LOGISTICAL CITIES IN PERIPHERAL AREAS

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by

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DECLARATION

I declare that this thesis submitted for the Philosophiae Doctor degree at the University of the Free State is my own, independent work and has not been submitted by me to any other university/faculty.

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ACSA	Airports Company of South Africa
ATAG	Air Transport Action Group
BESTUFS	Best Urban Freight Solutions
BTE	Bureau of Transport Economics
CSIR	Council for Scientific and Industrial Research
DBSA	Development Bank of Southern Africa
DETR	Department of the Environment, Transport and Regions
DOT	National Department of Transport
DPLG	Department of Provincial and Local Government
DTI	Department of Trade and Industry
DTRPW	Department of Transport, Roads and Public Works of the Northern Cape Province
DTSL	Department of Transport, Safety and Liaison of the Northern Cape Province
DWC	Dubai World Central
GDP	Gross Domestic Product
GTZ	Gesellschaft fűr Technische Zuzammenarbeit
FTZ	Free Trade Zone
Ha	Hectare
IA	International Airport
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICT	Information and Communication and Technology
IDZ	Industrial Development Zone
ILSCM	Institute of Logistics and Supply Chain Management
km	Kilometre
km^2	Square kilometre
LED	Local economic development
LPI	Logistics Performance Index
LQ	location quotient
m^2	Square metre
MIT	Massachusetts Institute of Technology
NCPG	Northern Cape Provincial Government
NCPGDS	Northern Cape Provincial Growth and Development Strategy
NDP	National Development Plan
NEG	New Economic Geography
nm	Nautical mile
NPC	National Planning Commission
NFLS	National Freight Logistics Strategy
ORTIA	OR Tambo International Airport
OECD	Organisation for Economic Co-operation and Development
OEF	Oxford Economic Forecasting
SADC	Southern Africa Development Community
UIA	Upington International Airport
UNIDO	United Nations Industrial Development Organisation

UNCTAD	United Nations Conference on Trade and Development
UNESCAP	Economic and Social Commission for Asia and the Pacific
UNECE	United Nations Economic Commission for Europe
USA	United States of America
SCM	Supply Chain Management
StatsSA	Statistics South Africa

1 SETTING THE SCENE

1.1 Background and problem statement

Trade competition between regions and countries has increased significantly in recent years. This increase is mainly due to increasing levels of globalisation, the rapid development of transport technology and the enlargement, worldwide, of markets (Capineri and Leinbach, 2006; Leinbach and Bowen, 2005). International trade liberalisation and the composition of global production chains have changed the geographical location of supply and distribution facilities, which, in turn, facilitate the development of technologies that accompany the globalisation of logistics (Du and Bergqvist, 2010). As a result, the favourable location of a region in terms of the connectivity of one economy to another in respect of sourcing and distribution has been seen to play an important role in determining a particular region's ability to participate in emergent globalisation opportunities (Sengpiehl, 2010). Thus, the logistical setup and the associated global connectivity of any region and of its related industries, requires a significant review of the way in which many regions – especially peripheral regions – interface with world markets.

There is a substantial body of research focusing on a variety of topics that specifically aim to improve the competitiveness of peripheral areas. The following, though by no means constituting an exhaustive list of the body of research on peripheral areas, does nevertheless aim to demonstrate the range of subject matter typically researched. Examples of such research include: clustering in peripheral areas (Nuur, 2007; Pontes, 2003); knowledge, innovation and growth in peripheral areas (Crescenzi, 2005; Fitjar and Rodrigies-Pose, 2011; Lagendijk and Lorentzen, 2007; Todtling and Trippl, 2005; Virkkala, 2007) entrepreneurship in peripheral areas (Skuras et al., 2005); socio-economic development (Floysand and Sjoholt, 2007); regional policy (Oksa, 1992); development and planning strategies (Bryden and Munro, 2000; Kourliouros, et al., 2006; Nijkamp, 1993; Nuur and Laestadius, 2010); information technology, (Gibbs and Leach, 1994); conceptual and theoretical research (Gren, 2003; Hayter et al., 2003); globalisation in peripheral regions (Glasmeier and Conroy, 1999; Keivani and Mattingly, 2007);

economic development (Gatrell, 1999; Rickman, 2007); and tourism (Brown and Hall, 1999).

Modern advances in trade liberalisation, transport and information and communication technologies (ICT) have, among others, led to the emergence of a new generation of logistics and distribution facilities around the world. These facilities owe their existence to changes in freight and logistics processes, and have been developed in response to the challenges posed by regional population and freight growth (Higgins, et al., 2012). Loosely termed *logistics centres*, these facilities have become fundamental elements of local, national, and international transportation systems in regions with high volumes of trade (Higgins et al., 2012). Very often these logistics centres are located at seaports (for example Rotterdam), airports (for example Memphis and, in South Africa's case, OR Tambo International Airport (ORTIA) or at other suitable locations such as City Deep in Johannesburg.

The modern advances discussed in the preceding paragraph have furthermore resulted in the emergence of new business strategies and trends, namely centralised inventory, delayed configuration or light assembly, customising and quality control (Abrahamsson et al., 2003; Sengpiehl, 2010; UNESCAP, 2005). These forces appear to lead to a high concentration of logistics activities in relatively few nodes or logistics centres that have good access to major markets (Notteboom and Rodrigue, 2009a). Advances in both technology and logistics systems have resulted in increased use of airports as logistics centres, hubs or gateways. The air-freight industry has played an increasingly important role in world trade and has doubled in volume every ten years since 1970 (Chang et al., 2007). This increase in volumes makes air freight and airports important components of trade and trade processes. According to Kasarda, "[A]irports will shape business location and urban development in the 21st century as much as highways did in the 20th century, railroads in the 19th and seaports in the 18th" (TIACA Times, 2005:5). With international transactions, production, flexibility and speed characterising the economy of the 21st century, air-cargo and air-express services play increasingly important roles in business strategies (Kasarda, 1998). No other means of transit is better equipped to meet the economic realities of this century in which global sourcing and selling and just-in-time logistics require that producers receive and ship smaller quantities more frequently and more speedily over long distances (Kasarda, 1998).

Engagement in the global trading arena and in the resulting concentration of logistics activities in the trade hubs, commonly encountered in metropolitan areas (such as in Gauteng), can give rise to congestion and bottlenecks that decrease the seamlessness of connectivity and put both the facility and the region under enormous pressure (Capineri and Leinbach, 2006). The occurrence of such bottlenecks and congestion in metropolitan areas may pave the way for suitably located nodes in peripheral areas to relieve the pressures caused by such negative externalities, thereby increasing system efficiencies. The question is whether such peripheral areas have the necessary capacity, knowledge, strategies and policies in place to support the development of logistics nodes or hubs in their area and whether such nodes can be located and developed in peripheral areas.

Local economic development (LED) in peripheral areas faces a number of challenges consequent to the absence of major competitive advantages and other economic drivers. Many smaller towns in South Africa are currently experiencing decline and thus going in search of bases for economic revival (Donaldson and Marais, 2012). The result of the current decline is that decision makers often look for non-traditional development outcomes. The existence of infrastructure is sometimes regarded as a possible replacement for natural drivers of growth such as resource endowments or agglomeration advantages and scale economies. Goods (whether final or intermediate) can be transported by a variety of modes that include vehicles (road-based transport), ships (water-based transport or airplanes (air-based transport). Peripheral areas that do not have access to seaports are totally dependent on road and air transport to supply their freight-movement requirements.

Given the presence of inherent negative externalities in peripheral areas (lack of growth drivers, agglomeration advantages), new strategies are required to develop well-structured, sustainable solutions to support industrial and commercial activities within a region that has efficient connectivity to other economic localities. In this context, one essential issue is the alignment of activities and regulations across traditional boundaries to enable logistics-centre gateways to connect a region to the rest of the world via physical, virtual and legal interfaces (Sengpiehl, 2010). Indeed, one strategy that is considered to be capable of addressing these changes is the *logistics city* concept – this being one of the most recent manifestations of logistics nodes (ILSCM, 2007a; Nagel et al., 2009a; Sengpiehl, 2010). Some researchers, such as Sengphiel (2010), strongly believe that the logistics city concept is a suitable strategy for enhancing or indeed achieving competitiveness as a supply-chain location.

Peripheral areas mostly lack market forces of sufficient magnitude to allow facilities such as airports to grow organically into air-freight hubs. Two questions therefore arise:

- Can airports in peripheral areas be catalysts for development through air-freight movements?
- What needs to be done to overcome the natural absence of drivers of economic development in order for these airports to develop optimally into fully fledged air-cargo hubs?

1.2 Aim and objectives of the study

Taking into account the background and problem statement provided above, the aim of the study is to evaluate Upington (as a peripheral area within the South African economy) and its ability to utilise the Upington International Airport (UIA) as a LED initiative, and then specifically through the establishment of an air-freight and logistics hub at the airport.

Taking into account the background and the aim of the study, the following six specific objectives have been formulated:

- To analyse not only the traditional location theories but also the new economic geography (NEG) in overcoming both spatial inequality and the role that processes such as globalisation and clustering have played in the modern economy.
- To contextualise clusters and logistics centres and to analyse the logistics city concept in terms of typology and critical enablers and then to place these in perspective in peripheral areas.

- To analyse the transport and logistics environments – specifically the air-freight environment – so as to gain an understanding of the potential opportunities these may offer peripheral areas.
- To analyse not only the African and the South African logistics and policy environments but also the air-freight markets in Africa and South Africa and to place them in the context of the LED policy environment in South Africa.
- To reflect on the suitability not only of the LED strategies and policies for Upington but also of the UIA for the development of an air-freight hub at the airport.
- To assess the potential of UIA to develop into a freight hub.

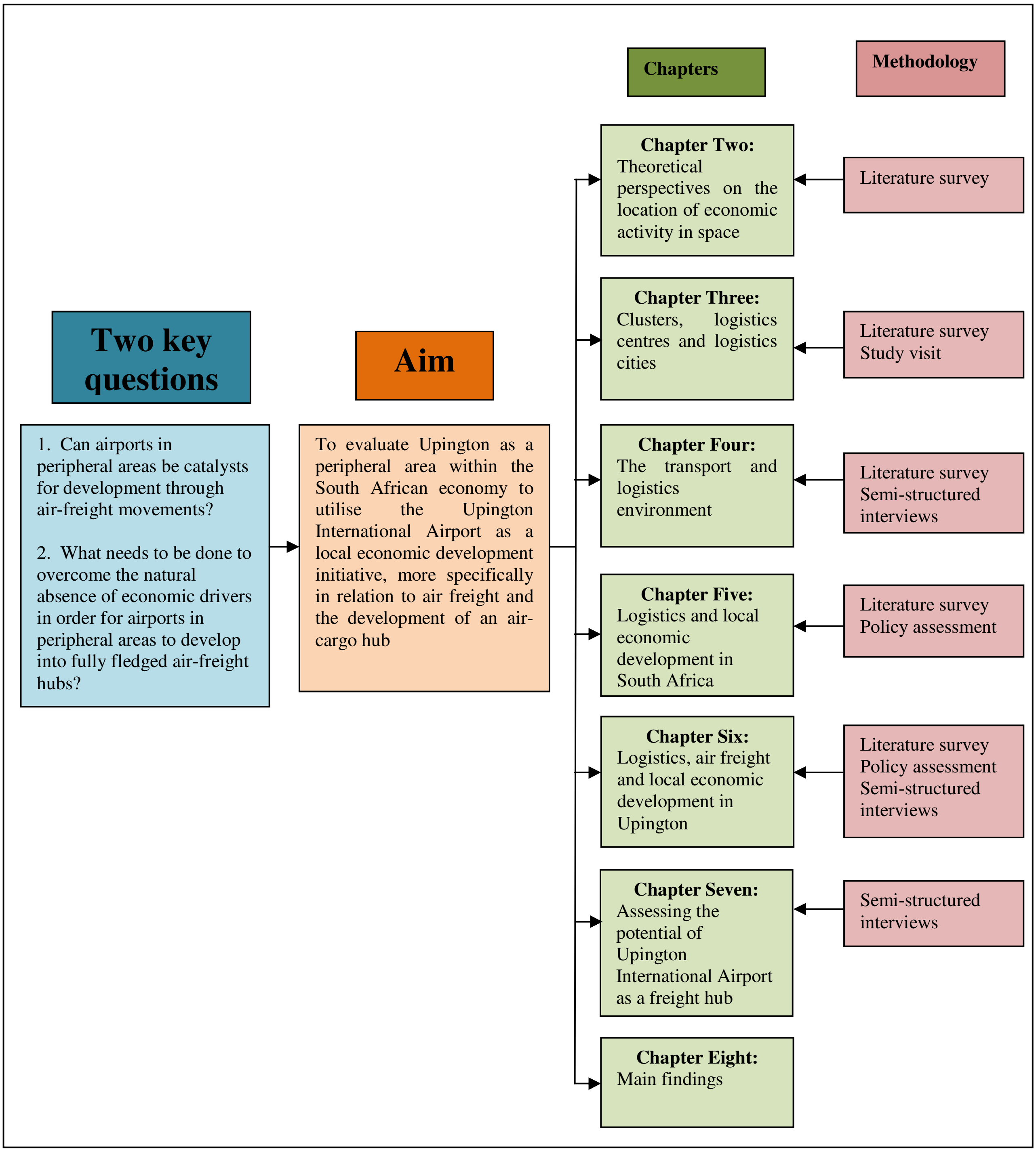
The study is conceptualised in Figure 1 on the following page.

1.3 Core concepts

Certain core concepts have been briefly referred to in the above sections and are used in the remainder of the thesis. These core concepts are: *peripheral areas*, the process of *globalisation* and how it has influenced thinking on location theory, *logistics and logistics costs*, the progress and developments pertaining to transport infrastructure, specifically the modern phenomenon of *logistics clusters or hubs*, the *logistics city* and the role of *regional airports in the LED environment*.

The remainder of the section defines each of these concepts.

Figure 1: Conceptualisation of study



1.3.1 Peripheral areas

The central focus of the study is on peripheral areas. Yet the definition of what a peripheral area actually is does not seem to be straightforward. In its simplest form, a *peripheral area* is equated with a less favoured area (Glasmeier and Conroy, 1999), a non-core area (Lagendijk, 2000), or even an area located in metropolitan areas (Lagendijk and Lorentzen, 2007). The geographical constructs of, for instance, distance, accessibility and proximity are also sometimes used to describe peripheral areas (Lagendijk and Lorentzen, 2007; Virkkala, 2007). Nuur and Laestadius (2010) though they do not offer a firm definition, imply that they equate peripheral regions with sparsely populated areas. McDowell (1990) however equates peripheral areas with rural areas. In other studies, the definition of a peripheral area is often implied or the reader has to deduce the meaning of the term from the context of the work (Bryden and Munro, 2000; Crescenzi, 2005; Fitjar and Rodríguez-Pose, 2011; Nuur and Laestadius, 2010). Gren (2003) argues that structured definitions of peripheral areas are often avoided in the literature mainly so as to avoid any definition problems related to this elusive concept.

For the purposes of this study, a peripheral region is regarded to be a region that is isolated from another region because of physical and human factors. This means that the region is both physically and economically isolated from the 'main' or core region. Upington was selected as a case study area for two reasons. Firstly, it is fairly isolated in the South African context in that it is located in a large, rural province that is characterised by low population densities and, given that the economic heartland of the country is the Gauteng Province, Upington is moreover isolated in terms of economic activities. Secondly, it has an international airport that has, since about 2006, regularly been mooted as a possible air-cargo hub (DTRPW, 2009; //Khara Hais, 2006)

1.3.2 Globalisation

In his book "The world is flat" Friedman (2006:134) states that the 21st century will be remembered both as the new age of globalisation and also for the 'flattening of the world'. *Flattening of the world* in this sense points to globalisation having levelled the competitive playing fields between the industrial countries and the emerging-market countries.

The term *globalisation* is often used to describe the increased flow of knowledge, resources, goods and services among nations. Globalisation can also be described as a process by which the people of the world are unified into a single society that functions together. This process is a combination of economic, technological, sociocultural and political forces. Yet the term is often used in the narrower sense of economic globalisation, which involves the integration of national economies into the international economy through trade, foreign direct investment, capital flows, migration and the spread of technology (OECD, 2010). The Organisation of Economic Co-operation and Development (OECD) (2010) further emphasises that three major forces have contributed significantly to the globalisation process, namely the liberalisation of capital movements and the deregulation of financial services in particular; the further opening of markets to trade and investment, thereby spurring the growth of international competition; and, the pivotal role played by ICT in the economy.

Against the above background, the concept *globalisation* has a twofold application in this study. Firstly, it will be used to explore the significance and relevance of location (space utility), especially in peripheral areas and within the complexities of international competitiveness between industrialised countries and developing countries. Secondly, globalisation will be used to determine the implications for development in peripheral areas, given the opportunities it may offer.

1.3.3 Logistics and logistics costs

The Council of Supply Chain Management Professionals (2011) defines logistics as "that part of supply chain managements that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements". Simply put, logistics means having the right thing at the right time at the right place.

Logistics encompasses a wide set of activities dedicated to the transformation and circulation of goods, such as the material supply of production, the core distribution and transport function, wholesale and retail and also the provision of households with consumer goods together with the related information flows (Handfield and Nichols, 1999).

There is a need for effective and efficient transportation networks and infrastructure both to bridge the spatial divide between production and consumption and also to address the issues of lowering logistics costs and increasing supply-chain efficiencies. The study investigates the changing trends in international logistics and the issue of logistics costs and logistics performance indicators so as to demonstrate the effect that those factors have on a region and a country's competitive advantage. Furthermore, logistics is investigated as a possible economic driver in peripheral areas, by specifically focusing on the possible LED benefits that can potentially be associated with logistics.

1.3.4 Logistics hubs

Transport infrastructure has an important role in the effective functioning of any freight-transport system. One of the effects of globalisation is that infrastructure at specific locations has become increasingly important towards ensuring seamless movement of goods. A logistics hub, which is simplistically defined as an integrated centre for the transhipment, storage, distribution and collection of goods (Jorgenson, 2007), is an example of such location-linked infrastructure. Logistics hubs are very well established internationally (Botha and Ittman, 2008), but less so in South Africa. Their success has led to the international proliferation of such hubs and there is concern that, locally, many so-called 'decision makers' have jumped on the band-wagon and are pushing for the establishment of logistics hubs within their regions or areas of jurisdiction, especially because logistics hubs are a fairly new phenomenon in South Africa (Botha and Ittman, 2008).

This study will investigate the logistics hub as location-linked infrastructure with specific reference to gaining an understanding of the common attributes and functionality offered by logistics hubs and the development of such facilities as part of a Local Economic Development (LED) initiative at the Upington International Airport.

1.3.5 Logistics cities

A number of cities around the world have established their international standing, competitiveness and attractiveness as logistics hubs. In some examples, the ultimate progression of the logistics-intensive component of their economy evolved to the establishment of a new kind of city, namely a logistics city. Several of these so-called logistics cities exist and while they are not always referred to as such, these logistics cities, for example Dubai (Proffitt, 2006; Turner, 2006), Shanghai (Harmsen et al., 2006; Leach, 2006), Singapore and others in the United States of America (USA) and Europe (Tierney, 2004) are multifaceted in terms of their characteristics pertaining to infrastructure, business services and urban amenities. Logistics cities exhibit significant economic-growth potential in addition to possessing the ability to attract investments and projects from leading international and local logistics companies, thereby securing further strength in their supply-chain management and general logistics capability.

During the period 2006–2008, the Institute of Logistics and Supply Chain Management (ILSCM) at the Victoria University developed an academic framework for a logistics city. They regarded this as a planning framework for resolving the problems experienced in Melbourne in respect of the logistics at the seaport. This was the first attempt to contextualise the concept of a logistics city within a metropolitan environment. There is no evidence of similar work having been undertaken for peripheral areas.

The concept of a logistics city will be investigated in terms of its typology and the associated critical enablers and will then be evaluated as a planning framework tool for the establishment of an air-freight and logistics hub at a regional airport located in a peripheral area in South Africa.

1.3.6 Regional airports and local economic development

In the new fast-cycle logistics era brought about by globalisation, nations with good air-cargo capability have competitive trade and production advantage over those who do not. Air cargo enables nations, regardless of location, to connect efficiently to distant markets and global supply chains in a speedy, reliable manner. Air cargo plays an important role in world trade, with air cargo accounting for the transportation of about 42% of the value of current world trade (TIACA Times, 2005:1) consisting chiefly of high-value, time-critical products such as computer chips, pharmaceuticals, just-in-time inventories, urgent documents, electronic components, aircraft parts, high-fashion apparel, cellular telephones, and a wide variety of time- and temperature-critical perishables. Boeing predicts that over the period between 2003 and 2023, world air cargo will grow at 6.2% per year (TIACA Times, 2005:1).

It is evident from the literature that air cargo is an important engine for economic development (ATAG, 2008; Kasarda et al., 2004; 2006; Senguttavan, 2006). Internationally, airports often act as hubs, for example locations at which air-traffic movements (passengers and cargo) are both generated and attracted. Airports play an important role in economic development, especially in urban areas. A number of urban areas on the broader periphery of the South African main economy have tried to lobby for the development of an air-cargo airport as a development strategy. Evidence furthermore exists that airports and specifically the concept of air-cargo hubs are often regarded by government departments and/or development agencies as important catalysts for LED, with a number of studies being commissioned to investigate the feasibility of air-freight hubs at smaller, regional airports such as UIA, Mahikeng International Airport, Wonderboom Airport, Secunda Airport and even a new freight airport at Vereeniging (Arcus GIBB Engineeers, 2012a; 2012b; 2012c; City of Tshwane, n.d.; DTSL, 2012; DTRPW, 2009; Emfuleni Local Municipality, n.d.; Grant Thornton, 2009; VKE Engineers, 2001). These studies seem to indicate that political decision makers are of the opinion that the mere existence of airport infrastructure is sufficient reason why the facility should be seen as an important local and regional development driver, especially in peripheral areas.

Despite these initiatives, academic reflection on these aspects from an LED perspective has been extremely limited. The majority of work in this respect is located within the consultancy fraternity – as is borne out by the examples listed above. The LED policy environment in South Africa will be analysed to determine the status of regional airports in national policies. The specific the policies of the //Khara Hais Local Municipality will also be analysed to determine the standing of the hub-related developments and initiatives at UIA in LED-related literature and to gauge what role, if any, the LED process has played in the cargo-hub initiatives.

1.4 Justification for the study

The justification for the study is twofold. Firstly, only limited consideration has been given to air freight and logistics in South African academic literature. Secondly, a large number of places (many of them peripheral to South Africa's economic heartland Gauteng) have conducted feasibility studies probing the viability of developing smaller, regional airports into air-freight hubs.

In fields related to this study, namely planning, economic development, policy, strategy development, institutional and regulatory aspects, business development and infrastructure development, the extent of postgraduate and other academic work in South Africa is fairly small, and then also not very recent. Some studies have been undertaken with regard to air transport (not simply air freight) in general, focusing specifically on economics and finances related to air transport (Apfel, 1978; Scholtz, 1998); deregulation issues (Smith, 1998); business development (Baker, 1981; De Bruyn, 1985; Hamerton-Stove, 1993; Miller, 1977); demand-type studies (Presto, 1982); legal and institutional aspects (Ehrenbeck, 1998; Walters, 1985); infrastructure (Botha, 2008; Perkins, 2003); and strategic development of the industry (Ssamula, 2008). Only one postgraduate study could be found that dealt with the role of transport and logistics in South Africa's international competitiveness (Van Rensburg, 2000). Unfortunately, though, air transport received very little attention in this study.

Although some work has been done in general on air transport, very little has been done in respect of air freight and logistics from a developmental perspective. Although two authors (Botha, 2008; Ssamula, 2008) focussed on hubs in their studies, they did not do so from a local development or peripheral area perspective. No evidence could be found of any academic study specifically dealing with either transforming regional airports into air-freight hubs, or with the role and function of logistics hubs in peripheral areas in South Africa.

Furthermore, evidence exists that airports and specifically the concept of air-freight hubs (and by implication air freight) are often regarded by government departments as important catalysts for LED. More than a decade ago, the airport at Welkom was one of the first small, local airports to be investigated for its suitability as a possible air-cargo hub (VKE Engineers, 2001). The City of Tshwane has also developed a master plan for an intermodal freight hub, which includes Wonderboom Airport as an air-cargo hub (City of Tshwane, n.d.). In 2009, a project was launched to develop an airlift strategy for Limpopo Province, with a particular focus on the development of a cargo hub at Polokwane International Airport (Grant Thornton, 2009).

More recently – in January 2012 – the North West Department of Public Works, Roads and Transport put out a proposal call to consultants entitled “Development of a freight transport strategy, passenger and freight rail plan for the North West Province and feasibility study for the development of a freight hub at Mahikeng International Airport” (Arcus GIBB Engineers, 2012a).

In February 2012, a tender proposal was put out by the Govan Mbeki Local Municipality for a viability study on the Secunda Airport. One of the potential market areas stipulated for investigation was the possible air-freight market (Arcus GIBB Engineers, 2012b). The Emfuleni Local Municipality (Vereeniging) has developed a colour brochure on its own logistics hub that is to comprise a container depot, an industrial development zone and an international cargo airport (Emfuleni Local Municipality, n.d.). Further to this brochure, the Emfuleni Local Municipality has requested Arcus GIBB Engineers to prepare a proposal document on a feasibility study for a Vaal logistics hub in the jurisdiction of the Emfuleni Local Municipality of Gauteng, and that this should focus specifically on the cargo airport (Arcus GIBB Engineers, 2012c).

The proposed cargo hub at UIA is the “air-freight hub project” that has received by far the most attention and publicity. After a pre-feasibility study conducted in 2006 (//Khara Hais, 2006), a fully fledged business-case development study was undertaken in 2008 and 2009 (DTRPW, 2009). In 2007, the then Premier of the Northern Cape Province, Ms Dipuo Peters, gave prominence to the cargo hub at UIA in her keynote address to the

Siyanda District Growth and Development Summit held in Upington on 21 February of that year.

Moreover, the Northern Cape Department of Transport, Safety and Liaison hosted a Transport Investors' Conference on 16–17 November 2011 during which four key freight-transport and logistics projects were flagged. One of these projects was the Upington International Cargo Hub (Jenkins, 2011). Subsequently, the Department of Transport, Safety and Liaison in the Northern Cape put out a tender in 2012 entitled 'Project Management Services for the following projects: De Aar Freight Transport Hub, Douglas/Belmont Rail Branch Lines, Upington International Air Cargo Hub and the Port Nolloth Harbour Development' (Department of Transport, Safety and Liaison, 2012). This serves to illustrate the importance in the minds of the provincial government of the air-cargo hub in Upington and the general freight-transport hub at De Aar.

The above statements demonstrate that there is ample interest in logistics, freight logistics and especially air-freight logistics in the country. It would seem that policy makers are aware of the possible economic benefits of airports (the direct, indirect and induced impacts) hence their focus on feasibility studies for converting existing smaller airports into cargo hubs. Despite there being ample interest in the development of air-freight hubs in the peripheral areas of South Africa, there is virtually no academic interest in the topic. This often leads to feasibility studies being conducted without the proper theoretical underpinnings. This situation is sometimes exacerbated by consultants who demonstrate scant knowledge of the aviation industry in general and particularly of the air-freight industry. This research has aimed to respond to this state of affairs by providing a sound theoretical foundation for the development of air-freight hubs in peripheral areas.

