political components.

Figure 4.4   Components of QOL
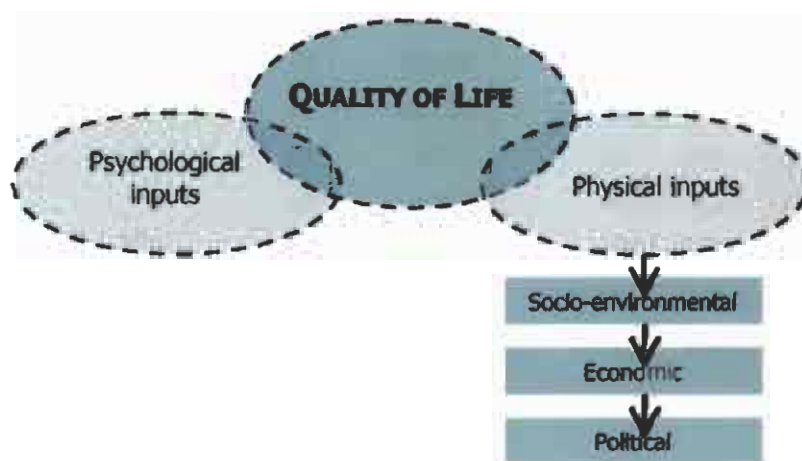
Source: Own deduction

It may thus be inferred that numerous variables exist that could be used in assessing the quality of life, according to the specific needs of the study. The specific equation developed by Liu taking into account a wide variety of indicators, could be a good compendium to use as starting-point in the measurement of quality of life and in the compilation of an index. The table to follow represents the QOL scores and ranking of various countries, including South Africa. It also lists the GDP per person and ranks each country accordingly. In the last column the difference between the QOL and GDP ranks is shown, illustrating that even though the GDP is high in some countries, the QOL for a specific country could differ due to numerous factors (see Section 4.3.1.1). The QOL is scored on a scale from 1 to 10.

Table 4.3   Quality of Life Index and GDP according to country

Country	Quality of Life		GDP per person		Difference in ranks
	Score	Rank	$ (at PPP)	Rank	
Ireland	8.333	1	36,790'	4	3
Australia	7.925	6	31,010	14	8
Spain	7.727	10	25,370	24	14
United States	7.615	13	41,529	2	-11
Austria	7.268	20	31,420	12	-8
Germany	7.048	26	28,250	21	-5
UK	6.917	29	31,150	13	-16
India	5.759	73	3,290	96	23
Egypt	5.605	80	3,390	88	8
South Africa	5.245	92	10,810	50	-42
Uganda	4.879	101	1,450	108	7
Zimbabwe	3.892	11	1,500	106	2

Source: Anon (2005)

This table reflects the significant disparity between GDP and QOL in South Africa. Although the GDP is fairly high and SA is ranked fiftieth in the world, the QOL is very low, SA is ranked in the ninety-second position. Thus the QOL in South Africa is very low, and does not correlate with the GDP at all.

The following section will discuss the Human Development Index. This index has been widely used in the measurement of various countries, and to trace growth and development within countries.

4.5.2 Human Development Index

The UN Human Development Index (HDI) is a comparative measure of poverty, literacy, education, life expectancy, childbirth and other factors for countries worldwide. It is a standard means of measuring well-being, especially child welfare. Numerous organisations use the HDI to distinguish whether a country is a developed, developing, or underdeveloped country. Since this index takes into consideration a number of different variables to create a single index, it is viewed as a composite index.

According to the UN (UN, 1995: 12), human development comprises four main components, viz. productivity, equity, sustainability and empowerment. Human development in terms of productivity entails that people must be able to increase their productivity by participating in employment and income generation. Therefore it is important to consider economic growth in human development studies. Secondly, human development entails equity, which implies equal opportunities to participate in all economic and political opportunities available. Thirdly, human development refers to the sustainable access to opportunities for current and future generations, taking into account economic, physical, human, and environmental sustainability. Finally, human

development entails empowerment, i.e. giving people the opportunity to participate in decision-making and to initiate development.

The HDI measures the average achievements in a country in three basic dimensions of human development (UN, 1995:12):

- A long and healthy life, as measured by life expectancy at birth
- Knowledge, as measured by the adult literacy rate (with a two-thirds weight) and the combined primary, secondary and tertiary gross enrolment ratio (with a one-third weight)
- A decent standard of living, as measured by the gross domestic product (GDP) per capita.

The HDI does not attempt to measure well-being or happiness, but is in fact a measure of empowerment. It is not a comprehensive measure of all the fields of human development, but rather a measure of a few selected areas of development as has been described. The UN (UN, 1995: 12) recommends that other indicators and indexes of well-being and development be used in conjunction with the HDI, to provide the complete picture of human development.

The HDI value illustrates how far a specific country still has to progress to attain certain defined goals, i.e. a life expectancy of 85 years, access to education for all and an adequate income. The HDI varies between 0 and 1; the closer a country's HDI value is to 1, the closer it is to attaining the preceding goals (UN, 1995: 18). The HDI is constructed first by defining a country's measure of relative achievement in each of the three categories, and second, by calculating an average for the three categories.

Figure 4.5   Human development trends in South Africa (1990 – 2003)
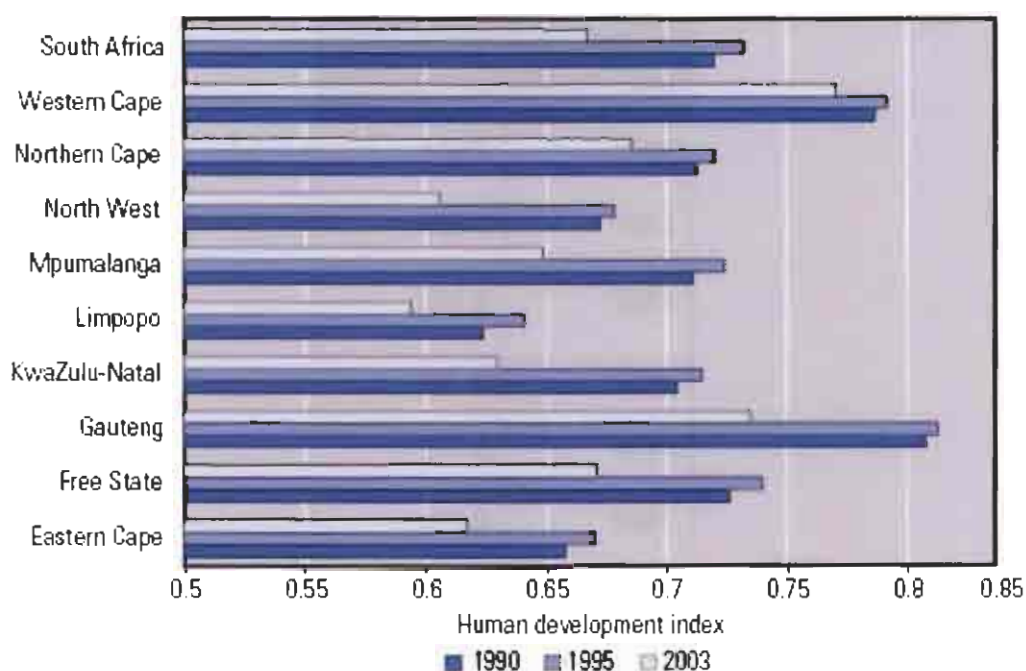
Source: UN (2003 (b): 44)

The figure illustrates South Africa's HDI development between 1990 and 2003. It indicates that, generally speaking, that the HDI of South Africans has increased between 1990 and 1995. Since 1995, however, a sharp drop has occurred in the HDI value of all provinces and South Africa as a whole, as is also depicted in the table below. South Africa's HDI trends over the past 30 years are as follows:

Table 4.4   Human Development Index trends – South Africa

Year	HDI value
1975	0.655
1980	0.674
1985	0.702
1990	0.735
1995	0.742
2000	0.696
2003	0.658

Source: UN (2003)

This table illustrates that South Africa's HDI value was increasing up to 1995, but has dropped sharply since 2000. This could be attributed the high mortality rate due to HIV/AIDS, and the resultant short life expectancy. It could also be ascribed to low levels of education and literacy (UN, 2003(b): 46). In 2003, South Africa reached its development goals by 65,8%, in comparison to 74,2% in 1995, a drop of more than 10% in eight years. According to the HDI values for South Africa over the past 30 years, the country is actually falling further behind from reaching the three goals of empowerment.

It can be concluded that the HDI is a more comprehensive measure of empowerment in three broad categories of human life, i.e. economic prosperity, living a healthy and fulfilling life, and education and access thereto. It is important though to keep in mind that the HDI index does no attempt or aspire to provide a single index of development, but should be used in conjunction with other measures of well-being and satisfaction in order to present an accurate account of the position of a region or country. The

following section will focus on the lessons learned and criticism against the use of social indicators, which will direct this study with regard to the identification and use of the different social indicators.

4.6   Evaluation of social indicators

Since the beginning of the social indicators movement in the 1960's these indicators have evolved and developed into more accurate and relevant indicators of well-being and welfare. In a previous section (see Section 4.2) a number of prerequisites for indicators, as well as the different types of indicators were mentioned. This section will provide information on the criticism against social indicators, or on certain types of indicators as well as lessons learned about the practical implications and use of social indicators.

The most commonly expressed criticism against social indicators is that these indicators are seldom put to use when they are developed (Cobb, 2000: 15; Miles, 1985: 181). Social indicators have thus failed to assist in the decision-making and policy-making processes. This can be ascribed to irrelevant indicators being used in the measurement of urban systems (Cobb, 2000: 15). Indicators are thus not successful due to the lack of purpose when they are designed. Without a purpose an indicator will not be of use to any institution. It is therefore very important that all indicators should be based on certain outcomes and be related to public policy goals (see Section 4.2).

A number of problems in this regard were identified by Cobb (2000: 16), including the utilisation of the indicators or data obtained. It has been mistakenly assumed by numerous authors that descriptive data will automatically lead to action. It is important to note that the data or index of development will not in itself correct mistakes. The index and descriptive data obtained should be analysed in order to identify problems and disparities within a community or within a region in order to correct them. Cobb (2000: 16) further pointed out that indicators are often used in "subtle, but effective,

ways to preserve the interests of those who benefit from the status quo". This statement implies that it is in many ways possible to manipulate and use indicators in such a way that they reflect, e.g. good governance, or good service delivery, in order to promote the image of the relevant authority or service provider. Carley (1981: 13) also warned against social indicators being used to advance particular political stances, or against data that could be distorted through "bureaucratic wrangling", to hide problems, or to make past policies look more or less successful. It should also be noted that "a number of social scientists believe that value conflicts are based on predictable patterns in every society, not on the arbitrary preferences of individuals" (Cobb, 2000: 16). In other words, increased understanding of the patterns in a community will allow them to treat differences as socially uplifting through solving issues together, rather than as a negative issue that drives communities apart.

Bauer (1966: 46) identified two major problems that have been experienced in the use of social indicators. The first is that the interference with data obtained is one of the most pressing problems of social indicators. Data which do not comply with what one wishes to measure or represent, are consequently interpreted to suit the purpose of what needs to be represented. Human interpretation and interference are thus concerns when social indicators are put to use. Carley (1981: 12) also warned against the interpretation, or in some instances misinterpretation, of data. The second problem is the interpretation of subjective. Psychological perceptions of individuals are not easily quantifiable, and are thus not easily measured. The concern therefore arises how subjective data can be quantified in a manner to be interpreted and applied to decision-making processes.

Miles (1985: 181) described in detail a number of problems that could occur when social indicators are used. His first problem dealt with refers to the application of social indicators in order to reach a goal. He pointed out that social indicators are of no use when they are not directed towards a specific purpose or goal. Furthermore, he warned against comprehensiveness and stated that it is important to establish priorities in terms

of the indicators to be used. It is also vital to establish how accurate and how timely data need to be, as "imperfect data may not only be the best that can be hoped for in many situations: they may be the most useful in terms of making decisions at an early enough stage to have maximum effectiveness" (Miles, 1985: 182). In the third place, Miles warned against the use of identical social indicators for every region or town, since circumstances differ from place to place. Social indicators which are used to assess towns cannot be utilised in assessing the well-being of a country since a single urban centre may exist under certain localised circumstances that is not applicable when a country is measured as a whole. This was mentioned earlier (see Section 4.2) as a prerequisite for social indicators, to be adaptable under different circumstances, be it economical, social or geographical circumstances. Finally, Miles issued a warning against making use of too much data. Social indicators are much more useful when key conditions and trends can be identified through a number of key indicators. One should thus be wary of trying to measure too much at once, and rather concentrate on identifying key indicators to address a single concern. This relates back to indicators that are designed to be outcome-based and address public policy goals (see Section 4.2).

It is of very important to take into account the problems that may occur and the lessons that have been learnt from past mistakes when social indicators are used. These lessons should contribute towards more reliable and relevant indicators, as well as reaching certain goals.

4.7   Conclusion

Chapter four was dedicated to social indicators in general, and also attempted to focus on two separate composite indexes of social indicators. This chapter had as goal the investigation of the numerous measures and indicators that have been used since the start of the social indicators movement in the early 1960's. These indicators mostly have one purpose, which is to determine economical, physical, environmental or social progress and development of the human race.

The first section described the development of social indicators over the past four decades, and listed a number of prerequisites for social indicators in general. A number of prominent characteristics will be of particular significance to this study, i.e. social indicators should be universal, flexible, adaptable, and have certain goals in view. This will be kept in mind when indicators for the proposed index are decided upon. Social indicators are also divided into two main groups, objective and subjective. Objective indicators are mostly easily measurable, while subjective indicators are difficult to assess and quantify.

The second section focused on objective indicators. This included the use of economic indicators as representatives of development, welfare and growth within a community. The GDP and GPI were discussed. The GPI is, in fact, a consequence of the GDP, and is in many respects based on the GDP. The GPI attempts to include externalities that are not taken into account in the GDP, as well as benefits from certain developments. The GDP has been found to be an inadequate measure of true growth and development since it only measures monetary growth, and does not take into account the positive and negative aspects of development. From this section it was concluded that the GPI is a much more accurate reflection of the true state of welfare in a country than the GDP.

Other objective indicators discussed in this chapter are environmental indicators. The most well-known indicator of environment is that of sustainability. This section highlighted the three types of sustainability, each with its own unique approach. The types are ecological, socio-economic, and urban sustainability. Each of these needs to be carefully considered in the assessment of an urban area. The second concept under discussion was that of the ecological footprint, which measures the area of land and resources needed for a community to sustain its current growth and development in the long run.

The third section attempted to explain a subjective indicator that of human perception. This section focused on the subjective variable *sense of place*, which refers to a person's personal view and experience of a certain environment, be it natural or urban. This aspect was included in the specific chapter and study due to the importance of psychological experience in the choice of individuals. This section indicated that not all urban centres have a *sense of place*, and neither can all urban centres be described as *place* due to a number of factors. The *genius loci* or *topophilia* of a place which can be summarised as the uniqueness and character of a place was also discussed.

The fourth section of this chapter was dedicated to the two composite indexes relevant to this study. The first index, the Quality of Life (QOL) index, was developed fairly recently and attempts to measure different aspects of human development and growth in order to express it as a single index. This index includes numerous variables such as material well-being, health, political stability and security, family life, community life, climate and geography, job security, political freedom and education. The second composite index to be discussed was the Human Development Index (HDI). The HDI does not claim or attempt to be a single index that expresses all aspects of human development. The HDI claims to be an index of empowerment and concentrates on measuring three aspects of human development, i.e. a healthy life, education, and a decent standard of living. Both these composite indexes attempt to take into account more that one variable and combine these to form a single index, which is the ultimate goal of the study at hand.

This chapter concluded was with a brief evaluation of social indicators in general. Numerous criticisms were raised of social indicators. Ranked among these are the misinterpretation of data and interference with data obtained. It was also emphasised that indicators should be developed with a specific purpose in mind and used for the purpose identified.

This chapter formed the final theoretical chapter of this study. The next chapter will attempt to use all the information obtained in order to create an index of vitality. Chapter five will propose a number of variables to be included in the index and use the proposed index in an empirical study to test its relevance and value in the planning profession.

CHAPTER FIVE

INDICATORS OF VITALITY

5.1   Introduction

The previous three chapters attempted to provide a background to a large number of measures and indicators of urban growth and development. Chapter Two focused on explaining the existence and importance of certain urban centres within a region in accordance with the services they deliver to the surrounding region. Chapter Two also called attention to the existence of an urban centre as part of a larger system, the urban system, and explained the hierarchy that exists between urban centres according to their spatial position and the role a specific centre plays within the region. Chapter Three provided a background to indicators which measure the relative importance of a town in spatial terms, viz. functional, social, economic and physical classification of urban centres. Chapter Four discussed the social indicator movement, and numerous indicators of growth and development which have been identified by various researchers. These included psychological, economic, environmental and composite indicators.

From the previous chapters valuable information was gathered and numerous lessons learned with regard to measuring urban centres. In this chapter the indicators that were discussed in detail in the previous chapters, will be put forward again in order to identify the most important indicators to measure an urban centre's prospects for sustainable growth and development. This chapter will divide each of the identified indicators into broad categories to establish a number of sub indexes to be included in a composite index. This chapter aims to conclude with a composite Index of Vitality, which will be a measure of numerous aspects of an urban centre, including its long-term fortitude prospects.

5.2   Revision of indicators

In previous discussions in this study numerous characteristics of indicators were highlighted. For the purpose of this chapter it is deemed necessary to revisit and emphasise some of these characteristics. A brief overview will also be given of criticism levelled at indicators in general, in order to avoid repeating errors identified by other authors.

The most common criticism (see Section 4.2.2) offered of the use of indicators is that they are not used for initiating change or addressing policy goals and issues (Cobb, 2000: 15; Miles, 1985: 181). It is thus important to make use of relevant indicators that address issues within a community. These indicators and proposed Vitality Index should be used to identify weaknesses and strengths within a town. Once weaknesses and strengths are identified it could be addressed by specific policy goals and initiatives. Bauer (1966: 46) and Carley (1981: 12) also warned against interference and subjective observation of data, as date should not be interpreted to fulfil one's own expectations, but should always be interpreted objectively. In addition, Miles (1985: 181) warned against comprehensiveness. He stated that one should not try to measure too many aspects (of life) in one single index, but should rather identify a certain goal and use only indicators specific to that goal. This study will, however, attempt to identify and create a comprehensive index, but the goal in mind will justify the use of numerous indicators. Only the indicators of highest value and importance will be highlighted and included in the index. Miles (1985: 181) also warned against using the same set of indicators and data for every town or region, since circumstances differ in various regions and the availability and quality of data will also differ from region to region or from country to country. Lastly, Miles (1985: 181) commented that the accurateness and timeliness of data should be established, since perfect data may not be available for certain regions within a constricted time period. He stated that imperfect data could also be utilised since this data may prove to be the most useful in making decisions timely enough to ensure maximum effectiveness within the community at the specific time.

5.3   Subgroups of indicators

The following sections of this chapter will be dedicated to discussions on relevant indicators reviewed earlier in this study. According to Land (1983: 1) social indicators can be divided into normative welfare indicators, satisfaction indicators, and descriptive social indicators (see Section 4.2.1). Normative welfare indicators closely correlate to objective indicators since they refer to direct measures of welfare, i.e. income. Satisfaction indicators, in turn, are psychological measures of a person's happiness and fulfilment in life. Satisfaction indicators use subjective surveys to obtain data indicating a person's contentment with his circumstances and life as a whole. Descriptive social indicators, the most inclusive category, refer to indexes of social conditions and changes therein. Descriptive indicators are thus an encompassing index of a number of indicators which measure social conditions within an urban centre or urban centres (see Section 4.2). Consequently this chapter will be further divided into these three subgroups. These will ultimately form part of the four subgroups in the Vitality Index, since most of the indicators discussed in this study can be categorised into one of these subgroups. The remaining indicators that do not fall in the scope of one of these subgroups are mainly spatial indicators and measures of spatial importance, and will hence be categorised under a fourth subgroup, i.e. spatial indicators (Land, 1983).

Figure 5.1   Subgroups of Vitality Index
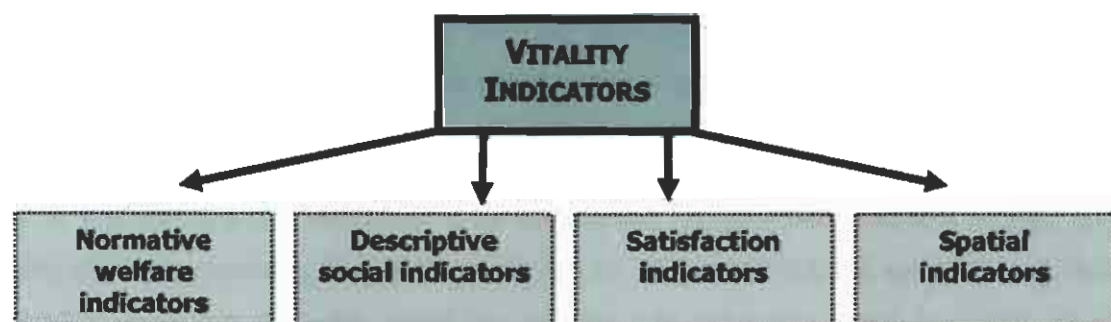
Source: Own deduction

5.3.1 Normative welfare indicators

Normative welfare indicators are objective indicators which act as direct measures of welfare within a community or region (Land, 1983: 1). This section will evaluate all the possible indicators that may be categorised as objective indicators of welfare. Consequently, a number of indicators will be identified to be part of the final Vitality Index, taking into account the availability of data and relative importance of the indicator.