1.5 Methodology

Very early on in the research process it became apparent that gaining access to and obtaining reputable basic data and information from air-freight industry role players – such as freight forwarders and cargo airlines – would prove to be a major challenge. As indicated by these role players during personal interviews the reason lay in the air-freight industry being a relatively small industry that operated as a tight-knit community. They regard information such as volumes, routes, schedules, products and business philosophies to be of a proprietary nature so that if such information were to be placed in the public domain, it would impact negatively on their operations.

Therefore, the methodology adopted for this study attempts to answer the two key questions set in Figure 1 by means of a process of triangulation, which comprises five elements, namely a literature review, policy analysis, questionnaire research and semi-structured interviews with industry role players, a study visit to Australia to obtain first-hand information on the newly developed logistics city concept, and a multi-level qualitative assessment of Upington International Airport. Each of these elements will now be discussed in more detail.

1.5.1 Literature review

A comprehensive literature review, of which more than 460 sources are referenced in this document, was undertaken on the core concepts discussed in Section 1.3 so as to obtain a thorough understanding of these core concepts and to identify the underlying dynamics and shortcomings of theory, policy and industrial trends central to the aim and objectives of this study. The literature review also provided the theoretical background against which South African policy and LED attempts in Upington were mirrored.

1.5.2 Policy analysis

The literature review was augmented by a policy assessment in respect of two aspects, namely the South African freight and logistics strategies and linking these to LED policies and strategies. The most prominent national-level freight and logistics policy in South Africa is the National Freight Logistics Strategy (NFLS) compiled in 2005. The policy is analysed with a view specifically to identifying freight and logistics problems in the country and to gaining an understanding of the national government's strategic thinking on freight and logistics in the country. The policy assessment was further expanded to include an assessment of the current LED policy in South Africa and more specifically the decentralised LED policy efforts in Upington and the Northern Cape.

Essentially, these policy assessments assess national and local policy attempts against the existing theory and literature.

1.5.3 Questionnaires and semi-structured interviews

The initial mechanism with which to solicit information from the variety of sources active in the air-freight industry was a questionnaire. The purpose of the questionnaires was to gather basic information on the activities of each organisation and also on the factors the organisation felt would prompt the use of the UIA as an air-freight hub. The questionnaires were designed to solicit a mixture of quantitative and qualitative information. Having to take into account the industry-specific nature of each of the categories of role players meant that different questionnaires were developed for each category of role player. This section contains a summary of the questionnaire and semi-structured interview methodology followed in the information-gathering process. A more detailed description of the process and the particular questionnaires used are provided in Annexure A.

Key industry role players would be an obvious starting point for obtaining information that might assist in answering the two key questions reflected in Figure 1. Three main categories of role players that could potentially provide valuable information on the air-freight industry were identified, namely freight forwarders, air-cargo airlines and the business sector that made or would make use of air freight.

Freight forwarders are service providers that organise shipments for individuals or businesses to move/transport goods from the manufacturer or producer to a market, customer or final point of distribution. Forwarders contract a carrier to move the goods. A forwarder does not actually move the goods but acts as an expert in supply-chain management. Without freight forwarders there would be no movement of freight to and from an airport and they moreover need to be consulted regarding their requirements for operating from an airport.

An air-cargo airline is an airline that operates only dedicated freighter aircraft and does not transport any passengers. I decided to focus on cargo airlines because of the absence of scheduled international flights to and from the UIA, which meant that freight movement on passenger airplanes was not possible. The cargo airlines were targeted to provide information both on their requirements and their pre-requisites in respect of operating from an airport.

The business community – as the producers in the economy – needed to be consulted to gain an understanding of their requirements, preferences, product types and product volumes.

I made use of three main sources of information to assist me in compiling a list of target organisations in each of the three categories of role players: firstly, the feasibility study undertaken by //Khara Hais Local Municipality on the development of an air-cargo hub at the UIA (//Khara Hais, 2006); secondly, Mr Gerd von Mansberg (2009 to 2012), chairperson of the Cargo Connection, a general sales agent responsible for selling cargo capacity to freight forwarders; and thirdly, the Northern Cape Chamber of Commerce and Industry (NOCCI), who assisted with the identification of businesses from their membership list who were likely to make use of air freight.

The feasibility study conducted in 2006 indicated that a potential market for the UIA could be the vehicle-manufacturing industry in the Eastern Cape. Air-freight to and from the Eastern Cape is transported to ORTIA by truck. ORTIA and the UIA are virtually equidistant from Port Elizabeth, which means that, theoretically, the cost of road transport from Port Elizabeth to ORTIA would be same as to the UIA. The following freight forwarders who are active in that market were selected with the aid of Mr von Mansberg as a target population for the information-gathering exercise: Safcor/Panalpina, Schenker, Kuehne and Nagel, SDV South Africa, DHL and W.E. Deane.

There are relatively few cargo airlines that operate regularly from ORTIA and the following were targeted: Lufthansa Cargo, Cargolux, Martinair Holland, MK Freight Systems and SA Airlink Cargo. The only ground handling company at the UIA (Upington Ground Handling Company) was also targeted as a possible source of information.

The following business role players were also targeted with the aid of NOCCI: ORPA (grape industry), OKLU (Agricultural Union), LAW (EU-approved abattoir), Karstens Boerdery, McDonalds Transport, Hudson Transport, Fruit and Vegetable Distributors, Peu Bezuidenhout (rose producer), KLK (an agricultural co-operative) and OWK (wine producers and marketers). In terms of the vehicle-manufacturing industry Ford, GM and Volkswagen were targeted.

In early 2009, I dispatched 74 questionnaires by email to the selected parties listed above. The response was extremely poor and only six completed questionnaires were returned to me, namely those of SDV South Africa (freight forwarder), MK Airlines, Lufthansa Cargo, Martinair Cargo, (all cargo airlines) and Upington Ground Handling Company.

As a follow-up initiative, I arranged interviews with the targeted sources. Interviews were conducted with every role player who was prepared to grant an interview of this nature. The same questionnaires that had been dispatched in the manner described in the preceding paragraphs, were then used as an interview guide in an attempt to improve the information contained in the six questionnaires that had been returned completed.

During these interviews it became apparent that additional role players would also have to be interviewed (snowball effect). These additional sources included Sabila Freight and Logistics (freight forwarder), SA Airlink Cargo (national cargo airline), the Automotive Industry Development Centre (an organisation established to assist in increasing the global competitiveness of the South African automotive industry to world-class levels) and representatives from the Namibian Fish Industry.

Interviews were conducted with the following freight forwarders during the period 17 to 18 March 2009: Safcor/Panalpina, Schenker, Kuehne and Nagel, SDV South Africa, DHL and W.E. Deane. Sabila Freight and Logistics were interviewed on 8 June 2009. The cargo airlines interviewed during the period 17 to 18 March 2009 included Lufthansa Cargo, Martinair, MK Airlines and SA Airlink Cargo. Representatives of the Namibian Fish Industry (Marco Fishing, Aroma Fishing, Corvina Fishing and Benguela Fishing were consulted in Walvis Bay on 24 March 2009. The interview with the Automotive

Industry Development Centre was conducted on 10 June 2009. See Annexure A for a more detailed description not only of the process and of the individual responses but also of the questionnaires used.

The interviews were secured on the basis that all interviewees remain anonymous. Therefore, all references made in Chapter 7 on information received and comments made during the interviews are reflected as originating from Interviewee 1 to 13. Interviewees 1 to 7 were from the freight forwarder category, 8 to 11 from the air cargo category and 12 and 13 from the general business category.

1.5.4 Study visit

I undertook a study visit to the ILSCM in Melbourne, Australia to interact at first hand with the developers of the logistics city concept and to discuss the applicability of their concept to LED in peripheral areas. The main purpose of the said visit in September 2010, was to obtain first-hand knowledge of the enablers of a logistics city, which, at the time, were not well documented in academic literature on the logistics city concept. I also held in-depth discussions with Mr Carsten Sengpiehl who was then finalising the only postgraduate dissertation to date on the logistics city concept. His research was specifically focused on identifying and classifying the critical enablers of a logistics city by means of a modified Delphi process.

During the time spent in Melbourne, discussions were held with a wide variety of people and organisations. These included academics, researchers, local-authority officials and planners. Discussions were also held with Leadwest, a regional development organisations in Melbourne, responsible specifically for development in the western sections of Melbourne. As such, Leadwest is closely involved in the implementation of the logistics city concept in Melbourne (see Figure 3).

Based on these discussions, the following important conclusions applicable to this study were made:

- The logistics city concept is regarded to be a planning framework and, as such, there is no reason why the concept cannot be applied proactively to a peripheral area such as Upington.
- The market can be local, regional, national or international and need not only be local. This means that, theoretically, the absence of a local market at Upington does not preclude the development of an air-freight hub at the UIA.
- The mere existence of infrastructure related to a terminal (as is the case with the UIA) cannot on its own be an enabler (or driver) for the establishment of a hub.
- Government support – and in some cases government intervention – is an important driver of the application of the logistics city concept in any area, and even more so in the case of a peripheral area. Government should have an economic focus in its support for the development of an air-freight hub and should focus on aspects like policy development, strategy development, integrated planning and even incentives.

1.5.5 Qualitative assessment of Upington International Airport

A qualitative assessment of the UIA was also made from the perspective of the logistics city and its critical enablers. The critical enablers, as discussed in Chapter Three, were individually and qualitatively rated based on the application of a four-level rating scale. The scale used in the assessment measures two main elements of each enabler, namely the level of compliance and the level of constraint.

A converse rating scale was used, which means that if an enabler receives a Level One rating (indicated by ✓) for level of compliance, it automatically receives a Level Three rating (indicated by ✗ ✗ ✗) for the level-of-constraint element. The rationale behind this rating scale is simply that if the level of compliance is low, the level of constraint is automatically high.

1.6 Theoretical assumptions

Notwithstanding the fact that theoretical development within the field of LED is acknowledged to be a "complex blend of concepts, practices and rhetoric", (Rogerson and Rogerson, 2010:469), the present study is embedded within the theories of LED. Le Heron (2009) argues that LED originated in response to two fundamental realities, namely increasing spatial inequality and the reaction of local actors to the lack of local investment in specific localities. Theoretically, LED emanates from three main bodies of literature, each with its own theoretical assumptions (Rogerson and Rogerson, 2010). The first body of literature is associated with the process of political decentralisation that has occurred globally and, more specifically, in Africa over the past two to three decades. According to this body of literature, political decentralisation provides a platform for localities to establish uniquely local responses in respect of the development of a specific locality. In this regard, Rogerson and Rogerson (2010:465) argue that "... planning for local economic development is now a widespread facet of international development planning, particularly in the context of pervasive trends towards decentralisation – the deliberate and planned transfer of resources away from central state institutions – and of shifting structures of government and governance".

The second body of literature on LED has emanated from the changing world economy and from changing patterns of production, consumption and distribution over the past three decades (Blakely, 1989). The focus is usually on the behaviour of firms. Essentially, the new type of economy, more dependent on knowledge, has had a significant impact on the locality of enterprises, with enterprises also becoming far more 'footloose'. Within this context, localities have started competing with one another and the concept of urban entrepreneurialism has been constructed to explain such competition (Rogerson and Rogerson, 2010). The third body of literature has its origins in local development efforts – especially of non-governmental organisations looking for an alternative to current development approaches (Gomez and Helmsing, 2008).

Rogerson and Rogerson (2010) maintain that most of the LED programmes and research are embedded in one or more of the above theories, but that a range of other theoretical foundations are also applicable to LED. This study is largely embedded in two of these theoretical foundations. In the first place, the study acknowledges the given realities of increasing competition, of globalisation and of the different patterns of consumption and production. The development of the logistic city concept is in fact moulded within this reality. It is within this context of increasing globalisation that I attempt to position freight (more specifically air freight) and logistics. Secondly, the study considers the local reaction in order to develop the UIA. It should further be accepted that much of the LED research in South Africa is empirical and pragmatic in nature and that only limited theoretical work has to date been undertaken in this field (Rogerson and Rogerson, 2010).

1.7 Study outline

The thesis comprises eight chapters and is structured as follows: Chapter Two (**Theoretical perspectives on the location of economic activity in space**) investigates the theories developed, over time, on the location problem and the reasons why industries locate where they do. The theoretical perspectives are discussed in terms of the classical, neoclassical and behavioural approaches to location theory. The latest development in location theory, namely the NEG is also investigated. Emanating from principles of classical location theory and from the insights peculiar to the NEG, the concept *agglomeration* and its more modern term *clustering*, are discussed in detail. The chapter concludes with a discussion on the process of globalisation and the effects of the latter on the location of producers.

Chapter Three **(Clusters, logistics centres and logistics cities)** further develops the ideas on clustering mentioned in Chapter Two and also investigates cluster theory in more detail. The link with the concept of a logistics city as part of a progression of dense trade clusters is made and explored in detail. The theoretical foundation of logistics cities is laid and the critical enablers of logistics cities are both identified and described. The chapter concludes with some remarks on the role of logistics cities in peripheral areas.

Chapter Four **(The transport and logistics environment)** discusses: the roles of transport, logistics and air cargo in economic development; the changes in logistics processes and the importance of the cost of logistics to the economy; general trends in logistics and the links between air cargo and economic growth; the air-freight industry in terms both of its role in the broader economy and as an engine for economic growth; and, the air-freight operating environment.

Chapter Five **(Logistics and local economic development in South Africa)** focuses on the freight and logistics environment in Africa and, more specifically, in South Africa. The chapter provides an overview of the African and the South African logistics environments and of the air-freight market both in Africa and South Africa. These overviews are then followed by a discussion on LED from an international perspective and of how LED in South Africa has progressed since 1994, with special reference to LED in small towns. The chapter concludes with an analysis of LED policy in South Africa from a logistics and air-freight perspective and with a discussion on government interest in air-freight hubs and logistics in South Africa.

Chapter Six **(Logistics, air freight and local economic development in Upington),** after placing Upington in its provincial context, provides the reader with a historical and developmental perspective of both the town itself and also the airport. The chapter concludes with a discussion on the developments at the airport as they relate to the possible cargo hub, the existing freight volumes at the airport, the current level of development at UIA within the air-freight industry (in South Africa), and the LED of the town.

Chapter Seven (**Assessing the potential of Upington International Airport as a freight hub)** offers an evaluation of the UIA from the perspective of the logistics city concept as discussed in Chapter Three. This is followed by a critical reflection on the air-freight hub at Upington within the theoretical perspectives discussed in chapters Two to Five and the LED policy environment as discussed in Chapter Five and Chapter Six. The third part of the Chapter then interrogates whether the UIA has potential if the realities regarding the market enabler are taken into account.

Chapter Eight **(Main findings)** enumerates the main findings of the study, the conclusions and the recommendations for future research.

2 THEORETICAL PERSPECTIVES ON THE LOCATION OF ECONOMIC ACTIVITY IN SPACE

> "Far from being a process of smooth convergence, development is highly spatially differentiated. This poses a number of questions for economic theory. The first is, why do these spatial disparities develop?" (Venables, 2003:2)

2.1 Introduction

Spatial inequalities exist within and between countries because economic activity is unevenly distributed. As this thesis considers the location of a freight airport at a peripheral location such as Upington, the question that then arises is: Why is economic activity distributed so unevenly across space, with centres of concentrated activity surrounded by 'peripheral' regions of lower density?

According to Lall and Chakravorty (2005:47), spatial inequality refers to "a condition in which different spatial or geographical units are at different levels on some variable of interest, usually (average) income". Recently, the persistence of socio-economic inequalities within national space economies has triggered a reassessment in international scholarship regarding both the nature of spatial inequalities and the appropriate policy responses (World Bank, 2009a). New research in several countries indicates that development gaps between different regions are generally on the increase, so much so that spatial inequalities are a matter of mounting policy concern (Kanbur and Venables, 2005a; Lall and Chakravorty, 2005; Rodriguez-Pose and Fratesi, 2003; Rodriguez-Pose and Gill, 2003a; 2003b; 2005b; Venables, 2005).

It is commonly argued in literature that the spatial concentration of economic activity occurs mainly because some regions have characteristics that attract more firms to be established there than in other regions (Rosenthal and Strange, 2003; Venables, 2003). From a theoretical perspective it is important to gain an understanding of the mechanisms that shape the location of economic activity during the development process in order both to understand the dynamics of retaining existing activity in a region and to entice new activity to locate in the region, especially in peripheral or economically lagging regions. It is equally important to understand how the spatial organisation of economic activity responds to exogenous shocks, such as technological change or policy measures.

The aim of the chapter is thus to provide a perspective on traditional and modern location theory against the background of spatial inequality. In this process, the effects of exogenous shocks – such as progress in transport and logistics technology – are discussed within an economic environment that is changing because of increased globalisation. Bearing this aim in mind, I start the chapter off by providing a brief review of location theory. I then turn to a discussion on the NEG as a modern theoretical perspective on the location of economic activity in space. This is followed by a discussion on the modern economy and globalisation and the role that these two constructs play in the location of economic activity. Given the importance of agglomeration in these theoretical perspectives, I conclude the chapter with an introductory discussion on the concept of clustering, a concept discussed in more detail in Chapter Three.

2.2 Traditional approaches to location theory

Traditional viewpoints on the location of economic activity in space indicate that spatial differences in the location of edible plants with abundant nutrients and wild animals capable of being domesticated to help people in their agricultural and transport activities, explain why only a few regions have become independent centres of food production (Diamond, 1997). The literature on spatial inequality seems to indicate that the inherent advantages of one location over another have become the accepted way of explaining spatial disparity between regions (Bosker, 2008; Brülhart, 1998; Krugman, 1993a; Schmutzler, 1999; Venables, 2005). Such disparities were explained through so-called 'first-nature' causes (Krugman, 1993b), such as temperature, rainfall, access to the sea, the presence of natural resources or the availability of arable land, or 'second-nature' causes, such as those relating to human actions and economic incentives (for example, scale economies, comparative advantage or knowledge spillovers) (González-Val and Pueyo, 2010).

An understanding of the theory of the location of economic activity in space is a precursor to finding sustainable solutions to the apparent locational disadvantages with which peripheral areas have to contend. However, there seems to be no widely accepted theory of spatial location that incorporates location decisions in a unified manner (Berliant, 2007; Fujita et al., 1999; Fujita and Thisse, 2002). For the purposes of this research, the traditional perspectives on location theory have been divided into classical approaches, neoclassical approaches and the behavioural approaches.

2.2.1 The classical approach to location theory

The classical approach to location theory dominated the field from the 1800s to about 1950. Classical location theory represented an attempt by social scientists to emulate the scientific methods and philosophies of the natural sciences and those of economics within the social-science environment (Coe et al., 2007). In broad methodological terms, classical location analysis and theory adopted mathematical forms of geometric modelling to describe and explain spatial patterns (Coe et al., 2007), thereby gaining an understanding of how factor inputs transformed into physical commodities.

The classical fathers of location theory such as Ricardo, Von Thünen, Launhardt and Weber came from a very particular nineteenth-century tradition of economic analysis, one in which the focus of analysis was primarily on the nature and characteristics of the production process (McCann and Sheppard, 2003). Within this broad production-focused tradition, the distinguishing feature of early location-theory development was an attempt to reveal and explain the relationship between issues of geography and production. In this context, the notion of geography was understood in terms of land and land use, and the tradition investigated the unique role that land – as a factor input – plays in determining the characteristics of the transformation process (McCann and Sheppard, 2003). The specific production focus caused an inherent weakness in the said approach, one that resulted from its abstraction from demand.

Alfred Weber was essentially concerned with demonstrating how the optimum location could be found in a simple situation with two different sources of material and a single market (Smith, 1981). Economic activity was therefore spread over space, depending on the cost of transport. Weber argued that the firm, in attempting to minimise costs, would rationally locate at what he termed the 'least-cost' location. The least-cost location theory implies that internal factors that may exist in a firm play no role in its locational decisions.

The methodological approach of the classical location theory approach was to distinguish between the costs incurred by the firm – explicitly distance-related costs and location-specific costs. In other words, different notions of geography were employed to distinguish between various cost components: some costs were specified as functions of distance, others are specified as functions of location. Distance-related costs were assumed to be transport costs and location-specific costs were related to local labour and land (McCann and Sheppard, 2003).

2.2.2 Neoclassical approaches to location theory

The classical location theory models were not given a neoclassical 'twist' until the middle of the twentieth century (about 1950 to the late 1960s) (McCann and Sheppard, 2003). Neoclassical theory was characterised by perfect competition, homogeneous products and non-increasing returns to scale. In neoclassical location theory, location was determined exogenously through spatial distributions of natural endowments (Brülhart, 1998; Krugman, 1993a), which meant that economic activity was therefore spread or concentrated over space according to the spread or concentration of the said natural endowments.

The dominant locational pattern was inter-industry specialisation where settlement occurred in locations with matching comparative advantages. In this framework, and assuming zero trade costs, the spatial distribution of demand affected the pattern of trade, but not the location of production (Brülhart, 1998). It then follows that if, realistically, trade costs were assumed, and if demand was more evenly spread over space than were endowments, then locational dispersion of activity would correlate positively with the level of trade costs.

The neoclassical location theory focused on presenting a general normative model of finding an optimal location for one or more firm(s) based on economic considerations. The theory was founded on the concept of the entrepreneur as a rational being (the so-called *economic human* or *homo economicus* concept), fully informed and able to exploit that information optimally in order to maximise his/her own profit through his/her ability to make rational decisions (Mariotti, 2005). The term *economic human*, or *homo economicus*, refers to a hypothetical individual who acts rationally and with complete knowledge, but entirely out of self-interest and who is driven by the quest to maximise profit (Persky, 1995).

Models that were developed based on neoclassical location theory were explanatory in nature. Here cost-reduction factors (for example transportation cost, labour cost and market size) were the main forces driving firms' location. Lösch rejected a least-cost perspective and, instead of the alternative of seeking the location at which revenue would be greatest, he strove to find the place of maximum profits (Smith, 1981).

Points of criticism on the neoclassical approach included objections couched in the terms of the philosophy of science, doubts about the utility of mathematical models in geography, and a certain aversion to the notion of *economic human* (Mariotti, 2005). In addition, Smith (1981) also criticised the classical theories (which would include both the classical and neoclassical theories) as having been more concerned with the construction of elegant theories of location equilibrium and with the fusion of location and production theory, than with providing a guide for empirical enquiry.

Standard neoclassical approaches to location theory assumed constant returns to scale and perfect competition with the role of government involvement being limited to infrastructural investments that affected the mobility of goods, labour, and other factors (Kim, 2008:5).

2.2.3 The behavioural approach to location theory

The behavioural approach to location theory was developed between the late 1960s and the 1980s (Coe et al., 2007). This approach questioned the rationality assumption that underpins both classical and neoclassical location theories. Behavioural location theory interpreted firms as agents that had limited information, bounded rationality, and settled for suboptimal outcomes rather than maximum profits (Mariotti, 2005). It stressed the importance of internal factors (for example abilities and perception) and personal considerations over the neoclassical cost-reduction factors.

The precursor of this theory was Herbert Simon's idea of 'bounded rationality' developed around 1959 (Coe, et al., 2007; Mariotti, 2005). *Bounded rationality* examines the role of cognitive information and human choices in determining decision-making and locational outcomes. Simon held that a decision maker was an individual (entrepreneur) who was as unable to collect all the information relevant to a decision, as was incapable of digesting such information. To Simon, the idea of 'optimal' decisions and of minimising and maximising was a theoretical abstraction (Mariotti, 2005) in that firms generally consider a limited number of choices, search and evaluate alternatives in a highly sequential fashion and choose the first solution that is 'satisfactory' (Hayter, 1997).

According to the behavioural approach, well-informed firms and those with a high ability to use information, approximated *homo economicus*, and were expected to locate near the optimal point (Mariotti, 2005). If this were true, it would mean that firms with limited information and low ability to use it may be expected to locate at less profitable or even unprofitable locations. The analytical focus of the behavioural approach remained squarely on locational issues and spatial behaviour. This particular approach tended to shy away from the mathematical modelling that dominated classical and neoclassical location theory (Coe et al., 2007) and focused more on questionnaires and detailed empirical work rather than on explanatory models.

2.2.4 Synthesis: early location theory

Table 1 is a summary of the main characteristics of the early theories on the location of economic activity in space.

Table 1: Summary of main characteristics of early location theory

	Classical approach	Neoclassical approach	Behavioural approach
Approximate timeline	1800s to 1950	1950 to late 1960s	Late 1960s to 1980s
Main characteristics	Sought to gain an understanding of how factor inputs transformed into physical commodities Revealed the relationship between geography and production	Was characterised by perfect competition, homogeneous products and constant returns to scale Economic human, rational being	Questioned the rationality assumption of the neoclassical approach Considered firms to be agents with limited information and bounded rationality Was specifically geared to firm relocation
Methodological approach	Emulated the scientific methods found in the natural sciences and in economics Adapted mathematical forms of geometrical modelling to explain spatial patterns	Normative modelling and was explanatory in nature	Favoured questionnaires and detailed empirical work rather than explanatory models Was descriptive and explorative
Location focus	Nature and the characteristics of the production process Firms would locate at least-cost location, based on transport cost	Location determined exogenously ('first-nature' factors) Economic activity spread/concentrated in space according to 'first-nature' factors Cost-reduction factors (labour and transport) considered to be the main drivers of a firm's location.	Firms settle for suboptimal outcomes rather than maximum profits. Emphasised internal factors (abilities, perception, personal considerations) rather than cost-reduction factors
Weaknesses	Abstraction from demand	Aversion to economic human concept Doubts about utility of mathematical models	Largely descriptive and explorative approach vs. explanatory modelling
Implications for peripheral locations	Lowest transport cost paradigm meant that peripheral locations would find it difficult to prosper/grow. Internal factors in a firm played no role in decisions regarding location.	Location of economic activities would be directed by 'first-nature' factors. Peripheral areas without such endowments would lag behind. Internal factors within firms played no role in decisions regarding location.	Because of recognition of firms' internal factors in decisions regarding location, peripheral areas had improved chances of growth.

The main shortcomings and weaknesses of the three approaches as discussed above can briefly be summarised as follows. A major shortcoming of both the classical and neoclassical approaches to location theory is that these are mainly focused on increasing returns and comparative advantages as opposed to constant returns to scale (Hess, 2004). The result is that models based on these theories fail to explain concentrations of economic activity (for example the highly clustered and concentrated Silicon Valley) in that the explanation of differentiated production characteristics is based on underlying characteristics – such as diverse geographical factors, factor endowments and technological factors (Ottaviano and Puga, 1997). This is in line with the reasoning of Smith (1981) who maintains that a major criticism of early location theory is its abstraction from demand.

In turn, one of the weaknesses of the behavioural approach is that it is largely descriptive and explorative in nature and to a much lesser extent based on an explanatory model (Mariotti, 2005). The behavioural approach has also been criticised for its excessive focus on sociological, psychological and other softer, cultural factors to the exclusion of the hard factors of the classical and neoclassical location-theory approaches.

To counteract some of the shortcomings of the three approaches to the location of economic activity in space, a new body of theory has emerged since the 1970s that incorporates economies of scale. Towards the 1990s, mainstream economists showed a renewed interest in the neoclassical location theory and labelled it 'NEG' (Fujita et al., 1999; Krugman, 1991a; Krugman, 1995). It is to this theory of NEG that the chapter now turns.

2.3 The new economic geography

NEG is based on explanatory models in which 'location' factors (for example transportation cost, labour cost and market size) are the main forces driving firms' location. Mobility of economic activities is a crucial adjustment in this theory yet hardly any attention is paid to the crucial spatial behaviour of firms.