In the first place, the basic-nonbasic concept was previously identified (see Section 3.3.2.1). The basic-nonbasic relationship describes the relationship between services and products provided for the local community (nonbasic), and services and products exported to the surrounding region (basic) (Alexander: 1954: 246) According to Harris and Ullman (1945: 7) a city depends not on the services and goods it produces for the local community, but on the services and goods provided to the surrounding region. The contribution made by the study of basic and nonbasic services is of great importance, according to Alexander (1954: 251) since it allows for the classification of cities according to the function they provide in the region. This relationship of basic-nonbasic services could thus be employed to measure a town's sectoral composition. The presence of a large export base (basic sector) may indicate future economic growth and development. The larger the export base, the more revenue is collected from outside the urban centre. Money is consequently not only circulated within the community, as with non-basic services, but money is added to the local economy.

The second indicator that may be categorised as a normative welfare indicator is the GDP (see Sections 3.3.2.2 and 4.3.1). In the past, public policy-makers generally relied on the GDP as a primary measure of a nation's well-being. Although numerous criticisms were levelled at the GDP (see Section 3.3.2.2), it can still play a role in measuring economic activity within a region or urban centre and data are fairly readily available for the whole of South Africa (RSA Regional Market Indicators, 2001). It should be

mentioned, though, that the GDP is not to be regarded as the sole measure of well-being, but should form part of numerous other indicators to assist in measuring towns or regions in terms of their overall performance and growth.

In the third place, the income of a community may be categorised as a normative welfare indicator. The income of a community is representative of its ability to satisfy its basic needs (DBSA, 2001: 8). This indicator correlates to the employment level and GDP of a community (see Section 5.5). Data on the average household income of inhabitants of South Africa are readily available and could be utilised to establish the levels of satisfaction a community experiences.

The final normative welfare indicator to be discussed is the GPI (see Section 4.3.2). This index of indicators encompasses a number of indicators which could be classified into other subgroups, but will be discussed in this section as the index is represented as a monetary value. The GPI thus attempts to address the concerns voiced about the GDP (see Section 4.3.1). The GPI is a fairly new concept and has not been calculated for all countries. GPI data are, for example, not available for South Africa. The GPI will consequently not be used in this specific study, but an attempt will be made to include factors of the GPI in order to present a more comprehensive view on development in general. This will include negative externalities such as pollution, and various indicators of social well-being (see Section 5.5).

5.3.2 Satisfaction indicators

According to Land (1983: 1) satisfaction indicators are subjective indicators indicating a person's general contentment with his life. In this subgroup two indicators are most prominent as representative of life satisfaction. First, a person's perception of the environment may be said to be indicative of his satisfaction in general. Human perception of the environment (see Section 4.4.1) was discussed earlier on in terms of

two concepts, viz. topophilia and genius loci. Both of these aspects are measured subjectively via surveys and questionnaires and will ultimately reflect a person's perception of the surrounding environment and the sense of place one experiences in the specific environment.

The concept of Quality of Life (QOL) was also under discussion in previous chapters (see Section 4.7.1). QOL attempts to quantify a number of general indicators to reflect a community's general feeling of well-being and satisfaction. This index comprises numerous variables such as material well-being, health, political stability and security, family life; community life; climate and geography, job security, political freedom and education. In the initial development of the QOL index, suggestions were made on data that should be used in the calculation of QOL. The QOL index thus consists of a number of objective and subjective indicators, some of which would be difficult to measure with limited data available.

The last indicators, satisfaction indicators, could also include the two environmental indicators (see Section 4.5), viz. sustainability and the ecological footprint (EF). Sustainability, in the first place, can be approached from three different angles, i.e. ecological sustainability, socio-economic sustainability, and urban sustainability (Wackernagel & Rees, 1996; Maclaren, 1996(b)). The concepts in question are a state of being rather than indicators of growth and development. They should therefore not be regarded as unimportant indicators in the measuring of an urban system's performance, but should rather be seen as a state that an urban system reaches when all other indicators show positive growth and development. The second environmental indicator is the ecological footprint (EF) which goes hand in hand with sustainability. The EF measures the impact a community or country has had on the ecological resources of the specific region (see Section 4.5.2) and whether or not the current trends are sustainable over the longer term (Venetoulis & Talberth, 2005: 2). Once again, the EF is not so

much an indicator of growth and development, as a measure of the impact of growth and development, or the demands of the community on its surrounding resources.

The satisfaction indicators thus consist of a person's subjective sense of a place, numerous indicators of QOL and environmental indicators, which entail sustainability and EF. Most of these indicators are difficult to measure and are liable to subjective views and interpretations. The satisfaction indicator subgroup is thus a more subjective group of indicators which could play a prominent role in the performance and growth measurement of urban centres. The following section will attempt to discuss the various indicators that fall within the scope of descriptive social indicators.

5.3.3 Descriptive social indicators

The subgroup of descriptive social indicators takes into account a large number of indicators, including physical, demographic, institutional and labour indicators. Land (1983: 1) described this subgroup as an encompassing index of indicators, be they objective or subjective indicators. Descriptive social indicators can thus be described as indexes of social conditions and changes therein over a period of time for various sectors of the population.

Numerous descriptive social indicators such as physical (see Section 3.3), demographic (see Section 3.3.4.1), institutional (see Section 3.3.4.3) and labour (see Section 3.3.4.2) indicators were discussed in the course of this study. These indicators are all based on objective quantitative data and are, therefore, fairly readily available and easy to interpret. The physical indicators are infrastructure and transport (see Section 3.3.1 and 3.3.2). Infrastructure is measured according to the availability of engineering and basic services. Data for the delivery of basic services are readily available and thus it is more practical to use as an indicator. The United Nations (UN, 1979: 185-204) proposed numerous transport related indicators which should be taken into account when a

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transport network is measured. Under these fall density of road systems, access needs of the population, quality of the road system, average distance between settlements within the region, classification of the road hierarchies, comprising national roads, regional roads, and local roads, modes of transport and the suitability thereof, road conditions and level of maintenance, and origin and destination of traffic. Numerous different indicators are thus proposed to measure a transport network within an urban centre.

The second descriptive social indicator is the demography of a region or town. Demography includes indicators (see Section 3.3.4.1) such as population, population growth rate, age and gender distribution, level of education and life expectancy. Most of these indicators are measured in the four-yearly census in South Africa and will therefore be easily obtainable to be used as indicators of growth and development. In the third instance, labour and employment (see Section 3.3.4.2) can also be classified as a descriptive social indicator. As in the case of demographic indicators, data are easily obtainable since unemployment levels are reflected in the census as well as the different sectors which provide employment.

The final descriptive social indicator to be included in this subgroup is that of institutional capacity. This indicator refers to the capacity of local government to provide basic services to the community as well as the capacity to manage the urban centre in question as efficiently as possible (see Section 3.3.4.3). Institutional capacity can either be measured objectively, through a rating-system such as developed by the DBSA (Steyn, 2005), or subjectively, through surveys made within the community to determine overall satisfaction with the municipal government. Descriptive social indicators can thus be measured without difficulty since data become available every five years through the local census. This concludes the indicator categorisation as proposed by Land (1983:1). The final subgroup to be discussed is that of spatial indicators.

5.3.4 Spatial indicators

Spatial indicators have not been proposed by any of the authors or researchers on indicators or social indicators. Most of the indicators discussed in this study focus on growth (GPI, see Section 4.3.2), human development (HDI, see Section 4.7.2), quality of life (see Section 4.7.1), and performance (GDP, see Section 3.3.2.2) within a single urban centre or within a country. The indicators provide for a comparison of urban centres, but not for the classification of centres in terms of regional importance. This study is focussed on the science of regional planning, and the spatial aspects of performance and growth should therefore play a central role in the Vitality Index. This study would therefore propose that spatial indicators be included in this study, since this study attempts to provide a measure of the spatial importance of urban centres, taking into account normative welfare, satisfaction and descriptive social indicators.

Various spatial measures and theories have been discussed in this study. The first measure of spatial importance to be discussed was the central place system and town's relative importance in the region based on the centrality of the town and the services it provides to the surrounding region (see Sections 2.3.1 and 2.3.3). Boudeville (1966: 112) described this regional growth pole as a number of growing industries situated in an urban area and stimulating further development of economic activity throughout its sphere of influence. Polarised regions are composed of heterogeneous centres, which are functionally interrelated. Richardson (1969: 69) suggested that these functional interconnections should be revealed in flow phenomena, and added that these flows do not occur at even rates over space. The heaviest flows tend to polarise towards and from the dominant node. The growth-pole concept may thus be regarded as an important indicator of future spatial growth and performance.

The position of an urban centre in the hierarchical distribution of towns (see Section 2.5) is also indicative of the relative importance of the specific centre in the region. The hierarchy of a town is and indication of its relative position or importance among towns

in a region. A town's hierarchy can thus be linked to its urban field, whereas the size of the urban field of a town will be directly proportional to its hierarchical order. The larger a town's zone of influence, the higher it will be ranked among other towns in that region.

The hierarchical distribution of urban centres closely correlates with the urban system (see Section 2.4) and a town's position in this urban system division. The urban system concept provides a view on the position of a certain urban centre within the surrounding region. The urban system of a region is indicative of the size of each urban centre, as well as of the services it provides. The levels of relations in the urban system will differ in scale and composition at different levels of urban hierarchy (Berry & Horton, 1970: 56; Bourne, 1975).

Another spatial indicator is the existence and relative location of development corridors since development corridors stimulate growth and development in nodes. Richardson (1987: 217) stressed that two individual growth centres will have reinforced viability when linked with a development axis, or when located at the end point of such an axis. It is proposed that existing policy initiatives also be included as Spatial Indicator. Policy initiatives as identified by National, Provincial and District Government will also play a role in the spatial importance of an urban centre. Urban centres mentioned in spatial policy documents are regarded as centres of potential growth, and therefore receive additional incentives to encourage growth.

It is proposed that the following spatial concepts be included as spatial indicators:

- The reason for the town's continued existence
- The position of the town within the urban system
- The hierarchical position of the town in the region
- The presence of development corridors in the region

- Existing policy initiatives as proposed by national, provincial and district governments.

The following section will attempt to give a short overview of the characteristics of indicators, and to categorise the indicators discussed in this study accordingly.

5.4 Characteristics of indicators and data

Earlier in this study, the distinctive characteristics of indicators were highlighted (see Section 4.2.1). This section will provide a concise and critical review of these characteristics. It will also attempt to measure the different indicators discussed in this study against these characteristics in order to identify the most useful and relevant indicators of vitality.

Carley (1981: 2) distinguished between indicators as *surrogates* and as *measures*. As a surrogate, the social indicator must always be related back to the concept which it represents, and as measures, social indicators are concerned with information that cannot be expressed on an ordered scale. In the identification of certain indicators to be used in the Vitality Index, it will be important to bear in mind that objective measurement will have to occur, due to numerous variables that cannot be expressed in an ordered scale. It will thus be necessary to identify a scale and measure a town or towns accordingly. It is also important, once this scale has been produced, to refer the results back to the original indicator and discuss the implications accordingly. From the discussion on a number of other characteristics and prerequisites (see Section 4.2). It became evident that indicators should be representative of the social conditions within a community and refer to outputs rather than inputs (Knox, 1975: 9). Not all indicators will be applicable or related to the specific region or towns. This fact is especially important to bear in mind in this study due to a lack of information on certain indicators. This chapter will thus attempt to identify indicators within the broad categories that satisfy these prerequisites.

Each indicator will be measured in terms of its compliance to the specific condition. The following prerequisites (see Section 4.2.1) have been identified ensuing from the suggestions of Liu (1975) and Knox (1975). An indicator:

1. They should be comprehensive measures of social conditions.

2. They should be available as a time series.

3. They should refer to the outputs of the system, rather than the inputs.

4. They should relate to public policy goals.

5. They should be universally applicable.

6. They should be easily understood.

7. They should be flexible so as to relate to any lifestyle among individuals at different places and times.

8. They should be adaptable to changing social, economic, political and physical conditions.

Table 5.1 provides an analytical methodology to sort through the indicators which have been discussed. This will be done to prevent the use of indicators that are not relevant to this study. The sorting method will also highlight indicators that do not meet the prerequisites, and which will not be used for this study. The filtering of indicators will contribute towards compiling a comprehensive Vitality Index which includes only indicators that satisfy certain stipulations as identified (Liu, 1975; Knox, 1975). As example the GPI indicator in the sub-category Normative Welfare Indicators will be discussed. The GPI is consequently measured in relation to each of the prerequisites, first, the GPI can be considered a comprehensive measure of social well-being, and are therefore highlighted. GPI data is however not available as a time series in South Africa, it does not refer to outputs or policy goals, is not universally applicable, easily understood or flexible, and is consequently not highlighted. The final prerequisite is met by the GPI, and is consequently marked. The GPI adhered to only two of the eight prerequisites, and is consequently regarded as a poor indicator for this specific study.

Table 5.1   Prerequisites for Indicators

Indicators	Prerequisites							
	1	2	3	4	5	6	7	8
Normative Welfare Indicators								
Basic/nonbasic ratio								
GDP								
GPI								
Income distribution								
Satisfaction Indicators								
SOP								
QOL								
Material well-being								
Health								
Political stability and security								
Family life								
Community life								
Climate and geography								
Job security								
Political freedom								
Gender equality								
Environmental								
Sustainability								
EF								
Descriptive Social Indicators								
Physical								
Infrastructure								
Transport								
Demography								
Population								
Population growth rate								
Age and gender distribution								
Literacy rate								
Life expectancy								
Labour and employment								
Institutional capacity								
Spatial Indicators								
Reason for continued existence								
Core-periphery								
Urban field/hierarchy								
Urban system								
Development corridor								
Policy initiative								

Source: Own deduction

This table is based on a subjective opinion of each of the indicators, and was compiled to assist in identifying indicators that may be utilised in this study. Indicators that satisfy the specific prerequisites have been marked. Indicators that meet at least five of the eight prerequisites will be taken into account for the Vitality Index. The second prerequisite, in particular, (should be available as a time series), will play an important role in identifying indicators since much of the data are not available in South Africa. Miles (1985) previously mentioned (see Section 4.6) it is not as important to use the perfect data, but rather to use the data that are available at an early enough stage to have maximum effectiveness.

5.5   Study area

The proposed study area which will be used to test the Vitality Index is situated in the Northern Cape Province (see Map 5.1). The Northern Cape Province is sparsely populated and has very few large urban centres. The urban centres also occur at irregular intervals. The geography of the area is fairly homogeneous. The area is therefore ideal for a study project such as this one since the geography will not influence the settlement of people. The homogeneous plain (Dicken & Lloyd, 1990: 15-16) is also highlighted by theorists of simplified settlement theories (see Section 2.2.1) as a way of simplifying the complexity of space economy.

Research in South Africa is mostly focused on the metropolitan areas and larger urban centres in the country (SACN, 2006). Unlike many other provinces, the Northern Cape has not been the subject of many research studies. This study will therefore attempt to make a contribution to undertake research in an area of the country which has not been researched extensively. The study area forms part of the rural area of South Africa. The Rural Development Strategy was first compiled in 1997, and a revision was completed in 2001. Because of the lack of rural development, the Presidency identified thirteen rural nodal points/towns in the country (SA, 2001), one of which is in the study area, emphasising the need for research and development in this area. This was the result of a lack of spatial planning capacity and initiatives. The White Paper (DLA, 2001) indicated

that all provinces should compile Spatial Development Frameworks (SDF) to direct development, but capacity is lacking. The Northern Cape Province does not have a SDF to guide development in the province.

5.5.1 Motivation

The identified study area allows for a complete range of urban centres in the urban system (see Section 2.4) to be evaluated. This study area was consequently identified as ideal to test the spatial contribution made by this study with regard to existing urban indicators. Two District Municipalities have been identified in the Northern Cape Province, namely Frances Baard District Municipality (DC 9) and the Kgalagadi District Municipality (DC 45). These two district municipalities are adjacent to each other and have specifically been selected since they include a large number of urban centres of different hierarchical levels (see Section 2.5). As Kimberley, the capital of the Northern Cape, is also situated in the Frances Baard DM, it makes for an even distribution of centres of various sizes and levels of importance.

The specific study area is represented in each of the levels of the urban system (see Section 2.4.1), and thus includes urban centres in the *national, regional*, and *daily urban systems*. This contributes greatly to the study, due to the inclusion of Spatial Indicators in the Vitality Index. The study area furthermore fits into the core-periphery model (see Section 2.3.2), with certain centres forming part of the core, while other centres and development corridors are included in the transition zone, and the periphery.

Map 5.1
STUDY AREA

Legend
● Main Towns
　 Rivers
　 Roads
　 Study Area
　 Municipal Boundaries
　 Provincial Boundary
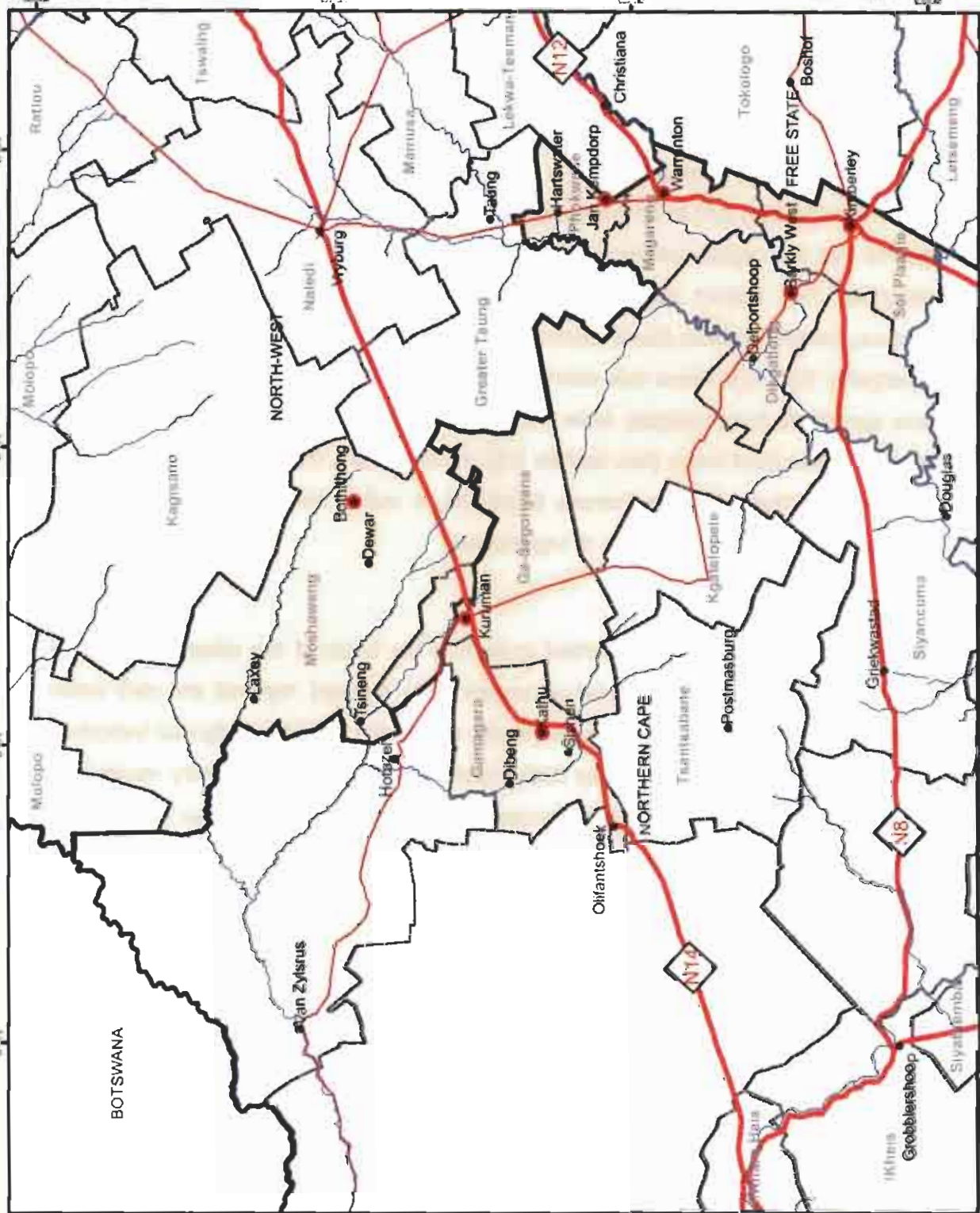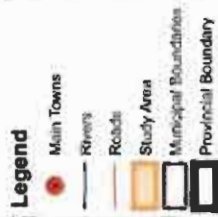
Due to the extent of the Northern Cape it is sparsely populated, with few national roads passing through. The latter is important to this particular study as the importance of a development corridor (see Section 2.4.2) and the influence it has on the urban centres close to it will be measured. The N12 and N8 passes through Kimberley and the N14 passes through large parts of the Kgalagadi DM. Since the Northern Cape is such a large province with numerous smaller settlements, the infrastructure is mostly insufficient in smaller towns. This will enable the study to also determine the importance of infrastructure as an indicator of vitality.

The study will concentrate on urban centres within the two District Municipalities, in question, which include the following Local Municipalities and centres (see Map 5.1):

- Frances Baard DM

    o Sol Plaatjie LM (NC 091): Kimberley

    o Dikgatlong LM (NC 092): Barkley West, Delportshoop, Windsorton

    o Magareng LM (NC 093): Warrenton

    o Phokwane LM (NC 094): Jan Kempdorp, Pampierstat, Hartswater

- Kgalagadi DM

    o Moshaweng LM (NC 451): Heuningvlei, Tsineng, Bothithong

    o Ga-Segonyana LM (NC 452): Kuruman, Mothibistad

    o Gamagara LM (NC 453): Deben, Kathu, Dingleton, Olifantshoek

This study will relate all data back to the largest town within each local municipality, as identified according to the size of population. This is as a result of the Local Municipality's political importance, and spatial initiatives which are mainly focused on

main urban centres in terms of SDF`s[1] (Spatial Development Framework) and IDP`s[2] (Integrated Development Plan), and the fact that data is released in this manner. The NSDP (2003) proposes to focus upon localities that demonstrate some economic potential and high levels of social need, since greater benefits will be achieved by focussing resources and effort on these localities. Consequently policy proposals (see Section 6.3.2) will be made for each of the main urban centres within the study area. The indicators which will be included in the Vitality Index will consequently be discussed briefly.