The main focal point of these new theories was Dixit and Stiglitz's (1977) formalisation of monopolistic competition, which, although Krugman (1991a) calls it 'somewhat farfetched', provides a useful, simple and fairly accurate method of analysis (Hess, 2004). Towards the end of the 1970s, theorists began to apply this view of industrial organisation to international trade, and later to technological change and economic growth. Thus, a relationship began to emerge between 'new trade' and 'new growth' theory, which in turn planted the seeds for the 'NEG' theories of the 1990s (Fujita et al., 1999; Hess, 2004). This was an important development in that the theories of spatial location of economic activity before the advent of the so-called 'NEG' would simply mean that the theoretical likelihood of development in peripheral areas would be limited to national endowments or other special comparative advantage that an area might possess.

2.3.1 Origins of the new economic geography

The seminal paper by Krugman (1991b) gave rise to what became known as the NEG literature, where the 'new' refers to the fact that the spatial distribution of population, production and consumption emerges endogenously from full general equilibrium models (Bosker, 2008; Fujita et al., 1999; Krugman and Venables, 1995; Puga, 1999; Venables, 1996). Any particular spatial distribution of economic activity is based on forces that respectively discourage or encourage agglomeration (Bosker, 2008). The interplay of these two forces determines whether or not economic activity will migrate to another region, thereby possibly changing the spatial economic landscape. The theoretical models are now able to give predictions about the effect of a change in these spreading or agglomeration forces on the distribution of economic activity across space (Fujita and Thisse, 2002). In the following sections, the basic premise of the NEG and its substantive contribution to location theory are discussed in more detail.

2.3.2 The basic premise of new economic geography

Krugman's (1991b) model of geographic concentration has spearheaded the economic geography revolution (Henderson et al., 2001; Kim, 1995; Krugman and Venables, 1995; Petersson, 2002). Krugman (1991a) argues that the presence of increasing returns, transport costs and demand play an important role in the location decisions of industry. Thus, if economies of scale in a particular industry are strong, and transport costs low enough, firms in that industry will want to serve the market from one location. However, if economies of scale are small, and transport costs large, production will take place in each separate population area. Such thinking differs from earlier theories in which geographic concentrations of production were bound by natural-resource endowments, whereas now they are the result of the complex interplay of various dynamic factors.

The NEG models contain five essential ingredients: increasing returns to scale that are internal to the firm; imperfect competition (usually Spence-Dixit-Stiglitz monopolistic competition), trade costs (Samuelson's 'iceberg form' where goods melt away by distance); endogenous firm location; and, most importantly, endogenous location of demand. The first four ingredients give rise to agglomeration economies, whereas endogenous location of demand creates the well-known process of circular causation that causes core-periphery regions to arise from initially symmetric regions (Head and Mayer, 2004).

Transport costs also play an important role in the NEG. Krugman and Venables (1995) contend that as transport costs fall, at some point the lower wages demanded in the periphery dominate the disadvantage of being remote from markets and suppliers. Thus, an incentive is created for firms to move to the lower wage periphery. When this happens, the location of economic activity follows a *u-shaped* pattern, which means industry in the periphery will first decrease with a fall in transport costs and then increase once transport costs reach a critically low level. The model is therefore one of multiple stable equilibria that depend on the levels of transport costs.

The initial break from equilibrium is caused by what Krugman (1991a) has termed 'historical accident' where, for no apparent reason, an industry mushrooms in a region with no distinctive advantages. This 'historical accident' then snowballs as cumulative causation locks the system in place. What then develops may be a 'second-best' scenario, where another location may be found to have resources that better suit the industry but, because industry has become established and 'locked in', firms are unwilling to relocate (Martin, 1999).

The NEG therefore is an analytical framework developed so as to explain the formation of a large variety of economic agglomerations in geographical space, and it has today grown into one of the major branches of spatial economics. To date, the NEG remains the only general equilibrium framework in which the location of agglomerations is determined explicitly through a microfounded mechanism (Fujita and Mori, 2005). The NEG illustrates (Krugman, 1991a) how the interactions among increasing returns at the level of the firm, transport costs and factor mobility can cause spatial economic structure to emerge and change.

In a theoretical spatial analysis, Krugman (1993a) shows how industry will agglomerate according to different specifications. The core will normally develop near the centre of the region, though not necessarily at the very centre, as the core itself may shift the economic centre. Transportation networks may influence the location of these core areas, especially if these include ports (Hess, 2004; Krugman, 1993a).

2.3.3 Substantive contribution of the new economic geography

The principal substantive contribution of the NEG is that it uses knowledge gained from a long tradition of analysing spatial-economic development – on agglomeration, specialisation, urbanisation, the formation of cores and peripheries, and the tendency towards circular and cumulative reinforcement of certain patterns – and it develops models that capture these processes in a single, internally consistent framework with microfoundations (Storper, 2011). In addition, the NEG places production at the centre of spatial-economic development.

According to the NEG, the space economy is the outcome of preference-seeking behaviour on the part of individuals, households, service firms and goods-producing firms. The deduction is that cities and regions can develop because people decide that they like to go there (for example for amenities such as landscape and climate) and that production can follow. It can also work the other way round, with firms having some reason to go somewhere and then attracting a workforce (Storper, 2011). In line with the above argument, Storper (2011) further holds that the Sunbelt area in the USA developed as a result of households and workers seeking bigger, cheaper houses and warmer climates and not because they were following firms that were relocating from the Frostbelt or firms in new-economy industries seeking out new regions.

The NEG's core-periphery model has firms occupying a central role in making places develop and attracting workforces to them, which is in contrast to both classical and neoclassical location theories, which focus mainly on first-order location factors. The economies of scale mechanism that is prevalent in the NEG also explains regional development as being kicked off by the location of jobs in one place, then attracting workers to it, and subsequently interacting with the concentration of markets so as to bring together a greater variety of goods, and so on, in a circular and cumulative process in which firms – or, more broadly, production – are the key to the explanation (Storper, 2011).

Of particular importance to this study is that the favourable characteristics of a location, such as the availability of a good port (which could be either a sea port or an airport), typically play a catalytic role in the development of the region (Fujita and Mori, 2005). The catalytic role that such locations may play makes it likely that, when a new centre emerges, it will be situated there rather than at some other location in the general vicinity. Fujita and Mori (2005) further contend that once a new centre has become established, it grows through a process of self-reinforcement, and may thus attain a scale at which the initial advantages of the location become unimportant compared with the self-sustaining advantages of the agglomeration itself. This is especially important regarding the concept of a *logistics city* (as discussed in Chapter Three) which may play just such a catalytic role in the further development of a peripheral area – particularly if there is a port in that area.

2.3.4 Synthesis: the new economic geography

Before the introduction of the NEG, 'first-nature' factors, (as explained in Section 2.2.2) typically explained why some regions generally develop a particular concentration of economic activity and others not. However, there are many cases where regions without obvious natural advantages develop into economic centres. In such cases, additional arguments need to be invoked so as to understand concentration.

In essence, the NEG is a theory of the emergence of large agglomerations, which relies on increasing returns to scale and transportation costs, and emphasises linkages between firms and suppliers and also between firms and consumers (Schmutzler, 1999). According to Schmutzler, increasing returns to scale tend to foster the geographical concentration of the production of each good.

From the above discussion on the NEG, it can be deduced that the NEG focuses on the interactions among firms and workers in markets where producers face increasing returns to scale and enjoy market power that, in turn, may generate self-sustaining processes of agglomeration that cause firms to cluster in space.

At least two central themes emerge from an analysis of both the traditional location theories discussed earlier in this chapter and the NEG discussed in the preceding section, namely economic interaction costs, and the forces of agglomeration, the latter often leading to the clustering of economic activities. Over time, technological progress has been driving the costs of economic interaction down (Crafts and Venables, 2003) through the easier movement of people, capital and goods, in a process commonly known as globalisation (Crafts and Venables, 2003).

The question then is: Given the pivotal role that 'first-nature' factors played in the location of early economic activity how did the economy change over time to today's modern economy in a globalised world? In the next section, the modern economy and the role that globalisation plays in the cost of economic interaction are discussed in more detail. The focus subsequently shifts to a discussion on how the second central theme of the NEG, namely, agglomeration or clustering, impacts on the location of economic activities in space.

2.4 The modern economy and globalisation

The terms *globalisation* and *globalised world* are widely used by many as a blanket term for a number of processes facing modern economies and societies. According to the sociologist Castells (1996), the forces of globalisation are leading people to assume that anything can be located anywhere and that it can thus be moved somewhere with ease. Dicken (2007:18) however differs from Castells in stating that the world is both a 'space of places' and a 'place of flows'. Although transportation and communications technologies have been revolutionised, both geographical distance and place are fundamental (Dicken, 2007).

2.4.1 The modern economy

The modern economy or what some authors term the *new economy* came into being after about 1990 (Blakely and Green-Leigh, 2010), a timeline very similar to the emergence of the NEG as discussed in Section 2.3. The transformation to the new economy is regarded by some researchers as "equivalent in scope and depth to the emergence of the factory economy in the 1890s and the mass-production, corporate economy in the 1940s and 1950s" (Atkinson and Correa, 2007:3). The location of economic activity in the world is rapidly changing. During the past fifty years, the share of the global gross somestic product (GDP) of today's rich countries has been about 80%. Projections indicate that this could fall to 40% over the next few decades (World Bank, 2009a). This means that a substantial portion of the world's GDP will, spatially, be shifting from developed countries to developing countries (World Bank, 2009a). Which countries, regions and cities stand to benefit from this shift, will to some extent depend on their natural endowments and their history, and perhaps even on luck. It will however depend much more on the policies that are put in place, because policy reform – at the international, national and sub-national level – is able to initiate large and lasting changes in economic geography (World Bank, 2009a).

The modern-day economy is knowledge dependent. This is evident from the fact that managerial and professional jobs (involving so-called 'knowledge workers') have increased in their share of employment from 22% in 1979, to just below 35% in 2003 (Atkinson and Correa, 2007). This is in contrast to the only one in seven workers being employed as production workers in manufacturing (Atkinson and Correa, 2007).

The modern-day economy is also global. Today's globalisation is pervasive in that more of the production process is interconnected in a global supply web (Atkinson and Correa, 2007). According to Blakely and Green-Leigh (2010), the modern economy has become more entrepreneurial and is also rooted in ICT. ICT are increasingly being used to improve production, the quality of products and to stimulate innovation. Innovation is now a main driver of the modern economy as countries, regions, firms and individuals compete to create value in new ways for increasingly diverse customers worldwide (Atkinson and Correa, 2007; Blakely and Green-Leigh, 2010).

2.4.2 Defining Globalisation

Recent literature reflects that consumerism, globalisation and technological advances (Botha, 2008; Friedman, 2006) have changed the economy from being supply-driven to one that is demand driven (Botha, 2008) so that national borders have effectively been supplanted by commercial borders (Kasarda, 1998). Global sourcing now predominates because advanced telecommunications and transportation technologies allow a wide geographic dispersion of component-manufacturing sites and places of final assembly, which has caused supply chains to become increasingly complex in that supplying the right goods to the right place at the right time has become a necessity. *Globalisation* means that work now is done where it is most efficient and effective, not necessarily where it is the closest to its final destination. Globalisation has also caused the strategies of firms to change and has caused production to be shifted to low-cost locations (Fawcett, 1992). The changes brought about by globalisation open up possible opportunities for areas that were previously resource constrained and had but few natural endowments.

2.4.3 Globalisation and spatial inequality

Trade competition between regions and countries has increased significantly in recent years, this being partly due to developments in globalisation and to advances in technology. Kleynhans (2003:3) states: “Globalisation and modern technology is (*sic*) moving the world from an industrial era to an information era. This is creating a ‘new economy’ with new ways of conducting business, producing goods and realising profits. Mass production ‘Fordism’ is being replaced by a new approach where competition depends on knowledge and skills”.

Profit maximisation is no longer only a function of activities within a firm, but depends on production management, marketing and innovation, utilising all the available linkages and services in an industrial district and manufacturing network. With the aid of modern technology in a global context companies are now in a position to achieve increasing returns to scale, increasing efficiency and profits far beyond those previously possible. Kleynhans's statement regarding globalisation and modern technology as being the forces that created a 'new economy' characterised by markets free of trade and import barriers, large volumes of cross-border trade between countries and the application of modern technology – especially knowledge-based, computer and communication technology – is strongly supported by the United Nations Industrial Development Organisation (UNIDO) (UNIDO, 2000:10).

In the production of information goods, location does not matter. This has given rise to a new spatial organisation (Kleynhans, 2003). All kinds of knowledge and information goods and services can, in principle, be out-sourced and traded anywhere in the world. Increased global networking is central to global production. The NEG referred to in Section 2.3 above, regards skilled-labour market pooling, non-tradable inputs and knowledge and technological spillovers to be the most important locational factors (Isserman, 1996; Kleynhans, 2003; Krugman, 1998; Martin, 1999).

Flexible production emphasises the importance of clusters (Helmsing, 2000). This issue is important as the effects of globalisation have led to dramatic changes in the supply-chain environment, which, in turn, has given rise to new perspectives (and a greater emphasis) on issues such as logistics and transportation.

One of the contested aspects of globalisation concerns its geography and especially whether globalisation is rendering the significance of location (place utility) both redundant and irrelevant. Writers have argued that globalisation – especially as driven by the revolution in ICT – either marks the 'end of geography' (O'Brien, 1992), the onset of the 'death of distance' (Cairncross, 1997), the emergence of a 'borderless world' (Ohmae, 1995) or the 'vanishing of distance' (Reich, 2001).

Friedman opines that as a consequence of globalisation, 'the world is flat' (Friedman, 2006). He contends that the ICT revolution, the deregulation of markets by states and increasing economic integration have contributed to a marked time-space compression of economic processes. According to some scholars, the result is that there is no longer any ‘friction of distance’ in economic relationships (Christopherson et al., 2008). The basis of Friedman’s ‘flat world’ thesis, then, is that there now exists a global information-communications platform that transcends distance, place and geography, a platform that connects users anywhere, irrespective of their physical location (Friedman, 2006).

Christopherson et al. (2008) contend that even though the world is becoming ‘flatter’ as Friedman postulates, it by no means follows that the global economy is generally becoming a flatter landscape. Contrary to Friedman’s views, there exists a body of opinion and evidence that globalisation far from flattening the world economy is accentuating its unevenness (Christopherson et al., 2008). It is also a moot point whether the global ICT platform, as Friedman calls it, is itself flat. Indeed, both the architecture and the flows of Internet and telephonic communication are spatially markedly skewed and concentrated in that they are overwhelmingly focused on and dominated by major ‘global’ cities. In this respect, not all socio-economic groups or local communities have equal access to or control over this platform. Some actors and networks have more access to information than others (Leamer and Storper, 2001; Storper and Venables, 2004). Apart from the reductive effect of ICTs on the cost of trading with distant countries, at least one research study indicates that ICTs have a greater impact on trade among smaller economies than it has among larger economies. The study moreover found that the more distant trading partners experience more trade in the presence of ICTs than do the less distant countries (Demirkan et al., 2009).

Key factors determining the production of wealth (investment capital, innovation capacity, talented labour) are still very unevenly distributed among places. Indeed, some claim that the geography of the global economy besides containing a dynamic of centralisation and agglomeration, it also contains one of dispersion (Christopherson et al., 2008). These authors claim that the spatial agglomeration of economic activity, including key businesses, talented labour and innovation and creativity, is actually increasing and that the global economy is now being driven by key cities and mega city-regions (Sassen, 2006).

Further, while globalisation has enabled and involved the rapid rise of new national economies (notably in the BRIC[1] countries), it has simultaneously exposed other countries to worsening poverty (Christopherson et al., 2008; Stiglitz, 2002; 2006; World Bank, 2002).

The above discussion has shown that it is not all that simple to classify globalisation either as making the world flatter (according to Friedman) or as adding to spatial inequality. Globalisation as approximated by increasing economic integration can both lead to a more agglomerated or uneven world and to a more dispersed or a more even spatial distribution of economic activity (Crafts and Venables, 2003; Krugman and Venables, 1995). Perhaps, the words of Gray (1998:55-56) sum up globalisation the best:

> "[globalisation] does not require that economic life throughout the world be equally and intensively integrated. A universal state of equal integration in world-wide economic activity is precisely what globalisation is not. On the contrary, the increased interconnection of economic activity throughout the world accentuates uneven development".

This begs the question as to what the possible implications of globalisation may be for development in peripheral areas.

2.4.4 Implications of globalisation for peripheral areas

Whether the effects of globalisation on development in peripheral areas are either negative or positive is by no means certain. The discussion above indicates that there are certain disadvantages caused by globalisation such that it accentuates uneven development. This is in line with the NEG core-periphery model. However, the principles of agglomeration and clustering definitely hold promise for the development of selective clusters in peripheral areas as indicated in Section 2.5.4 below. Ottaviano and Pinelli (2004) argue that globalisation can be expected to have a non-linear effect on the extent of geographical agglomeration of economic activities. Initially, lower transport costs, lower institutional barriers and lower communication costs tend decidedly to foster

[1] BRIC is an acronym for the countries of Brazil, Russia, India and China.

agglomeration. As each of these mentioned costs becomes negligible, agglomeration unfolds. This means that care should be taken as to regarding how clusters are designed and managed in peripheral areas so as to avoid a situation where cluster formation is done artificially and in an unsustainable fashion.

As a consequence, the strategic planning of a region with a view to taking advantage of its position in the context of its connectivity function between key economic centres (interregional, intraregional or even international) will play an important role in the sustainable future of the region. One outcome of globalisation is to expose "even the most remote spaces to competition and forcing firms, localities and regions to react and adjust to the new economic conditions" (Pike et al., 2006:4).

Moreover, agglomeration is more pronounced and more persistent in sectors characterised by intense scale economies, strong market power, tight input-output relations, higher relative intensity of mobile rather than immobile factors (such as capital and skilled labour versus land and unskilled labour), rapidly changing products and tasks (as in hi-tech industries) and a high value-added nature.
Given the advances in transport technology (especially air transport), this chapter will be amiss in not contextualising globalisation in the transport and more specifically the air-transport environments.

2.4.5 Globalisation, transport and air transport

Air transport has also played a key part in fostering globalisation. However, airlines (and to an even greater extent, air-transport infrastructure) have had to respond to changing demands for their services. Globalisation, almost by definition, means demands for greater mobility and access, but these demands are increasingly becoming different for passengers of different kinds, and particularly for cargo to different places and over different distances than was previously the norm. Many structural changes have taken place in the aviation sector as a result of globalisation. International air transport is now a major contributor to globalisation and is continually reconfiguring to meet the demands of the economic and social integration that globalisation engenders. Between 35% and 40% of world trade by value now moves by air (see Chapter Four for further details).

Botha (2008) contends that one of the results of globalisation is that supply chains are getting longer, in terms both of time and distance. Transportation, through logistics, links these geographically distant sources and markets. The implications of this are that there is a greater need for efficiency in specifically the transportation and the distribution networks. The integration of transport infrastructure into a logistics hub is seen as an enabler of distribution on a global basis (Botha, 2008).

Universally, logistics hubs have intermodal or multimodal solutions to obviate transportation difficulties, thereby creating seamless movement of goods and, in the process, optimising general operations. Freight shipments now have the ability to be consolidated at a central point and distributed from that point to their final destination. This creates added value for freight products. Customers now receive products at the right time, at the right place and in the right quantity, but with the added benefit of having to pay less as a result of the economies of scale created by the value added at the logistics hub.

The second central theme of the NEG, referred to in Section 2.3, is agglomeration or clustering. In broad terms the NEG emphasises not only the role played by the forces of clustering (or agglomeration) towards generating the uneven distribution of economic activity, but further also that clusters seem to be a prominent feature of the economic landscape of every advanced economy (Porter, 1998). It is important to understand how this process impacts on the spatial location of activities. The clustering process is discussed in more detail in the following section.

2.5 Clustering of economic activity

Economic activities are not only located somewhere; they also tend to be concentrated into various kinds of spatially localised agglomerations in which different groups and different mixes of activities tend to be clustered together in different places (Gordon and McCann, 2000). The phenomenon of clustering was first observed by Alfred Marshall who termed them *industrial districts* (Mills et al., 2008). Marshall noted a tendency among specialised firms to cluster together in a way that produces geographical concentrations of expertise and economic activity.

Porter (1998) argues that agglomeration, or the clustering of economic activities, is an essential ingredient of economic development. Clustering occurs at many geographical levels and in diverse ways. At the one extreme of the spectrum lies the core-periphery structure at the global scale, while at the other, very detailed extreme lie the clustering of activities to be found in the large commercial districts set up in the inner city itself (such as Soho in London, Montparnasse in Paris, or the Ginza in Tokyo). At the lowest level, restaurants, movie theatres or shops selling similar products are clustered within the same neighbourhood; at a more extreme level, the clustering may take the form of a large shopping mall.

The importance of clusters lies in the fact that successful clusters create economic benefits (Ketels and Memedovic, 2008). They increase productivity, and in so doing they make companies function more efficiently in an environment in which they can both compete and cooperate. Because of close interaction, members of a cluster are the better able to learn, innovate and develop. A strong cluster environment within which companies locate their activities creates a pool of competitive resources available to them (Porter, 1998). Cooperation (enhanced opportunities for learning and productivity improvement) and sharing (shared risks and costs) in clusters have increasingly become requirements for success, for the improvement of economic performance, and for the reduction of costs, while furthermore reducing the time-to-market effects (Roelandt and Den Hertog, 1999

This section explores the concept of clustering in more detail in order to gain an understanding of its impact on patterns of spatial development. To gain this understanding, the concept is explored in terms of a common definition, the main elements of a cluster and an overview of clusters in peripheral areas.

2.5.1 Definition of the term *cluster*

An analysis of the various definitions prevalent in the literature on clusters indicates that there are at least the following three common elements present in these definitions, for example a spatial element, a proximity element and the relationship between the various actors (participants or firms). Vom Hofe and Chen (2006) argue that it appears that there is little evidence on how a specific framework can be applied to define a cluster (Vom Hofe and Chen, 2006). The literature reflects that clusters are usually defined in terms of three main elements, namely a spatial element, a proximity and linkage element and a relationship element. These elements are now discussed in more detail.

Whereas Vom Hofe and Chen (2006:21 define a *cluster* as a group of businesses and institutions "that co-locate geographically in a specific region and enjoy economic advantages through this co-location", Porter (1990) defines clusters more simplistically: they are geographical concentrations of firms involved in similar and related activities. Mills et al. (2008) regard a regional industry cluster to be a geographic concentration of interconnected businesses, suppliers, service providers, and associated institutions in a particular field.

According to Doeringer and Terkla (1995), the identification of clusters starts with proximity and linkages and becomes dynamic through face-to-face collaboration economies. Cooke and Huggins (2003:52) further elaborate on this perspective by stating that a cluster represents "geographically proximate firms in vertical and horizontal relationships involving a localized enterprise support infrastructure with shared developmental vision for business growth, based on competition and cooperation in a specific market field".

According to Becattini (1989), industrial districts are a particular kind of agglomeration characterisd by a localised 'thickening' of inter-industrial relationships that are reasonably stable over time. Porter (1998:254) regards a cluster as a "geographically proximate group of interconnected companies and associated institutions in a particular field, linked by communalities and complementaries".

The above discussion reveals a variety of definitions that are each obviously couched in the terms of the specific field of the researcher or academic in question. The above further makes it apparent that the various definitions cannot be generalised to any single defining element or characteristic. This results from the interrelated nature of the elements such as proximity and the relationship between the actors.

A common element across all the definitions is the importance of local networks and interdependences towards creating a competitive advantage (Braun et al., 2005). The literature seems to indicate that there is a general assumption that clusters strengthen and improve the economic performance both of the firms and the regions in which they are located (Spencer et al., 2010). Based on this belief, many scholars view clusters as a policy tool for LED, but actually, LED is a result of the unique combination of complementary economic activities (Ketels and Memedovic, 2008).

Porter's definition (1998:254) of a cluster as being a "geographically proximate group of interconnected companies and associated institutions in a particular field, linked by communalities and complementaries", although general, covers the essential elements and the most important and common features of clusters applicable to this study.

2.5.2 Main elements of a cluster

The cluster concept is further explored in this section in terms of the main elements of a cluster as discussed in the preceding section. The elements are used as a basis, but are expanded to be more in line with the literature on cluster elements. As such, the spatial element was expanded to include the size of the cluster and a fourth element, namely a temporal element was added to include the typology and life cycle of a cluster.

<u>Spatial organisation and size</u>

The spatial organisation of clusters varies considerably (Jacobs and De Jong, 1992; Motoyama, 2008; Rosenfeld, 2002), both in general and also specifically among industries (Cortright, 2006; Jacobs and De Jong; 1992; Porter, 2000). Clusters could grow from a single city location or a region to a whole country, and eventually even stretch over national borders (Braun et al., 2005; Enright, 2000; Porter, 1998). In addition, the boundaries of a cluster are likewise not exact (Porter, 2000). They grow continually as new firms, industries and local institutions emerge, develop, change and decline.

Some clusters consist of small and medium enterprises, others involve large and small firms, some give birth to research institutions and universities and others create connections with existing universities (Porter, 1998). Apart from the spatial organisation of clusters, they occur in any type of industry and also in advanced and developing economies (Porter, 2000).

Proximity

Proximity, or the geographical co-location of firms, is another main element of a cluster. Clusters exist, grow and develop because companies and other cluster participants benefit from their concentration, proximity and interdependence. The same kind of growth may not be possible when firms locate outside the cluster or operate independently (Cortright, 2006). Additionally, the close positioning of firms within a cluster creates "a favorable economic environment of competitiveness and innovation" and thus "strengthen[s] productivity and economic growth by transferring technology and information" (Vom Hofe and Chen, 2006:14). This makes clusters the key drivers of prosperity and regional economic improvement (Spencer et al., 2010).

Relationship between actors and specialisation

Industry clusters may also be characterised by the relationships between the actors (Rosenfeld, 2002). Both competition and cooperation are necessary in a cluster for it to reach its full potential (Todorova and Ilieva, 2011). In order to keep its position, a dynamic cluster needs intense competition (Todorova and Ilieva, 2011), which, paradoxically, is not an obstacle standing in the way of mutual collaboration, trust and ease of communication within the cluster (Rosenfeld, 1997). All the members of a cluster have direct contact with their competitors, and invest in related technologies, infrastructure and information. Information flows freely and this helps them to work together (Porter, 1998). The cluster eventually grows and attracts new members. No less important is building connections with other clusters that provide complementary capabilities, which will help the cluster to grow, develop and innovate (Rosenfeld, 1997). In this way clusters become more visible and attractive.

An industry cluster is further characterised by specialisation in a single industry or in a majority of the individual industries comprising the cluster (Spencer et al., 2010). Porter's (1998) basic premise is that a strategy common to all companies is that of locating in an environment with favourable factor conditions. Very often the location of some industries and their concentration in that particular location is driven by the so-called "first-nature factors" (referred to in Section 2.2) – such as climate or raw materials (Cortright, 2006). In contrast, a strong cluster is sometimes designed and exists not because of these first-nature factors, but because of acts of entrepreneurship (Porter, 1998). This element is of particular importance in peripheral areas from which natural endowments are often absent and entrepreneurship will consequently be the deciding factor in the development of clusters.

Life cycle and typology

Clusters do not simply appear or disappear, they develop over time (Ketels and Memedovic, 2008). Rosenfeld (2002) identifies four different stages in the life cycle of a cluster, for example the embryonic stage, the growth stage, maturity and decay. In turn, Cortright (2006) refers to clusters as emerging, established or mature and declining.