5.5.2 Indicators to be included in Vitality Index

The indicators have been fitted into four categories, i.e. normative welfares, satisfaction, descriptive social and spatial indicators. This section will identify the final indicators (based on availability) in each subgroup to be included in the Vitality Index, as well as mention the data which could be utilised for each indicator.

5.5.2.1   Normative welfare indicators

As discussed previously (see Section 5.3.1), normative welfare indicators refer mainly to objective indicators which directly measure the welfare of communities. The ideal indicators as discussed in this study would include the basic-nonbasic ratio (see Section 3.3.2.1), the GDP (see Section 4.3.1.1), the GPI (see Section 4.3.1.2), and income distribution (see Section 3.3.4.1).

The table of prerequisites (see Table 5.1) revealed that the GPI is an index that has not been utilised in South Africa, and therefore data are not available to calculate a GPI for each urban centre in the region. The GDP and basic-nonbasic ratio are not

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[1] Spatial Development Framework refers to a indicative plan showing desired patterns of land use, directions of growth, urban edges, special development areas (SA, 2001).
[2] Integrated Development Plan refers to a single inclusive strategic plan for the development of a municipality, which guides and informs planning and development (SA, 2001).

comprehensive measures of social conditions, but will be included due to their importance as indicators of economic welfare.

The following table gives a brief summary of the indicators, the measure of the indicators, and the availability of data for the study area.

Table 5.2   Normative welfare indicators

Normative welfare indicators		
Indicator	**Measure**	**Data available**
Basic-nonbasic ratio	% Basic vs nonbasic sectors	Yes
GDP	GDP	Yes
GPI	Consist of numerous indicators	No
Income	Income distribution	Yes

Source: Own deduction

Consequently the GDP, income distribution and basic-nonbasic ratio will be included as normative welfare indicators. The GDP is not available on urban centre level, but it may be assumed that the GDP of a local municipality will be representative of the largest centre in that municipality.

5.5.2.2   Satisfaction indicators

Satisfaction indicators are subjective indicators indicating a person's general contentment with his life (see Section 5.3.2). Possible indicators that were discussed during this study included sense of place (see Section 4.4), quality of life (see Section 4.5.1) and environmental indicators (see Section 4.3.2) including sustainability and ecological footprint.

Sense of Place would ideally be included in this survey considering the lack of subjective indicators in previous studies. Data are, however, not available and could not be compiled satisfactorily for the study area as a whole due to the extent of the study area. In the table of prerequisites (see table 5.1) the subindexes of QOL were set out individually. QOL is not currently measured in the study area, but some data included in the QOL index are available. An attempt will thus be made to include indicators of QOL in this study, although not all data are available. Environmental indicators include sustainability and the EF. Data for the study area are, however, not available[3]. A brief summary of the satisfaction indicators and the availability of data are shown in tabular form below.

Table 5.3   Satisfaction indicators

Satisfaction indicators		
Indicator	**Measure**	**Data available**
SOP	Subjective survey	No
QOL		
Material well-being	GDP	Yes
Health	Life expectancy	Yes
Political stability and security	Crime rates	Yes
Family life	Divorce rate	No
Community life	Church attendance	No
Climate and geography	Latitude, temperature, rainfall	Yes
Job security	Unemployment rate	Yes
Political freedom	Subjective survey	No
Gender equality	Male vs Female earnings	Yes
Environmental		
Sustainability	Extensive surveys	No
EF	EF calculator	No

Source: Own deduction

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[3] It could be mentioned that the EF for the Northern Cape Province is 4,3ha per person (My Footprint, 2006), this implies that every person requires 4,3ha to support his lifestyle. Worldwide there exist 1,8 biologically productive global hectares per person.

It is proposed that other data that are available for the study area be used instead. The following section will give a brief overview of descriptive social indicators.

5.5.2.3   Descriptive social indicators

The descriptive social indicators subcategory takes into account a large number of different indicators, including physical, demographic, institutional and labour indicators (see Section 5.3.3). Most indicators in this subcategory satisfy the prerequisites as set out in Table 5.1. The following table illustrates the different indicators which will be employed in this subgroup.

Table 5.4   Descriptive social indicators

Descriptive social indicators		
Indicator	**Measure**	**Data available**
Physical		
Infrastructure	Engineering services available	Yes
Transport	Distance to nearest national road	Yes
Demography		
Population	Population distribution	Yes
Population growth rate	Growth rate	Yes
Age and gender distribution	Distribution	Yes
Level of education	Literacy rate	Yes
Life expectancy	Life expectancy in years	yes
Labour and Employment	Unemployment rates	Yes
Institutional capacity	CA rating	Yes

Source: Own deduction

The data for this subgroup are fairly readily available and all the indicators will be employed. In terms of institutional capacity, the Demarcation Board (DME, 2006(b)) provides a capacity assessment for each Local Municipality and measures the municipalities in terms of the services they provide, as well as the standard of these

services. It is suggested that the Capacity Assessment of the Demarcation Board (2006(b)) be utilised in order to measure institutional capacity.

5.5.2.4   Spatial Indicators

Spatial indicators have not been used in previous assessments, therefore this section will be regarded as a contribution to research on spatial planning. Numerous indicators and measures for spatial importance were discussed in this study (see Sections 2.2, 2.3, 2.4, and 2.5). On the strength of these discussions the following indicators were deemed the most important indicators of spatial importance and spatial performance.

The first spatial indicator is the reason for the continued existence of the town (see Section 2.2) and the part the town plays in the larger region. It is proposed that the reason for the continued existence of a town be measured in terms of the tress index, which indicates the level of diversification or concentration of the economy of a town or region (see Section 3.3.2.2). The tress index also highlights the most prominent economic sector of the region, indicating the main contribution made to the economy, and thus relate to the reason for the existence of the town.

The second spatial indicator is a combination of the core-periphery model (see Section 2.3.2) and the urban system (see Section 2.4). These two indicators combined could also be regarded as supportive indicators of regional importance of each urban centre. This will be compiled in an objective manner, starting with the largest centre (in terms of population), and categorising each of the other centres accordingly on the Vitality scale (one to four). A third spatial indicator which is deemed important is the urban field of each urban centre (see Section 2.3). This indicator will be indicative of the size of each centre's urban field, and therefore act as supportive indicator of the importance of the centre within the region.

In the fourth instance, the presence of a development corridor is deemed important to be included as a spatial indicator. As discussed previously, the presence of such a

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development corridor usually stimulates development in urban centres close to, or on the corridor. Since the proposed study area does not include a nationally recognised development corridor, the presence of national roads could be regarded as stimulant of growth and development (Richardson, 1987. Typically, this refers to roads such as the N14, N8 and N12, which fall within the scope of the study area. Consequently the urban centres will be classified with regard to the distance to the closest national road.

The last spatial indicator to be proposed is referred to as *policy initiative*, and will indicate urban centres mentioned as growth and development centres, first on a national level (National Spatial Development Perspective, 2003), second on a provincial level (Northern Cape Growth and Development Strategy, 2001), and third, on district municipality level (Kgalagadi SDF, Frances Baard SDF). The following table summarises the spatial indicators proposed for this study.

Table 5.5   Spatial indicators

Spatial indicators		
Indicator	**Measure**	**Data available**
Reason for continued existence	Tress index	Yes
Regional importance	Urban system	Yes
Urban field	Central place index	Yes
Development corridor	Distance from development corridor	Yes
Policy initiative	Growth centre in NSDP, NCGDS, SDF	Yes

Source: Own deduction

The spatial indicators identified meet most of the prerequisites (see Table 5.1) and are therefore regarded as accurate indicators of growth and development. The following section will illustrate the composition of the Vitality Index.

5.5.3 Composite Vitality Index

The four subgroups of indicators under discussion will form the Vitality Index as illustrated below. Each of the different subgroups will ultimately carry the same weight (1/4) when the Vitality Index is calculated.

Figure 5.2   Composite Vitality Index
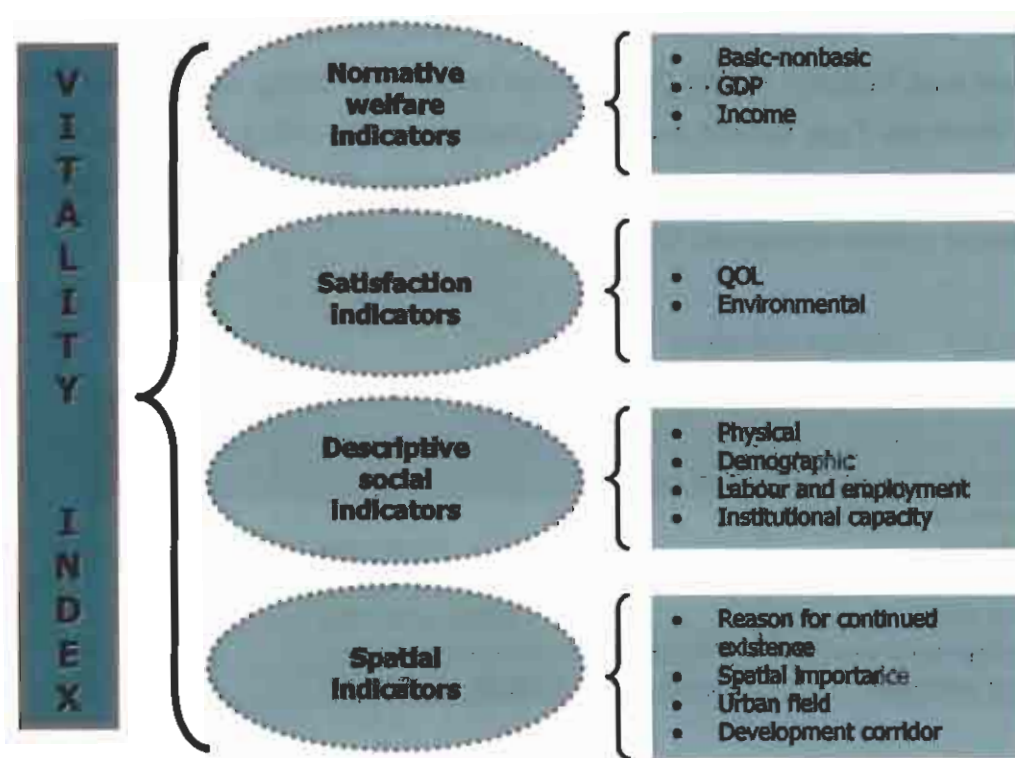
Source: Own deduction

The Vitality Index in its final form will be calculated in a fashion similar to the calculation of the HDI (see Section 4.5.2). Each subgroup will thus carry an equal weight since the four subcategories are regarded as equally important in determining the vitality of urban centres.

5.6   Empirical study

Data obtained in 2001 will be used for this study, since this is the most recent and reliable data derived from the national census. The data from the 2001 census are readily available and allow for generalised data usage. Data will be obtained for each Local Municipality for each indicator. The Northern Cape Province consists mainly of a few core urban centres (Central Place Index), with a large number of less significant small rural settlements. The data available for each of the Local Municipalities could thus be regarded as representative of the largest urban centre within the municipality. The main town within each municipality was consequently determined (Central Place Index), and comprises the following urban centres (see Maps 5.2 and 5.3):

- o   Ga-Segonyana Municipality: Kuruman

- o   Gamagara Municipality: Kathu

- o   Moshaweng Municipality: Bothithong

- o   Phokwane Municipality: Jan Kempdorp

- o   Sol Plaatjie Municipality: Kimberley

- o   Dikgatlong Municipality Barkley West

- o   Magareng Municipality: Warrenton.
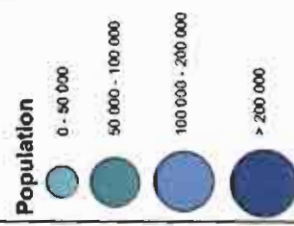
Map 5.2
URBAN SYSTEM
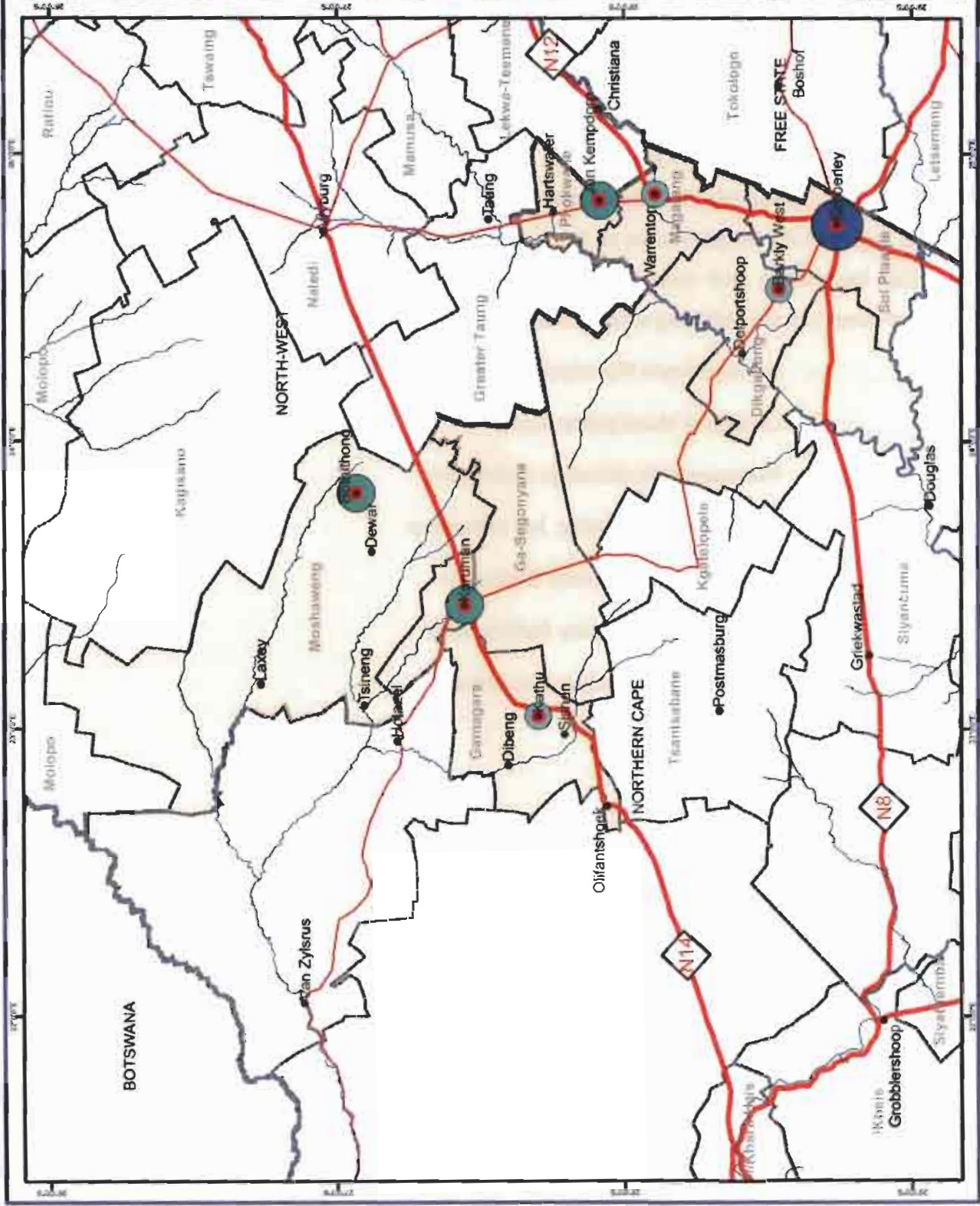
Map 5.3
URBAN FIELDS

Legend
• Main Towns
— Rivers
— Roads
Study Area
Municipal Boundaries
Provincial Boundary
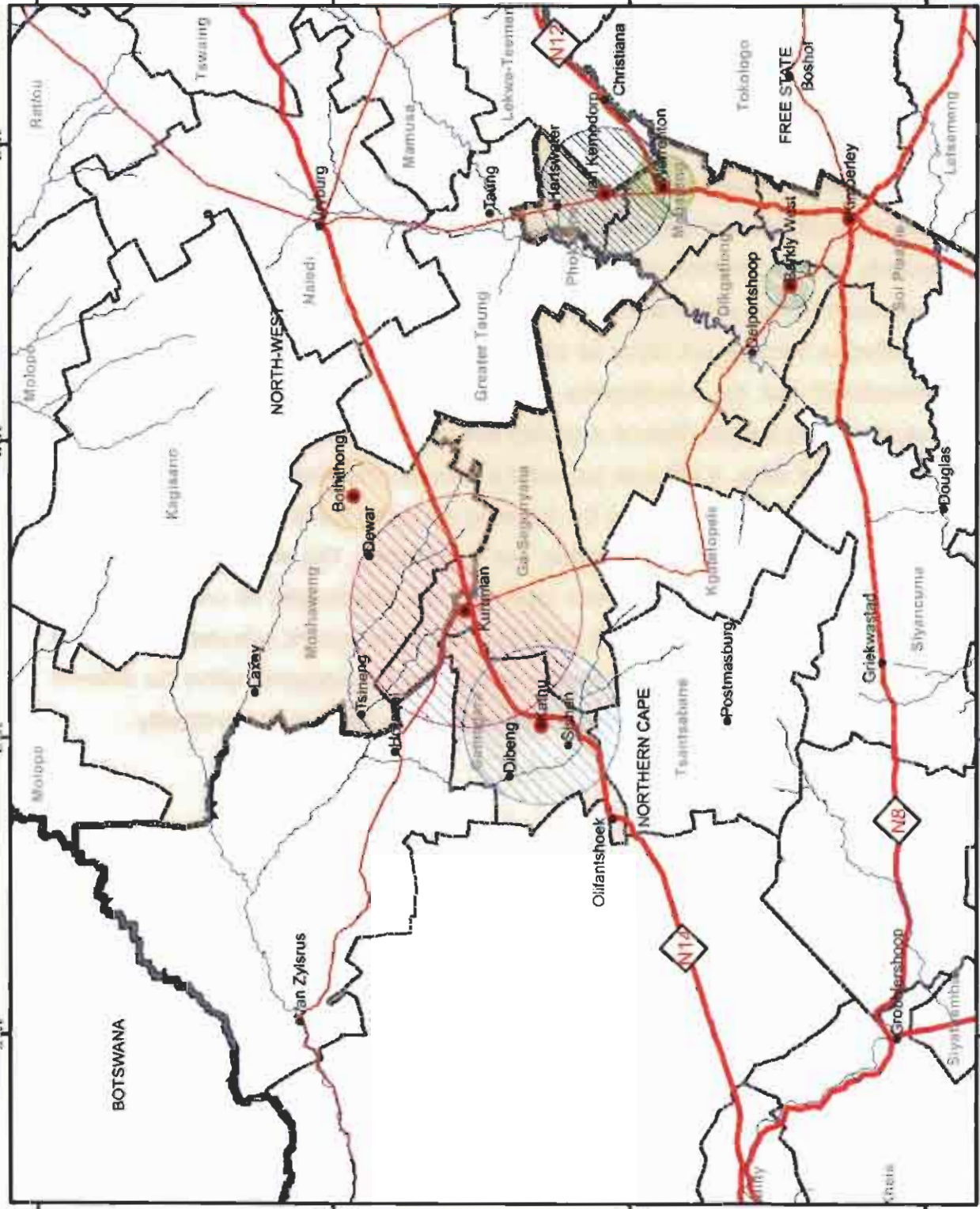
Each of the subcategories will be discussed in this section in order to explain the data employed as well as the method for calculating the scores for each indicator. In each category a score between one and four will be awarded; four being the highest score that can be obtained. Each of the indicators is assessed in terms of a percentage value. The percentage values are categorised in quartiles. This was decided upon since divisions of 25% allow for a broad categorisation of indicators, without going into too much detail. The quartile categories still allow for significant trends to be identified. This quartile classification also allows for a definite distinction between urban centres that are spatially more important (scores of three and four) and urban centres of lower importance (scores of one and two). This implies that none of the urban centres will be classified as average, but rather as either strong or weak spatial centres. It should be remembered that the subcategories do not consist of exactly the same number of indicators. This was not deemed necessary due to each sub-category being related back to an average value, it will thus not make a difference whether a subcategory includes more indicators than another. In the following discussion it will be observed that some of the indicators appear in more than one subcategory. This was deemed necessary since some of the indicators fit into more that one subcategory; to omit an indicator within a subcategory will therefore result in a void in the specific subcategory. It is also the intention to investigate and compare each of the sub-categories within the different Local Municipalities in order to compare the main towns within each municipality.

5.6.1 Normative welfare indicators

The indicator *basic-nonbasic ratio* is measured in terms of the GDP contribution of each sector within each municipality (RSA Regional market indicators, 2001). First, the nine sectors are categorised according to sectors serving the basic market (i.e. agriculture, mining and manufacturing), and sectors serving the nonbasic market (i.e. electricity and water, construction, wholesale and retail trade, transport and communication, finance and business services, and community, governmental and personal services). The percentage value for each of the sectors is calculated and scores are awarded

accordingly. Municipalities with a larger nonbasic sector division are awarded higher scores, since the nonbasic sectors are indicative of exports, which in turn are potentially indicative of a high level of growth and development.

The *GDP* indicator is measured in terms of the relative GDP contribution of the municipality to the largest GDP contribution in the study area (RSA Regional market indicators, 2001). The municipalities are scored according to the percentage contribution made in proportion to the largest contributing municipality. The final scoring is done according to the percentage contribution made by the municipality. A value of between 0-24% presupposes a score of one, 25-49% a score of two, 50-74% a score of three, and 75-100% a score of four. The municipalities with the largest GDP contribution are thus regarded as more important.