Clustering of economic activities cannot take place without transport and transport systems to move factors of production (raw materials, intermediate goods and final products) to and from cluster locations. The role of transport in clusters is thus discussed in the following section.

2.5.3 Clusters and transportation

Industrial clustering often appears in association with major transport nodes (Fujita and Mori, 2005). Earlier research supports this view by showing that the nodes (and transhipment points) of transport networks always contain an optimal location for cost-minimising firms (Hakimi, 1964; Louvex, Thisse and Beguin, 1981). Obvious examples of agglomeration activities near transportation nodes are nodes in cities. These nodes are usually seen near key junctions of highway networks or large railroad stations. At a more aggregated level, the unprecedented growth in Asian industries in the 1980s occurred around the three largest ports in the world, for example Hong Kong, Singapore and Kaohsiung.

The coincident location of industrial clustering and transport nodes results from the process of reciprocal reinforcement between them. Firms' motivation to save transport costs attracts them to locate around transport nodes. Also, the efficiency of transport nodes is improved by an increase in transport demand stemming from the growth of industrial agglomeration (Fujita and Mori, 2005). This is a result of scale economies in transportation, which have been realised by the development of large-sized and high-speed carriers, such as container ships, "bullet" trains, and "jumbo" jets (Fujita and Mori, 2005). The scale economies provide an incentive towards collective transportation and hence stimulate the development of a hub-spoke structure in transportation (as discussed in Chapter Three).

When scale economies in transportation rule out the transport advantage of each location, a major transport node can spontaneously emerge at any place where there is a large demand for transport, such as at the location of an industrial agglomeration. Fujita and Mori (2005:398) term this mechanism 'economies of transport density'. Economies of density are significant in all modes, but of particular relevance to the present study is the fact that several studies have shown particular evidence that economies of density are significant in respect of air transport (Brueckner and Spiller, 1991; Brueckner, Dyer and Spiller, 1992; Caves, Christensen and Tretheway, 1984). Of even greater relevance to this study is the finding of Ottaviano and Pinelli (2004) that agglomeration is more likely then to take place in the presence of hubs and gates that emerge amid intense industry restructuring.

2.5.4 Cluster development in peripheral areas

In recent decades, regional industry clusters have become important not only for local development planning, but also for practice and for research efforts (Mills et al., 2008). Regional industry clusters are generally known as groups of interconnected businesses and organisations in a specific region that, through cooperative and competitive relations involving a localised business, support infrastructure and a shared vision, and then glean productive synergies both for themselves and for their particular local industry (Cooke and Huggins, 2003; Enright, 2003; Porter, 2000; Wolfe and Gertler, 2004).

Thus, a growing interest in clusters, both as a concept and as an instrument for influencing regional renewal has led to many local planners and community developers striving to improve their regions by developing new clusters and by rejuvenating old, regional industry clusters (Arbuthnott, 2011; Karlsson, 2008). This is exemplified in Sweden, the OECD and the European Union (Arbuthnott, 2011) where local, national and international authorities have recognised regional clusters as being important for renewal, for industrial modernisation and for wealth creation.

Research suggests that peripheral regions often lag in terms of local business development, investment and such support organisations as are conducive to an entrepreneurial, local business environment (Arbuthnott, 2011; Rosenfeld, 2002; Tsipouri, 2005). The geographical remoteness of regions from large markets, mostly combined with low levels of human capital, limited local competition in product markets and narrow regional market opportunities generally deters development in peripheral regions (North and Smallbone, 2000). Added to this is the fact that private-sector activities, in these areas, are generally sparse, and moreover dominated by small businesses in traditional industries (Arbuthnott, 2011).

Developmental services, and the necessary support structures for facilitating fruitful and productive networking, up-skilling and technological transfers tend also to be lacking in peripheral regions (Malecki, 2004; Tödtling and Trippl, 2005). Empirical examples of renewal and regional industry clustering in peripheral locations are few, a fact borne out by the research efforts of a variety of scholars (Camagni, 1995; Hall and Donald, 2009; Kaufmann and Tödtling, 2000; Nuur and Laestadius, 2007; Rees, 2005; Virkkala, 2007; Von Friedrichs, 2003). This research indicates that knowledge of industry clusters in peripheral regions, and their competitive and cooperative dynamics, is limited.

Very recent research on cluster development and renewal in the Swedish periphery (Arbuthnott, 2011) concurs with Sölvell et al. (2003) in noting that one of the most important factors for regional industry-cluster success is the willingness of local businesses to participate in the efforts, which indicates that participation is more assured when regional industry clusters emerge from the bottom up. They further argue that clusters that are driven from the bottom up are more successful than are top-down ones.

While highlighting the importance of bottom-up efforts for regional industry-cluster development, the research by Arbuthnott (2011) does not imply that either regional government or support agencies should step away from cluster development and renewal responsibilities. Arbuthnott suggests that public agencies should rather take responsibility to educate local business communities on how to develop bottom-up industry clusters and how to promote the advantages of having proactive (and industry-led) collaborative organisations in peripheral regions. Thus, public agencies should aim to facilitate, yet not drive new and emerging clusters' competitive and cooperative relations.

Cluster-based policies can play an important role in the development of the more peripheral areas (Lagendijk and Charles, 1999). A cluster approach may be adopted to increase the 'absorptive potential' of the regional economy, and also to build a more strategic context in which local actors can work at the improvement of regional innovative capacities. In addition, through structuring and integrating business support along sectoral and supply-chain lines, a cluster policy may contribute to the effectiveness of business support (Lagendijk and Charles, 1999). The essence here is to overcome substantial failures in government-based support provision and to address institutional mismatches in the policy and support system. Literature seems to indicate that cluster development does have a place in peripheral areas, but that such development should be carefully driven to ensure sustainability.

This chapter set out to provide some theoretical perspectives on the location of economic activity and space. Traditional approaches to location theory were discussed as was the NEG as a more modern theory on the location of economic activity. Two core themes were identified both in the traditional approaches to location theory and in the NEG, namely the modern economy and globalisation, and clustering caused by agglomeration forces.

The modern economy and its processes differ totally from the situation that was current as little as 40 to 50 years ago. Advances in technology have led to faster production processes (mechanisation) and also to faster transport times, especially with the introduction of large cargo aeroplanes. Both the NEG and the cluster concept discussed in this chapter acknowledge that spatial interactions are costly and that agglomeration forces induce economic activity in space. The chapter further showed that the processes of the modern economy, commonly known as globalisation, impact on the location of economic activity in space and it subsequently explored the relevance of especially the NEG while also explaining the inequality evident in the spatial location of activities.

The discussion on the modern economy and globalisation revealed that the process of globalisation coupled with the advances in modern technology is moving the world from an industrial era to an information era. The new economy is heavily dependent on knowledge and skills and globalisation is increasingly exposing even the most remote areas to trade. Air transport is now a major contributor to globalisation and between 35% and 40% of world trade (by value) now moves by air.

The discussion on clusters also indicated that successful clusters create economic benefits and that clusters have increasingly become requirements for improved economic performance and the reduction in the cost of doing business whilst at the same time reducing the time-to-market effects. The reduction in time-to-market effects are of particular importance to airports as the air-freight industry is particularly well suited to achieve these reductions.

Further to the general discussion on the concept of clustering in this chapter, the concept is explored in more detail within the logistic cities concept in the next chapter.

3 CLUSTERS, LOGISTICS CENTRES AND LOGISTICS CITIES

3.1 Introduction

Chapter Two explored the theory and other processes pertaining to spatial inequality and location theory. The NEG concept discussed in that chapter focused strongly on the agglomeration of economic activity in space (not a totally new concept at the time but actually building on Marshal's thoughts almost a century before the advent of the NEG theory) and hence the basic concept of *clustering* was also explored. A brief introduction to clustering was given in Chapter Two.

Given the central thesis of the study, namely how logistics cities[2] (a form of a cluster) can facilitate development in peripheral areas, the concept of *clustering* requires a more detailed further exploration. This chapter therefore addresses the typology of logistics cities as nodes of development. In addition, the logistics city concept is analysed in detail in terms both of its levels of progression and as the critical enablers applicable to logistics cities. The chapter concludes with a section on how the logistics city concept can be adapted within the context of a peripheral area.

However, before the chapter turns to the discussion on logistics cities, it is necessary first to understand how logistics and logistics management feature in regional connectivity, because without such connectivity there would be no need for a logistics and transport functionality in that region. As a consequence, the strategic planning of a region so as to take advantage of its position in the context of its functions of accessibility and connectivity between key economic centres will play an important role in the sustainable future of the region.

3.2 Logistics management and regional connectivity

As reflected in Chapter Two, trade competition between regions and countries has increased significantly in recent years, mainly as a result of increasing levels of

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[2] The term *logistics city* is used in this document both in its broadest conceptual definition as encompassing the full spectrum of its level of progression (as explained in Section 3.3) and in its narrow typological definition as a particular level in the said progression.

globalisation, the rapid development of transport technology and the worldwide enlargement of markets (Capineri and Leinbach, 2006; Leinbach and Bowen, 2005). International trade liberalisation and the composition of global production chains have changed the geographical location of supply and distribution facilities, which, in turn, facilitate the development of technologies that accompany the globalisation of logistics (Du and Bergqvist, 2010).

As a result, the favourable location of a region in terms of the connectivity of one economy to another – in respect of sourcing and distribution – has been seen to play an important role in determining the ability of the said economy to participate in emergent globalisation opportunities (Sengpiehl, 2010). Thus, the logistical set-up and the associated global connectivity of any region and of its related industries, together with its ability to retain and further develop its 'competitive advantage', requires a significant review of the way in which many regions, especially peripheral ones, interface with world markets.

The connectivity provided by one economy to another through physical trade gateways, is often historically embedded in the regional demand for importing and exporting goods (Notteboom and Rodrigue, 2009a). However, simple transhipment connections evolve through more complex 'hub-and-spoke' systems to logistics centre gateways (Abrahamsson et al., 2003; UNESCAP, 2005). This move towards logistics centre gateways includes the development of logistics supporting value-add business services and related social aspects (Sengpiehl et al., 2008a), and in this context, it is important briefly to address the core factors that influence these ongoing evolutionary changes.

Progress in trade liberalisation through the reduction of trade tariffs and trade barriers as an outcome of 'free-trade agreements' (FTAs) and 'free-trade zones' (FTZs), are an impetus for companies to focus on distinctive logistics management resulting from new global-oriented production structures (Rimiene and Grundey, 2007). Additionally, significant developments in transport technology are taking place (Coe et al., 2004; UNESCAP, 2009a). For instance, the emergence of the container unit in the 1960s was one such major technological revolution (Rodrigue, 2008), and the consequent reduction in transhipment times has made transportation of all types of goods more economical, leading to the development of large logistics locations as part of the emergent 'hub-and-spoke' network (Capineri and Leinbach, 2006).

Additionally, as briefly alluded to in Chapter Two, the importance and the influence of ICT are continually increasing and becoming firmly embedded in logistics (Lemoine and Dagnaes, 2003). For instance, e-commerce-based administration and services are multiplying efficiency by reducing redundant information and enhancing visibility within the entire supply chain, thus leading to better operations and reduced cost (Groznik, 2008). The integration of ICT is also taking place in trade nodes, thereby further increasing the competitiveness of the said nodes (Srour et al., 2008).

Modern advances in trade liberalisation, transport and information technology have resulted in the emergence of new business strategies (Sengpiehl, 2010; UNESCAP, 2005). Global companies now tend to concentrate production facilities in particular regions, while forsaking business opportunities – such as customising and light manufacturing – in other regions because of heterogeneous markets (Van der Lugt and De Langen, 2005). Business strategies, such as centralised inventory, delayed configuration or light assembly, customising and quality control have consequently emerged (Abrahamsson et al., 2003).

These forces appear to lead to a high concentration of logistics activities in relatively few nodes or gateways with good access to major markets (Notteboom and Rodrigue, 2009a). However, such engagement in the global trading arena and the resulting trade hubs' concentration of logistics activities, commonly in metropolitan areas (such as in Gauteng), can cause congestion and bottlenecks that decrease the seamlessness of connectivity and put regions under enormous pressure (Capineri and Leinbach, 2006). The occurrence of such bottlenecks and congestion in metropolitan areas may pave the way for the establishment of suitably located nodes in peripheral areas with a view to relieving the pressures brought about by these negative externalities, thereby increasing system efficiencies.

Thus, new strategies are required to develop well-structured and sustainable solutions to support industrial and commercial activities in a region with efficient connectivity to other economic localities. In this context, one essential issue is the alignment of both the activities and regulations across traditional boundaries to enable logistics-centre gateways to connect a region to the rest of the world via physical, virtual and legal interfaces (Sengpiehl et al., 2008b; Sengpiehl, 2010). Indeed, one strategy that is considered able to address such changes is the logistics city-cluster[3] concept, one of the latest manifestations of logistics nodes (ILSCM, 2007a; Nagel et al., 2009a; Sengpiehl, 2010). Some researchers, Sengphiel (2010) for example, strongly believe the logistics city concept to be a suitable strategy to enhance (or indeed) achieve competitiveness as a supply-chain location.

Since the logistics city is regarded to be part of a broader category of logistics centres[4] or logistics nodes, it is necessary first to investigate the general category of logistics centres in more detail before turning to a specific analysis of the logistics city concept.

3.3 Conceptual framework of international logistics centres

The modern advances in trade liberalisation, transport and information technology alluded to in the foregoing section have, among others, led to the emergence of a new generation of logistics and distribution facilities around the world. They are driven by changes in freight and logistics processes, and have been developed in response to the challenges posed by regional population and freight growth (Higgins et al., 2012). Loosely termed ‘logistics centres’ these facilities have become fundamental elements of local, national, and international transportation systems in regions with high volumes of trade (Higgins, et al., 2012).

However, in examining the academic literature on logistics centres, it has become clear that this phenomenon has not yet received an agreed-upon name (Meidute, 2005;

3 Sengpiehl (2010) refers to the term *Logistics city cluster* in his research. Originally the term *logistics city* was used by Sengpiehl and also the ILSCM. It is felt that the term *logistics city* is perhaps a more user-friendly term and therefore used in this study to reflect the highest level in the progression typology of logistics nodes.

4 The generic term *logistics centre* has, for purposes of this study, been adopted to reflect any type of logistics centre irrespective of its size or functionality.

Notteboom and Rodrigue, 2009b; Rimiene and Grundy, 2007; Rodrigue et al., 2010). Many common, though imprecise terms, have been found that describe these centres, such as *freight hub*, *freight gateway*, *inland port*, *inland terminal*, *dry port*, and *freight village*, to name but a few. These definitions cover a wide variety of roles and scales, with some facilities being simple, single-function terminals, while others are complex partnerships and legal entities that include logistics zones and governance structures (Rodrigue et al., 2010).

3.3.1 Variety of terminologies regarding logistics centres

Scrutiny of the literature on logistics centre terminology serves to highlight the variety in terminology around the concepts and definitions of logistics centres. Table 2 offers an overview of some of the terms and definitions encountered in the literature. While some of these are similar, each author presents a different conceptualisation and definition of the observed facility.

The table illustrates the variety, and sometimes even confusion, surrounding the terms for logistics centres. This confusion is illustrated by the following example. The term *dry port* is often used to refer to a terminal at which various cargo-handling and value-added activities are performed and that the facility is directly connected to a major seaport with rail or barge shuttle services (Roso et al., 2009). However, according to Rodrigue et al. (2010), this makes dry ports an issue of contention in that the word ‘dry’ appears to exclude other inland terminals served by barge. There also seems to be a distinction between a ‘conventional’ logistics centre such as pure transhipment terminals and various types of large-scale intermodal logistics centres that are mainly developed in a public-private collaborative context (Höltgen, 1995).

Even between countries, similar facilities are named differently. What Tsamboulas and Dimitropoulos (1999) term *nodal centres for goods* are called *freight villages* in the United Kingdom, *Platformes Multimodales/Logistiques* in France, *Interporti* in Italy, and *Gueterverkehrszentren* (GVZ) in Germany.

Table 2: Various terminologies in relation to logistics centres

Term	Author
Air cargo port	Leitner and Harrison, 2001
Bulk terminal	Wiegmans et al., 1999
Container yard	UNESCAP, 2009b
Distribution centre	Hesse, 2004; Rimienė and Grundey, 2007; Notteboom and Rodrigue, 2009b; Higgins et al., 2012
Distribution terminal	Wiegmans et al., 1999
Dry port	UNCTAD, 1991; Ng and Gujar, 2009; Roso, et al., 2009; UNESCAP, 2009b
Freight hub	ILSCM, 2007a; Sengpiehl et al., 2008a; Sengpiehl, 2010
Freight village	Tsamboulas and Kapros, 2003; ILSCM, 2007a; Rimienė and Grundey, 2007; Boile et al., 2008; Sengpiehl et al., 2008a; UNESCAP, 2009b; Sengpiehl, 2010; Higgins et al., 2012
Gateway	Notteboom and Rodrigue, 2009b
Hinterland terminal	Wiegmans et al., 1999; Du and Bergqvist, 2010
Industrial park	Boile, et al., 2008; Du and Bergqvist, 2010
Inland clearance depot	UNECE, 1998; Jaržemskis and Vasiliauskas, 2007 UNESCAP, 2009b
Inland customs depot	UNCTAD, 1991
Inland freight terminal	UNECE, 1998
Inland port	UNECE, 2001; ILSCM, 2007a; Sengpiehl et al., 2008a; Rodrigue et al., 2010; Sengpiehl, 2010
Inland terminal	UNCTAD, 1982
Intermodal and multimodal industrial park	Boile et al., 2008
Intermodal freight centre	Cardebring and Warnecke, 1995; Du and Bergqvist, 2010
Intermodal railroad terminal	Roso and Lumsden, 2009
Intermodal terminal	UNESCAP, 2009b; Du and Bergqvist, 2010
Load centre	Notteboom and Rodrigue, 2009b; Du and Bergqvist, 2010
Logistics centre	Europlatforms EEIG, 2004; Meidutė, 2005; Rimienė and Grundey, 2007; Higgins et al., 2012
Logistics city	ILSCM, 2007a; 2007b; Nagel et al., 2009a; 2009b; 2009c; Sengpiehl et al., 2008a; 2008b; 2009; ILSCM, 2010; Sengpiehl, 2010
Logistics node	Rimienė and Grundey, 2007; Higgins et al., 2012

Term	Author
Logistics village	Sengpiehl, 2010
Maritime feeder inland port	Leitner and Harrison, 2001
Nodal centres for goods	Tsamboulas and Dimitropoulos, 1999
Satellite terminal	Slack, 1999; Notteboom and Rodrigue, 2009b
Trade and transportation centre inland port	Leitner and Harrison, 2001
Transfer terminal	Wiegmans et al., 1999
Transmodal terminal	Notteboom and Rodrigue, 2009b
Transport terminal	Rimienė and Grundey, 2007; Higgins et al., 2012
Urban consolidation centre	BESTUFS, 2005
Urban distribution centre	De Cerreño et al., 2008
Warehouse	Rimienė and Grundey, 2007; Higgins et al., 2012

The term *logistics centre* itself is subject to confusion, with some authors referring to it as a concept covering the 'broadest meaning' of a centre for companies participating in activities related to transportation and logistics (Meidute, 2005:106). Others view logistics centres as the functional equivalents of freight villages in Europe, Japan, Singapore, China and the USA (Europlatforms EEIG, n.d.; 2004; Rimienė and Grundey, 2007). According to Rimienė and Grundey (2007), the heritage of theory development and empirical research on a unified concept of logistics centres is quite poor in comparison with that of other disciplines. At the time (2007), that statement was probably correct. Since 2007, the Institute for Logistics and Supply Chain Management (ILSCM) at the Victoria University in Melbourne, Australia has conducted in-depth research on the general topic of logistics centres and the development of the term logistics city, which forms part of a typology of logistics centres. Although this research does not quite put right the heritage of poor theory development, it does make some inroads in providing some theoretical backbone to a logistics city concept as part of what are generically referred to as logistics centres.

3.3.2 Basic attributes of logistics centres

Apart from the variety in the terms used to describe logistics centres as has been illustrated in Table 2 above, the literature indicates that a number of basic elements are common to all such centres. From the literature it transpires that the main purpose of international logistics centres is to facilitate seamless integrated transport networks that are able to enhance both the attractiveness of the market and the competitiveness of the companies involved. Logistics centres therefore act as nodes that link suppliers and consumers through transportation.

The various types of logistics centres share a number of common attributes. These are geographical coverage (size), market conditions, functionality (range of operations and services) and management structures. What differentiates the different types of logistics centres are the differences in the scope of logistics activities and the services offered. In general, logistics centres have developed beyond traditional activities – such as storage, receiving and dispatching, break-bulk and consolidation. They now also offer integrated logistics management, value-added services (for example labelling and bar-coding, procurement and vendor management, customer service functions, such as return, repair, rework, and an assortment of promotional assembly functions). Lastly, they also offer ICT for inventory control, for tracking and for tracing (Du and Bergqvist, 2010; Rimiene et al., 2007).

Whatever the actual attributes of a logistics centre, all logistics centres share a basic element, namely that each logistics centre must at least have a terminal. The terminal is therefore regarded as the principal component of any logistics centre (Du and Bergqvist, 2010; Roso et al., 2009). Unlike the variety of terms used for logistics centres, there seems to be a larger consensus or understanding of what a terminal is. The general understanding is that a terminal is the point of transfer of freight from one transport mode to another, which point requires a large area of land and a high degree of accessibility (Labanauskas and Palsaitis, 2007; Racunica and Wynter, 2005; Roso et al., 2009). A useful classification of intermodal terminals proposes two types, for example (i) pure terminals that provide transhipment services, and (ii) value-add terminals that provide ancillary services (Sengpiehl, 2010).

Intermodal terminals are also associated with a range of stakeholders and can bring benefits to its users and operators because of economy of scale (McCalla et al., 2001;

Sengpiehl, 2010). In addition, observations on the regional effects of intermodal terminals, such as regional employment and economic development, are consistent with arguments made for the other logistics nodes (Meidute, 2007; Sengpiehl, 2010). It can be concluded that there is general consensus on the nature of an intermodal terminal and its core services of simple transhipment between transport modes.

Following on the basic understanding of logistics centres and the various terms used to describe such centres, the chapter now turns to the focus of this study, namely the logistics city.

3.4 The logistics city concept

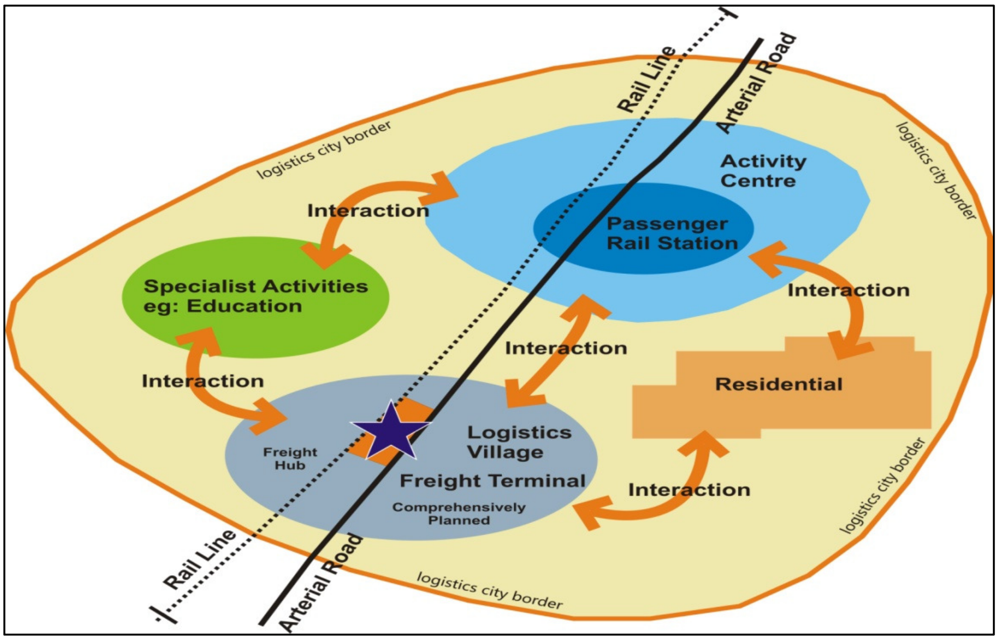
The ILSCM is arguably on the forefront of research into and development of the concept of a *logistics city*. A significant body of work has been done and published on the concept since about 2007, either as reports of the Institute or in other scientific journals by researchers employed by the institute (ILSCM, n.d., 2007a; 2007b; 2007c; 2010; Nagel et al., 2009a; 2009b; 2009c; Sengpiehl et al., 2008a; 2008b; 2009; Sengpiehl, 2010).

Although used very loosely, logistics cities are perceived as a critical approach to address the challenges of globalisation and the increasing complexity of trade (Sengpiehl, 2010). The concept of a logistics city is relatively new in the global economy and broadly represents a geographical metropolitan area containing a number of logistics nuclei, one of these being a massive international freight hub that is associated with a critical volume of multimodal transport and gateway infrastructure (Sengpiehl, 2010). The main function of the logistics city is to provide a logistical platform to accompany appropriate logistics infrastructure and physical facilities (for example roads, railroad tracks, terminals and ICT) and substantial logistics services (for example warehousing – including cold storage – and freight forwarding).

Sengpiehl (2010) contends that for the logistics city to be an independent and sustainable entity, a number of related business value-add services (for example legal or financial) and social infrastructure (for example education and recreation) are necessary offerings.

This configuration attracts various names such as ‘logistics cluster’, ‘harbour city’, ‘port city’ or, originally, a ‘logistics city’ (Sengpiehl et al., 2008b). Whatever the name chosen, the concept of a dense trade cluster with a primary logistics function has gained acceptance as representing a viable and unique concept (Nagel et al., 2009a), as is shown by recent developments like those in Dubai, Lingang, Singapore, Hamburg, Zaragoza and Duisburg. Figure 2 depicts the generalised framework of a logistics city.

Figure 2: Generalised framework of a logistics city

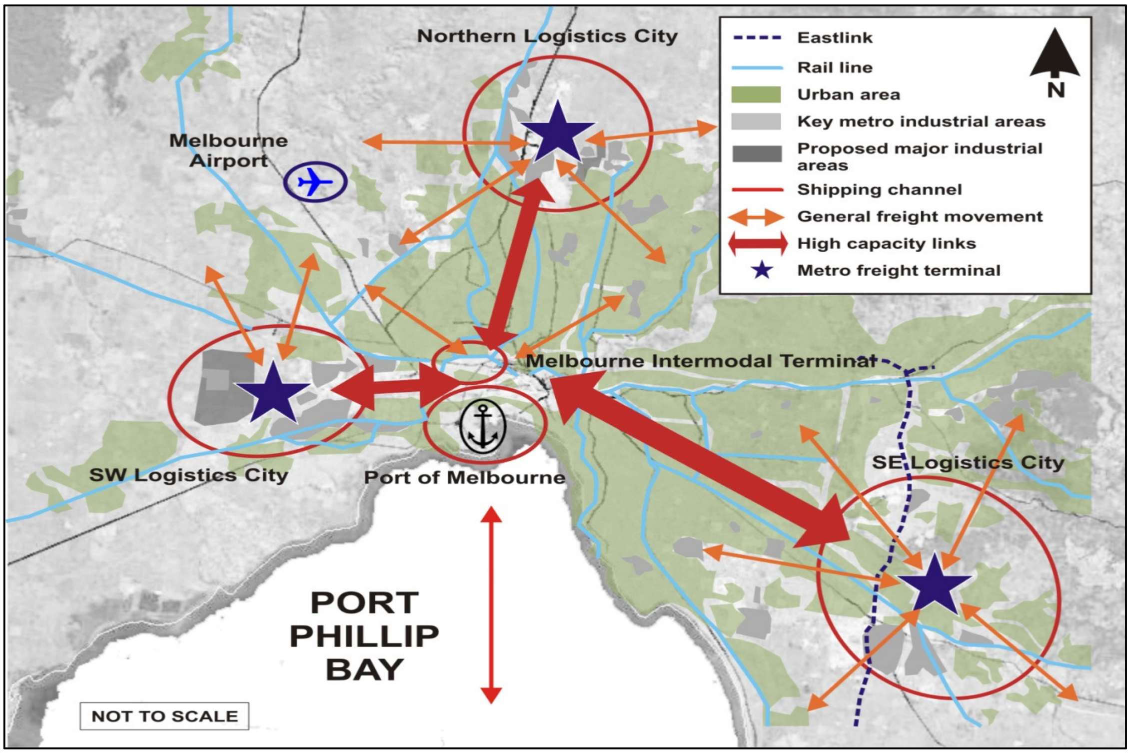


Source: ILSCM, 2010:6.