The indicator *income* is measured in terms of income distribution in the study area. Household income is one of the main indicators of welfare in a region since it measures the capacity to meet basic needs, i.e. food, clothing, and shelter (DBSA, 2001: 9). Data were obtained (DBSA, 2006(b)) which represents the percentage of people within each municipality with a monthly income of below R6 000. Scores are awarded according to these percentages. Since this is a negative indicator the highest score (four) is awarded to the municipalities with the lowest percentage of people with an income of below R6 000.

The total value, as well as the percentage value for the subcategory *normative welfare indicators* is subsequently calculated. The table below lists the normative welfare indicator scores for each municipality out of a total of twelve (three indicators with a maximum score of four for each), indicating that the Gamagara Municipality (Kathu) scored the highest in this subcategory. This could be ascribed to the large GDP contribution this municipality makes to the region due to the iron ore mining activities in

the municipal area. The municipalities of Ga-Segonyana (Kuruman) and Magareng (Warrenton) scored the lowest in this category.

Table 5.6   Normative welfare indicator scores

Indicator	Ga-Segonyana	Gamagara	Moshaweng	Phokwane	Sol Plaatjie	Dikgatlong	Magareng
Basic-nonbasic ratio	1	3	2	2	1	3	2
GDP	1	2	1	1	4	1	1
Income	3	4	4	3	3	3	2
Subcategory total	5	9	7	6	8	7	5

Source: Own deduction

The subcategory attains a score between one and four according to the average percentage obtained (see Table 5.10) for all the indicators in the category (see Map 5.4.1).

5.6.2 Satisfaction indicators

This subcategory contains six indicators of satisfaction. First, the material well-being of each municipality is scored in terms of the GDP as discussed in the previous section (see Section 5.6.1). Second, health of the inhabitants is measured in terms of relative life expectancy. Since life expectancy data could not be obtained, it was necessary to make use of a substitute for the health indicator. The percentage of the municipal population (Census, 2001) above 65 years is calculated for each municipality, where the municipalities with a higher percentage of older people obtain higher scores.

The following indicator is that of political stability and security. This is measured through the number of crimes reported in 2001 for each municipality (ISS, 2001). The number of

Map 5.4.1
NORMATIVE
WELFARE
INDICATORS

Legend

● Main Towns
Rivers
Roads
□ Municipal Boundaries
▢ Provincial Boundary

Score
1
2
3
4

12,190,000
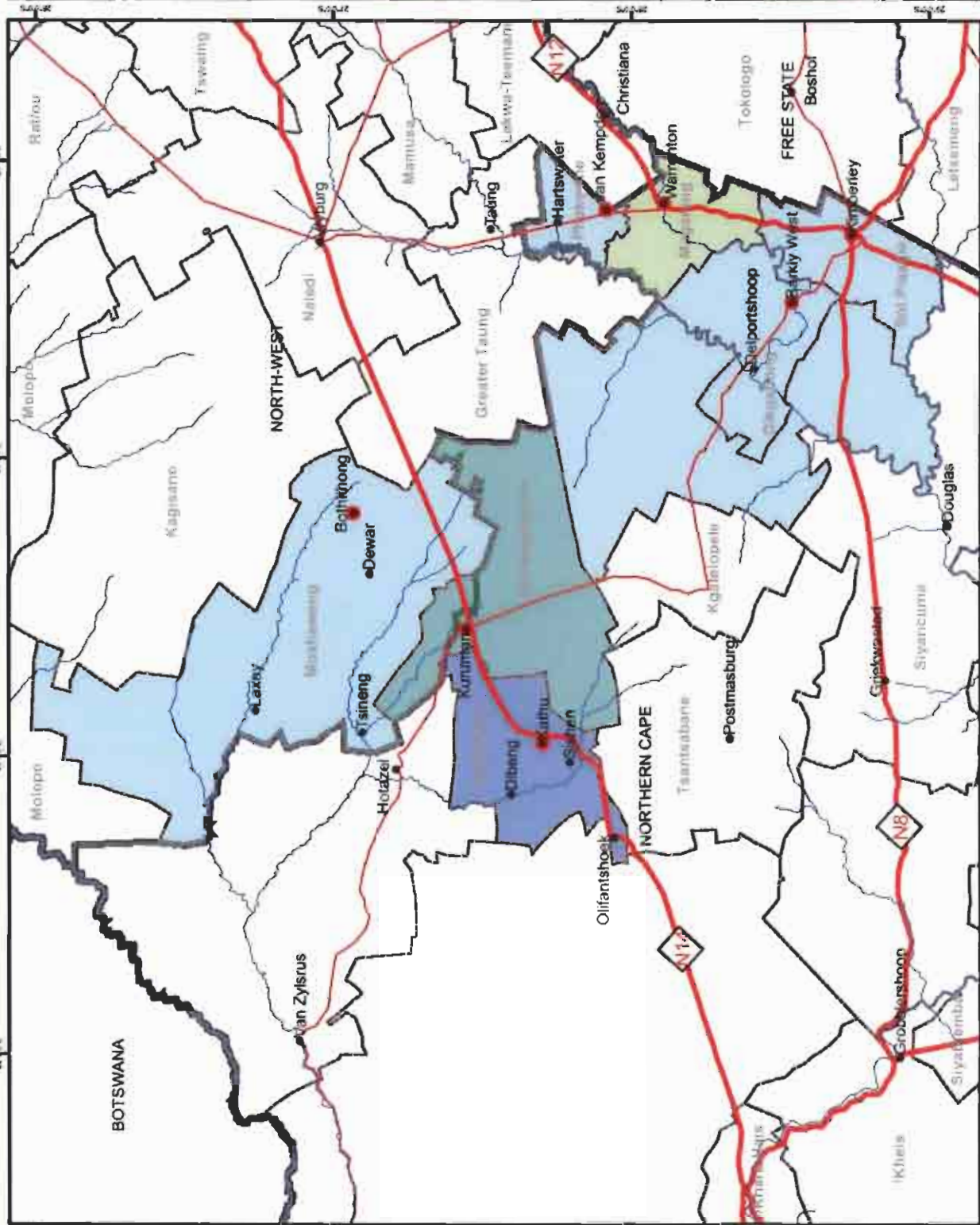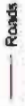
crimes is related back to the population of the municipality and scores are obtained accordingly. This is also a *negative* indicator, and therefore a higher score (four) is awarded for lower percentages of crime.

The next indicator of QOL is job security, which is measured in terms of the percentage of employed people versus the unemployed (Census, 2001). Unemployment has economic costs since it decreases output and wears away human capital (DBSA, 2001: 18). The municipalities with a higher employment percentage obtained a higher score, and those with a lower employment percentage, and thus a high rate of unemployment, obtained a lower score.

The next indicator of QOL is gender equality, which is measured in terms of male versus female earnings (Census, 2001). The percentage of females who have no income is established first. The higher the percentage of females who do not earn an income, the lower score the municipality in question obtains.

The last indicator in this subcategory is environmental. The environmental indicators discussed in this study included sustainability (see Section 4.3.2.1) and EF (see Section 4.3.2.2). Data for these indicators are, however, not available for the study area. The proposed indicator to be used instead is the land degradation level (HSRC, 2002). This entails the removal or loss of the indigenous vegetation cover that protects the soil (HSRC, 2002: 120), which can be regarded as an environmental indicator. According to the HSRC (2002) four different levels of degradation exists, i.e. not degraded, lightly degraded, moderately degraded, and severely degraded. The municipalities obtained scores of between one and four; one indicating severely degraded land, and four indicating land that is not degraded at all.

The scores obtained for each indicator in this category will consequently be added up. The table below illustrates the scores obtained by each municipality. This score is out of a total of twenty four.

Table 5.7   Satisfaction indicator scores

Indicator	Ga-Segonyana	Gamagara	Moshaweng	Phokwane	Sol Plaatjie	Dikgatlong	Magareng
QOL							
Material well-being	1	2	1	1	4	1	1
Health	3	1	1	3	3	3	3
Political stability and security	4	2	4	3	2	3	2
Job security	3	4	2	3	3	3	2
Gender equality	2	2	2	2	2	1	2
Environmental							
Degradation level	3	3	3	3	3	3	3
Subcategory total	16	14	13	15	17	14	13

Source: Own deduction

This table illustrates that the Sol Plaatjie Municipality (Kimberley) constitutes the highest levels of satisfaction. This could be ascribed to the easy access that the residents have to numerous services. Kimberley also provides job opportunities and stability to its people. Moshaweng (Bothithong) and Magareng (Warrenton) scored the lowest in this category, especially in terms of material well-being.

A percentage value will consequently be calculated and the sub-category will once again be scored on an index (see Table 5.10) between one and four (see Map 5.4.2). The following section will give an overview and brief summary of indicators and calculation methods used for the descriptive social indicators.

Map 5.4.2
SATISFACTION
INDICATORS

5.6.3 Descriptive social indicators

There are nine descriptive social indicators which are divided into physical, demographic, labour and employment as well as institutional capacity indicators. The first indicator, infrastructure, is measured in terms of access to basic services, including water, electricity, refuse removal, sanitation, telephone services and housing (DBSA, 2006(b)). The percentages of people with access to each of the services are calculated. These percentages are then ranked from the place with the highest (seven) access levels to the lowest (one) access levels. A percentage is calculated for the average level of access, which is in turn used to score the municipalities. Those with high levels of access (50-74%, and 75-100%) obtain higher scores (three or four), while municipalities with poor levels of access to services obtain lower scores (one or two).

The transport indicator is measured in terms of distance to the nearest national road, which will for the purposes of this study, refer either to the N12 or the N14 (see Map 5.1). The distance from the main town of each municipality to the closest national road is determined; this ranges from 0 km to 95 km. The highest score (four) is obtained by the town (municipality) closest to the national roads, and the further off a town is situated from the national road, the lower the score.

The next indicator, which is categorised under the subgroup demography, is population. The population of the individual municipalities is calculated (Census, 2001), and the largest municipality identified. Each of the other municipalities is presented as a percentage of the largest municipality, and is scored accordingly. The largest municipality obtains the highest score (four), since population is an indicator of the importance of a place (Brush, 1953:382). The benefit of this indicator is that it condenses all the different elements in a settlement to a sole general denominator.

The population growth rate is also classified as a descriptive social indicator. The population growth rate is regarded as an important indicator, especially for planning purposes (DBSA, 2001: 6). A negative growth rate indicates the out-migration of people, which could be ascribed to the lack of opportunities and declining economic growth (DBSA, 2001: 6). The indicator is scored according to the growth in population between 1996 and 2001 (DBSA, 2006(b)). The municipalities are ranked according to their growth in population, and scored accordingly. Municipalities with a higher growth rate are scored higher, since this constitutes in-migration, and therefore economic prospects and growth.

Gender distribution is the next indicator to be scored. The gender distribution within a municipality is calculated (Census, 2001) and then compared to the national average distribution. The municipalities are scored according to their deviation from the national norm, municipalities that deviate from the norm between 0-1 % obtain the highest score (four). The greater the deviation from the national norm the lower the score will be. This indicator is not perfect, however, since it does not take into account the slanted gender distribution on account of mining activities in the study area. This indicator will not influence the subcategory significantly, since numerous other indicators are taken into account.

The next indicator refers to level of education, and will be measured on the basis of literacy rate. The literacy rate of the population in municipality refers to the percentage of the population above thirteen years who have accomplished a Grade 6 or higher qualification (DBSA, 2001: 12). The literacy rate for each municipality is calculated as a percentage (DBSA, 2006(b)), and each municipality is scored accordingly. The municipalities with a literacy rate of between 0-24% obtains one point, of 25-49%, two, 50-74%, three, and 75-100% obtains four.

The next indicator, life expectancy, has been discussed in a previous section (see Section 5.6.2). Employment rates have also been discussed in a previous section (see Section 5.6.2). It is important to note that these indicators have been included in both subcategories for the sake of completeness of each subcategory since the sub-categories for each municipality will ultimately be compared and analysed.

The final indicator in this subcategory is institutional capacity. Institutional capacity was discussed earlier on in this study (see Section 3.3.4.3) and reference was made to two methods of institutional rating developed by the DBSA (DBSA, 2006(a)). This report is however regarded as confidential. Consequently data on the municipalities could not be obtained. The Demarcation Board also compiled a capacity assessment for the various municipalities (Demarcation Board, 2006). The municipalities are measured in terms of numerous functions that should be performed and ultimately obtain a percentage which represents the percentage of functions performed. The scores are obtained on the basis of the more functions a municipality performs, the higher it is scored. The scores (out of thirty six) of each municipality in terms of the descriptive social indicators are shown in tabular form below.

Table 5.8   Descriptive social indicator scores

Indicator	Ga-Segonyana	Gamagara	Moshaweng	Phokwane	Sol Plaatje	Dikgatlong	Magareng
Physical							
Infrastructure	1	3	3	2	3	1	2
Transport	4	4	2	1	4	3	2
Demography							
Population	2	1	2	2	4	1	1
Population growth rate	3	3	1	2	2	1	1
Age & gender distribution	4	3	1	4	3	4	3
Level of education	3	4	2	3	4	3	3
Life expectancy	3	1	1	3	3	3	3
Labour and employment	3	4	2	3	3	3	2
Institutional capacity	3	3	1	3	4	2	3
Subcategory total	26	26	15	23	30	21	20

Source: Own deduction

This table illustrates that in terms of the descriptive social indicators, the Sol Plaatje Municipality (Kimberley) can be considered the most important urban centre. Kimberley scored high for all indicators, except population growth, indicating a possible out-migration of people. Moshaweng Municipality (Bothithong) manage to score only fifteen out of a possible thirty six. In terms of social importance this municipality is thus ranked very low.

The total value, as well as the percentage value for the subcategory descriptive social indicator is subsequently calculated. The subcategory obtains a score between one and four (see Table 5.10) according to the average percentage obtained for all the indicators in the category (see Map 5.4.3). The first three subcategories, i.e. normative welfare, satisfaction, and descriptive social indicators, can be regarded as performance indicators (see Section 4.2.1), since they are indicative of the performance of each urban centre and local municipality in general. The following section will discuss the final subcategory, spatial indicators. Since these indicators have not previously been used a number of ways in which to measure them will be indicated.

Map 5.4.3
DESCRIPTIVE
SOCIAL
INDICATORS

Legend
● Main Towns
Rivers
Roads
Municipal Boundaries
Provincial Boundary

Score
1
2
3
4
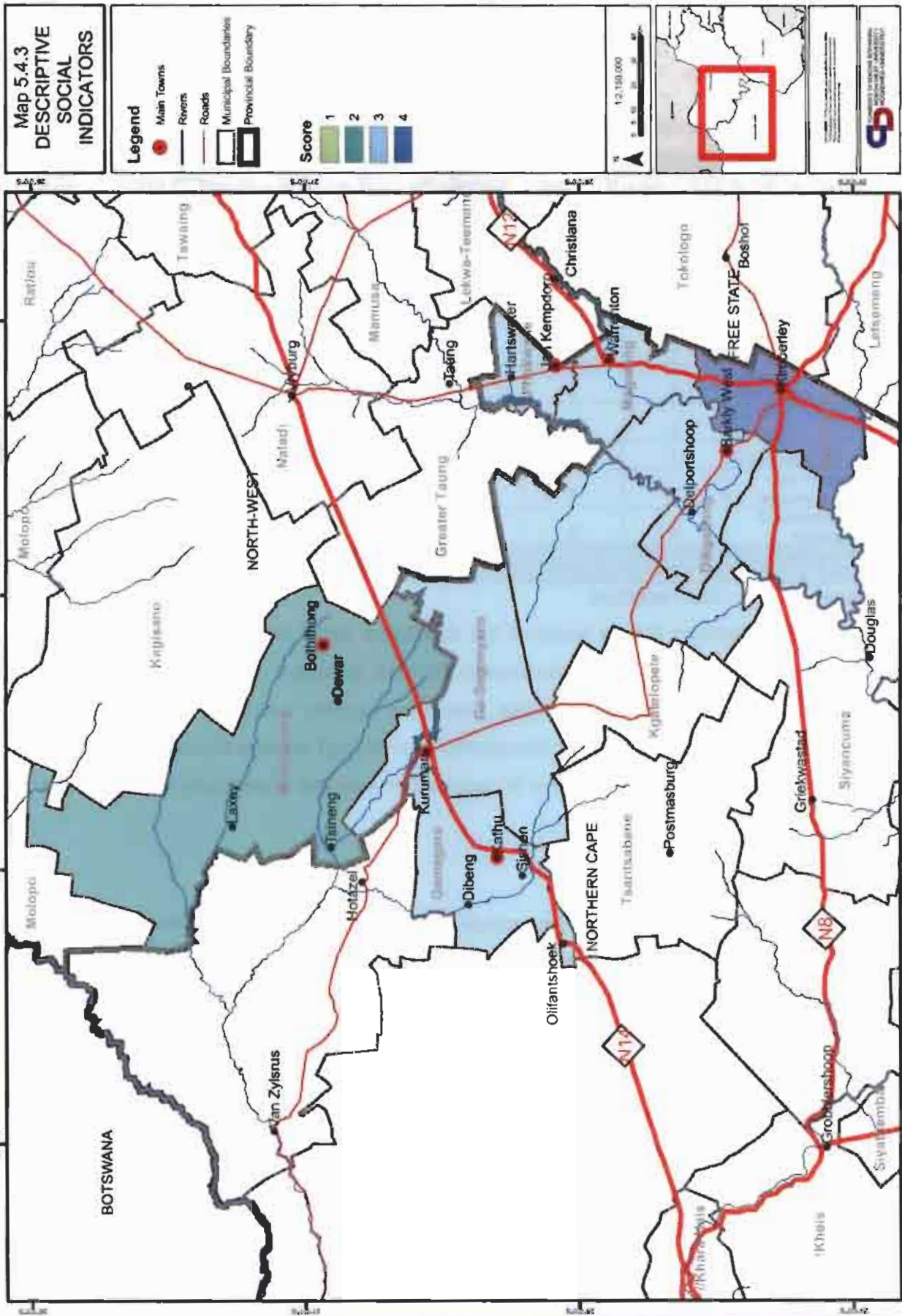
5.6.4 Spatial indicators

The spatial indicator is a new concept, identified and recognised in this study, which attempts to measure urban centres and their importance within the surrounding region. The spatial indicators that have been identified throughout this study include the following: 1) Reason for continued existence 2) Regional importance 3) Urban field 4) Development corridor and 5) Policy initiative.

The reason for the continued existence of an urban centre will be measured in terms of the tress index. The tress index indicates the level of diversification or concentration of a town's or region's economy (see Section 3.3.2.2). This index also highlights the most prominent economic sector of the region, indicating the main contribution made to the economy, and thus reflects the reason for the existence of the town. This indicator is measured in terms of the tress index for each municipality, the higher the index, the lower the score will be. This is due to the fact that a tress index closer to 100 indicates a concentrated economy being dependent on a single or few sectors for economic growth. This may imply that the region is vulnerable to exogenous variables, i.e. climate, commodity price fluctuations, and the world economy (DBSA, 2001: 25).

The second spatial indicator is regional importance. This indicator attempts to illustrate the regional position of a town within the greater urban system. The indicator is scored according to the population of each of the main towns, compared to the total of the largest town. The largest centre obtains a score of four, and the other centres obtain scores in accordance with the percentage of the total population of the largest town (see Map 5.2).

The next indicator, urban field, is measured in terms of the central place index (see Section 2.3). The business index was compiled for the main town within each local municipality; the urban centre with the largest index (100) obtains four points. Urban

centres with a business index between zero and nine obtains one point, between ten and fourteen, two, and an index between fifteen and twenty obtains three points. This indicator subsequently indicates the centrality of the urban centre, and the extent of the business services provided to the surrounding region (see Map 5.3).

The fourth spatial indicator is the development corridor. The spatial implications of a development corridor have been explained (see Section 2.4.2), and it is deemed an important indicator of spatial importance of an urban centre. This indicator is measured in terms of the distance (in km) between the main towns within each municipality and the nearest development corridor. All the main towns in question are within a radius of 100km from either the N12 or the N14. Towns closest (between 0-24 km) to these corridors obtain four points, between 25-49 km three points, between 50-74 km two points, and the town farthest away (75-100km) obtains only one point.

The last spatial indicator is the policy initiative. This indicator measures the urban importance of an urban centre in terms of policy initiatives. Three levels of policy initiatives are recognised: the NSDP (2003) on national level, the NCGDS (2001) on provincial level, and the Kgalagadi and Frances Baard District Municipality's IDP documents on district level. N urban centre (main town within the municipality) obtains three points if special mention and policy initiatives are proposed for the specific town, on a national level (NSDP). Two marks are obtained if the main town is mentioned in terms of policy initiatives on a provincial level (NCGDS), and one mark is awarded if mention of policy initiatives is made on a district level. The total score (out of a possible six) for each municipality is calculated as a percentage and scores are obtained accordingly.

The table below illustrates how score are obtained for each indicator within the sub-category. The maximum score which may be obtained is twenty.