The above figure indicates that the concept of a logistics city is more of a development concept (or a planning overlay) than a geographically delimited city. The concept is about more than just logistics or transport and it also encompasses other land uses and functions, these including residential areas and certain specialist activities such as education. The focal point is the freight hub and the transport infrastructure such as road and rail.

Figure 3 gives an indication of the spatial characteristics and size of a typical logistics city. The example reflects the actual planning of logistics cities in the Port of Melbourne, Australia.

Figure 3: Spatial characteristics of a logistics city



Source: ILSCM, 2010:4.

Figure 3 indicates that the City of Melbourne plans to develop three logistics cities in its metropolitan area. These are all new developments. An important aspect of the development of the said logistics cities is their location in close proximity to key industrial areas. In addition, their primary aim is to alleviate congestion (in the case of Melbourne, port congestion) thereby lowering the logistical costs and improving turnaround times. Interestingly, the planning concept shows that the three future logistics cities in Melbourne are distant from the port, which in this case is a seaport. Also, a new multimodal terminal will be developed.

In developing a typology of logistics centres by analysing the main attributes of logistic centres (see Section 3.5) and also the above perspective on a logistics city, one important element comes to the fore, namely the element of progression. It seems obvious that there must be more than one level of a logistics centre (mainly because of functionality differences) before the logistics city is formed – as shown in figures 2 and 3 above). The typology of logistics centres that culminate in the highest level, namely a logistics city, is analysed in the following section.

3.5 Typology of logistics centres

Apart from the work done by the ILSCM between 2007 and 2010 – as reflected in the preceding section – some research has also of late been done in developing some form of typology of logistics centres (Du and Bergqvist, 2010; Higgins et al., 2012). In developing a typology of logistics centres, it was for two reasons decided to use the corpus of research conducted by the ILSCM as the basis for deciding on terminology. Firstly, the research of the ILSCM is the only body of work that uses the term *logistics city* in its typology and, secondly, there has been some progression in the development of terminologies over the period 2007 to 2010. It should be noted that, with the exception of the terms *logistics city* and *logistics city-cluster*, the other terms in the typology have also been used by other researchers and academics. The following section, after discussing the base typology of *logistics centres*, discusses how the typology has evolved over time.

3.5.1 Base typology of logistics centres

Initial research proposed a basic typology of logistics centres based on a progression through four levels to eventually become a fully fledged logistics city (ILSCM, 2007a; Sengpiehl et al., 2008a). These levels were freight village, inland port, freight hub and, lastly, logistics city. Given the prominence of the research done by ILSCM on the logistics city concept and the plethora of terms in use among the general academic population (see Table 2), it was decided to keep to the various levels and specific terms used for each level as they were used by the ILSCM. Other research was then used to define, describe and analyse the various typologies.

The concepts *freight village*, an *inland port* and a *freight hub* were regarded as subsets of the logistics city. These designations and their variants are reviewed and discussed in the next paragraphs in terms of their definitions and characteristics. Each of the types presupposes the existence of a terminal as discussed in Section 3.5.7. The basic premise is that the levels progress in order of the size and range of services provided (Du and Bergqvist, 2010; Rimiene and Grundey, 2007; Sengpiehl, 2010).

3.5.2 Level 1: Freight village

The European Association of Freight Villages (Europlatforms EEIG, 2004:11) provides a layman's definition of a freight village by stating that "just as with a residential village, a freight one comprises not only infrastructures but also the services necessary to satisfying and responding to the requirements arising from its primary transport activity". It further describes the concept as being a site that concentrates logistics activities such as transport, goods distribution and warehousing.

A freight village has also been described in early research as being an element of intermodal transport chains, one that provides efficient transhipment infrastructure supported by specialised logistics services (Konings, 1994). The United Nations Economic Commission for Europe (UNECE) specifies that it is a geographical grouping that comprises at least one terminal and offers accompanying services such as storage, maintenance and repair (Sengpiehl, 2010). Capineri and Leinbach (2006) suggest that this bounded grouping of infrastructure and superstructure is linked to different transport modes, logistics services and is equipped with sophisticated information technology. These authors further argue that that freight villages are located inland to unload and repack containers coming from major seaports.

Research also indicates that activities within a freight village are carried out by more than one company for national and international trade purposes and that the freight village consists of essential facilities and services (for example logistics service providers and other business services) to support the logistics sector (Europlatforms EEIG, 2004; Meidute, 2005; Tsamboulas and Kapros, 2003). Tsamboulas and Dimitropoulos (1999) established an important principle regarding the progression of logistics nodes in saying that intermodal terminals constitute the principal component of freight villages, and further suggested that freight villages are more than just a terminal in that they provide additional facilities and services.

Kapros et al. (2005:56) offer probably the best explanation of what a freight village is and what activities occur at that node: "The concept of a freight village relates to the specialized zones offering space and common services to transport operators, logistics providers and shippers. Freight villages develop various activities related to consolidation; warehousing; storage; handling operations; shipment coordination; services to transport modes, transport units and human resources; banking; and other cargo administrative services".

Locating logistics activities and infrastructure in a dedicated zone improves the competitiveness and efficiency of individual companies. This is due to their combined efforts and shared risk, plus the economy of scale and de-bureaucratisation, which cannot be achieved by single small and medium-sized companies (Labanauskas and Palsaitis, 2007; Meidute, 2005).

A critical factor in the development of freight villages is the importance of efficient access to their markets' freight generators through transport networks (Capineri and Leinbach, 2006). Tsamboulas and Kapros (2003) and Meidute (2007) also claim that the development of freight villages do not only benefit private stakeholders, but also the regions and their associated governments and populations. There are indications in the research that freight villages enhance regional economy through their integration in global supply chains (Meidute, 2005; Tsamboulas and Kapros, 2003). These enhancements are achieved through improved transport infrastructure, logistical services and integrated information technologies. It is therefore to be expected that specific gains for the regional economy would be through employment opportunities and economic growth that are due to direct, indirect and induced impacts. From the above it can be deduced that a freight village develops from a basic freight terminal through the addition of logistical activities and other supporting activities.

3.5.3 Level 2: Inland port

The role and function of inland ports has been the object of some confusion in that there is no specific consensus, even concerning the definition of the term itself (Rodrigue et al., 2010). In the early 1990s, the term *inland port* started appearing in supply chain and logistics reports, particularly those published in the trade press. Up to that point, it had mainly been associated with inland waterway ports. The new definition of inland ports – as clusters of distribution and logistics centres located on a transportation corridor – indicated a different kind of operation, mode and commodity mix (Rahimi et al., 2008).

Generally, *inland ports* are defined as logistics centres that include appropriate multimodal transportation assets, logistics services and business value-add activities that consequently have the ability to enable international trade (Notteboom and Rodrigue, 2009a; Walter and Poist, 2004). Some definitions include free trade zones (FTZ) in inland ports and that these ports tend to involve high-value commodities (Sengpiehl, 2010). An inland port, according to some definitions, incorporates massification of flow networks by rail and barge terminals that are linked to other major gateways (Notteboom and Rodrigue, 2009a).

It seems as though inland ports can have more than one typology. Leitner and Harrison (2001) have identified four different types of inland ports: inland waterway port, air cargo port, maritime feeder inland port trade, and transportation centre inland port. An important principle of this and other research is that an inland port does not necessarily require navigable water or a link to a maritime transport node to be classified as an inland port (Bichou and Gray, 2005). This opens the way for airports also to fulfil the role of an inland port.

A study of the available literature reveals that the activities prevalent at an inland port commonly include transhipment and distribution services, customs brokerages and clearance, integrated information systems, stuffing and stripping of containers and also their consolidation and buffering (Leitner and Harrison, 2001; Notteboom and Rodrigue, 2009a; Roso et al., 2009; Walter and Poist, 2004).

Some inland ports are dominantly private and linked to supply chains quite unrelated to the regions in which they are set, for example Europort Vatry in France, an all-cargo airport where at least two cargo airlines use the facility for flights to the Caspian Sea and to and from Africa (Tioga Group, 2006). Other inland ports are the outcome of public initiatives that aim to anchor and develop freight distribution within regional economies (Rodrigue, et al., 2010), such as Metroport, Auckland, New Zealand, an inland port more than 220km distant from the maritime port of Tauranga (Tioga Group, 2006). In addition, some inland ports are decidedly commercial in that they finance their operations through the revenue they generate; others, again, are heavily subsidised, particularly for infrastructure provision. An example of the latter type of inland port is the Port of Huntsville, an inland port complex located in northern Alabama, USA, which had an airport as the driving force behind its development. About 40% of the capital investment came from Federal sources such as airport and improvement grants (Tioga Group, 2006). In some cases inland ports can be exclusively dedicated to a specific metropolitan area or even to a single customer (Rodrigue et al., 2010).

It was found that inland ports, like freight villages, can increase efficiencies for its commercial stakeholders and have the capability to create local employment and stimulate regional economic growth (Roso et al., 2009). However, Notteboom and Rodrigue (2009a) warn that there is the potential of over-investment because many locations want to participate in this growing segment. This warning is certainly also applicable to the establishment of logistics centres in South Africa, particularly with regard to airports in peripheral areas. Therefore, the decision to create an inland port must be based on the demand of cargo flows and the efficient access to these freight generators (Notteboom and Rodrigue, 2009a; Roso et al., 2009; Walter and Poist, 2004).

Based on the literature available on the concepts of freight villages and inland ports, significant similarities between the two concepts are found. It seems as if many of their characteristics and purposes are comparable. It would thus be reasonable to deduce that the level of value-added services and size are probably the two main distinguishing characteristics between the freight village and the inland port.

3.5.4 Level 3: Freight hub

Hubs, because of their direct connection to many destinations, are ideally accessible places at which to gather and from which to distribute material. Freight hubs are frequently defined as nodes that enable the transfer of freight between different transport modes, and in this context the term *gateway* is often used as a synonym (Van Dam et al., 2007). The core function of a hub is large-scale freight consolidation in terminals, which is characterized by short-, medium- and long-distance distribution at regional and international levels (Hesse and Rodrigue, 2004; Racunica and Wynter, 2005).

Some literature sources indicate that freight hubs are planned and operated on the basis of a particular freight-network design, referred to as a 'hub-and-spoke' arrangement (O'Kelly, 1998; Racunica and Wynter, 2005). Hubs are geographical in that they serve a specific regional area and they, very similar to freight villages and inland ports, often confer benefits on the region in which they are located (O'Kelly, 1998). Hubs are usually a catalyst for agglomeration and scale economies. Indeed, to participate in trade growth and to generate economies of scale, freight hubs focus on infrastructure development that enhances transhipment and transport capacity (Sengpiehl, 2010). Because of this focus and the existing spatial constraints, there are often limited attempts to integrate additional logistics and business services in freight hubs (Hesse and Rodrigue, 2004; Lemoine and Dagnaes, 2003).

A number of studies conclude that the existence of freight hubs is only possible if sufficient demand is available (Racunica and Wynter, 2005; Sengpiehl, 2010; Van Dam et al., 2007). This is embedded in the fact that economy of scale is needed to justify the massive infrastructure development and the efficient operation of associated mass transport modes. It also appears as though its development depends on factors such as the financial stability to provide the necessary infrastructure and the government sector (Van Dam et al., 2007). Like inland ports and freight villages, hubs involve various stakeholders like transport agencies, infrastructure providers, hub operators and users, governments and communities (Hesse and Rodrigue, 2004; Van Dam et al., 2007). Most stakeholder-related studies focus on the benefits to hub operators and users by pinpointing increases in efficiencies, cost reductions and the higher frequency of transport schedules resulting from critical cargo mass (Hesse and Rodrigue, 2004; Racunica and Wynter, 2005). However, there are also recognised benefits to the community itself such as the minimising of environmental externalities and the creation of employment opportunities (Van Dam et al., 2007).

It is important to note the argument of Rodriguez et al. (2007) regarding both the location of a freight hub and the possible capacity constraints. In respect of the location of hubs, they argue that if the capacity of the hub is considered to be limited, it may at certain times become congested so that the time the cargo spends in the hub may negatively affect the standard of the services offered. This is an important observation, especially in the case of regarding air-cargo hubs, where congestion is often a problem.

The main difference between the freight hub and the previous two lower levels once again is one of scale and thus also of investment in infrastructure. However, there is one significant difference between freight hubs, freight villages and inland ports, namely that hubs only consider consolidation, transhipment and distribution to be their core objective. Yet this can eventually evolve into an integrated logistics centre that has the value-added services of freight villages and inland ports (Sengpiehl, 2010). In this context it is argued that complex supply chains integrated in hub-and-spoke systems can further attract pure logistics providers and various other business value-added business activities (Lemoine and Dagnaes, 2003; Sengpiehl, 2010).

3.5.5 Level 4: Logistics city

Although the term *logistics city* was used as early as 2001 (Schulz, 2001a) and was shortly afterwards strongly marketed by Dubai (Sengpiehl, 2010), the first attempt at an academically conceptualised definition was provided by ILSCM (2007a). In their context, a logistics city is defined as a metropolitan area with a dominant agglomeration of logistics and supporting value-add services that embrace transport infrastructure and gateways (ILSCM, 2007a). Sengpiehl et al. (2008a) identify three key enablers of the logistics city concept. The first enabler 'consolidation of the geographic dispersion' highlights logistics sites as focal points for services connecting industry to the main logistics hubs. The second main enabler is called 'enhanced professional and business services'. Value-add business services, apart from logistics operations, are key components in the development of logistics cities and the third enabler, 'increased transport infrastructure capacity', is related to the enhancement of capacity and connectivity between logistics sites, residential and business/industrial centres through the application of intelligent transport systems technology. In later publications, this understanding is extended by including, as essential elements, the notion of social infrastructure and the coordination of the various stakeholders of a logistics city (Nagel et al., 2009a).

Apart from the work of ILSCM, public information is largely restricted to specific web-based material that is associated with metropolitan logistics cities that are either being planned, under development or in an expansion phase (Sengpiehl, 2010).

In the applied industrial context, two smaller inland developments – labelled as 'logistics cities' – are identified. First, Schulz (2001a) mentions Colombia (Mexico) as an emerging logistics city that connects Mexico and the USA. The city currently deals with 40% of the total transport of goods between the two countries (Schulz, 2001a). This development provides not only an adjacent FTZ and airport, but also enables efficient border crossing via a 12-lane bridge and two major railroads supported by expeditious legal and administrative computerised customs procedures. The next development on the cards for the city is an additional 2.4km^2 international trade facility combining warehouses, customs brokers and shipping companies and additional business services such as hotels and banks (Schulz, 2001b).

The second is Zaragoza (Spain) as part of the development plan of the Aragon region to diversify its economic structure (Tierney, 2004). Zaragoza has a major aviation hub and an efficient transport infrastructure that integrates high-speed rail links, and it is further seen as a distribution hub for the seaports of Bilbao, Barcelona and Valencia. The core asset of this logistics city is its 11km^2 freight village (Plaza Logistica), which has already attracted more than 100 global and regional companies (MIT, 2009). Besides the typical logistics assets such as multimodal terminals and warehousing, Plaza Logistica includes the typical value-add business services and amenities of freight villages and a dedicated technology precinct (Sengpiehl, 2010). To meet the objective of becoming a global logistics centre, the government also invested in logistics research and higher education facilities, such as the newly opened subsidiary of the Massachusetts Institute of Technology (MIT) in Zaragoza (MIT, 2009). This strategy of diversifying the economic setup of the regions by introducing the logistics sector appears to have been successful.

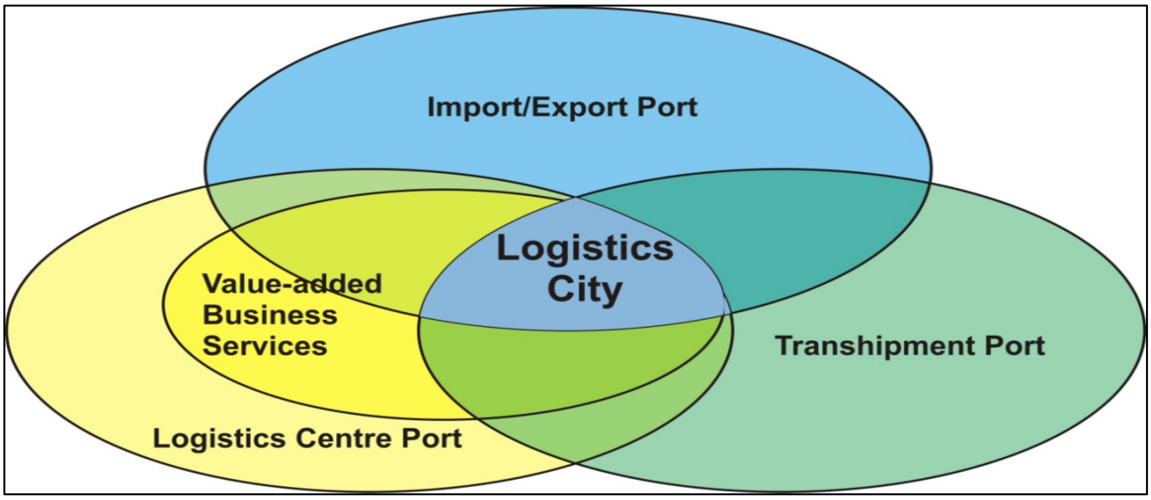
The region's economy grew by a yearly average of 3.3% since the first major logistics developments, which is above the average for Spain. During the economic recession, the region's economy grew by 1.5% (MIT, 2009).

Probably, the most widely known logistics city is part of Dubai World Central (DWC), a five-zone development with a total area of approximately 140km^2 (DWC, 2010; Sengpiehl, 2010). The new Dubai World Central mega-project was necessary because of constraints in the current cargo-handling capacities and because of the growing demand for value-add services (Walter and Eiermann, 2008). Dubai Logistics City is located adjacent to the new air-cargo terminals of the Al Maktoum International Airport and to Jebel-Ali Port. Importantly, all three components are integrated in a single customs-bonded free zone and are efficiently linked with rail and road corridors (Sengpiehl, 2010). Dubai Logistics City is dedicated to cargo consolidation, warehousing, distribution services, light manufacturing and assembly, and includes a business park for administration and logistics ancillary services (DWC, 2010; Sengpiehl, 2010). The holistic development of Dubai World Central is aimed at providing a maritime and aviation integrated logistics platform with excellent logistics know-how and quality labour (Walter and Eiermann, 2008), which is seen as a strategy to enable economic growth (Turner, 2006).

The literature reflects that the term *logistics city* is used fairly widely. Although these logistics cities differ in size, and focus on different elements, infrastructures and service provision, they do have certain commonalities. Logistics cities all include or are adjacent to ports that include seaports, airports and inland ports; all of them provide sufficient transport and communication infrastructure, logistics facilities and related logistics services, even if these differ in size and the exact nature of the services provided. Value-added business services – such as light assembly, banking and hospitality – are integrated in these logistics cities. Additionally, the FTZs and research/education facilities seem to be an important part of the logistics city concept. Lastly, the identified logistics cities form part of the economic development plan of their related regional government structures. An important observation made in the literature is that logistics cities are not only found in regions one would expect to find them, for example seaports, but also as dense trade clusters in less obvious inland locations like Zaragoza, Duisburg and Fort Worth/Dallas (Sengpiehl, 2008a).

The existence of a port, here referred to as an international gateway that can be either a seaport, airport or inland port, is the most essential element in the logistics city concept (Sengpiehl et al., 2008a). There are significant differences between common port cities and logistics cities (Sengpiehl et al., 2008a), and in order to separate common ports from logistics cities, a basic description of various port models is required to aid our understanding of the differences (see Figure 4).

Figure 4: Logistics city and a basic port model



Source: UNESCAP, 2005:17.

The historical port model is concerned with the regional demand for importing and exporting goods. This port is well known as the traditional import/export port. However, the increased complexity of international trade, in combination with the increasingly sophisticated demands of port customers and therefore the increased requirements of multinational industries that are passed on to logistics services (Abrahamsson et al., 2003), lead to the inevitable progression towards transhipment ports, as part of the hub-and-spoke system, and lastly towards logistics centre ports. The point of intersection of the three port models, which includes value-added business services and social aspects, can be seen as generating the logistics city concept.

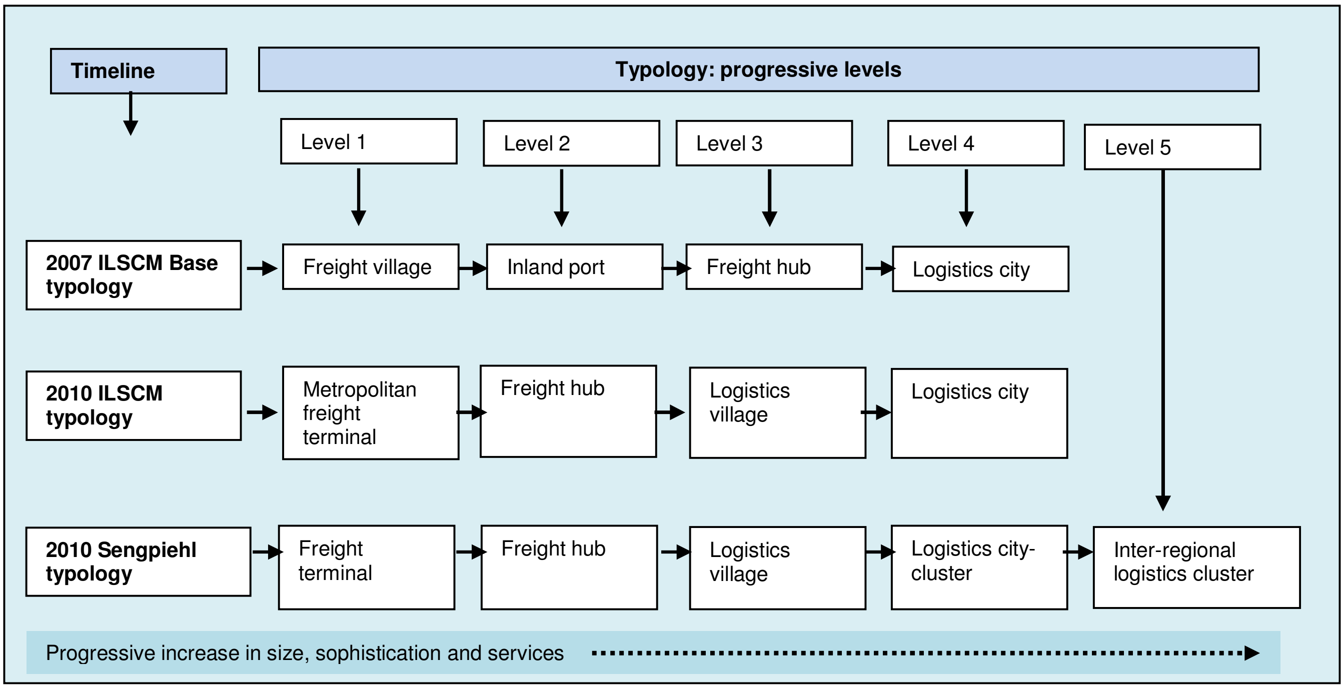
According to Sengpiehl et al. (2008a), two main types of logistics cities have emerged that are naturally linked to their associated gateways. First, there is an origin/destination city that includes so-called ‘export platforms’ and/or ‘import platforms’. Second, there is the transit-type logistics city environment, which represents the hub function as its main driver. It must be noted that the two types commonly coexist. Sengpiehl (2008a) contends that one of these will represent the main function of the logistics city and its associated gateways.

3.5.6 Further development of the base typology

The base typology developed by the ILSCM in 2007 did not remain static, and some changes were made to the typology in later research. An analysis of this evolution reveals that it mostly involved a change in terminology for each level, probably to attempt to avoid possibly confusing terms.

Figure 5 reflects the progressive development of the logistics city typology since its inception in about 2007. The progression is shown in three timelines, namely the original 2007 ILSCM typology (2007a) as discussed in the preceding section, followed by the 2010 ILSCM typology as adapted from the base typology (ILSCM, 2010), and then the latest typology developed by Sengpiehl (2010).

Figure 5: Progressive development of the logistics centre typology



According to the model developed by Sengpiehl (2010), the progression between the levels is as follows: Simple activities such as transhipment, transport and storage operations present at the freight terminal (the same level as the freight village of the 2007 ILSCM typology) increase over time to include freight consolidation and distribution functions. The facility then progresses to a freight hub, which would include the functionality of the inland port of the 2007 base typology. The logistics village, which integrates both freight villages and inland ports (as discussed in sections 3.5.3 and 3.5.4), have further logistics activities such as light assembly, customising and supply-chain management activities (Sengpiehl, 2010). These also include supporting value-add business services that create potential advantages for the logistics industry. The physical boundaries constitute one of the core transition factors between these three progressions and the logistics city (specifically the logistics city-cluster and inter-regional logistics cluster). While the first three progressions have clear physical boundaries, the logistics city-cluster and the inter-regional logistics cluster are more diffuse, having planning boundaries that include multiple, geographically bounded logistics nuclei (as illustrated in Figure 2). Both are embedded in urban constructs and, additionally, the size and quantity of their logistics infrastructure are superior, this resulting in massive networks. The distinguishing factors between these two are their geographical size and the number of logistics nuclei and urban constructs. Whereas logistics city-clusters are associated with one particular metropolitan area, an inter-regional logistics cluster can include various metropolitan areas and can also cross national borders (Sengpiehl, 2010).

3.5.7 Conclusions on the logistics centre typology

In Table 3, the core characteristics of the typology discussed above are presented in more detail in terms of description, the typical infrastructure required and also the services offered.