Table 5.9　　　Spatial indicator scores

Indicator	Ga-Segonyana	Gamagara	Moshaweng	Phokwane	Sol Plaatjie	Dikgatlong	Magareng
Reason for continued existence	2	1	2	4	2	2	3
Regional importance	2	1	2	2	4	1	1
Urban field	3	2	1	2	4	1	1
Development corridor	4	4	2	1	4	3	2
Policy initiative	4	4	1	1	4	1	1
Subcategory total	15	12	8	10	18	8	8

Source:　　　Own deduction

Map 5.4.4
SPATIAL INDICATORS

Legend
● Main Towns
— Rivers
— Roads
□ Municipal Boundaries
▣ Provincial Boundary

Score
1
2
3
4
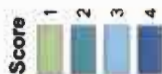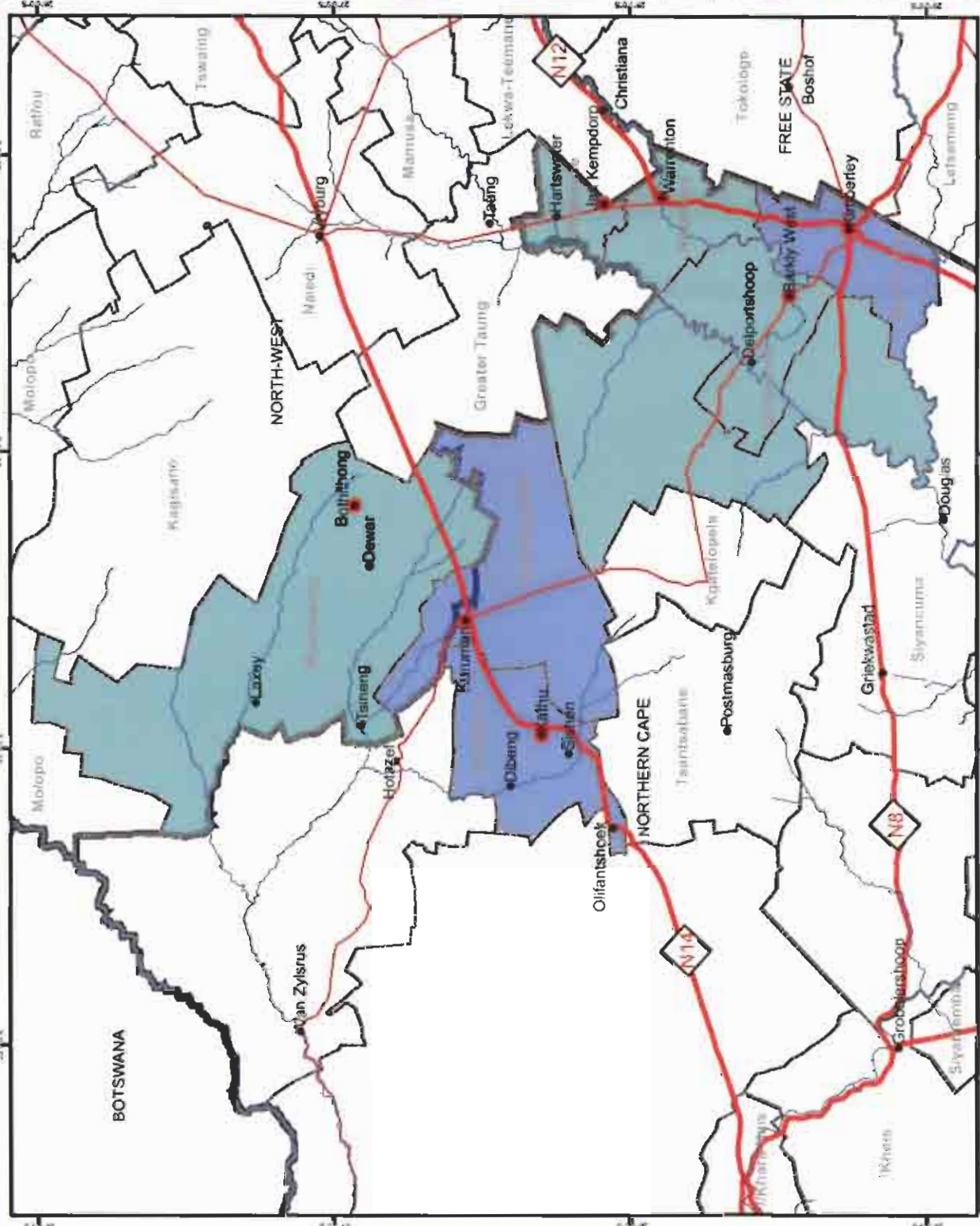
This table illustrates that in terms of the proposed spatial indicators, Kimberley (Sol Plaatjie Municipality) is by far the strongest node within the region. This may be ascribed to the fact that Kimberley is the capital of the Northern Cape Province, thus providing all possible services and acting as central node for the entire Northern Cape. Kimberley is followed by Kuruman (Ga-Segonyana Municipality), Kathu (Gamagara Municipality) and Jan Kempdorp (Phokwane Municipality). The other three towns, Bothithong (Moshaweng Municipality), Warrenton (Magareng Municipality), and Barkley West (Dikgatlong Municipality) scored eight marks, each indicating less significant regional importance.

The scores obtained for the subcategory spatial indicator are added together and calculated as a percentage value (see Table 5.10). Scores between one and four are obtained for the sub-category (see Map 5.4.4).

5.6.5 Vitality Index

The Vitality Index comprises each of the above-mentioned subcategories, i.e. normative welfare, satisfaction, descriptive social and spatial indicators. The Vitality Index may be calculated in two different ways. First, the Vitality Index could be calculated in order to provide a score between one and four as with the sub-categories. The Vitality Index will consequently be determined for each municipality by adding all the scores for each subcategory, i.e.

Vitality Index $=$ (¼) Normative welfare indicator score

$+$ (¼) Satisfaction indicator score

$+$ (¼) Descriptive social indicator score

$+$ (¼) Spatial indicators score

This measurement gives a broad overview of scores obtained by each main town within each of the municipalities (see Map 5.4.5). The table below illustrates the final Vitality Index Score, as proposed by this study, for each municipality, subsequently representing the main town identified within each of the municipalities.

Table 5.10   Vitality Index score

Indicator	Ga-Segonyana	Gamagara	Moshaweng	Phokwane	Sol Plaatjie	Dikgatlong	Magareng
Normative welfare indicator score	2	4	3	3	3	3	1
Satisfaction indicator score	3	3	3	3	3	3	3
Descriptive social indicator score	3	3	2	3	4	3	3
Spatial indicator score	4	4	2	2	4	2	2
Vitality Index %	63.89	66.39	48.54	56.60	77.71	53.75	41.60
Vitality Index Score	3	3	2	3	4	3	2

Source: Own deduction

This table suggests that Kimberley (Sol Plaatjie Municipality) is the urban centre with the highest vitality, which is an indication of the town's ability to stay vibrant and function in an effective way (see Map 5.4.5). Kimberley is followed by Kuruman (Ga-Segonyana Municipality), Kathu (Gamagara Municipality), Jan Kempdorp (Phokwane Municipality), and Barkley West (Dikgatlong Municipality), each of which obtained a vitality score of three. These towns thus show the ability to perform their tasks effectively and to provide for the needs of their residents. Bothithong (Moshaweng Municipality) and

Warrenton (Magareng Municipality) on the other hand have low levels of vitality with a score of two each. Bothithong and Warrenton are thus ranked low with regard to spatial importance within the study area as a whole. The final Vitality Index scores are illustrated below, per urban centre, or main town within each local municipality.

Figure 5.3   Vitality Index – Urban centre score
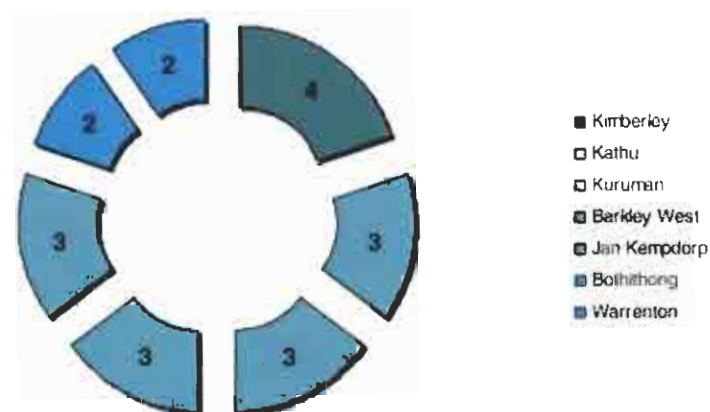
Source: Own deduction

The second method proposed to determine the Vitality Index will allow for a ranking of the different main towns within the study area. Accordingly, the average percentage scored for each municipality within each subcategory is calculated (see Table 5.11). The average Vitality Index percentage for each municipality is calculated and the municipalities are ranked accordingly. The municipality with the lowest average percentage is ranked one, and the municipality with the highest average percentage, seven.

Map 5.4.5
VITALITY INDEX
SCORE

Legend
● Main Towns
— Rivers
— Roads
▢ Municipal Boundaries
▢ Provincial Boundary

Score
1
2
3
4

1:2,160,000

BOTSWANA

NORTH-WEST

FREE STATE

NORTHERN CAPE

Table 5.11   Vitality Index rank

Indicator	Ga-Segonyana	Gamagara	Moshaweng	Phokwane	Sol Plaatjie	Dikgatlong	Magareng
Normative welfare indicators	41.67	75.00	58.33	50.00	66.67	58.33	16.67
Satisfaction indicators	66.67	58.33	54.17	62.50	70.83	58.33	54.17
Descriptive social indicators	72.22	72.22	41.67	63.89	83.33	58.33	55.56
Spatial indicators	75.00	60.00	40.00	50.00	90.00	40.00	40.00
Vitality Index %	63.89	66.39	48.54	56.60	77.71	53.75	41.60
Vitality Index rank	5	6	2	4	7	3	1

Source: Own deduction

This table essentially represents the same data as Table 5.10, but in this case each sub-category is assigned a percentage value. This allows for a more accurate classification of the urban centres in terms of spatial importance. The table also allows for a more significant interurban (see Section 4.2.1) evaluation of the subcategories. Kimberley (Sol Plaatjie Municipality) assigned the highest ranking since it illustrates an average vitality percentage of 77,71%. Kathu (Gamagara Municipality) surprisingly illustrates the second highest vitality with 66,39%, which could be ascribed to the mining activities and rapid economic growth within the mining sector. It should also be noted that the gap between the highest and second highest rank is more than ten percent, Kimberley thus excels as a definite core centre within the study area. The town which ranked third is Kuruman (Ga-Segonyana Municipality) with 63,89%, followed by Jan Kempdorp (Phokwane Municipality) with 56,6%, and Barkley West (Dikgatlong Municipality) with 53,75%. The two urban centres which ranked lowest are Bothithong (Moshaweng Municipality) with 48,54% and Warrenton (Magareng Municipality) with 41, 60%.

The following figure provides a graphic representation of each of the indicators within the municipalities out of a possible total of four hundred.

Map 5.4.6
VITALITY INDEX
RANK

Legend

● Main Towns
— Rivers
— Roads
☐ Municipal Boundaries
☐ Provincial Boundary

Rank
1
2
3
4
5
6
7
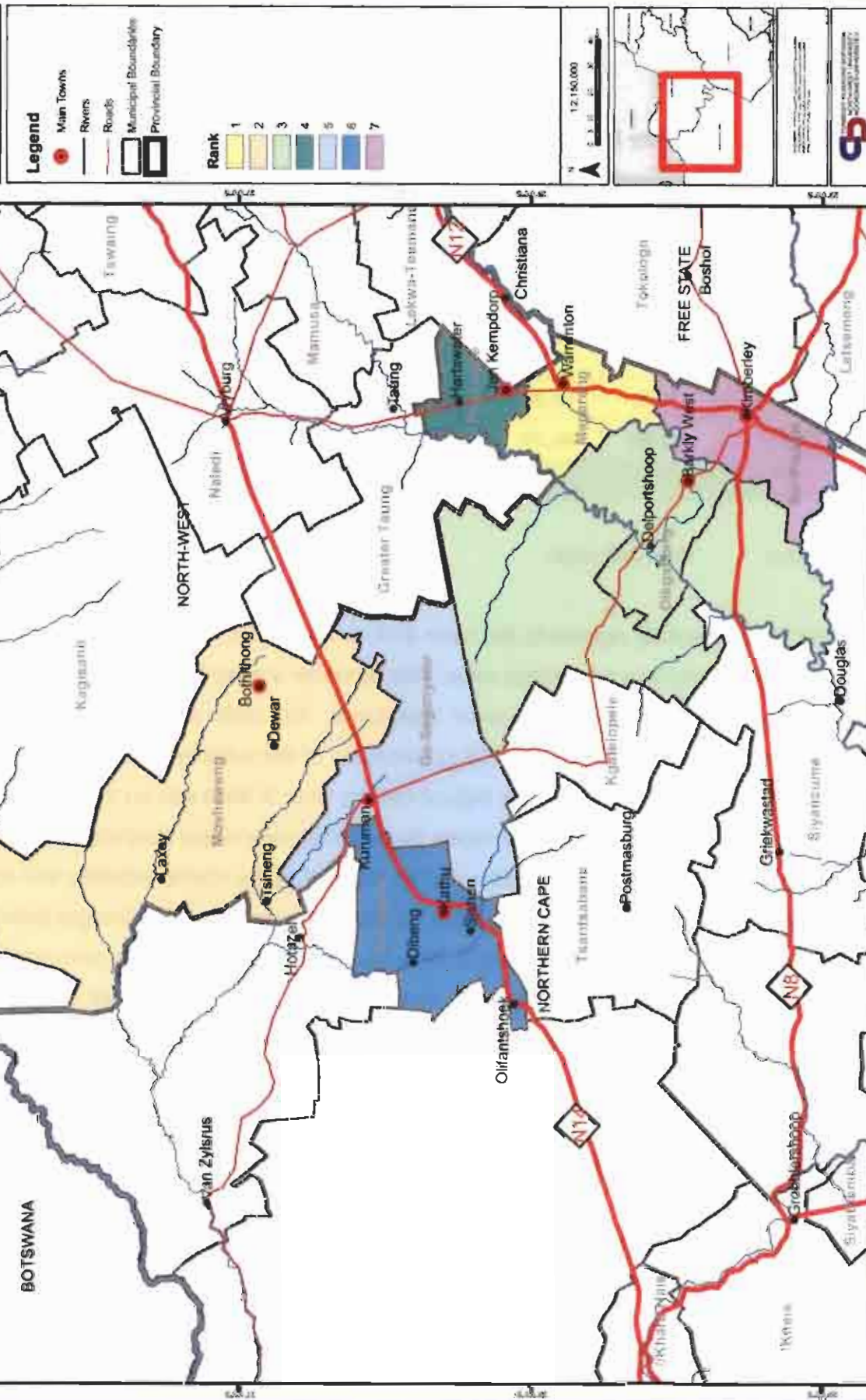
Figure 5.4   Vitality Index – Indicator contribution (%)
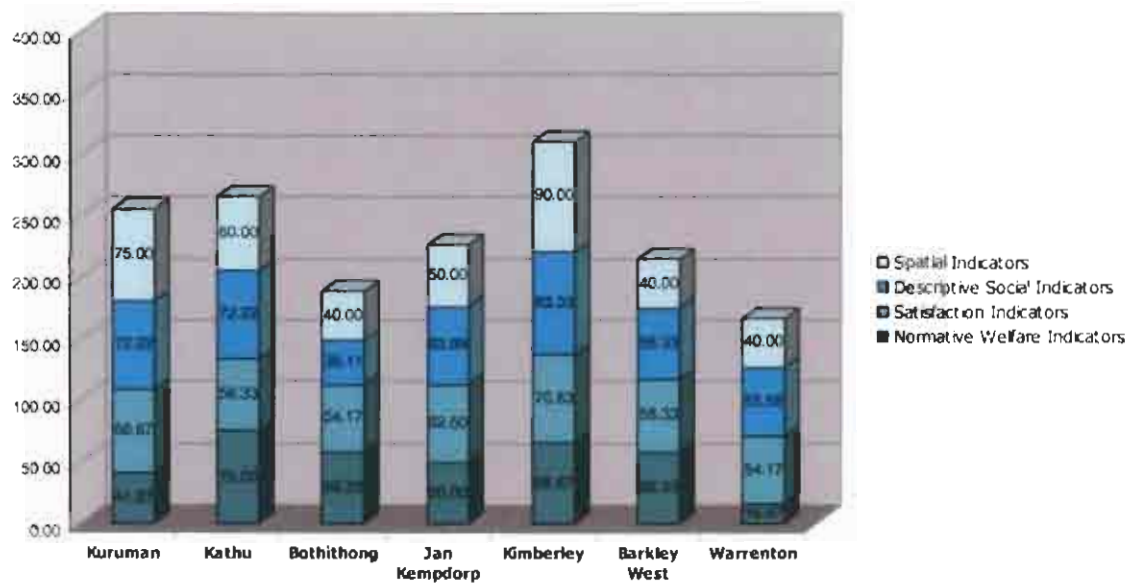
Source: Own deduction

This figure not only allows one to recognise the total contribution of each municipality, but also gives an overview of the contribution of each urban centre in each subcategory. The figure represents the second method of calculating the Vitality Index according to percentage contribution.

The figure below illustrates both the proposed calculation methods per urban centre, viz. ranking the urban centre from least (one) to highest (seven) importance, as well as illustrating the scores for each main urban centre within the local municipalities.

Figure 5.5   Vitality Index - Urban centre score and rank
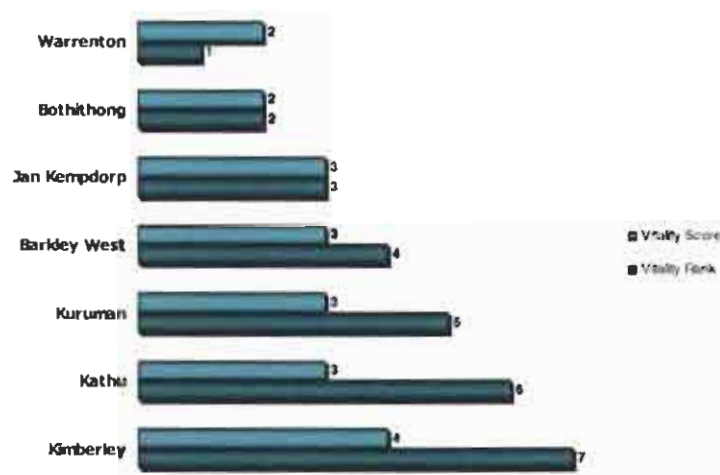
Source: Own deduction

The preceding figure clearly illustrates the regional importance of each urban centre within the study area, starting with Kimberley, the town of greatest importance with the highest possible Vitality Index score (four) as well as the highest possible ranking (one). Kathu, Kuruman, Barkley West and Jan Kempdorp all obtained the same score (three), but their ranking differ (second, third, fourth, and fifth respectively) when the second method of calculation is employed. This is on account of the fact that the second calculation allows for a detailed differentiation between urban centres (up to a hundredth of the percentage scale), while the first delineation method only allows for a broad categorisation (quartiles). It is thus possible to use the Vitality Index on two different levels, whether for a broad categorisation or for a detailed ranking, in accordance with the needs of the study.

5.7   Conclusion

This chapter concludes the study with the proposal of an index to measure the regional importance of urban centres within a larger region, taking into account numerous factors and aspects of urban centres. This chapter proposed that a composite index be used for the measurement of urban centres. The Vitality Index was proposed for this purpose. The concept of vitality, in this study, refers to the ability of an urban centre to sustain life, and perform and function in an effective way.

It was proposed that the Vitality Index should consist of four subcategories, i.e. normative welfare, satisfaction, descriptive social and spatial indicators. The first three subcategories occur in numerous other studies and indexes, but the spatial indicators have not been included in the previous measurement of urban centres in a composite index. The study deemed it important to not only compile a single index including all of the indicators, but to divide the indicators into different subcategories. This will allow for interurban comparison and the identification of possible problem areas within the study area. Each of the subcategories comprises various indicators deemed important for the effective and contributory measurement of urban centres. Due to the fact that various indicators, proposed by other authors, are not available in South Africa, a number of substitute indicators were utilised instead.

This chapter concluded with an empirical study to test the effectiveness of the proposed Vitality Index and the indicators within each of the subcategories. Each of the indicators is measured according to date obtained in 2001, the most recent national Census year. Due to the lack of data on urban centre level, it was deemed necessary to investigate the indicators on municipal level. Seven Local Municipalities in the Northern Cape Province were involved in the study area due to the lack of research in this particular region, as well as the distribution of urban centres on different hierarchical levels. A main town was identified in each municipality by making use of the central place index.

Data were thus gathered and calculated on a municipal level, and related back to the main town within the municipality.

Each of the main towns was subsequently measured in terms of the indicators identified within each subcategory. Scores between one and four were obtained by each indicator, and ultimately added together to score each of the subcategories individually. This allows for interurban analysis. The final Vitality Index for each municipality (and main town) was determined in two ways, namely by scoring each of the municipalities according to an average score obtained, and secondly, by ranking the main towns based on a percentage contribution of each subcategory. The second calculation and ranking allow for a more detailed comparison between urban centres, whereas the first method categorises the urban centres into four broad categories.

The Vitality Index scores and rankings revealed that Kimberley is undoubtedly the centre of greatest importance within the study area. Kimberley thus illustrates the ability and capacity to function in a more effective manner than the other centres of lower rankings. Kimberley is followed by Kathu, Kuruman, Jan Kempdorp and Barkley West, respectively. The two centres of least importance and lowest vitality were identified as Bothithong and Warrenton.

The final chapter will provide a brief synthesis of the study, and will conclude with proposals concerning the enhancement of the Vitality Index and proposed uses for the Vitality Index.

CHAPTER SIX

SYNTHESIS AND RECOMMENDATIONS

6.1   Introduction

This study was initiated to provide a comprehensive Index of Vitality for urban centres. The Vitality Index attempted to evaluate and measure urban centres in terms of growth and general performance on different levels. The Vitality Index attempted to provide a comprehensive composite index which reflects the vitality of an urban centre and which could assist in comparing and evaluating urban centres within a delineated study area. A number of indicators of growth, development and service delivery were consequently classified into four broad subcategories. This included three categories as identified by Land (1983:1), viz. normative welfare, satisfaction, and descriptive social indicators. A fourth subcategory, spatial indicators, was regarded as important to be included since it had been overlooked in the past. These four subcategories make interurban comparison and measurement in terms of numerous indicators possible.

This final chapter in this study will attempt to provide a broad synthesis of the indicators discussed throughout the study. This chapter will also provide a synthesis of the proposed Vitality Index and the results obtained in the measurement of the study area. The study will conclude with a number of proposals; first, proposals with regard to the Vitality Index, and second, with regard to the study area and the results of the Vitality Index.

6.2 Synthesis

In the first chapter, the following specific objectives (see Section 1.3) were proposed for the study:

- To include spatial indicators in a composite index

- To include qualitative indicators in a composite index

- To compile a Vitality Index from numerous indicators

- To use the Vitality Index to identify shortcomings or problems within urban centres

- To use the Vitality Index to recognise spatial concerns within the region

- To use the Vitality Index to promote a specialised policy response for relevant government spheres.

The main aim of this study was therefore to propose a detailed comprehensive index to measure the growth, development, performance and regional importance of urban centres in specific. Since limited attempts have been made to measure an urban centre in terms of spatial importance, it was deemed important for measurement to take into account as many of the aspects contained and performed by urban centres. These functions include numerous aspects of everyday life, which have been measured often before. The aspect that was regarded as of great importance, but which had not been included in previous studies is that of spatial planning, or the regional context of urban centres. This study thus commenced with an examination on the urban centre as entity, and its position and role in the surrounding region (see Chapter Two).

6.2.1 The occurrence of urban centres

Any study on spatial planning naturally entails an overview of the existence of urban centres and the reason for settlement within a certain context (see Section 2.2). Chapter Two thus presented an overview on general settlement theory, taking into account two broad types of settlement theory, i.e. simplified settlement theory on a homogenous plain (see Section 2.2.1), and also, settlement theory based on a

heterogeneous land surface (see Section 2.2.2). The central-place theories of Christaller (1966) and Lösch (1954) were discussed, both providing for a system of hexagonal service areas. The theories of Christaller and Lösch are mainly used as a supportive tool in regional planning to derive hierarchical order of places (see Section 2.5). This study attempted to utilise the concepts of central and non-central places as described by Christaller and Lösch in order to derive a hierarchical order of urban centres within the study area (see Section 5.5). This study has confirmed that urban centres do occur at regular intervals arranged around a stronger central place (see Maps 5.2 and 5.3). The concept of central places can be linked with most of the indicators discussed in this study. Therefore the size of the central place will be influenced by a number of spatial indicators, namely the urban system (see Section 2.4.1), development corridor (see Section 2.4.2) and the urban hierarchy (see Section 2.5). The central place system also relates to the concept of the core-periphery model (see Section 2.3.2), and the concept of urban fields (see Section 2.3.3). Accordingly a larger urban centre of greater spatial importance will form part of the core node in the core-periphery model, and will thus have a larger urban field to support.

In the discussion on heterogeneous surfaces (see Section 2.2) reference was made to Weber (1929) and his theory of least effort which implies that an industry, and by implication an individual, will locate at the point where the least effort (including distance and mass) is required. Richardson (1973) criticised the assumption of a homogeneous plain, since it is too far removed from reality and thus not representative of reality. Richardson (1973: 173) argued that urban centres exist at a certain location on account of a number of locational constants. Examples of these constants are immobile natural resources, long established city, or sites with a particular advantage. This study also revealed that certain urban centres have a strong advantage over other centres due to locational constants. These centres often form the core centres of the region (see Section 2.3.2) with the largest urban field (see Section 2.3.3). The main towns, as identified in this study, included two centres of which the primary reason for their settlement was the occurrence of natural resources (Kimberley and Kathu).

Chapter Two directed attention to the region surrounding the urban centre, taking into account the core-periphery model (see Section 2.3.2), and the occurrence of urban fields (see Section 2.3.3) The core-periphery model (Friedmann, 1966) explains the economic growth process in spatial terms according to four phases of development. This model also identifies three different types of urban centres in the spatial economy, viz. primary, secondary and tertiary centres. In the empirical study of the study area three different levels of urban centres, in terms of population, were evident (see Map 5.2). This included the primary centre (Kimberley), the secondary centres (Kuruman, Bothithong and Jan Kempdorp), and the tertiary centres (Kathu, Warrenton and Barkley West). The area surrounding the urban centre is known as the urban field (see Section 2.3.3) and refers to the influence sphere of the urban centre on the surrounding region (see Map 5.3). The stronger the influence sphere of an urban centre, the more important the role it fulfils within the specific region (Richardson, 1969: 67-69). This was thus regarded as an important spatial indicator at a later stage in the study (see Section 5.6.4). The influence sphere of a region is related back to numerous other indicators as discussed in this study, i.e. the physical infrastructure (see Section 3.3.1), the economic role it fulfils in the region (see Section 3.3.2), the number of functions provided (see Section 3.3.3), and the social and demographic composition of the urban centre (see Section 3.3.4). The urban centre's spatial position in the urban system (see Sections 2.3.2 and 2.4) further influences the scoring of economic, environmental and subjective indicators (see Section 4.3.1, 4.3.2, and 4.4).

The subsequent section in Chapter Two provided a brief description of the occurrence of an urban centre within the urban system (see Section 2.4). The urban system describes the position of an urban centre within the larger space economy, being the national space, the regional space, or the daily subsystem (Bourne, 1975: 12). This study identified Kimberley as an urban centre part of the national spatial system, surrounded by the other main towns in the study area, forming part of the regional subsystem (see Map 5.2). This section (see Section 2.4) also concentrated on the development corridor as an indicator of spatial importance. The development corridor (see Section 2.4.2) may be defined as a "type of upward-transitional area connecting two or more core regions"

(Friedmann, 1966: xv). Development corridors generally refer to a development axis that links two or more urban centres. The development corridor as spatial indicator was also included in the Vitality Index since it is regarded as an important indicator of a town's growth and performance potential. The occurrence of the development indicator in turn influences the economic growth and performance (see Section 3.3.2.2) within an urban centre, and could subsequently influence a town's influence sphere (see Section 2.3.3) due to heightened accessibility.

Chapter Two concluded with the concept of urban hierarchy (see Section 2.5) according to which urban centres of different sizes (depending on the size of the population) are categorised into different hierarchical levels. Numerous hierarchical classifications exist (Christaller, 1966; Dickinson, 1964; Zipf, 1949; Davies, 1967; and Berry, 1967), which may be used to categorise urban centres into broad classes. This study primarily made use of the central place index method by which the urban centres within a region are classified according to the number of services they provide to the surrounding region (see Map 5.3). Urban hierarchy can, in turn, be linked back to all the concepts discussed in Chapter Two, since each of the spatial indicators will ultimately influence the hierarchical classification of an urban centre. Accordingly a central place (see Section 2.2.1) or non-central place (see Section 2.2.2) within a larger urban field (see Section 2.3) will claim a higher position in the urban system (see Section 2.4), and will thus hold a higher position within the total hierarchical classification. Each of these spatial indicators is influenced by the physical (see Section 3.3.1), economic (see Section 3.3.2), functional (see Section 3.3.3) and social (see Section 3.3.4) contexts of the specific urban centre. The hierarchical classification of urban centres (see Section 2.5) will, in turn, influence the objective and subjective (see Sections 4.3 and 4.4) indicators within the urban centre. It is thus deemed important to include these spatial indicators as discussed in Chapter Two, since each of the spatial indicators ultimately influences, and is influenced by the various urban indicators. The spatial indicators as discussed in Chapter Two form the main contributors towards determining the spatial importance of the urban centre within the region, which is regarded as the central objective of this study (see Section 1.3).

6.2.2 Review of urban indicators

In order to provide a comprehensive index and include different types of indicators in the final Vitality Index (see Section 1.3), it was regarded as important to investigate current measures of existing urban centres. Chapter Three provided a broad background to settlement analysis with regard to stages and methods of analysis (see Section 3.2). This discussion on settlement analysis made it clear that a number of indicators are more prominent than others. These included socio-economic criteria, physical criteria, functional criteria, and morphological criteria (Dickinson, 1964; Rondinelli, 1985; Siddall, 1961; Bracey, 1953). The measures of urban centres were divided into four broad categories or contexts, according to the discussion on settlement analysis, which included physical, economic, social, and functional measures (see Sections 3.3.1, 3.3.2, 3.3.3 and 3.3.4). Each of these categories of basic urban indicators has an influence on the importance of an urban centre within the region (see Section 1.3) as discussed in the preceding section (see Section 6.2.1).

In terms of the physical context (see Section 3.3.1), attention was called to infrastructure (see Section 3.3.1.1) and transport networks (see Section 3.3.1.2). From the discussion on the physical infrastructure of an urban centre it was evident that an urban centre's general performance and ability to provide for the needs of its inhabitants and those in the surrounding region (see Section 2.3.3), are determined by the availability and quality of the general engineering services (Richardson, 1987; DBSA, 2001; Bos, 1987). Engineering services entail the availability of water, refuse removal, telephone networks, sewage removal and housing. These services were obviously an important indicator of physical development and were therefore included in the Vitality Index (see Sections 5.3.3, 5.5.2.3, and 5.6.3). The availability and quality of engineering services affects a person's perception of the surrounding environment (see Section 4.4), as well as his general satisfaction with his life as a whole (see Section 4.5.1). The physical infrastructure of an urban centre may also be regarded as reflective of the institutional capacity (see Section 3.3.4.3) of the local government.

The physical context also took into account the availability and standard of transport networks (see Section 3.3.1.2). This discussion revealed that the existence of an efficient transport network, which unites the urban centres within a region as an urban system (see Section 2.4), is of cardinal importance in the growth and development of urban centres (UN, 1979; Rondinelli, 1985; Dicken & Lloyd, 1990; Bendavid-Val, 1991). The quality and standard of the transport network will also impact on the level of interurban linkages and flows of goods, services and people (see Section 2.3.4). The transport network within the study area was measured in terms of the distance of national roads to each of the urban centres (see Sections 5.3.3, 5.5.2.3, and 5.6.3). The occurrence of the transport network as a measure of spatial importance of urban centres also relates to the concept of development corridors (see Section 2.4.2), and the important role corridors play in the economic performance of urban centres (see Section 3.3.2).

This chapter consequently directed attention to existing measures of urban centres in terms of the economic performance and growth of the urban centres (see Section 3.3.2). This section bore out that towns are most commonly classified according to their economic context in the region (Berry, 1972; Alexander, 1954; Aurousseau, 1921). Accordingly it was established that urban centres can be measured in terms of various economic indicators, namely basic-nonbasic ratio, GDP, sectoral composition, and the comparative advantage. This discussion disclosed that the economic growth and performance of an urban centre may easily be measured in terms of its GDP contribution in the region (see Sections 3.3.2.1 and 4.3.1.1). It is also possible to determine an urban centre's sectoral composition by making use of the tress index (see Section 3.3.2.2). The comparative advantage is indicative of an urban centre's strongest or dominant sector. Each of these economic indicators is related to the spatial importance of urban centres (see Section 1.3), the role they play within the larger region (see Sections 2.3.2, 2.3.3, 2.4 and 2.5). Economic indicators also influence a person's level of contentment and therefore the quality of his life (see Section 4.5). The economic structure and performance of an urban centre is related to the demographic composition (see Section 3.3.4) of residents of a specific urban centre.

The next section of Chapter Three was dedicated to measures of the functional composition of urban centres (see Section 3.3.3). The functional size (Berry, 1972) of an urban centre can be calculated in a number of different ways, i.e. number of inhabitants, size of labour force and employment levels. Numerous contributions in terms of functional classification (Aurousseau, 1921; Harris, 1943; Nelson, 1955; Bendavid-Val, 1991) were discussed, especially in terms of the functions a town provides, namely administration, defence, culture, production, communication, recreation and production. It follows that all towns can be classified into a number of broad categories according to the main function the town performs. The number and variety of functions a town performs are interrelated to the hierarchical classification (see Section 2.5) and the influence sphere (see Section 2.3.3) of the town. The more functions a town performs, the larger its influence sphere will be, the higher it will be ranked in terms of hierarchy and the more prominent the role it will play within the urban system as a whole (see Section 2.4).

This chapter concluded with an overview of the social context within urban centres (see Section 3.3.4). These indicators included aspects such as demography, income, population density, population size and employment levels. Each of these indicators contributes in a different way to describe the composition of an urban centre, and to ultimately determine its position within the region (see Sections 2.3, 2.4 and 2.5). The importance of a town is usually determined in terms of its demographic composition (Brush, 1953). The demographic composition of a town is influenced by the prospects for economic growth and performance (see Section 3.3.2), since growth and performance influence the levels of employment and, in turn, the migration patterns within the region. This section also called attention to the labour composition and employment within urban centres (see Section 3.3.4.2). These indicators were incorporated into the final Vitality Index (see Sections 5.3.3, 5.5.2.3, and 5.6.3) since the demographic composition and employment situation within a town are an indicator of the general well-being and contentment (see Section 4.5.1) residents experience. This chapter concluded with a discussion on the importance of institutional capacity within urban centres. Accordingly municipalities are rated in terms of the number of

services they are able to provide and the quality of these services (see Section 3.3.4.3). Institutional capacity implies the supply and management of engineering services (see Section 3.3.1) provided to the residents. The higher the institutional capacity, the more satisfied the residents will be; the higher the possibility for economic growth and performance will be; the higher the urban centre will rank as spatially important within the region. As determining the spatial importance of an urban centre was identified as the primary objective of this study (see Section 1.3), this chapter greatly contributed to achieving this goal.

6.2.3 Integrated perspective on urban indicators

The social indicator movement in the 1960's was stimulated by the lack of availability of quality social indicators (Carley, 1981). In this context, *social indicators* was a comprehensive term including indicators in different frameworks, i.e. social, physical, economic and functional, as discussed in Chapter Three. This chapter commenced with a discussion on the prerequisites and characteristics of indicators in general (see Section 4.2), which were used to measure the different indicators included in the Vitality Index (see Section 5.2). The discussion on the characteristics of indicators brought to light that indicators can be broadly classified into two groups, namely objective and subjective indicators. Both objective indicators (see Section 4.3) and subjective indicators (see Section 4.4) were therefore under discussion in this chapter. The indicators were categorised in accordance with a classification by Rapley (2003).

Objective indicators (see Section 4.3) are directly measurable. These indicators were discussed in terms of economic indicators (see Section 4.3.1) and environmental indicators (see Section 4.3.2). The most common economic indicators used to measure urban centres include the GDP (see Section 4.3.1.1) and the GPI (see Section 4.3.1.2). The GDP is an indicator of the value of final goods and services produced within an economy over a period of one year (Van der Merwe, 1988). The GDP is regarded as the primary measure of a nation's material well-being, and a person's general satisfaction with his life (see Section 4.5.1). This section highlighted a number of reasons why the

GDP cannot be employed as sole measure of well-being. The GPI (see Section 4.3.1.2) was developed to take into account the externalities not recognised by the GDP. This study could not make use of GPI data since this measure has not yet been used in South Africa. It would, however, have been ideal to use GPI data in the Vitality Index. The GDP is directly related to a town's economic growth and performance (see Section 3.3.2) and the functions it provides (see Section 3.3.3), and therefore also influences the social context (see Section 3.3.4) of an urban centre. Each of these broad indicators is in turn related back to an urban centre's importance within the region as a whole as primary objective of the study (see Section 1.3).

Subjective indicators (see Section 4.4) are indicators of psychological perceptions, which included a discussion on human perception of the surrounding environment. Human perception plays a crucial role in the choice of individuals of where to settle. This section also referred to a person's experience and general contentment with his life. In terms of human perception, two aspects were discussed, specifically topophilia and genius loci (Tuan, 1974; Norberg-Schulz, 1980). Each of these terms refers to a person's perception of the surrounding environment (natural and urban) and the love a person has for a particular place. It would have made a significant contribution to this study if these aspects could have been included. Due to the lack of data it was, however, not possible. Human perception and satisfaction were, however, measured in terms of indicators that have an influence on general levels of satisfaction. This includes the material well-being (see Section 4.3.1), institutional capacity (see Section 3.3.4.3), the availability and delivery of general engineering services (see Section 3.3.1), and the variety of functions provided within the urban centre (see Section 3.3.3). Each of these indicators, in turn, exerts an influence on the spatial importance of an urban centre within a region, and for that reason the indicators were included in the Vitality Index (see Section 5.6).

The subsequent section attempted to discuss two different composite indexes which can be categorised as both objective and subjective indicators (see Section 4.5), i.e. the quality-of-life index, and the human development index. The QOL index attempts to link

results of subjective life-satisfaction surveys to the objective determinants of quality-of-life (Anon, 2005). This index thus attempts to measure both objective and subjective indicators of well-being, and includes a number of indicators which have been taken into account in the Vitality Index (see Sections 5.3.2, 5.5.2.2, and 5.6.2). The QOL index is influenced by numerous indicators which have previously been discussed and taken into account, i.e. material well-being (see Section 3.3.2), health (see Section 3.3.4) and job security (see Section 3.3.4.2). The HDI refers to a composite index of poverty, literacy, education, life expectancy, and childbirth (UN, 1995). The HDI was not included in the Vitality Index as a single indicator, but it was regarded as important to include each of the aspects of human development, that is poverty, literacy, education and life expectancy (see Sections 5.3, 5.5, and 5.6). These indicators were included individually to determine the individual importance of each indicator within each urban centre. This was deemed important to make an interurban comparison and analysis of urban centres in the study area (see Section 4.2) possible, and it relates to one of the main objectives of this study (see Section 1.3). Each of these indicators can, in turn, be related back to the economic growth and performance of the urban centre (see Section 3.3.2), which is interrelated with the urban hierarchy (see Section 2.5), the urban system (see Section 2.4), and thus the importance of the town within the greater region as ultimate objective of the study (see Section 1.3).

This chapter concluded with an evaluation of indicators (see Section 4.6). The evaluation disclosed that numerous indicators have not been used for a specific purpose (Cobb, 2000; Miles, 1985; Carley, 1981; Bauer, 1966). Indicators have been used for measurement and comparison, but have not been put to use to identify policy goals. As Miles (1985) warned against attempting to work with perfect indicators, this study attempted to use as many perfect indicators as possible, but in some cases data were not available and substitutes had to be identified. The prerequisites and characteristics of indicators were used to measure each of the urban indicators discussed in the study (see Section 5.4). This allowed for only the relevant and policy-related indicators to be included in the Vitality Index. The Index also allows for indicators to be added or discarded as needed, since indicators should be effective in different situations and in

different regions. This chapter constituted the final theoretical chapter of the study. It weighed, identified, and tested all the indicators to be incorporated into the proposed Vitality Index.

6.2.4 Indicators of vitality

The final chapter of this study focused attention on the different urban indicators discussed throughout the study. The indicators were discussed and divided into four main categories, partially as proposed by Land (1983:1). Proposed categories included normative welfare, satisfaction and descriptive social indicators. This study regarded it as important to also spatial indicators in the study as well as they could make a valuable contribution. This is due to the fact that all the indicators discussed can ultimately be related to each of the spatial indicators proposed. For example, the more commercial enterprises and industries there are in a place, the more employment opportunities it creates, and the better the needs of the people who live there as well as in surrounding areas can be satisfied. The status of a place is therefore, generally speaking, determined by the number of central functions it contains, as illustrated in the following figure.

Figure 6.1   Interrelation of indicators
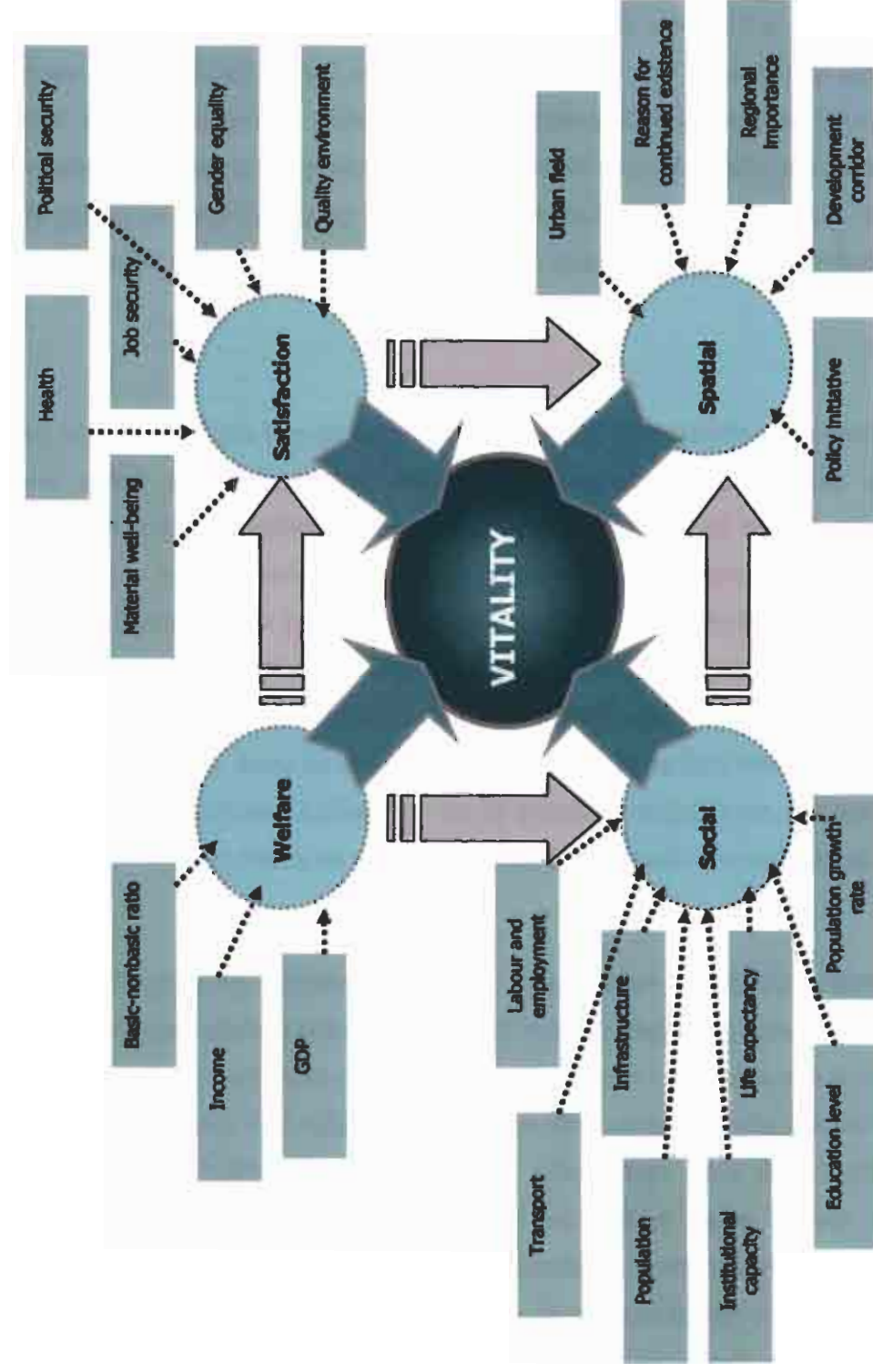
Source: Own deduction

This study is devoted to the spatial importance of urban centres within a larger study area or region. It is therefore important that each of the indicators discussed be related back to what it measures. This was also highlighted by Carley (1981: 2) who noted that indicators may be described as surrogates and therefore cannot be used in isolation. The indicators are related back to the immeasurable concept, i.e. spatial importance, for which it is a substitute. This chapter consequently proposed the composite Vitality Index, including spatial indicators and qualitative data, as presented as objectives of this study.