Table 3: Core characteristics of the logistics centre typology

Typology	General description	Infrastructure	Services
Freight terminal	Place equipped for the transhipment and storage of transport units. Nucleus for agglomeration economies (as described by the NEG) derived from localisation, where the benefits are derived from the consolidation of freight-intensive activities. Freight Terminals provide a facility for freight collection and distribution to local customers.	Truck loading/unloading bay. Platform for loading and unloading containers and freight to and from trains Container yard for temporary storage of containers, for loading and for container transhipment.?? Pallet-building area for building pallets and for shrink-wrapping Bulk-breaking area – places where break-bulk cargo is handled and transferred Cranes, forklifts, trucks (for loading, unloading and movement of freight, containers, cartons, pallets, etc. within the terminal) Customs administration office, duty/tariff payment processing centre Quarantine and inspection centre	Loading/unloading, Less-than-truckload (LTL) management. Freight receipting Last-mile despatch Freight tracking within terminal Container management (storage, tracking, inventory management and repair) Containerisation and bulk breaking Security Facility operations, such as crane operations, forklift, handling of freight vessel notifications Customs and quarantine services
Freight hub	A node used for the collection, sorting, transhipment and distribution of freight for a particular area, including at least one freight terminal. Provides value-added services such as bulk-breaking, and pick-and-pack. Distinguished from a freight terminal by capability for freight consolidation and deconsolidation. Is connected to the freight terminal through infrastructure that supports the use of specialised freight moving equipment. Has intermodal capability by virtue of its association with the freight terminal. A freight hub can also have international links (via customs services) through its association with a freight terminal that deals with international freight.	Warehouse for short-term storage of freight to enable freight pooling and freight consolidation/deconsolidation Packaging area for consolidation of small items and for shrink-wrapping Bonded warehouse	Freight consolidation (operations) Freight deconsolidation Freight pooling: temporary holding of freight for consolidation in the very near future Freight sorting to sort out the freight according to types, destinations or delivery times, etc., so that consolidation or despatching operations can be carried out Bonded warehousing
Logistics village	A logistics village is a grouping of independent companies and bodies that deal with freight transport (for example, freight forwarders, shippers, transport operators and customs) and accompanying services (for example, storage, maintenance and repair). The functional difference between a logistics village and a freight hub is the attraction of industrialisation economies that generate benefits in terms of savings and cost reductions that result from spatial concentration of industrial activities. Benefits are derived from the joint utilisation of local industrial infrastructure and close proximity to suppliers or customers.	The infrastructure in a logistics village not only needs to support the logistics operations, but also requires infrastructure to support surrounding industries and includes: Export/import agent administration offices Logistics consultancy companies' office/branch Professional logistics services providers' offices/branches Logistics insurance companies' offices/branches Call centre IT infrastructure development Industry related infrastructure such as technology precincts and industrial parks	Progressive services provide focus on fundamental logistics services, such as: Export services/import services (such as freight forwarding) Customs clearance Pre-clearance of customer goods Regulatory compliance services for both exporters and importers Customs relationship management Managed regulatory compliance services Preparation of bills of lading, commercial invoices, packing lists, export declarations, etc. for export shipments Duty refunds Professional logistics services

Typology	General description	Infrastructure	Services
			Logistics consultancy Supplier management Provide contract and rate management Supply chain coordination involving transportation, stock control, warehousing, and monitoring the flow of goods, materials and information Turnkey logistics services for highly complex projects Supply-chain security Risk management Logistics insurance, IT services (call-centre management, software, IT infrastructure services) Industry (for example biomedical, chemicals, electrical/electronics, environmental engineering, food and beverage, furniture, packaging, precision engineering, printing, textile and apparel, transport engineering, metrology)
Logistics city	A compact, logistics-intensive industrial development, within a logistics-friendly precinct, served by efficient, high-capacity freight transport links. Aims to reduce road dependency in especially metropolitan areas and provides a wide choice of logistics services, business services, civic amenities and jobs, focusing on appropriate urban design and freight-transport applications, and appropriate opportunities for new land-use mixes. Distinguishing functional characteristic of a logistics city is that it provides benefits derived from the agglomeration of population – namely common infrastructures (such as utilities or public transit or education), the availability and diversity of the workforce and market size.	Commercial infrastructure (such as a central business district) Social infrastructure Urban/transit city (public transport, town planning, environmental infrastructure, residential infrastructure and development (government and private) and social services Health services (government and private) incl. Hospitals, clinics Peripheral (entertainment, recreation, hotels, Restaurants, shopping centres) Education incl. kindergartens, schools, universities, child care centres Basic infrastructure (government and private) incl. energy, telecommunication/information, water	In addition to the above, also provides: Merchant banking General corporate lending Asset-based and project finance Financing of infrastructure Public-private partnerships Securitisation of receivables Hedging instruments Facilitation of access to capital markets Education (government and private) Urban planning services Project management Town planning Environmental services Residential Health services (government and private) incl. emergency services (police and ambulance) / defence infrastructure services (government and private) incl. energy (electricity and gas), telecommunication/information, water, road, rail, sea, air Peripheral services (entertainment, recreation, hospitality, tourism, retail, residential development
Inter-regional Logistics Clusters	Similar to the logistics city, but where the logistics city (or to use Sengpiehl's full terminology of the logistic city-cluster) is associated with one particular metropolitan area, the 'Inter-regional logistics cluster' can include various metropolitan areas and can also cross national borders		

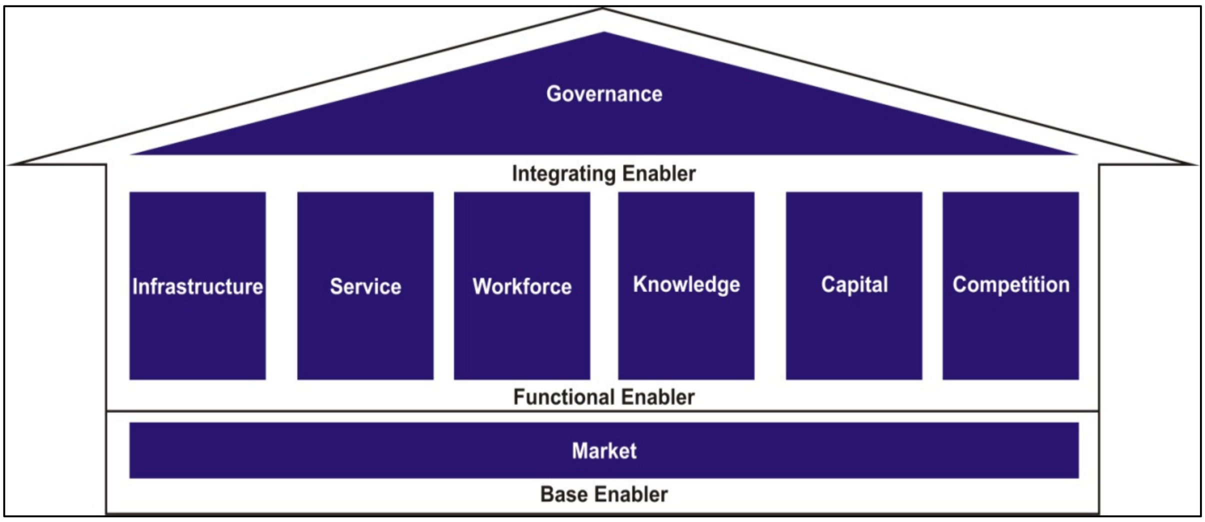
Source: Adapted from ILSCM, 2010; Sengpiehl, 2010.

In order for a logistics city to develop, there must be a strong foundation, which is referred to in the conceptual map as *enablers* (Sengpiehl et al., 2008a). These enablers have been identified as important determinants in the development of a logistics city.

3.6 Critical logistics cities enablers

Originally, the 2007 ILSCM (2007a) typology – described in the preceding section – made provision for only three critical enablers, namely the consolidation of the geographic dispersion of activities that connect industry to the main logistics centres, enhanced professional and business services and, lastly, increased transport infrastructure capacity. However, the latest research undertaken by Sengpiehl (2010)[5] expands the original mix to eight enablers in total. As shown in Figure 6 below, he distinguishes between three main categories of enablers, for example a base enabler, six functional enablers and one integrating enabler.

Figure 6: Critical enablers of a logistics city



Source: Sengpiehl, 2010:115.

These enablers will now be discussed in more detail.

5 The section on the logistic city enablers has been compiled mainly from the research undertaken by Sengpiehl (2010). This research is, to the best of my knowledge, the first on the enablers of logistics cities.

3.6.1 Base enabler

The market forms the base enabler, as economic activity cannot take place without a market environment. In Sengpiehl's 2010 classification, logistics cities are associated with densely populated metropolitan areas that have an inherited demand for logistics activities. In the original conceptualisation though, the importance of proximate demand was appreciated, but Sengpiehl (2010), in his research found that demand, since it is also associated with international locations, should not only be defined in terms of local or regional areas, but also in terms of international areas. Given that this study focuses on logistics cities in peripheral areas, this finding is of particular significance in that it indicates that a lack of proximate demand does not necessarily preclude the development of a logistics centre in such areas. This finding of Sengpiehl's was also confirmed during the study visit to Melbourne.

The latest research indicates that markets' demand for operational logistics activities is indisputably the rationale for the development of a logistics city (Sengpiehl, 2010). Markets are generally perceived as activities that generate the flow of commodities and value-add activities handled by logistics. In addition, market segmentation is an important factor in that the different market segments and their commodities impose different demand specifications on the logistics activities. A good example is the differences between the manufacturing and retail food markets. For example, demand created by the retail food sector must be consistently and continuously be monitored because of the short turnover time required for perishable and high-demand goods. While there are often less demanding physical transport issues involved in manufacturing markets, there are similar scheduling pressures where companies work on a 'just-in-time' (JIT) or 'just-in-sequence' (JIS) basis. Any interruption to supply will seriously jeopardise logistics contracts, which, in the end, will have a negative impact on the cluster. Indeed, both the time it takes to deliver the logistics services and the window of opportunity for serving the markets are imposed by the particular demand conditions of the commodities. Consequently, the infrastructure and services of a logistics city must be ready to cope with a wide range of the market's commodities.

The nature of the commodities will intimately influence the setup and the quality of the functional enablers, such as the logistics and ITC infrastructure or the logistics services (Sengpiehl, 2010). Important here is that although there are significant differences between the demands of the various market sectors and their commodities, there will always be the need for reliable logistics services. According to both basic cluster theory and agglomeration economics, it is easy to deduce that logistics cities will naturally appear in locations and regions that have strong markets. Sengpiehl (2010) indeed argues that proximate markets and the logistics city have a symbiotic relationship. While the logistics activities are enabled by the demands of the local and regional markets, these logistics activities strengthen the market segments. Hence, a well-designed logistics system is not only able to provide efficient services, but it also attracts companies from the market segments to locate in close proximity. This is an additional driver for infrastructure development, since it provides a solid base for initial investments. In this context, the market segments perceive logistics services and related infrastructure as a competitive weapon to increase their business activities. The logistics city concept is therefore regarded as a strategy to increase the attractiveness of local and regional markets (Sengpiehl, 2008a; 2010). This is of particular relevance to logistics cities in peripheral areas in that it recognises the possibility of using the logistics city concept as a strategy to boost local and regional markets, thereby not limiting the concept only to a reactive mechanism.

Despite the importance of proximate markets and their symbiotic relationship with logistics, every cluster also has a profound international role because of globalisation. Indeed, some efficient logistics cities, such as Singapore and Dubai, are mainly driven by international purposes, this indicating that their markets are predominantly global rather than simply local or regional.

Sengpiehl (2010) argues that a logistics city needs to be developed to serve as a global hub by connecting to a range of international markets. While this will allow regional economic growth, it also increases the demand size for a cluster, which is essential for the efficient implementation and performance of the functional enablers. In this context, governments attempt to increase market size through implementing favourable trade policies, import/export regulations and establishing specialised trading zones. Authorities further act as an early local demand source to stimulate the establishment of new logistics strategies or technologies.

3.6.2 Functional enablers

In this section, the six functional enablers of a logistics city are discussed in more detail.

Infrastructure enabler

At the outset of the academic development of the logistics city concept it was recognised that infrastructure (physical, financial and information technology) would play an important role in the development of the concept (Sengpiehl et al., 2008a; Toh et al., 2008). International gateways – such as seaports, airports and inland ports, and their logistics facilities – are crucial towards participation in the global and regional transport and distribution arena. The preliminary conceptualisation of the logistics city concept (Sengpiehl et al., 2008a) identified the importance of connectivity to the logistics city.

The efficient movement of goods to and from markets requires streamlined physical connectivity, which translates into infrastructure designed for logistics purposes. Trade gateways, having international, regional and local functionalities, act as consolidation and deconsolidation hubs, and, to be competitive, sophisticated transport infrastructure is required. Notwithstanding the fact that road connectivity is an essential part of any cluster, the notion of multimodality has gained increasing importance within recent years as a result of the growing emphasis on sustainability (Sengpiehl, 2010).

Sengpiehl (2010) feels strongly that the early recognition of a potentially dominant international transport mode, based on certain geographical factors, must be embedded in the core logistics infrastructure. In this context, these are the primary elements of the logistics infrastructure that handle high volumes of global and regional markets. However, there are also secondary infrastructural components for smaller regional and local trade. The infrastructure focus has of late seemingly shifted towards the importance of contiguous secondary infrastructure linking efficiently to the primary connectivity

(Sengpiehl, 2010). Congestion within the secondary infrastructure is currently one of the critical challenges facing the overall efficiency of logistics city-clusters.

The quality of logistics infrastructure, too, has been identified as a critical notion (Sengpiehl, 2010; Toh et al., 2008). The quality of the logistics infrastructure is determined by how robustly and reliably it connects on the international, regional and local levels. This can be gauged not only by the quantity and excellence of the infrastructure components, but also by the efficiency of the service operators.

Land allocation for the creation and extension of logistics infrastructure is a key element of this enabler. The ideal situation of spatial allocation for logistics infrastructure can be seen in an environment that has few competing urban constructs, which, however, is not common among logistics city-clusters in that these are situated in urban areas. It may be easier to find land for logistics infrastructure in less densely populated areas. Generally, peripheral areas do not suffer from a shortage of suitable land, geography permitting, of course. Scarcity of land, high growth rates and lengthy infrastructure implementation times can constrain existing logistics infrastructure and inhibit further growth of the system. However, it can also force innovations with a view to increasing the utilisation of existing infrastructure capacity (Sengpiehl, 2010).

In line with progress and the latest trends in logistics management, logistics infrastructure has to be complemented by appropriate physical ICT infrastructure and its virtual elements to ensure efficient logistics operation (Sengpiehl, 2010). Some authors argue that investment in ICT could be the main differentiator between cutting-edge logistics firms and average ones (Bowersox et al., 1989; Groznik, 2008; Langley, 1986; Lemoine and Dagnaes, 2003; Parsons, 1983; Porter, 1985; Toh et al., 2008) while Srour et al. (2008) argue that ICT increases the competitiveness of trade nodes. The provision of physical components is both costly and time consuming, but it is the essential base of the virtual component that is driven by an integrated information platform connecting all associated stakeholders.

Service enabler

Although there is a lack of an indisputable understanding that defines value-add as regards logistics, it is generally agreed that the intensity levels can be segmented into lower and higher logistics value-add activities (Sengpiehl, 2010). Transhipment, transport and simple storage / warehouse operations are seen as lower value-add activities. They commonly trigger and define the character of the higher logistics value-add services and supporting activities. Among the higher value-add services are light assembly, customising, quality control and packaging activities executed in warehouses or distribution centres. These have a stronger linkage to the import of goods and are located in close proximity to the final market demands to enable speedier response times (Sengpiehl, 2010). Typically, supply-chain management and logistics head office activities are part of this segment. They may not necessarily have a direct linkage to a gateway or transport function, but rather to other functional enablers such as social infrastructure.

Given the increased complexity and importance of logistics, its operations are being outsourced from the market segments to entities that focus purely on single or multiple logistics services. This is generally to achieve economic advantages such as lower costs. In the context of logistics cities, both pure logistics service providers (so-called 3PL or Third-party logistics providers[6]) and in-house logistics activities are seen as the core activities.

The latest research done by Sengpiehl (2010) intimates that all types of activities demanded by the logistics services can be categorised as supporting activities that enable efficient overall operations. These consist of a variety of professional business and technical services. Although, the establishment of supporting services in close proximity to logistics services is common, it needs to be ensured that they are accessible and compatible. The concentration of logistics and their supporting activities will provide

[6] A third-party logistics firm is a firm that provides outsourced or 'third-party' logistics services to companies for some portion or all of their supply-chain management functions. 3PL typically specialise in integrated warehousing and transportation services that can be scaled and customised to customer needs based on market conditions, demand and the delivery service requirements of their products and materials (Green et al., 2008).

agglomeration benefits, which are further strengthened by constructs such as social infrastructures.

Workforce enabler

The workforce can be divided into unskilled, semi-skilled and highly skilled segments, all of which require education and training specifically aligned to their tasks. Currently, the major employment group in logistics is the unskilled or semi-skilled workforce (Sengpiehl, 2010). However, there is an ongoing shift in the labour tradition that is introducing a more skilled workforce. This shift is perceived to be relatively slow and not as strong as in other sectors (Sengpiehl, 2010).

Logistics cities co-exist in thriving competitive service-oriented areas and face challenges in respect of attracting an appropriate workforce. The scarcity in the unskilled/semi-skilled sector is commonly associated with the poor reputation of the logistics sector, especially when one considers the competitive environment of attractive white-collar service jobs. The scarcity of a highly skilled workforce is mainly linked to an unattractive quality of life and to the lack of appropriate education (Sengpiehl, 2010). In peripheral areas, however, there is generally an abundance of unskilled and semi-skilled workers. Yet it may be more difficult to recruit highly skilled workers in these areas.

There are various strategies to tackle the imbalance apparent in the workforce. The negative image of the workforce can be addressed by marketing tools that should be complemented by education and career opportunities. Hence, to reduce the immediate lack of a suitable workforce and to ensure a sustainable workforce in the future, the provision of education and training facilities for both workforce segments is critical (Sengpiehl, 2010). The provision of the appropriate social infrastructure could also assist towards reducing workforce attrition.

Knowledge enabler

Historically, logistics emerged from complex military systems in which logistics is referred to as the timely provision of material required for all synchronous phases of an operation (Sengpiehl, 2010). Logistics is now adopted in industry and its implication of timely provision of services is still a key attribute. However, because logistics as an industry sector does not have a long history, systematic knowledge generation through tertiary education and dedicated research activities has only emerged in recent decades.

Sengpiehl (2010) contends that despite the fact that service-oriented businesses generally have lower innovation intensity and because logistics innovation is nowadays still somewhat contested, the primacy of continual knowledge generation is growing in importance. Hence, logistics innovation centres focusing on the technical and the economic/management sciences have been established. Although there are clear benefits attached to knowledge creation (for example cost savings or better service quality), it is perceived that some research outcomes are not practical enough to permit immediate implementation.

Interest in supply-chain innovation by a single private stakeholder can be limited because of the dispersed benefits along the chain and only marginal internal gains. Although single private stakeholders may have limited interest, they are the main impetus for the development of research centres (Sengpiehl, 2010). The public sector plays an important role by supporting the establishment of research platforms. The emergence of publicly driven innovation centres generally occurs in close proximity to industry demand, because of the faster knowledge exchange that stimulates innovations and their implementation. It has further emerged that major global logistics corporations have started to develop dedicated research departments and that they support publicly driven research centres (Sengpiehl, 2010).

The fact that both industry and public institutions are involved in logistics research underscores the logic of collaboration. The various benefits to be derived from collaboration (for example efficient deployment of resources, acceptance of innovations) are enabled by shared responsibility and the combination of individual strengths. Both internal and cross-sectoral collaboration occur in logistics city-clusters and have resulted in many viable innovations. However, it needs considerably more goodwill from all stakeholders to share and create knowledge that might not benefit each equally (Sengpiehl, 2010).

Capital enabler

Private participation in the infrastructure investments have been widely discussed, particularly in the form of private-public partnerships. In this regard, a user-pay mechanism has been introduced. An example of this is the German 'Maut' system that implemented in 2005 (Sengpiehl et al., 2008a). On all the motorways (Autobahn) and also some of the high-frequency freight-used federal highways, mandatory toll is paid by freight vehicles above 12 tonnes. This toll is based on the driven distance, the number of axles and the applicable emission category (Sengpiehl, 2010). However, transport infrastructural excellence on its own does not mean efficient connectivity, and, further, while physical transport infrastructure is seen as a necessity towards connectivity it is insufficient only to be considered as contributing to a logistics city. The physical flow has to be complemented by the information flow that is provided by appropriate information and communication infrastructure. Singapore is developing a trade-integrated information platform (one-stop platform) that will bring together the different systems to enable seamless information transfer, supporting the already high-quality existing physical infrastructure (Toh et al., 2008).

In his research, Sengpiehl (2010) differentiates between sources of public and private capital. Favourable accessibility to and conditions for capital for logistics operations are important factors in the successful development of a logistics city. Although accessibility to capital for logistics is not seen to be as critical as that for other sectors, the dynamic and diverse character of the logistics industry prefers tailored solutions. Sengpiehl (2010) further found that benefits from favourable capital conditions for particular logistics activities have positive flow-on effects to other logistics services. Whereas the public sector can influence the availability of capital indirectly through regulations or by direct financial support, it is the role of the private sector to provide direct capital to finance the elements of logistics activities. The increasing cost and complexity of modern systems mean that even the huge budgets available to governments are no longer capable of meeting the increasing pressure for upgrading and extending existing systems.

Capital for investment in infrastructure is commonly provided by the public sector. Hence, authorities with good access to capital are able to meet current and future infrastructure needs, which give them a competitive advantage. However, the endowment of capital for infrastructure development is challenged by the fact that capital demand is outweighed by supply (Sengpiehl, 2010). Consequently, there are resource-allocation conflicts that lead to private-sector participation in infrastructure investments. Private involvement through mechanisms such as public-private-partnerships helps to increase the financial capacity with which to enhance infrastructure capacity.

Sengpiehl (2010) notes that while private involvement can have negative implications for competitive positions – since paying for the use of infrastructure can potentially decrease the attractiveness of a location – the provision of sophisticated infrastructure due to direct capital allocation can be advantageous.

Competition enabler

In line with cluster theory, competition has positive effects for logistics cities. It is perceived as stimulating efficient logistics operations and catalysing the rapid adoption of new practices in response to client demand, which in turn leads to increased innovation and the introduction of competitive prices (Sengpiehl, 2010). It is important from an economic point of view to prevent monopolistic or oligopolistic structures, since they have a flow-on effect to other logistics services. In this context, it seems that the other logistics activities do need a smaller critical market size and therefore have lower economic entry barriers. This allows for multiple services of the same kind, thus providing healthy competition (Sengpiehl, 2010). It should be borne in mind that the higher the value-add nature of services, the more skills are needed. This will increase entry barriers, especially in peripheral areas.

Intergateway competition is commonly associated with a trade corridor and its quality of connecting to the intended markets (Sengpiehl, 2010). Quality is perceived to mean lower costs and shorter transport times, and if those are comparable, it is very likely that intergateway competition will occur. However, the quality factor depends strongly on the commodity; therefore, a trade gateway can have superior connectivity for one commodity, but not for others.

3.6.3 Integrating enabler

Any cluster consists of many different stakeholders that have individual aims and requirements. However, it is crucial that the efforts of the stakeholders be aligned so as to enable holistic development of the cluster (Sengpiehl, 2010; Toh et al., 2008). Sengpiehl (2010) regards the governance enabler as an integrating platform that informs and guides all stakeholders in a collaborative fashion to achieve values that benefit the cluster as an integrated system. Toh et al. (2008) regard governance to be a stabilising factor that allows the business environment to prosper.

What all logistics cities have in common is that separate public authorities and private stakeholders are involved. If these parties fail to act in a collaborative environment and align their activities and instrumentalities, no wider benefits will accrue to the system as a result of individual divergent objectives and motivations (Sengpiehl, 2010). For example, an authority that invests only in road infrastructure will not consider an optimised system that reduces congestion and atmospheric pollution. In contrast, authorities that also take rail or ICT policies into consideration, can provide better utilisation of the existing infrastructure and reduce pollution and cost. The main implication here is that a governing body or agency, one that incorporates public authorities and the major private stakeholder groups of a logistics city, is perceived to be as an important enabling factor. Sengpiehl's research (2010) showed that a governing body that ensures effective coordination of the logistics city-cluster as a system will enable the stakeholders, whether private or public, to invest and participate with confidence.

Collaborative governance, seen as the coordination of all the associated stakeholders, can therefore increase efficiency within a logistics city by reducing duplicated and opposing activities and also a lack of accountability regarding developments. According to Sengpiehl (2010), the governance body needs to be independent from any single stakeholder but should take into consideration the strengths of all stakeholders.

The governance body is thus perceived as a platform that conveys collaboration and leaves the decision making and the developmental processes to the stakeholders. A significant postulate for the existence and successful operation of a governance structure is the commitment and trust of all stakeholders. Additionally, the governance body's aims and operation need to be built on a consensual basis, and existing decision-making structures cannot be ignored. It further needs to be appreciated that the adoption of a specific governance model will be dependent on the political system and the values and norms of the respective region.

Sengpiehl (2010) argues that cluster governance is commonly perceived as being enforced by a governing body that should have oversight and the overarching responsibility as a mediator for promoting and developing the cluster holistically. This agency should be clearly detached from all relevant stakeholders, but without losing sight of its integrative function. Research by Sengpiehl (2010) has identified six major tasks for such a governing body. The governing body should develop an efficient network platform for all stakeholders both to exchange knowledge and to coordinate the work of the various government authorities and of the logistics industry so as to ensure appropriate infrastructure development. It is also the task of the governing body to identify the regulatory impediments and needs of the logistics industry and to work with the relevant stakeholder to remove these. A very important function of the governing body is one of marketing the cluster. This is normally achieved by building on the competitive advantage of the cluster. In addition, the governing body should strive for international, regional and local interconnectedness and, lastly, strive for knowledge creation in the logistics sector and also education of the workforce.

3.6.4 Concluding remarks on the logistics city enablers

The logistics city concept has been developed around three main enabling categories. The first of these is the base enabler, which is the 'market' category that creates the demand for establishing a logistics-driven system. Second are the six functional enablers (infrastructure, service, workforce, knowledge, capital and competition) that are the core elements of the logistics city as determined by the particular nature of the base enabler. Third, is the integrating enabler of governance that has the power to transform the logistics city into a holistic system by aligning objectives associated with the functional and base enablers.

The logistics city is therefore a complex system with a dynamic character that results from the mutual interdependency of the enablers. Hence, if one enabler is altered in terms of its properties and characteristics, this will change the course of other enablers. For instance, the lack of a skilled workforce (workforce enabler) will reduce the quality and efficiency of the logistics services (service enabler). In turn, low levels of rivalry (competition enabler) will decrease the level of innovation (knowledge enabler) but also the quality of services (service enabler). As a result of these relationships, the enablers have synergies, which, if strategically applied, have the potential to mould a mutually beneficial system.

3.7 The logistics city concept and peripheral areas

Owing to the focus on Melbourne as a metropolitan city and therefore on the logistics city as the highest level of the progression, the research undertaken by Sengpiehl (2010) does not address the level of intensity (or indeed the presence at all) of any of the enablers prevalent in any of the lesser clusters. Nor is the actual interlevel progression of clusters in terms of detailed functionality researched, apart, that is, from a generic theoretical perspective. This means that the applicability of the concept in terms of any of its lower levels cannot be deduced from Sengpiehl's research alone.

In order to use the concept of a logistics city as a planning framework in peripheral areas, the progressive levels of a logistics city need to be re-examined and adapted where necessary. This is occasioned by the fact that it would seem that the application of the logistics city concept in a metropolitan area is mostly reactive. This means that in a proactive application (as a planning overlay), especially in a peripheral area, the basic enablers (such as the market or workforce) may not necessarily be in place, thus necessitating a re-examination, and possible adaptation, of the concept for application in a peripheral area.

The proposed re-examination and adaptation have been based on three main premises:

Premise 1: Based on the literature as discussed in this chapter, it is indeed possible for an area to develop from Level 1 (freight terminal) to a fully fledged logistics city, while conceding that it may take many decades to complete such progression.

Premise 2: The enablers proposed by Sengpiehl (2010) are accepted as being applicable to all cluster levels, albeit in increasing levels of intensity.

Premise 3: It is recognised that a functional freight terminal of some kind may already exist in the relevant peripheral area, even though it may at its existing level of functionality not necessarily be operating at a level that allows it to be classified as a freight terminal (Level 1) in terms of the adopted typology.

Based on the above three premises and using the functionality attribute of logistics centres (discussed in Section 3.3.2) as the main progression determinant, an attempt has been made to adapt the logistics city typology to peripheral areas. Table 4 reflects the adapted logistics cluster progression based on Sengpiehl's 2010 classification.

Table 4: Progression of logistics clusters: adapted for peripheral areas

Progression: Logistic cities for peripheral areas				
Freight focus area	**Freight terminal**	**Freight hub**	**Logistic Village**	**Logistic City**
Basic terminal facilities, operational, spare capacity; Start of logistics activities	Terminal operations, intermodal operations, customs	Logistics services – freight consolidation/ deconsolidation	Industrial value-adding and intensive freight and logistics activities (for example manufacturing, warehousing, distribution)	Non-freight and logistics activities (for example head offices, commercial, retail, education, residential) that have a strong functional interaction with the logistics village.
<25Ha	25Ha	50Ha	700Ha	5-10km radius

The freight focus area (FFA) had to be introduced to provide a 'start-up' level in areas lacking significant existing logistics/freight activity. An FFA would typically be established at suitable peripherally located airports such as UIA, Bram Fischer International Airport (previously Bloemfontein International Airport) or even Kimberley International Airport. The only prerequisite is that basic terminal facilities and infrastructure should be available. Existing freight and logistics activity will be very limited in extent. As no literature could be found on the phases leading up to or pre-empting a cluster development, both the term FFA and the likely infrastructure and extent of activities have been developed *a priori.* This phase should be regarded as a phase leading up to the stage at which the facility develops into a freight terminal area, for example, a stage similar to a pre-terminal phase.

3.8 Conclusion

This chapter has indicated that connectivity between economies is provided by physical gateways or nodes that lead to the establishment of logistics centres. Through the forces of agglomeration and clustering (as discussed in Chapter Two) coupled to modern advances in trade, transport and information technology, these logistics centres have developed into facilities driven by freight and logistics processes in such a manner that the said facilities have become fundamental elements of local, national and international economies.

The chapter further revealed that the term *logistics centre* is used freely and that it means different things to different people, which often leads to confusion. Nevertheless, logistics centres all share common attributes such as geographical coverage, market conditions, functionality and management structures. *Logistics city* is another relatively new term in the global economy arena. Although freely used in the context of the Dubai Logistics City, for example, actual academic scrutiny and theory development only started circa 2007.

For the purposes of this study, the following typology (based on the most recent research by Sengpiehl in 2010) was adopted: freight terminal, freight hub, logistics village and logistics city. The logistics city concept has been developed around three main enabling categories, namely a base enabler, six functional enablers and an integrating enabler. The chapter closes with an adaptation of the typology of the logistic city concept to peripheral-area requirements by including a freight focus area as a start-up level before the freight terminal becomes fully functional.

In the next chapter, the transport and logistics environments are analysed in more detail in order to understand their possible roles in the development of peripheral areas within the context of the logistics city concept.

4 THE TRANSPORT AND LOGISTICS ENVIRONMENT

4.1 Introduction

In Chapter One, I argued that transport is the means whereby spatial inequality between production and consumption is overcome and the basic element of trade, movement of people and goods is met. The next two chapters alluded to transport and logistics and their importance in overcoming the spatial divide. In addition, transport is central to the process of globalisation (as discussed in Chapter Three) and, as such, forms a building block of clusters and nodes (hubs) as discussed in both Chapter Two and Chapter Three.

Given the central theme of this research, namely the issue of logistics, and specifically logistics hubs in peripheral areas, it is necessary to analyse the transport and logistics environments in more detail so as to understand their possible roles in the development of peripheral areas. The chapter starts out by giving general overviews of transport in both trade and the economy, specifically with regard to the developmental role of transport and the effects, on the economy, of investment in transport. This is followed by a discussion on transport modality and the role that the various modes play in freight distribution. Thereafter, the logistics environment is discussed in more detail by means of presenting profiles of general trends in logistics and the costs of logistics. The last section of this chapter analyses the air-cargo environment in more detail in terms of an analysis of the air-cargo industry, goods suitable for air freight and also the role players in the air-freight industry. This section is of particular importance towards understanding the opportunities and the limitations that logistics may have in the development of peripheral areas, particularly with regard to the air-freight sector.

4.2 Transport, trade and the economy

Transport, apart from being an industry in itself (aeroplane manufacturers, air-transport companies, car manufacturers), is also an economic factor in the production of goods and services. In addition to being the mechanism by means of which to overcome spatial inequality, it also contributes to economies of scale, facilitates geographical specialisation of regions, and adds value to economic activities (Rodrigue et al., 2006).

Whereas trade links spatially separated communities, transport is the technological means by which these links are established. It is well known that the development of the transport and logistics[7] sector is conducive to economic growth and development through its effect on production, consumption and trade. In addition, international trade could affect the transport and logistics sector because it contributes directly to a higher demand for transport services, thereby creating more opportunities for business expansion and investment (Brooks, 1994). These opportunities imply that the causal relationship between trade and the transport and logistics sector may be bi-directional (Fritsch and Prud'homme, 1997; Kessides, 1996) rather than only from the one to the other.

In many cases, transport is an important catalyst for opening up new opportunities in production, consumption and the external relationships of a country (DOT, 1984). This means that transport has a broader role in shaping development and the environment than merely its basic purpose of moving goods and people from one place to another (Eberts, 1999).

From the above discussions on transport, economic development and the role of transport in trade and overcoming spatial separation, and also the discussions in Chapter Two and Chapter Three pertaining to transport, the following three main elements of transport have been identified, namely transport investment, modality and logistics. Each of these components is of particular importance to this study and thus merits further investigation.

4.3 Transport investment

4.3.1 Generative effects of transport infrastructure investment

Freight-transportation enhancements that reduce the costs of moving goods to and from markets are critical to economic growth. This is because the movement of goods is what economists term a *factor input* in the production of goods. Much like labour and capital, transportation costs directly affect the price of goods and services and the profits of

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[7] According to the CSIR (2007:14), logistics is considered that part of the supply-chain process that deals with the transportation, warehousing, inventory carrying, and administration and management of goods between the point of production and the point of delivery to the final consumer. By definition, this excludes the costs of passenger transport and the costs of transport, storage, packaging, handling, etc. of mail and luggage, and also the storage and transport tasks involved in the production process.

producers. Consequently, investments that reduce the cost of moving goods to and from markets (via improvements in reliability, transit times, service levels, etc.) can help to increase and sustain economic growth. In effect, the efficiency and reliability of the freight-transportation system affect economic productivity and many economists would argue that productivity is the most important determinant of economic performance (ICF Consulting and HLB Decision-Economics, 2002).

According to Joynt (2004), macroeconomic studies by the World Bank indicate that investment in transport infrastructure promotes growth (and thereby development) through increasing the social return to private investment without crowding out other productive investment. An analysis of the World Bank transport projects points to the fact that the average economic rate of return on these projects is 22% (DOT, 1996:1). Although this figure is based on averages, it illustrates the economic importance of transport projects.

The literature amply supports the contention that investment in transport infrastructure – coupled with advances in ICT (as discussed in Chapter Three), transport modal technology (ships and aircraft), cargo handling and the tracking of shipments – lowers the costs of production and also the costs of exporting and importing (Alokan, 1995; Berndt and Hansson, 1992; Rietveld, 1989). Economies like those of Singapore and Hong Kong have grown rich partly because their past investments in superior transport have facilitated trade (Carruthers et al., 2003). Conversely, an economy like that of China continues to be driven by its exports that have brought substantial changes to the logistics network with new flows of raw materials, parts and final products (Lee and Rodrigue, 2006; Nguyen and Tongzon, 2010).

4.3.2 Economic impact of transport investment

The economic impact of any project (transport projects included) is generally measured by economic impacts of three kinds, namely direct, indirect and induced (DETR, 1999; Joynt, 2004; Weisbrod and Weisbrod, 1997).

Direct impacts are the immediate economic impacts of capital and operational expenditure required to build, operate and maintain any project (DETR, 1999). The direct economic impacts are thus the changes in local business activity occurring as a direct consequence of a transport project (Joynt, 2004). From a project perspective, direct impacts include the direct purchases made within the region by the project, the number of people employed, and the effects on the household incomes of those people (DETR, 1999). The size of a transport-infrastructure project will thus have a major influence on the extent of the direct economic impacts. For instance, it seems that a small transport-infrastructure project such as an airport-runway maintenance project will have little, if any, direct economic impacts, while a multi-billion Rand airport development such as the recently developed King Shaka International Airport would have significant direct economic impacts.

The *indirect economic impact* takes into account the fact that the supplying industries will also have to purchase more inputs, employ more labour and pay more wages (DETR, 1999). The supplying industries are those industries that supply construction materials and other resources to the construction companies. An airport-construction project, for example, creates a demand for stone, cement, bitumen and other construction materials such as steel, bricks, glazing and various construction plant-related items. Such items may be imported from other regions, but if the demand is sufficient, local businesses will acquire such materials, thereby stimulating local sales.

Induced effects take into account the fact that increased household income leads to an increase in household expenditure and to an increase in regional production (DETR, 1999). These are thus the further shifts regarding spending on food, clothing, shelter and other consumer goods and services that result from the change in terms of workers and the payroll of directly and indirectly affected businesses (Joynt, 2004).

Changes to the economy of a region that are a consequence of the construction of a transport project are known as *net economic impacts* (Joynt, 2004). The net economic impact is usually viewed as an expansion or contraction of the region's economy, which result from changes in a project or facility. It can therefore be concluded that the development of transport and logistics not only affects production and consumption directly, but it also creates many direct and indirect externalities, and involves large flows of expenditure, thereby stimulating growth through the multiplier effect (Gramlich, 1994; Kessides, 1996).

4.3.3 Economic impact of airports

The economic impact of airports on regions is of increasing public and policy interest because of the large capital investments entailed in airport construction and expansion, the possibly costly environmental impacts, and the negative externalities of airports (Appold and Kasarda, 2010). Furthermore, airports embody the interregional and international networking capacity of any region and especially of metropolitan regions (Nunn, 2005). Airports are considered to be a crucial ingredient in economic success in that they provide the means by which passengers and material are brought into and through a region (Debbage and Delk, 2001; Irwin and Kasarda, 1991).

Airport facilities, in and of themselves, have become centres of development that generate direct and indirect economic impacts on regional growth and development. Airports help create what Graham and Marvin (2001:357–358) term "logistical enclaves (which are defined as) spaces within which the precise and rapid shipment of goods, freight and people across the planet are coordinated, managed and synchronized between various transport modes, along with supportive information and energy exchanges". Thus, development on and around airports is thought to be a positive addition to local and regional economic development prospects (Nunn, 2005).

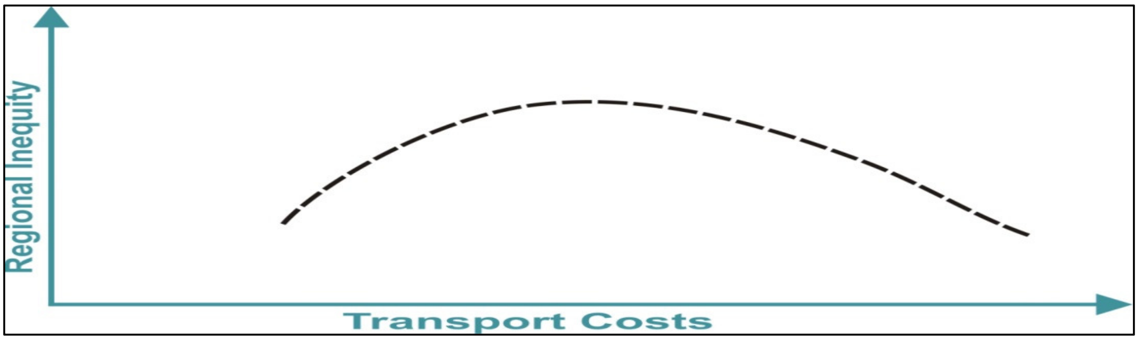
An additional factor here is the designation of various airports as hubs for the passenger and cargo operations of airline companies. This can multiply demand for airport services, and those regions in geographical locations better suited to efficient hub operations can develop an aviation-based advantage over other regions in less beneficial locations (Debbage and Delk, 2001).

4.3.4 Role of transport in the development of peripheral areas

According to classical and neoclassical location theory (as discussed in Chapter Two), a reduction in transport costs facilitates the location of production to where it is cheapest and goods are then transported to all markets from there. Yet a desire to reduce transport costs also facilitates concentration of production in one location so as to obtain economies of scale. The NEG (as discussed in Chapter Two) theorises that while the periphery has cheaper production costs (wages, land etc.), the core has a larger market and thus benefits from economies of scale (Krugman, 1991a). Within this framework, the key question is whether reducing transport costs between the core and the periphery allows the periphery to capitalise on its production-cost advantage or whether economies of scale will continue to predominate.

Venables and Gasiorek (1998) maintain that the impact of a transport improvement on the relative welfare of core and peripheral regions respectively depends on the initial level of such transport costs. From a position of very high transport costs, a reduction can initially lead to increases in regional inequalities as economies of scale in the core region overcome the initially prohibitive transport costs. However, further reductions in transport costs beyond a certain level would lead to the expected reduction in regional inequality, as the cost of transporting goods from the core to the periphery outweighs the gain to be derived from economies of scale. This suggests that there is an inverse U-shaped relationship between transport costs and regional inequalities, with transport cost reductions first increasing regional inequality and subsequently reducing it (see Figure 7). Transport improvements narrow output and wage differentials between the two regions only if the initial transport costs are not too high (Goodbody Consultants, n.d.).

Figure 7: Impact of transport cost reduction on regional development



Source: Goodbody Consultants, n.d.:22.

In the context of a core and a periphery region, the turning point of the 'U' occurs at a level where transport costs are considerably larger than those likely to be seen in interregional transport in developed economies (Venables and Gasiorek, 1998). The conclusion then is that regional inequalities between the core and the periphery can be reduced by transport improvements. However, care should be taken in planning and implementing transport-related infrastructure projects, especially regarding airport and air freight-related projects, so that the net effect of the reduction in transport cost results in actually reducing inequality.

Both economies of scale and transport costs, and also diseconomies of agglomeration are important in determining regional balance (Goodbody Consultants, n.d.). Where gains from economies of scale dominate transport costs, any reduction in transport costs may lead to a greater concentration of economic activity in larger core regions up to the point where diseconomies of agglomeration arise. The main constraints on the growth of cities arise from external costs associated with increased congestion and environmental degradation (Glaeser, 1998), which means that there is opportunity for peripheral areas where the costs associated with such negative externalities become higher than the cost of locating in peripheral areas.

It can broadly be concluded that where significant diseconomies of agglomeration have arisen, further improvements to already well-developed transport networks are likely to be to the benefit of peripheral regions. This is especially important in the case where

South Africa's major air-freight cargo hub is situated in the densely populated Gauteng Province with its associated diseconomy of agglomeration and congestion in that there may be strong benefits for a peripheral region such as the Northern Cape Province to offer a viable alternative at UIA.

4.4 Transport modality

Transport modality refers to the modes of transport used. Transportation modes are an essential component of transport systems as they are the basic technological means whereby spatial inequality is overcome. Traditionally, transport modes are grouped into three broad groups based on the medium they exploit, namely land, water or air.

4.4.1 Modal Characterictics

Each mode has its own requirements and features and is adapted to serve the specific demands of both freight and passenger traffic. As such, each mode is characterised by a set of technical, operational and commercial characteristics. These characteristics cause the various freight-transportation modes to have different capacities and levels of efficiency (see Table 5 for the likely capacities of various transport modes mirrored against a modern mode standard, namely a semi-trailer truck capable of transporting 26 tonnes of freight).

Table 5: Performance pomparison for selected freight modes

Mode (vehicle)	Capacity	Truck equivalency
Barge	1550 tonnes	57.7
Hopper car	100 tonnes	3.8
100-car train set	10 000 tonnes	384.6
Semi-trailer truck	26 tonnes	1
Panamax container ship[8]	5 000-tonne equivalent unit (TEU)[9]	2 116
Very large crude carrier	300 000 tonnes, which is equal to about 2 million barrels of oil	9 330
Boeing 747-400 Freighter configuration	124 tonnes	5

Source: Adapted from Rodrique et al., 2006:128.

While the truck is certainly the mode with the least capacity, it has a level of flexibility (speed and door-to-door capability) that is unmatched by rail, water and air transportation. As shown in Table 5, it takes about five semi-trailer trucks capable of transporting 26 tonnes of freight to fill the large Boeing 747-400 Freighter aeroplane.

4.4.2 Modal contribution to economic development

In recent years there has been a trend towards integrating the various modes through intermodality and linking the modes ever more closely into production and distribution activities (Rodrique et al., 2006). This means that each mode plays a specific role in different time periods of economic development. This is illustrated in Figure 8.

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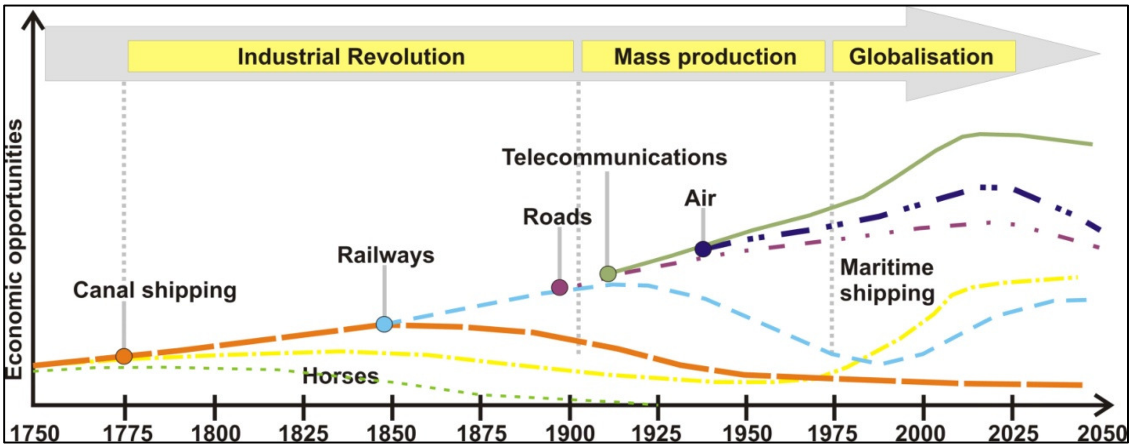
8 The term *panamax* refers to the maximum size of a container ship that is able to sail through the Panama Canal.

9 The twenty-foot equivalent unit (TEU) is an inexact unit of cargo capacity often used to describe the capacity of container ships and container terminals. It is based on the volume of a 20-foot-long (6.1 m) intermodal container, a standard-sized metal box that can be easily transferred between different modes of transportation, such as ships, trains and trucks.

Figure 8: Cumulative modal contribution to economic development



Source: Rodrique et al., 2006:85.

The above figure indicates that prior to the Industrial Revolution, economic opportunities were limited by the low capacity to move commodities over long distances, as most activities were localised in scale and scope. The Industrial Revolution unleashed greater economic opportunities, initially through the development of inland canal systems and steamships and then railway systems. Freight transportation expanded as production and consumption activities expanded and as new markets and resources became available.

The development of the mass production system at the beginning of the 20th century increasingly relied on the commercial opportunities introduced by road transportation, particularly the automobile. Later in the 20th century, globalisation became a reality that resulted in a synergy of maritime transportation, roadways, railways, air and telecommunications, all of which supported integrated transport systems and supply-chain management. Economic opportunities became global in scale and scope, particularly because of the capacity to maintain an intricate network of trade and transactions through transport systems. More recently, new opportunities arose with the convergence of ICT, thereby supporting a higher level of management of production, consumption and distribution. It is expected that such a process, building upon the advantages offered by other transportation modes, will account for a significant share of economic opportunities of the first half of the 21st century (Rodrique et al., 2006).

4.5 Transport logistics

4.5.1 Importance of logistics

The general perception is that while logistics is a necessary activity for any business, it has traditionally been regarded merely as a cost factor and therefore a non-value-adding activity. It now appears that this particular view of logistics as a non-value-adding activity has changed in recent years. As a consequence, there has been an increasing focus on logistics management and systems, and logistics has evolved to such an extent that it has become an essential factor for companies aiming to achieve a competitive advantage in the field (Abrahamsson et al., 2003; Rutner and Langley, 2000). The changing strategies of companies, which resulted in an increased focus on logistics costs and efficiency, imply development in the logistics concepts.

The growing flows of freight have been a fundamental component of contemporary changes in economic systems at the global, regional and local levels (Hesse and Rodrique, 2004). Apart from answering questions on the nature, origins and destinations of freight movements, it is also important to study the issue of how this freight is moving. New modes of production are concomitant with new modes of distribution, which brings forward the realm of logistics that is defined, in essence, by Hesse and Rodrique (2004:171) as the science of physical distribution. Logistics represents an entire system of space/time interdependencies and linked processes. The World Bank (2007:3) states the following regarding logistics: "The increase in global production sharing, the shortening of product life cycles, and the intensification of global competition all highlight logistics as a strategic source of competitive advantage".

4.5.2 Evolution of logistics

The exchange of goods is a constant feature of human economic activity and although logistics was initially applied to military operations, its most significant impact is being felt through the functions of production, distribution and consumption (Rodrigue and Slack, 2002). Logistics was once essential for the rise of the mercantile economy in medieval Europe (Braudel, 1982) and became a large-scale activity during the Industrial Revolution. A key element of logistics, namely the trade-off between transport and inventory costs, was formally recognised in economics at least as early as the mid-1880s (BTE, 2001). The origins of the modern logistics sector then go back to the emergence of capitalist economy and the development of specific modes of industrial production.

Contemporary production and distribution are no longer subject to single-firm activity, but are increasingly practised in networks of suppliers and subcontractors (Dicken and Thrift, 1992; Gertler, 1992; Hudson, 2001). The supply chain bundles together all this by means of information, communication, cooperation and by physical distribution (Bowersox et al., 2000; Hesse and Rodrique, 2004).

As was shown in Chapter Three, globalisation causes the spatial boundaries of the entire economy to expand, this implying more complex global economic integration, and an intricate network of global flows and hubs (Dicken, 1998; Held et al., 1999; Hesse and Rodrique, 2004; Knox and Agnew, 1998). Logistics thus developed against the background of long-term structural changes in the economy, with concomitant changes in technology and society affecting all the major industrialised countries (IMF, 2001). Technological change can therefore be regarded as the key determinant of change in logistics (Hesse, 2007).

These interrelated changes comprised sectoral and structural changes, involving mainly the rise of service economies, an increase in the share of goods with high value and low weight, consumerism and the upcoming hi-tech and knowledge-based sectors (Castells, 1996). The changes were further accelerated by new political frameworks that incorporated policies of deregulation and liberalisation. These policies were effective for the USA in the late 1970s and early 1980s and have also been effective for Europe since the introduction of the Single European Market in 1992 (Knowles and Hall, 1998). The policies are now also being adopted by many developing countries (Hesse and Rodrigue, 2004), seemingly with varied success.

Initially, logistics was an activity comprising the supplying, warehousing, production and distribution functions, with most of the functions being fairly independent from the others (Hesse and Rodrigue, 2004). Over time, as technological processes and transportation systems improved, production became increasingly fragmented, especially when firms began taking advantage of the new manufacturing opportunities in developing countries. Spatial fragmentation became a by-product of economies of scale in distribution. In the 1990s, with the convergence of logistics and information technologies, this principle was increasingly applied to the whole supply chain, and particularly to the function of distribution.

The modern techniques of supply-chain[10] management and the related emergence of the logistics industry are mainly characterised by four features (Hesse and Rodrigue, 2004). Firstly, a fundamental restructuring of goods merchandising occurred through the establishment of integrated supply chains with integrated freight-transport demand. Secondly, whereas transport was traditionally regarded as a tool for overcoming spatial separation, logistics is critical in terms of time. The logistics industry addresses this criticality by shifts towards vertical integration achieved mainly through subcontracting and outsourcing, which even includes the logistical function itself (Harvey, 1989).

The third main feature of modern supply-chain management practices has its origin in macroeconomic structural changes, which have led to demand-side oriented activities becoming much more predominant. While traditional delivery was primarily managed by the supply side, current supply chains are increasingly being managed by demand. The last main feature of modern supply-chain management is that of logistics services. These are becoming complex and time-sensitive to the point that many firms are now subcontracting parts of their supply-chain management to third-party logistics providers (Harvey, 1989). These providers benefit from economies of scale and scope by offering integrated solutions to many freight-distribution problems.

4.5.3 Logistics, trade and freight flows

International business has been undergoing a period of rapid transformation. Trends towards globalisation, integrated logistics and the development of ICT are all reshaping the world's trading patterns and consequently its physical trade flows.

[10] The term *supply chain* or *value chain* is a generic term describing the process integration of various commercial activities in order to convert raw materials into finished products and to convey these to the end-user.

Such restructuring is contributing to economic growth, better allocation of resources and more freedom of choice for consumers and also increased competition. In order to be internationally competitive, businesses are organising strategic worldwide networks that are able to deliver an efficient and high-quality response to demand from any segment of the world market (OECD, 2002). The efficient and integrated organisation of such activities is often referred to as global logistics or supply-chain management (SCM), which has become the core of global competitive power.

Modern advances in trade liberalisation, transport and information technology have given rise to the emergence of new business strategies (UNESCAP, 2005; Sengpiehl, 2010). Global companies now tend to concentrate production facilities in particular regions, while leaving business opportunities − such as customising and light manufacturing − in other regions where there are heterogeneous markets (Van der Lugt and De Langen, 2005). Consequently, business strategies such as centralised inventory, delayed configuration or light assembly, customising and quality control have emerged (Abrahamsson et al., 2003). It appears that these forces lead to a high concentration of logistics activities in the relatively few gateways or nodes that have good access to major markets (Notteboom and Rodrigue, 2009a).

One of the more obvious manifestations of logistics activities is the growth in freight transport due to the worldwide expansion of trade. In particular, the globalisation of industry − including planning, sourcing, manufacturing and marketing activities − has resulted in more complex trading and much more developed transport networks.

The traditional arrangement of goods flow included the processing of raw materials to manufacturers, with a storage function usually acting as a buffer. The flow continued via wholesaler and/or shipper to retailer, ending at the final customer. Delays were very common in all segments of this chain and accumulated as inventories in warehouses (Hesse and Rodrique, 2004).

Originally, there was a limited flow of information from the consumer to the supply chain. This procedure is now following a different route, mainly by eliminating one or more of the costly operations in the supply-chain organisation (Hesse and Rodrigue, 2004; Rodrique et al., 2006). Recent freight flows tend to have both lower volumes and higher frequency and often take place over longer distances (Hesse and Rodrigue, 2004). The magnitude of change is characterised by the growth of geographical areas of interaction, and by increases in the temporal flexibility of freight flows, both factors resulting in a rising amount of freight transport.

Against the background of the foregoing discussion on a basic understanding of the process of logistics within the transport environment, the following section turns to an overview of the latest international trends in logistics.

4.6 International trends in logistics

It is important to gain an understanding of the general international trends in logistics because these trends need to be taken into consideration when national policies and strategies are developed. In Chapter Five, the South African National Freight Logistics Strategy is mirrored against current international trends in logistics as discussed in this section.