The indicators were discussed in terms of their relevance and applicability (see Section 5.3). This chapter also attempted to use the proposed Vitality Index and its subcategories to test its applicability and relevance for spatial planning. A study area was consequently identified, which included a number of urban centres in the Northern Cape Province (see Section 5.5 and Map 5.1). The proposed Vitality Index with its sub-categories was tested as comprehensively as possible and, in some cases, by making use of substitute data. It is important to take into account that the perfect data were not available for all of the indicators, and substitutes had to be used. Miles (1985) correctly indicated that it is not crucially important to use the perfect indicators, but rather to use the available indicators to identify problem-areas within an urban centre.

The empirical study had to make use of data on a municipal level, due to the lack of data on urban centre level (see Section 5.6). A main town was consequently identified for each Local Municipality by means of the central place index (see Section 2.3) and the functional classification of towns with regard to population size (see Section 2.5). The results obtained for each municipality were consequently related to the main town within the specific urban centre (see Section 5.6). The results allow for interurban comparison and measurement as identified within the aims of the study (see Section 1.3). This study also aimed to propose a composite index which could highlight spatial and performance inadequacies on regional level, as well as on urban centre level. The proposed Vitality Index allows for such shortcomings to be highlighted and addressed

(see Section 6.3). From the empirical study it was disclosed that Kimberley acquires prominence as the urban centre of greatest spatial importance, followed by Kathu, Kuruman, Barkley West, Jan Kempdorp, Bothithong and Warrenton. The next section will discuss each of these urban centres individually, as well as within the larger study area to highlight inadequacies and shortcomings. The following discussion will attempt to present a brief summary of the results of the Vitality Index for each main town within the study area. The summary of the results will, in turn, be used in the subsequent section (see Section 6.3.2) to propose and identify relevant policy goals and policy initiatives for each main town.

6.2.5 Evaluation of study area in terms of Vitality Index

The first urban centre to be discussed is **Kuruman**, which has been identified as the main town of the Ga-Segonyana Municipality (see Section 5.5). Kuruman scored the second lowest percentage (41,67 %) in terms of the normative welfare indicators (see Section 5.6.1) one according to the basic-nonbasic indicator, indicating a total percentage of basic sector contribution of between zero and twenty four percent. It may therefore be deduced that Kuruman does not produce as much for the export market of the region as the rest of the study area. This is also reflected in the low GDP contribution made by Kuruman, with a score of one (0-24%). In terms of income, Kuruman scored in the top two quartiles (score of three), indicating that the income distribution within Kuruman is in the top fifty to seventy-four percent. In terms of the satisfaction indicators, Kuruman had the second highest score, namely 66,67 %. The general levels of satisfaction and quality of life within Kuruman are thus satisfactory. The only two indicators scoring unsatisfactorily (between one and two) are material well-being and gender equality. In the descriptive social indicator category, Kuruman again scored the second highest of all the main towns with 72,22 %. Kuruman is thus a strong node in terms of the social context. The town shows satisfactory levels of all social indicators, except for population and physical infrastructure. The disparity in population is, however, ascribed to the large difference in size between the largest urban centre (Kimberley) and the rest of the centres. Kuruman shows poor levels of physical

infrastructure, specifically the delivery of engineering services to the residents. In the last subcategory, spatial indicators, Kuruman once again had the second highest score, namely seventy five percent. This is partially due to Kuruman being situated on the N14, which indicates high levels of access to the corridor. Kuruman is also the second largest centre within the study area, causing it to obtain a high scoring. This also contributes to a high score in the urban field category, since a large number of functions and services are provided to the surrounding region. Kuruman was further identified as a rural growth point in the Rural Development Strategy (SA, 2001). All these indicators contribute to Kuruman being assessed the third most spatially important centre within the study area.

Kathu is situated in the Gamagara Municipality and was established as the main town within this municipality (see Section 5.5). Kathu scored an average vitality percentage of 66,39%, rating it as the second most spatially important urban centre in the study area. The highest score (75%) for Kathu was obtained in the normative welfare subcategory (see Section 5.6.1), which could be largely attributed to the considerable contribution this urban centre makes to the regional GDP in terms of the mining activities in Kathu. The income indicator also obtained a high score. Kathu scored low in the satisfaction indicator category with only 58,33%, indicating lower levels of satisfaction. This may be primarily ascribed to the low score obtained in the health, political stability and gender equality indicators. Health was measured in terms of relative life expectancy (persons past 65 years). As Kathu employs mainly mine workers, the low score in the health indicator may be attributed to the sectoral composition of the town. Kathu also scored low in terms of political stability and security, reflecting high crime rates within the town. Gender equality is an issue that acquires prominence in most of the towns within the region. As mentioned previously, Kathu employs mainly mine workers, which are mostly men. In terms of the spatial indicators, Kathu scored the third highest (60%) in the study area. This is mainly due to the fact that Kathu has a large export base in terms of mineral resources. Kathu is further situated on the N14 highway, and was identified in the RDS (2001) as a tourism development node.

Bothithong was identified as the main town in Moshaweng Municipality (see Section 5.5). Bothithong scored the second lowest overall vitality percentage of 48,54%, of which the normative welfare score was 58,33%, satisfaction indicators measured 54,17%, descriptive social indicators measured 41,67%, and the spatial indicator category 40% (see Section 5.5.3). Bothithong scored the lowest of all the main towns in the satisfaction subcategory, indicating low levels of life contentment (see Section 5.5.2.2). As Bothithong obtained low scores in most categories, it is deemed important to highlight some of these. Bothithong makes a poor contribution to the GDP of the study area, and also scored low in terms of the basic-nonbasic ratio, indicating low levels of basic services within the urban centre. Bothithong also scored very low (one) with regard to the indicators material well-being and health. This urban centre scored low (two) in terms of political stability and security, measured in terms of crime rate. This urban centre thus shows indications of a very low quality of life, since it is mostly quality of life indicators that obtained low scores. In terms of the descriptive social indicators, Bothithong scored below satisfactory (one or two) in all instances, except infrastructure measured in terms of basic service delivery (see Section 5.5.2.3). This urban centre can thus be regarded as deprived and lacking with regard to descriptive social indicators. Bothithong was finally measured in terms of the proposed spatial indicators, and once again had the lowest score (together with Barkley West and Warrenton). Bothithorig scored as a spatially unimportant centre in the study area for all indicators in this subcategory. This urban centre has a very limited urban field since it provides very few services and does not attract many people. Bothithong is also not mentioned in terms of any national, provincial or district policy initiatives.

The next urban centre to be discussed, **Jan Kempdorp**, is situated in the Phokwane Local Municipality (see Map 5.1). Phokwane obtained an average score in all of the subcategories, and its final vitality percentage was 56,6%, the fourth highest of all the main towns. In terms of normative welfare indicators, Jan Kempdorp obtained 50%. This can mainly be attributed to a low score (one) in terms of GDP contribution (see Section 5.5.2.1). Jan Kempdorp also scored low (two) regarding the basic-nonbasic

indicator, reflecting very few export-related functions provided by the town. In terms of satisfaction indicators, Jan Kempdorp scored the third highest average (62,50 %), showing high levels of life contentment and general quality of life. The lowest scores obtained in this category were for material well-being (one), and gender equality (two). The next subcategory, descriptive social indicators, resulted in a relative high percentage (63,89%), indicating average to above average scores for most of the indicators. Low scores (one and two) were obtained for transport, infrastructure, population, and population growth rate. Jan Kempdorp is situated a long way from the nearest national road, and also demonstrates low levels of access to the basic engineering services. In terms of the spatial indicators, Jan Kempdorp obtained an average percentage of fifty, indicating an average level of spatial importance. Jan Kempdorp scored the highest in terms of the indicator *reason for continued existence*, on account of the diversified economic base in the town. Jan Kempdorp is not mentioned as an urban centre in national or provincial policy initiatives and thus scored low (one) for this indicator. This town does not demonstrate a high level of regional importance and also has a fairly limited urban field which is dominated by the urban field of Kimberley (see Map 5.3). In terms of the Vitality Index, Jan Kempdorp demonstrates relatively sustainable vitality within the larger region.

The next urban centre to be discussed is **Kimberley**, situated in the Sol Plaatjie Municipality (see Map 5.1). Kimberley scored the highest vitality percentage of 77, 71%, indicating high levels of vitality and the ability to provide for the needs of its inhabitants in an effective manner. Kimberley scored the highest for each subcategory except for the normative welfare indicators (see Section 5.6.1), for which Kathu obtained a higher score. Kimberley scored low (one) in the basic-nonbasic indicator due to it not being more dependent on basic services. The satisfaction levels in Kimberley are high, especially in terms of material well-being. Kimberley, however, scored low in terms of the indicators of political stability and security, and gender equality (see Section 5.6.2). As has been pointed out before, gender equality is a concern throughout the study area. The crime rate in Kimberley is also cause for concern, as Kimberley scored lower than

most of the other urban centres in the matter of crime. In terms of the descriptive social indicators, this urban centre scored high (three or four) for all categories, except population growth rate, in which it demonstrated a negative growth rate (-0, 3%) between 1996 and 2001 (see Section 5.6.3). Kimberley obtained a perfect score in terms of each of the spatial indicators, except for the *reason for continued existence*, measured according to the tress-index (see Section 5.6.4). This can be ascribed to Kimberley's strong dependence on the financial and business services.

Barkley West is situated in the Dikgatlong Municipality (see Map 5.1), and demonstrated the third lowest vitality percentage (53,75%) of the main towns. This indicates average vitality or ability to work in an effective way. Barkley West is ranked fourth in the seven urban centres involved in the study area (see Section 5.6.5). Barkley West could only score one in terms of GDP contribution in the study area, showing poor regional strength in terms of the normative welfare indicators. It is, however, important to bear in mind that Barkley West has the third lowest population (see Section 5.6.3). With respect to the satisfaction indicators, Barkley West obtained the same score as Kathu (58,33%), thus indicating fairly high levels of satisfaction within the urban centre. Barkley West scored low (one) in terms of material well-being and gender equality in this subcategory. Low scores (one and two) were also obtained by Barkley West in the descriptive social indicator category, especially for infrastructure, population growth and institutional capacity. As for the proposed spatial indicators, Barkley West scored poorly (40%) along with Warrenton and Bothithong. Barkley West is relatively close to the N12 development corridor, and scored three for this indicator. Regarding the urban system and regional importance, this urban centre scored very low (one), and also for the influence sphere and policy initiative indicators. Barkley West is thus regarded as a poor performer with respect to its ability to work effectively and continue to exist in the long run.

The last urban centre to come up for discussion is **Warrenton**, which scored the lowest vitality percentage (41,60%) of all the urban centres in the study area. Warrenton

scored poorly for each of the indicators in the normative welfare sub-category, and demonstrated an especially low GDP contribution (see Section 5.6.1). It is, however, important to keep in mind that Warrenton is the second smallest urban centre in terms of population. The satisfaction levels within this urban centre are fairly average, but it demonstrates levels of material well-being which are a cause for concern, as well as a high crime rate, and low employment levels (see Section 5.6.2). Warrenton scored the second lowest in terms of the descriptive social indicators, namely 55,56%, which is still relatively high. The lowest scores (one and two) were obtained for infrastructure, population growth rate, and institutional capacity (see Section 5.6.3). For the final subcategory, spatial indicators, Warrenton scored forty percent, along with Barkley West and Bothithong. As far as spatial importance within the region is concerned, Warrenton can thus be regarded as a small centre with low performance (see Section 5.6.4). Warrenton is situated relatively far from the two development corridors in the study area, and is also not regarded as a growth centre in the national or provincial policy proposals. Since Warrenton is fairly small it provides very few services to the surrounding region, indicating a small influence sphere. Kimberley's influence sphere extends over Warrenton, and it attracts many potential buyers. Warrenton can consequently be regarded as an urban centre that does not play a significant role in the region, but will probably sustain a few local farmers in the years to come.

The subsequent section will attempt to propose policy responses, based on the findings of the Vitality Index (see Section 5.6), for each relevant government sphere (see Section 1.3) and urban centre.

6.3   Proposals

This section of the study will put forward a number of proposals regarding the Vitality Index and the application of these with respect to the study area identified. According to Miles (1985: 75), social indicators may be utilised in a number of different ways, i.e. to set targets for social development, and to monitor the consequences of policies. It is, however, important to note that the data and index of development will not in themselves correct imbalances or solve problems. It is therefore very important that all indicators should be based on certain outcomes and be related to public policy goals and instrumental in achieving these goals (see Section 4.2).

This section will be subdivided into two sections; first a section describing the Vitality Index and shortcomings that may exist, as well as proposals regarding various, substitute, or additional indicators. Second, an attempt will be made to use the proposed Vitality Index and the shortcomings identified to propose a number of policy interventions for the different spheres of government in the study area. The identification of policy proposals for relevant government spheres was stated as one of the main objectives of this study (see Section 1.3). Policy proposals will be made with respect to shortcomings and inadequacies identified in the preceding section (see Section 6.2.4).

6.3.1 Proposals for Vitality Index

The purpose of the Vitality Index was to serve as a comprehensive index measuring the importance of an urban centre within a larger region. The proposed Vitality Index and the measurement of urban centres within the study area are, however, not flawless due to numerous reasons. The availability of data figured prominently in the assessment of urban centres. It was regarded as important to test the Vitality Index in a study area even though the data used were not perfect. Data had to be used on a Local Municipality level and related back to the main town within the municipality. It would obviously have been ideal to have used data on an urban centre level to develop a more thorough index.

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It is nevertheless possible to apply the Vitality Index to different study areas throughout the world. The Vitality Index also allows for additional indicators to be included in the subcategories identified. Indicators could subsequently also be discarded if deemed unnecessary for the specific goal in mind. It is, however, important to follow the proposed methodology systematically, and to categorise indicators into the subcategories identified. The methodology of the Vitality Index is illustrated in the following analytical model.

Figure 6.2   Methodology of Vitality Index

Normative welfare indicators   *Satisfaction indicators*

NWI = total indicator score/n

Score indicators
$X_1, X_2 .... X_n$

Score

| 1= 0-24% |
| 2= 25-49% |
| 3= 50-74% |
| 4= 75-100% |

VITALITY INDEX

Percentage

Score

Rank

SI = total indicator score/n

Score indicators
$X_1, X_2 \quad X_n$

Score

| 1= 0-24% |
| 2= 25-49% |
| 3= 50-74% |
| 4= 75-100% |

| 1= 0-24% |
| 2= 25-49% |
| 3= 50-74% |
| 4= 75-100% |

Score

Score indicators
$X_1, X_2 \quad X_n$

DSI = total indicator score/n

| 1= 0-24% |
| 2= 25-49% |
| 3= 50-74% |
| 4= 75-100% |

Score

Score indicators
$X_1, X_2 \quad .X_n$

SPI = total indicator score/n

Descriptive social indicators   *Spatial indicators*

Source: Own deduction

The Vitality Index is consequently determined by making use of the scores obtained in each of the four subcategories. Each subcategory consists of *n* indicators, each of which is individually scored in terms of the proposed quartile system. The scores for the indicators are added up to constitute a total score out of a possible total of (n*4). A percentage value for the subcategory is calculated. The subcategory could obtain a score (from one to four) based on the quartile system, or the percentage values could be used. The Vitality Index is consequently calculated as the total of the percentage value of each of the subcategories (thus resulting in a total out of four hundred). The Vitality Index can be presented in three ways, as illustrated in the foregoing figure. In the first place, the percentage values for each subcategory could be added up and converted to a percentage, namely the vitality percentage. On the basis of this vitality percentage each of the urban centres can be scored in terms of the proposed quartile system, obtaining a vitality score of between one and four. The vitality percentage could also be used to rank the urban centres in the specific region; viz. the centre with the highest percentage will receive the highest ranking (subject to the number of urban centres in the study area).

It is consequently proposed that any of the three final vitality measures be employed when attempting to determine the vitality of an urban centre. A broad classification of urban centres will make use of the vitality score, whereas a more in-depth study of urban centres will call for the vitality percentage to be utilised. The vitality ranking could be used in order to give a brief overview of the vitality position of each urban centre within the broader region.

The subsequent section will propose a number of possible policy responses for urban centres demonstrating low levels of vitality referring to only some of the indicators.

6.3.2 Policy proposals

This section will attempt to suggest a number of regional and local strategies for the specific study area and the urban centres in question. This study did not, however, intend to provide a spatial strategy or regional plan for the study area. The subsequent discussion on proposed initiatives should therefore be regarded as a model which could be applied as policy response to the Vitality Index. This section hence aims to illustrate how the Vitality Index, and the indicators included, could be used to provide for policy responses. These policy responses would ideally be included in the IDP and SDF documents of the municipalities and the province concerned.

6.3.2.1   Regional Initiatives

Regional initiatives should be addressed by National and Provincial Government within the provincial SDF and GDS (Growth and Development Strategy) and the National Spatial Development Strategy. In the matter of regional initiatives, taking into account the entire study area, it is proposed in this study that the existing corridors be utilised and developed further. The N12, N8 and N14 national highways form part of the study area (see Map 5.1), and could potentially contribute considerably to the economic growth of the region. The N12 highway is a popular road used by tourists throughout the year, linking the south-western coastal region with the central regions of South Africa. Kimberley is one of the largest urban centres on this route and therefore shows potential for growth and development with respect to tourist attractions. In terms of policy proposals it is thus the objective to provide a national development node around Kimberley, extending along the N12 and N8 corridors. The primary focus of the proposed development corridor will be to promote economic growth and create job opportunities in and around Kimberley. The subsequent table provides an overview of how the Vitality Index could be utilised in setting and achieving policy goals.

Table 6.1   N12 corridor: Objective and strategies

Indicator: N12 corridor		Subcategory: Spatial	
Objective: *Develop corridor around Kimberley as national growth node.*			
Strategies: ⇨ Acquire and allocate funding for development projects. ⇨ Promote growth in developing industries. ⇨ Ensure capable institutional management and support. ⇨ Maintain and upgrade existing infrastructure. ⇨ Tax incentives for developers within the growth node. ⇨ Identify and allocate suitable land for identified development projects.		**Target urban centres:** ⇨ Kimberley	**Cross-indicator stimulation:** ⇨ Income ⇨ Employment ⇨ Quality of life ⇨ GDP ⇨ Economic growth and performance ⇨ Satisfaction
Responsible government sphere:		**Leading role**	**Supportive role**
	National Government	X	
	Provincial Government	X	
	District Municipality	X	
	Local Municipality	X	

Source: Own deduction

It is crucial that all spheres of government should play a leading role in the identified corridors, especially regarding the national spatial objectives. The N14 national highway links central South Africa with Namibia and Botswana, as well as with the west coast, and the popular Namaqua region. This corridor is of great importance to the mining sector in the Northern Cape since most of the mining equipment is transported along this route. The Kalahari region around Kathu and Kuruman is also of particular significance due to its international reputation for hunting of game. It is consequently proposed to set as objective, first, the development of the N14 between Kuruman and Kathu as tourism development node and corridor. Kathu was identified as tourism development node in the NSDP (2003), and Kuruman as regional rural growth point. These urban centres are thus already supported by national government. The primary focus of the proposed development corridor will be to promote economic growth and create job opportunities. Additionally, is proposed that the N14 highway be upgraded to

such a standard that it will be able to cope with the heavy vehicles travelling on it on a daily basis.

Table 6.2   N14 corridor: Objectives and strategies

Indicator: N14 corridor	Subcategory: Spatial	
Objectives: *Develop corridor around Kathu and Kuruman as tourist node.* *Upgrade the N14 to be able to cope with regular heavy traffic.*		
Strategies: ⇨ Identify and develop tourist attractions. ⇨ Identify and encourage local entrepreneurs to develop and manage tourist attractions. ⇨ Use holistic marketing approach to tourist attractions. ⇨ Upgrade and develop tourist products. ⇨ Maintain quality of N14 road. ⇨ Provide additional lane for heavy vehicles.	**Target urban centres:** ⇨ Kuruman ⇨ Kathu	**Cross-indicator stimulation:** ⇨ Income ⇨ Employment ⇨ Quality of life ⇨ GDP ⇨ Economic growth and performance ⇨ Satisfaction ⇨ Infrastructure ⇨ Institutional capacity
Responsible government sphere:	**Leading role**	**Supportive role**
National Government	X	
Provincial Government	X	
District Municipality	X	
Local Municipality	X	

Source: Own deduction

According to the preceding table, all spheres of government will have to play a leading role in developing these corridors. The development of both these corridors will impact on numerous other indicators, especially the stimulation of economic growth and performance within the region. In terms of nodal growth strategy for the study area, it should be taken into account that Kuruman has been identified as rural development node (NSDP, 2003). Kuruman should consequently be developed and invigorated as a development growth pole through local, provincial and national policy initiatives. In view of the foregoing, it is proposed that Kathu and Kuruman be established as the basis for the concentration of further development efforts in the region. The regional policy initiatives are illustrated on Map 6.1.

Map 6.1
REGIONAL POLICY INITIATIVE
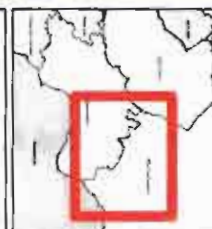
6.3.2.2   Local initiatives

This section will attempt to provide potential policy proposals for the main towns at issue. The proposals will be divided according to a number of the indicators that may possibly be addressed in terms of policy goals. For each of the indicators a specific objective will be developed, as well as strategies identified to realise the development objectives. It is proposed that si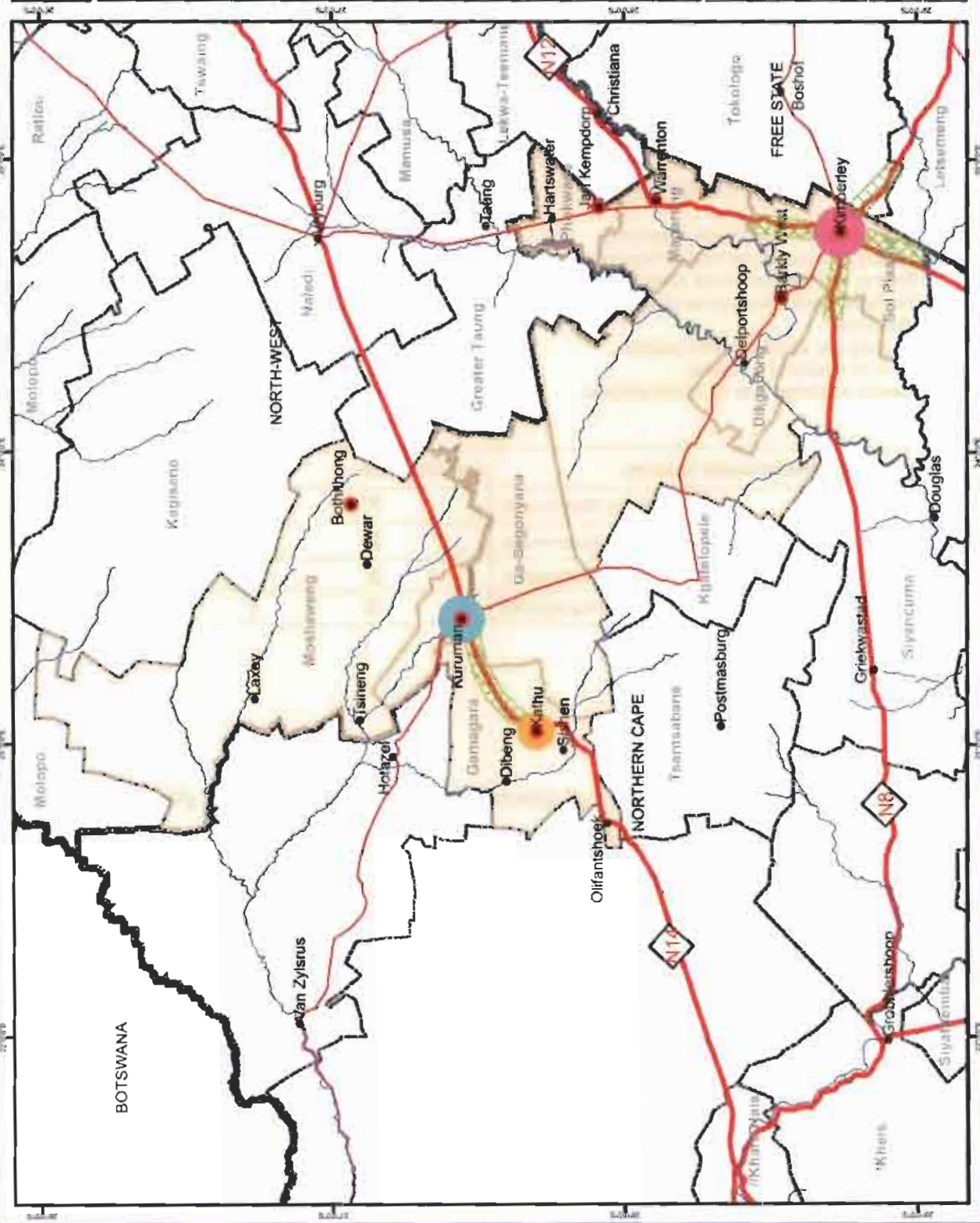milar strategies be incorporated and applied within the SDF's and IDP's of the Local Municipalities, as well as District Municipalities, and ultimately the Provincial Government. The development objectives were identified on the basis of the vitality indicators as discussed throughout this study, and include the following:

- Advance the institutional capacity of the relevant government sphere.
- Extend access to education for all and establish higher literacy rates.
- Attain lower levels of unemployment.
- Provide all households with access to adequate health services.
- Improve material well-being through the creation of employment opportunities.
- Prevent negative population growth or out-migration.
- Reduce the rate of crime and provide residents with a safe and satisfactory environment.
- Improve the overall quality of the environment.
- Increase the number of job opportunities.
- Strive for higher levels of female employment and gender equality.
- Provide affordable housing, and adequate levels of access to quality engineering services.

For each of the objectives identified, a number of strategies have been identified which are detailed in the following tables. Each of the strategies may be directly linked with a specific indicator and objective. Each objective is associated with a specific target urban centre(s), and will subsequently be discussed in terms of the strategies identified. The target centres, as indicated in the following tables, were identified by means of the Vitality Index. The main towns that scored low (one or two) are listed as target centres for specific indicators. However, these objectives and strategies could be made

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applicable to any of the main towns within the study area, if necessary. The tables also indicate the sphere of government which will play a leading role in realising the objective; and those playing a supporting role. The tables listing strategies with regard to specific objectives also list a number of indicators which are cross-stimulated by each other. Indicators of cross-stimulation refer to the figure (see Figure 6.1) which was shown earlier on in this chapter, indicating the interdependencies between indicators. If one indicator is thus positively influenced, it will have a chain reaction on the listed indicators of cross-stimulation that is if income levels increase, life satisfaction will increase, and accordingly quality of life will increase.

The first table deals with the material well-being indicator. It is proposed as objective to improve the material well-being of the residents through employment. This correlates with Tables 6.4 and 6.10. A number of strategies are proposed to address the issue of material well-being, including education in financial and family planning. These specific strategies are often overlooked, but could play a significant role if income is judiciusly spent. It is also important to take family planning into account to lower the dependency ratio effectively.

Table 6.3   Material well-being: Objective and strategies

Indicator: Material well-being	Subcategory: Satisfaction	
Objective: *Improve material well-being through employment.*		
Strategies: ⇨ Advance levels of employment. ⇨ Offer education in financial planning. ⇨ Initiate programmes on family planning. ⇨ Initiate tax relief policies.	Target urban centres: ⇨ Kuruman ⇨ Bothithong ⇨ Jan Kempdorp ⇨ Warrenton ⇨ Barkley West	Cross-indicator stimulation: ⇨ Income ⇨ Employment ⇨ Quality of life ⇨ GDP ⇨ Economic growth and performance ⇨ Satisfaction
Responsible government sphere:	Leading role	Supportive role
National Government		X
Provincial Government		X
District Municipality		X
Local Municipality	X	

Source: Own deduction

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The following table proposes the objective to provide all households within the specified urban centres with adequate access to quality health services. In this regard the Local and District municipalities will play a leading role, but will need the support of provincial and even national government. The objective of this indicator could easily be realised if health services and the proper health education were available as suggested below.

Table 6.4   Health: Objective and strategies

Indicator: Health	Subcategory: Satisfaction	
Objective: *Provide all households with access to adequate health services.*		
Strategies: ⇨ Train doctors and nurses. ⇨ Establish youth centre for AIDS education. ⇨ Provide for voluntary testing and counselling for HIV patients. ⇨ Improve emergency health care. ⇨ Establish new health centres. ⇨ Upgrade existing health centres. ⇨ Provide additional health services. ⇨ Train additional staff. ⇨ Educate mothers and teachers in basic hygiene. ⇨ Treat and report communicable diseases. ⇨ Educate in basic health hygiene; distribute promotional materials.	**Target urban centres:** ⇨ Kathu ⇨ Bothithong	**Cross-indicator stimulation:** ⇨ Life expectancy ⇨ Quality of life ⇨ Satisfaction
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		**X**
Provincial Government		**X**
District Municipality	**X**	
Local Municipality	**X**	

Source: Own deduction

In terms of political stability and security, Kathu, Kimberley, and Warrenton obtained low scores. The objective was thus proposed that the crime rate within these urban centres be reduced to provide the community with a safe environment. Low crime rates will stimulate the increase of satisfaction levels, and thus the quality of life. If this were the

case, it could even lead to a positive growth in population, since the urban centres in question would be attractive environments to live and raise children in.

Table 6.5   Political stability and security: Objective and strategies

Indicator: Political stability and security	**Subcategory:** Satisfaction	
Objective: *Reduce the rate of crime and provide a safe and satisfactory environment for residents.*		
Strategies: ⇨ Construct new police stations. ⇨ Acquire more police vehicles. ⇨ Train police personnel. ⇨ Encourage community policing. ⇨ Educate in laws, regulation and policy. ⇨ Promote higher levels of employment. ⇨ Employ reservists to compensate for lack of staff. ⇨ Introduce mobile police stations.	**Target urban centres:** ⇨ Kathu ⇨ Kimberley ⇨ Warrenton	**Cross-indicator stimulation:** ⇨ Crime rate ⇨ Satisfaction ⇨ Human perception of environment ⇨ Population growth ⇨ Quality of life
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		X
Provincial Government		X
District Municipality	X	
Local Municipality	X	

Source: Own deduction

To increase the number of job opportunities is the objective for the job security indicator. This objective specifically targets Bothithong and Warrenton which demonstrated high levels of unemployment. The proposed strategies include drumming up support for local initiatives and encouraging public-private partnerships. Entrepreneurship and the informal market could also possibly provide for added job opportunities. This will, in turn, lead to a higher rate of material well-being, and thus a higher level of satisfaction and quality of life. Added employment opportunities will also contribute to the GDP, and thus to economic growth and performance. The realisation of one objective could thus have a great impact on the position of an urban centre within the larger region.

Table 6.6   Job security: Objective and strategies

Indicator: Job security	**Subcategory:** Satisfaction	
Objective: *Increase the number of job opportunities.*		
Strategies: ⇨ Promote higher levels of education. ⇨ Create job opportunities through local initiatives. ⇨ Acquire investment funds for local initiatives. ⇨ Provide a support structure for SMME's. ⇨ Encourage public-private partnerships. ⇨ Offer entrepreneurial training programmes.	**Target urban centres:** ⇨ Bothithong ⇨ Warrenton	**Cross-indicator stimulation:** ⇨ Employment levels ⇨ Satisfaction ⇨ Material well-being ⇨ Quality of life ⇨ GDP
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		X
Provincial Government		X
District Municipality		X
Local Municipality	X	

Source: Own deduction

Gender equality is a difficult issue to address due to disparities which existed between genders in the past. The objective is to promote higher levels of female employment and gender equality in the work-place. It is proposed that this be realised by adhering to the Gender Equity Act in terms of programmes and policies, as well as by providing additional skills training for women.

Table 6.7   Gender equality: Objective and strategies

Indicator: Gender equality	**Subcategory:** Satisfaction	
Objective: *Promote higher levels of female employment and gender equality.*		
Strategies: ⇨ Implement Gender Equity Programme. ⇨ Implement Gender Equity Policy. ⇨ Adhere to Gender Equity Act. ⇨ Create training facilities for women.	**Target urban centres:** ⇨ All	**Cross-indicator stimulation:** ⇨ Employment levels ⇨ Satisfaction ⇨ Material well-being ⇨ Quality of life ⇨ GDP
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		X
Provincial Government		X
District Municipality		X
Local Municipality	X	

Source: Own deduction

Although all the urban centres scored high with respect to the environmental indicator, it is regarded as important to deal with the protection of the environment as a priority. The local government sphere in particular will play a crucial role in realising the objective of improved environmental quality. The rehabilitation of mine dumps is an important strategy to be used by the urban centres within the study area, since mining operations are a widespread activity. An improved natural environment will lead to a better quality of life, and could even attract immigrants to this area. A high quality natural environment also reflects positively on institutional capacity, and could foster higher levels of satisfaction.

Table 6.8   Environmental quality: Objective and strategies

Indicator: Environmental quality	Subcategory: Satisfaction	
Objective: *Improve the overall quality of the environment.*		
Strategies: ⇨ Identify suitable municipal dumping sites. ⇨ Rehabilitate mine-dumps. ⇨ Introduce sustainable waste management. ⇨ Compile and apply disaster management plan. ⇨ Initiate cleaning-up campaign. ⇨ Implement Integrated Environmental Programme. ⇨ Adhere to NEMA principles.	Target urban centres: ⇨ All	Cross-indicator stimulation: ⇨ Quality of life ⇨ Population growth ⇨ Institutional capacity ⇨ Satisfaction
Responsible government sphere:	Leading role	Supportive role
National Government		X
Provincial Government		X
District Municipality		X
Local Municipality	X	

Source: Own deduction

The infrastructure indicator entails numerous basic engineering services, including water, sewage, electricity, roads, refuse removal and housing. This indicator aims to attain high levels of access to basic services as well as adequate housing for all. Numerous strategies have been identified, especially for Kuruman, Jan Kempdorp,

Barkley West and Warrenton. Most of the strategies deal with the upgrading of services and roads, as well as with the maintenance of these services.

Table 6.9   Infrastructure: Objective and strategies

Indicator: Infrastructure	**Subcategory:** Descriptive social	
Objective: *Provide affordable housing, and adequate levels of access to quality engineering services.*		
Strategies: ⇨ Establish sufficient water resources for bulk water supply. ⇨ Devise regional water development plans. ⇨ Implement a maintenance plan for all services. ⇨ Provide sufficient sanitation facilities. ⇨ Enhance public awareness of safe electricity use. ⇨ Establish road maintenance and construction. ⇨ Provide efficient public transport. ⇨ Provide affordable housing. ⇨ Provide education wrt funding of housing. ⇨ Upgrade existing housing to RDP standards. ⇨ Provide serviced land for housing development. ⇨ Upgrade road signs. ⇨ Educate residents in terms of non-renewable resources.	**Target urban centres:** ⇨ Kuruman ⇨ Jan Kempdorp ⇨ Barkley West ⇨ Warrenton	**Cross-indicator stimulation:** ⇨ Institutional capacity ⇨ Satisfaction ⇨ Quality of life
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		X
Provincial Government		X
District Municipality	X	
Local Municipality	X	

Source: Own deduction

Population growth is one of the indicators dependent on a number of other policy objectives being realised. A town will attract immigrants if it is attractive-looking, has high employment levels, and if the local community is content. The table below lists these strategies, which refer back to other objectives mentioned in this section. Population growth is also stimulated by tourism and tourist activities, which are consequently proposed.

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Table 6.10   Population growth: Objective and strategies

Indicator: Population growth	Subcategory: Descriptive social	
Objective: *Prevent negative population growth or out-migration.*		
Strategies: ⇨ Create higher levels of employment. ⇨ Provide basic services. ⇨ Employ holistic marketing approach to tourist attractions. ⇨ Upgrade and develop tourist products.	**Target urban centres:** ⇨ Bothithong ⇨ Jan Kempdorp ⇨ Kimberley ⇨ Barkley West ⇨ Warrenton	**Cross-indicator stimulation:** ⇨ In-migration ⇨ Regional importance ⇨ Urban field ⇨ Employment ⇨ GDP
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		X
Provincial Government		X
District Municipality		X
Local Municipality	X	

Source: Own deduction

Once access to education and higher literacy rates have been attained, employment will increase, which in turn will increase the material well-being, and thus the satisfaction of the community. Only Bothithong is listed in this table since this town demonstrated low levels of literacy. This could be ascribed to a lack of education facilities or the distance children have to go to their schools on foot. It is consequently first proposed that new schools be erected, and second, that funds be allocated for public transport to schools. In this regard the provincial government, represented by the Northern Cape Education Department will have to play a significant role.

Table 6.11   Level of education: Objective and strategies

Indicator: Level of education	**Subcategory:** Descriptive social	
Objective: *Constitute access to education for all and higher literacy rate*		
Strategies: ⇨ Train educators. ⇨ Establish new schools. ⇨ Allocate funds for school transport. ⇨ Establish an adult learning facility. ⇨ Upgrade existing education facilities.	**Target urban centres:** ⇨ Bothithong	**Cross-indicator stimulation:** ⇨ Literacy levels ⇨ Employment ⇨ Income ⇨ Gender equality ⇨ Satisfaction
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		X
Provincial Government	X	
District Municipality		X
Local Municipality	X	

Source: Own deduction

The penultimate objective proposed is attaining lower levels of unemployment. This objective also links with the indicator of job security, and more or less the same strategies are proposed. It is especially important that each of the local municipalities should update their LED programmes, and establish facilities for adults to learn new skills.

Table 6.12   Labour and employment: Objective and strategies

Indicator: Labour and employment	Subcategory: Descriptive social	
Objective: *Attain lower levels of unemployment.*		
Strategies: ⇨ Create job opportunities through local initiatives. ⇨ Outsource non-core activities. ⇨ Establish and implement procurement policy. ⇨ Develop and implement LED policy. ⇨ Develop and improve agricultural sector. ⇨ Initiate skills development programme. ⇨ Establish adult learning facility.	**Target urban centres:** ⇨ Bothithong ⇨ Warrenton	**Cross-indicator stimulation:** ⇨ Income ⇨ Satisfaction
Responsible government sphere:	**Leading role**	**Supportive role**
National Government		X
Provincial Government		X
District Municipality	X	
Local Municipality	X	

Source: Own deduction

The final objective in this section deals with building institutional capacity, which is applicable to all government spheres. Bothithong and Barkley West obtained low scores for this indicator and strategies were proposed accordingly. The strategies especially deal with skills training, co-operative governance, managing change and the provision of adequate municipal buildings. The strategy of adhering to the *Batho Pele* principles is especially important since community participation could effectively initiate change, which also leads to a satisfied community.

Table 6.13   Institutional capacity: Objective and strategies

Indicator: Institutional Capacity		Sub-category: Descriptive social	
Objective: *To build the institutional capacity of the relevant government sphere.*			
Strategies: ⇨ Initiate an effective information management system. ⇨ Initiate an effective performance management system. ⇨ Facilitate process of managing change. ⇨ Promote co-operative governance between different spheres of government. ⇨ Adhere to *Batho Pele* principles of community participation. ⇨ Integrate an institutional programme. ⇨ Provide adequate municipal offices. ⇨ Build capacity through training programmes.		**Target urban centres:** ⇨ Bothithong ⇨ Barkley West	**Cross-indicator stimulation:** ⇨ Infrastructure ⇨ Service delivery ⇨ Satisfaction
Responsible government sphere:		**Leading role**	**Supportive role**
National Government			X
Provincial Government		X	
District Municipality		X	
Local Municipality		X	

Source: Own deduction

This section attempted to provide a number of specific objectives for urban centres within the study area, as well as numerous strategies to realise the objective. The specified strategies may be used to identify specific projects in order to realise certain objectives. In this regard the Vitality Index assisted in identifying certain shortcomings of urban centres with regard to certain indicators. These urban centres could consequently be addressed accordingly.

6.4   Conclusion

This study identified a limitation with regard to existing indicators and therefore the spatial aspects of urban centres should be taken into account when they are measured. Towns have been measured in terms of numerous indicators, mostly in connection with social and economic conditions, over an extended period of time. The lack of typical

spatial indicators was identified as a shortcoming in the measurement of urban centres. This study further identified the fact that qualitative indicators were ignored in existing methods of urban centre measurement. As urban centres exist and function within a larger region all urban centres are interrelated, this study proposed the utilisation of a comprehensive index to measure the importance of an urban centre within a specific region. Consequently the Vitality Index was developed on the basis of which an urban centre is scored by means of a number of indicators, indicating the ability of that urban centre to continue to exist, be viable, and function satisfactorily in order to provide for the basic needs of the community and to improve the lives of all residents in the long run. This Vitality Index includes social, economic, satisfaction and spatial indicators.

This study contributed in a number of ways to the measurement of urban centres, including the classification of urban indicators into four broad categories, i.e. normative welfare, satisfaction, descriptive social and spatial indicators. This study also proposed the sifting of possible indicators by measuring them against certain prerequisites. Methods were proposed for calculating the Vitality Index, including the ranking and scoring of urban centres. This made it possible to determine the ability of an urban centre to function satisfactorily over time and to stay vibrant and viable. It was proposed that shortcomings that were identified for the urban centre be addressed by policy initiatives, comprising a set of objectives and strategies to correct imbalances. The Vitality Index also provides a basis for framing national and provincial growth policies, in the identification of urban centres with sustainable growth potential and vitality.

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