4.6.1 General trends

The OECD has identified the following main trends in logistics and supply chains (OECD, 2002:11-13).

Restructuring of logistics systems

Manufacturers are restructuring their logistics systems by concentrating production and inventory capacity in fewer locations. This trend is in line with the NEG, as explained in Chapter Two, where it was noted that any particular spatial distribution of economic activity is based on forces that either discourage or encourage agglomeration (Bosker, 2008), and also on the concepts of agglomeration and clustering as explained in that chapter. Concentrating production capacity enables companies to maximise economies of scale in production at the expense both of making their logistics system more transport-intensive and of lengthening the lead-time to customers.

Inventory centralisation, which has been a long-term trend, is now occurring on a larger geographical scale. Companies have been able to enjoy the inventory cost savings, while they have minimised additional transport costs by geographically separating stockholding and break-bulk operations. In the process, the former has become more centralised while the latter remain decentralised.

<u>Realignment of supply chains</u>

In many sectors, companies have been concentrating on core competencies and on subcontracting non-core, ancillary activities to outside contractors. Vertical disintegration of production is adding extra links to the supply chain and increasing the transport intensity of the production process.

At the same time, companies have steadily expanded the geographical scale of their sourcing and distribution operations. Also, in order to overcome the tension between centralised production and product customisation, companies are centralising the core production of standard products, often in countries with low labour costs, and delaying their customisation until products reach their regional markets. The number of stock-keeping units is minimised to the point of customisation, thus minimising inventory risk and costs, and reducing lead-times.

An example of such supply-chain realignment is found in the computer-manufacturing industry, which has reformed its activities to take advantage of the globalisation of production networks so as to reduce costs. In order to respond flexibly to changes in demand while simultaneously wishing to avoid increases in inventories of finished products, the industry has created a global product network in which final assembly is placed as close as possible to the end markets.

In realigning supply chains, international transport is becoming increasingly concentrated at a smaller number of hub ports and airports in order to enjoy economies of scale.

Rescheduling of product flow

Product flow in the supply chain is becoming increasingly time-compressed. The lengthened supply chains are now under pressure to compress order lead-times (for example time elapsing from the placing of an order to the actual delivery of goods) in order to be competitive in a foreign market. Time compression of product flow can save inventory costs, enable companies to respond more rapidly to shorter life cycles of products and also to variations in demand, and so increase the reliability of delivery. One way of rescheduling freight movement is by operating nominated-day delivery to customers and introducing timed-delivery at factories.

Refinement of transport and warehousing management

Transport and warehousing management are refined by the optimal use of different modes of transport and by increasing the use of ICT, a trend that is also in line with both the NEG and globalisation, as explained in Chapter Two. For example, selective use of international transportation modes is now common in the personal computer industry, in which parts are transported either by air or by sea, depending on the degree of added value. Items with low added values are normally carried by sea in order to reduce transportation costs, whereas key parts with higher added values are selected according to demand shifts and transported by air immediately prior to assembly. This enables manufacturers to maintain the quality of the parts used in finished products, ensure consumer satisfaction, and at the same time eliminate the risk of declines in the price of product inventory.

Changes in product design

An increase in the complexity and sophistication of products will lead to more value being added per unit of weight, especially with products. Integrated product-design processes increasingly integrate logistics and transport into the early stages of product design.

Integration of logistics

As production activities extend globally, logistics will involve more material and information flows throughout a supply chain from sources to customers, which may extend beyond national borders. In restructuring supply chains, logistics need to be managed as an integrated process seeking to optimise these flows. If any of the firms involved in a particular supply chain optimise their logistics systems independently of other firms in that particular chain, the management of flows across the whole chain is likely to be suboptimal. Integrated logistics attempt to overcome this problem.

Companies can no longer afford to focus on supply-side efficiency alone; they need to use their business strategy to drive them towards integration of their demand and supply sides with a view to building a platform for achieving a competitive advantage. This involves the complete set of activities and organisations relevant to production and distribution, in addition to their connecting supply links. It suggests an underlying structure of activities operating within a process of material and product flow. Decisions made in each area impact on others so that it becomes a single, interdependent system.

4.6.2 The cost of logistics

There is some evidence (World Bank, 2007; 2010) that suggests that, for countries at the same level of per capita income, those with the best logistics performance (for example the lowest logistics costs) experience additional growth. This additional growth is in the order of 1% in GDP and 2% in trade (World Bank, 2007; 2010).

Developing countries produce 37% of the world's GDP, but foot 48% of the logistics bill (CSIR, 2005:9), whereas total logistics costs (packaging, storage, transport, inventories, administration and management) are estimated, on average, at 20% of the total production costs in OECD countries (WTO, 2004:120). These figures indicate that transport and logistics costs are impacting negatively on these countries' economic growth and development. The best economies in the world have achieved logistics costs of lower than 10% of GDP, while the worst could pay as much as 30%, while the average lies between 11% and 16% (CSIR, 2005:9).

Probably the most important indicator of logistics performance is reflected in the Logistics Performance Index (LPI) of the World Bank. The LPI is a comprehensive index created to help countries identify the challenges and opportunities they face in trade logistics performance. A recent World Bank report (World Bank, 2010: iii) states: "Improving logistics performance has become an important development policy objective in recent years because logistics have a major impact on economic activity". It continues: "The importance of efficient logistics for trade and growth is now widely acknowledged. Analysis based on the 2007 LPI or similar information has shown that better logistics performance is strongly associated with trade expansion, export diversification, ability to attract foreign direct investments, and economic growth" (World Bank, 2010:1).

The above makes it clear that a competitive network of global logistics is the backbone of international trade and it is therefore important to compile a comparison of the logistics costs of various countries. Table 6 reflects the Logistics Performance Indices[11] for a number of countries, namely the five top performers in the world in 2010, the Southern Africa Development Community (SADC) countries (including South Africa) and the five worst performers in the world in 2010.

Table 6: Comparative LPI scores for various countries, 2007 and 2010

Category	Country	2010 World ranking	2010 LPI score	2007 World ranking	2007 LPI score
Top five Performers	Germany	1	4.11	3	4.10
	Singapore	2	4.09	1	4.19
	Sweden	3	4.08	4	4.08
	The Netherlands	4	4.07	2	4.18
	Luxembourg	5	3.98	23	3.54
Southern African Development Community (SADC)	Angola	142	2.75	86	2.48
	Botswana	134	2.32	N/A	N/A
	The Democratic Republic of Congo	85	2.68	N/A	N/A
	Lesotho	N/A	N/A	108	2.3

[11] The LPI is a multidimensional assessment of logistics performance rated from 1 (worst) to 5 (best). It uses more than 5000 individual country assessments made by nearly 1000 international freight forwarders to compare the logistics performance of 155 countries.

Category	Country	2010 World ranking	2010 LPI score	2007 World ranking	2007 LPI score
	Madagascar	88	2.66	120	2.24
	Malawi	N/A	N/A	91	2.42
	Mauritius	82	2.72	132	2.13
	Mozambique	136	2.29	110	2.29
	Namibia	152	2.02	126	2.16
	The Seychelles	N/A	N/A	N/A	N/A
	The Republic of South Africa	28	3.46	24	3.53
	Swaziland	N/A	N/A	N/A	N/A
	Tanzania	95	2.60	137	2.08
	Zambia	138	2.28	100	2.37
	Zimbabwe	N/A	N/A	114	2.29
Worst five Performers	Somalia	155	1.34	127	2.16
	Eritrea	154	1.70	124	2.19
	Sierra Leone	153	1.97	144	1.95
	Namibia	152	2.02	126	2.16
	Rwanda	151	2.04	148	1.77

Source: World Bank, 2007; 2010.

The table indicates that, generally, Africa – with the exception of South Africa – does not perform well when it comes to logistics costs. Namibia is in the unenviable fourth last position in the world in terms of logistics performance. The country has declined significantly from position 126 in 2007 to 152 in the short space of three years. South Africa has also fallen four places from Number 24 in the world in 2007 to Number 28 in 2010. It is not so much the South African decline in index score that is responsible for the lower position but rather that other countries have markedly improved their positions. One such example is Luxembourg, which has shot up from Position 23 in 2007 to Number Five in 2010. The relatively poor performance of African countries (South Africa excluded) should be cause for concern, especially since the importance of efficient logistics for trade and growth is now widely acknowledged (World Bank, 2010).

4.7 The air-freight operating environment

A basic understanding of the air-freight industry is required in order to understand the possibilities that the industry might hold for local and regional development. Equally important, if not more so, is that we should understand what the air-freight industry is not. This is especially important given the current situation in South Africa where government structures appear to consider the mere existence of an airport to be sufficient grounds for the development of an air-cargo hub or logistics centre.

4.7.1 General background to air freight

> "Every plane that takes off is a catalyst for economic growth and prosperity" (Tony Tyler, Chief Executive Officer of IATA) (IATA, 2011).

As indicated in Section 4.4, the process of the physical distribution of freight has become a highly sophisticated operation, with increasingly greater reliance being placed on the use of new technology to assist in the movement, storage, and tracking of consignments. Transport is but one component in this logistics chain. In this section, the air-freight sector is examined in terms of its structure, its organisation and its role in the supply chains of shippers.

With time-definite international transactions, production flexibility and speed characterising much of the new economy, it is nearly certain that air freight will play an increasingly vital role in the global economy. No other means of transportation is better equipped to meet the economic realities of the new era in which global sourcing and selling, and just-in-time logistics require that producers receive and ship smaller quantities more frequently, more rapidly and more reliably over long distances.

The transportation of air freight is the mode of freight transport with the shortest history. While the 18th century was dominated by international transportation via ships, the 19th century saw railroads playing the most crucial role. The advent of cars and trucks in the 20th century made road transportation the most common mode of transport and, for the first time, allowed for door-to-door delivery.

The 21st century is marked by the intensifying importance of integration and information and also by the increasing interconnections between nations − both economically and culturally − which has resulted in a rising demand in respect of international shipment. Developments such as these call for the integration of national economies into seamless global supply chains that combine different modes of transportation so as to achieve the reliable and fast shipment of commodities.

Through the implementation of advanced technologies, such as tracking devices and the widespread use of just-in-time logistics concepts, it is possible today to ship cargo from door to door worldwide within 72 hours. Such high-speed overseas shipment is made feasible through air carriage (DTRPW, 2009).

Kasarda et al. (2006) state that global exports (by volume and value) have outpaced production (by volume), which has, in turn, outpaced economic growth indicating a need for substantial restructuring of production and distribution. Air freight has outpaced all, having increased by approximately 80% over the decade 1995−2005 despite recessions and other setbacks to air transport (Kasarda et al., 2006). The air-cargo industry has shown consistent and, at times, phenomenal growth. The industry has played an increasingly important role in world trade and has doubled in volume every ten years since 1970 (Chang et al., 2007).

The real cost of international freight movements has been declining. Air freight, previously seen as too expensive and complex, has emerged as a more viable option because of declining unit costs, excess capacity on some routes, reduced international trade bureaucracy and the growth of integrators with comprehensive door-to-door services (OECD, 2002:11−13).

4.7.2 Air-freight categories

According to the World Bank (2009b), air freight can be characterised in terms of the types of services required. There are currently four such categories: emergency freight, high-value freight, perishables and routine freight.

Emergency freight includes time-critical shipments of spare parts and business and financial documents (where these cannot be transmitted electronically). **High-value freight** includes gold, jewellery, currency, artworks, electronic components and luxury vehicles. These utilise air freight for both security and speed. **Perishables** include fresh seafood, fruits and vegetables, pharmaceuticals and cut flowers. Air freight provides most of the value added and usually accounts for the majority of the delivered price. The last category is **routine freight,** which is the residual from which new categories are emerging. Among these are the rapid-replenishment shipments, which are used to limit the amount of inventory when demand is volatile, for example in the markets for fashion garments or apparel with short seasons. It also applies to a portion of the just-in-time manufacturing process in which a short lead time is combined with a flexible production line (World Bank, 2009b).

4.7.3 Goods suitable for air freight

Air transport is critical to the movement of goods in national and global supply and distribution chains. From the beginning, air transport specialised in high value-to-weight products, perishable goods, emergency deliveries for unanticipated shortages and products requiring the security of increased attention. Kasarda et al. (2004) maintain that the percentage of air freight transported by value (set at between 35% and 40% of world trade) is likely to rise given the nature of products in the new economy, for example small, light, compact and high value-to-weight items.

High value-to-weight ratios imply a relatively light transportation cost burden and high inventory costs if goods are long in transit. Highly perishable goods incur a significant decrease in product value with any delay. The absence of critical components of complex supply or distribution chains means that significant assets would lie idle if the components are not delivered timeously. The air-cargo industry has thrived on the rise of industries incorporating high levels of knowledge into lightweight goods but the industry has managed to move down the value-to-weight ladder (DTRPW, 2009).

When compared with other modes of transport, the most striking particularity of air cargo is the high value per ton of transported goods. New economy products such as microelectronics, pharmaceuticals, aerospace components, medical devices and other high value-to-weight products account for close to three-quarters of international air cargo by value (DTRPW, 2009). In 2001, the average value per ton of USA international air freight was an estimated US$86 500, compared with much lower numbers for other modes of transportation, like shipment via truck (US$2 194), rail ($959) and waterways (US$563) (DTRPW, 2009). In turn, the Boeing Company (2008:14) estimates that commodities transported by air show a strong tendency to be valued at more than $16 per kilogramme. It is much more costly to ship via aircraft than via surface carriers, which makes air transportation mainly attractive to industries in which the advantage of this mode of transport plays a key role. Table 7 gives a more detailed breakdown of the product (goods) mix of the air-freight industry.

Table 7: Goods mix of air-freight industry worldwide, 2007

Type of good	%
Refrigerated foods	5%
Non-refrigerated foods	1%
Consumer products	16%
Apparel, textiles and footwear	17%
Hi-tech products	27%
Capital equipment	19%
Intermediate materials	12%
Primary products	2%

Source: Merge Global, 2008:36.

The table above shows that worldwide high-technology products constituted the highest percentage of air-freight commodities in 2007, with more than a quarter (27%) of all air freight being such products. Primary and non-refrigerated products were almost negligible in terms of air freight at 2% and 1% respectively.

Air carriage is especially of interest for two types of commodities: time- and value-sensitive goods (DPRTW, 2009). Examples of time-sensitive commodities are perishables, such as flowers, fruits, and vegetables, live animals, food products, obsolescent items, such as apparel and footwear, and emergency items, such as drugs and machinery parts. Shipment within a very short time frame to their destinations is essential to preserve the product and guarantee saleability. For example the supply of exotic fruits in colder regions such as Western Europe is mainly possible through the utilisation of air carriage. Emergency items like drugs and machinery parts also rely on rapid shipment, because they would be entirely useless if the arrival were delayed for even a couple of days. However, even goods whose saleability is not dependent on shipment within a matter of hours can still be sensitive to time, such as obsolescent items. So fashion for apparel and shoes, for example, can change in the course of one season, thus making sufficient fast transport to the end destination a key element for the successful selling process.

Generally speaking, air carriage is essential for goods for which it is hard to predict demand, because such commodities can be provided rapidly and reliably by means of air transport, given that there is successful implementation of a supply-chain system capable of reacting speedily to sudden orders. Accordingly, business areas in which air cargo plays a dominant role are industries related to hi-tech, apparel, pharmaceuticals and food products.

The second group that can be identified are value-sensitive goods, which include medicines, electronic components (such as computer equipment), photographic equipment, chemicals, machine parts and fragile goods.

Goods transported by air are less likely to be damaged in that they are not exposed to long travel times, as is the case with rail, road or ship transport. That makes this mode of transport especially popular for fragile or high-value commodities. Examples are medicine, photographic equipment or chemicals, which can lose their value when exposed to shipment in humid surroundings or under hot temperatures.

Machine parts and other fragile goods are usually transported by air, because any other mode of shipment would expose the products to the risk of being handled roughly and therefore being damaged before arriving at their destinations.

The average value-to-weight ratio of air shipped goods is 31 times as high as that of vessel-shipped goods (DTRPW, 2009). However, the variation in the proportion of traded goods that are shipped by air (air-intensity) can be quite large for products with similar value-to-weight ratios. For example, motor vehicle bodies, valued at $9.14 per kilogramme (or specialty motor scooters valued at $9.30 per kilogramme) are shipped almost exclusively by surface freight, whereas 60% of specialty chemicals, printed matter or even specialty leathers (with a roughly equivalent value-to-weight) are shipped by air (DTRPW, 2009). It is important to note that Boeing states that goods to the value of $16/kg and upwards are more likely to be transported by air (Boeing, 2010).

The degree of variation in value-to-weight of specific products even within these detailed categories may play a role in determining the degree of air intensity. Yet the bulkiness of the product and size of shipment may also be important. Perishability plays a role in the decision to ship by air. For example, approximately 80% of the international trade in cut flowers travels by air as does a similar proportion of specialty meats, with two-thirds of the fish traded internationally being are shipped by air. Almost all of the trade in large live animals goes by air. Singapore, for example, imports much of its milk, non-tropical fruits and even some types of mass-marketing meat by air (DTRPW, 2009).

4.7.4 Main industry role players

The role players in the air-freight environment are a heterogeneous group of operators offering different types of services and different levels of logistical expertise. The industry role players are discussed in more detail in Annexure B.

The air-freight industry extends well beyond just airlines. The global air-cargo operating system is characterised by a network of relationships among carriers, brokers, handlers, motor carriers, integrators, airports, freight forwarders, customers, suppliers, manufacturers and logistics service providers. Today’s air-cargo environment is becoming increasingly integrated and ground-linked and is characterised by door-to-door service from shipper to customer, as opposed to just from airport to airport. In addition, time-definite services too are increasingly being expected by supply-chain members, which makes it imperative that all key players operate in an integrated, reliable fashion (Kasarda et al., 2004).

4.8 Air freight and the economy

4.8.1 Air freight as engine of economic growth

Several studies have indicated that air transport (as an industry, not just the actual air-freight movement part of air transport) makes a significant contribution to economic development to the extent that aviation is sometimes described as a major engine of economic growth (Boon and Wit, 2005; Kasarda et al., 2004; Kasarda and Green, 2005; Kasarda and Sullivan, 2006; OEF, 2006).

The causal relationship between air freight and trade and the economy is relatively straightforward. Air cargo enables nations efficiently to connect to distant markets and global supply chains in a speedy, reliable fashion, regardless of location. Thus, in the new fast-cycle logistics era, nations with good air-cargo capability have competitive trade and development advantages over those lacking the said capability. Competitive advantage, as Porter (1990) and others have documented, is fundamental to economic growth.

There is a direct and interdependent relationship between air cargo, trade and GDP. Indeed, the key influence on air-freight demand is world economic and trade growth (Boeing, 2006; IATA, 2006). Kasarda and Green (2005) maintain that there is an established statistical relationship between levels of air-freight volume and both GDP and GDP per capita, which means that as economic activity and trade increase, so the demand for the transportation of goods increases. A 2000 World Bank study indicated that the relationship between air freight and GDP can be predicted with 97% (96.8%) accuracy (World Bank, 2002). Table 8 below gives an historical overview of the relationships between GDP, trade and air freight.

Table 8: Historical growth in GDP, trade and air freight, 1992–2002[12]

Trend	GDP	Trade	Air freight
10-year (1992-2002)	32%	76%	81%
20-year (1982-2002)	72%	132%	302%
30-year (1982-2002)	154%	355%	1395%

Sources: World Bank, 2002; Senguttavan, 2006:6

In the last 30 years, growth in trade has consistently outperformed GDP growth. Likewise, air-freight growth has consistently outperformed trade growth.

Apropos of the above, there is a well-established correlation between air-freight growth and growth in GDP. Kasarda et al. (2004) found a strong causal relationship between air freight and GDP in a study of the world by regions between 1980 and 2000. The researchers established that if they knew either the world GDP or world air-freight volumes, the other could be predicted with approximately 97% accuracy (Kasarda et al., 2004:10). Since the two are mutually causal, they are also highly interdependent. Indeed, Boffinger (2009:7) estimates that an approximate 1% growth in GDP results in roughly 2% growth in freight traffic.

The air-cargo growth advantage outlined above is not restricted to a few advanced economies. Over the period between the early 1980s to the early 1990s, 90 out of a total 130 economies analysed by Kasarda et al. (2004) (representing 98% of the total world air-freight market at the time) had a 10-year growth in air-freight ton-kilometres. Moreover, between 1990 and 2000, air-freight growth outpaced GDP growth in 77 countries (89% of the total air-freight market), which demonstrates that air cargo is indeed a lead growth factor (Kasarda et al., 2004).

Hong Kong is one example of the close correlation between economic activity and air cargo. Table 9 illustrates the leading role of air cargo in driving Hong Kong's trade between 1992 and 2003.

[12] Freight is measured in ton-kilometres, GDP and trade in constant US$.

Table 9: Role of air cargo in Hong Kong's economy, 1992–2003 (indicated in Hong Kong Dollars)

Year	Air freight (USD)	Trade (USD)	Air cargo % of total trade
1992	332,654	1,880,248	17.7
1993	390,096	2,118,847	18.4
1994	447,627	2,420,722	18.5
1995	573,530	2,835,248	20.2
1996	593,810	2, 933, 499	20.2
1997	654,855	3,071,039	21.3
1998	597,002	32,776,741	21.5
1999	664,262	2,741,718	24.2
2000	862,160	3,230,651	26.7
2001	824,081	3,049,181	27.0
2002	909,815	3,179,936	28.6
2003	1,074,466	3,548,206	30.3

Source: Senguttavan, 2006.

During the said period, air cargo tripled in value, increasing substantially faster than other modes of trade as it pushed Honk Kong's overall trade upward. As a result of its much faster trajectory, air cargo's percentage of Hong Kong's total trade value increased from 17.7% in 1992 to 30.3% in 2003.

In their research, Kasarda and Sullivan (2006) noted that the spikes and troughs in economic growth and the growth in the air-freight industry coincide roughly, while reflecting a correlation over time. Yet, growth in the value of air cargo is more pronounced in upswings (for example after the 1997–98 Asia financial crisis, and after 9/11) and leads trade and GDP growth (Kasarda and Sullivan, 2006).

Even with such strong long-term growth as demonstrated in Tables 8 and 9, the aviation market has in recent years experienced unprecedented challenges triggered by world events such as the outbreak of the SARS virus and the war in Iraq. More recently, the general worldwide economic downturn has had a definite impact on air cargo. Historically, however, air-cargo traffic, when subjected to downturns impacting the aviation sector, has recovered at a much quicker rate than have passenger flows (Kasarda and Sullivan, 2006) as has been demonstrated in the most recent aviation downturn. In fact, air cargo is increasingly being viewed as an important lead indicator of the direction the larger economy will be taking (Kasarda and Green, 2005). This, together with the substantial part air cargo has played in generating trade and manufacturing competitiveness, has led policymakers around the globe to accept that promoting air-cargo services is a viable economic development strategy.

The strong causal relationship between the economy and air freight also holds true in times of economic decline. Air-cargo traffic declined precipitously during the global economic downturn of 2008 and 2009. In 2009, world air-cargo traffic declined 11.3%, after declining 1.8% in 2008 and growing 3.3% in 2007. The period between 2008 and 2009 marked the first time that air-cargo traffic had contracted in two consecutive years (Boeing, 2010:2).

An important advantage of air freight is that it saves time. In the course of the ongoing logistics revolution, the costs of carrying inventory have dropped from close to half of the total USA logistics costs to one-third even as total logistics costs have decreased from approximately 15% to about 10% of GDP (Appold and Kasarda, 2010:17). Despite having fallen over the past several decades, the per kilometre direct cost of air transport is still relatively high. However, air transport can be cost effective when speed sufficiently reduces inventory and wastage costs. The costs of transport become less important as value-to-weight rises, while inventory costs increase in importance as the value of that inventory increases.

4.8.2 The global air-freight industry

Both the available statistics and the consistency of basic air-freight statistics seem to be problematic, which could lead to some confusion. Various sources tend to reflect different figures for similar topics. However, despite these inconsistencies, the relative differences between certain main indicators are not alarmingly high.

The global air-freight industry represents almost 100 billion revenue ton-miles of transportation, generating an estimated $52 billion in direct revenue in 2005 (Kasarda et al., 2006). In turn, IATA indicated that in 2005 the air-cargo industry earned revenue to the value of US$48 billion, which grew to US$66 billion in 2010 (IATA, 2011).

Kasarda et al. (2006) have indicated that approximately 50 million tonnes of freight are flown worldwide annually. IATA (2011) estimated the air-freight tonnes flown in 2005 to have been 42.1 million, which increased to 45.8 million tonnes in 2010.

IATA estimated that, in 2006, air freight accounted for around 35% of global merchandise trade by value, which was equivalent to $4.2 trillion of the $12 trillion value of trade in 2006 (IATA, 2007). This differs somewhat from another source, which estimated that, in 2007, 35% of the value of trade in manufactured goods (US$3.5 trillion) was transported by air, and that air freight had increased by 65% in the 10-year period between 1998 and 2007 (Oxford Economics, 2009). Kasarda et al. (2004) and Senguttavan (2006) estimated that air freight accounted for about 40% of trade by value.

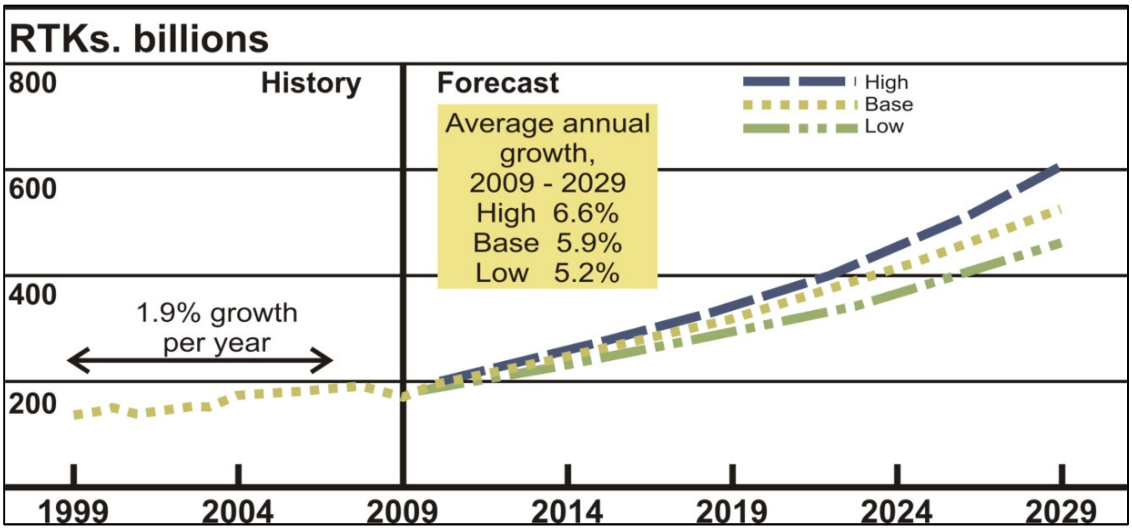
It can thus be concluded that while air freight accounts for between 35% and 40% of international merchandise trade by value, it accounts for only around 1% in terms of volume (World Bank, 2009b). IATA states that, typically, air freight by volume is less than 1% (IATA, 2007:4), whereas Kasarda et al. (2004:20) maintain that air freight is less than 2% by volume.

The above would lead me to conclude that though the air-freight industry transports around 1% of all freight, it transports between 35% and 40% if measured by value.

4.8.3 Future air-freight growth projections

Demand for air-cargo transport rebounded sharply in 2010 after a calamitous 18-month decline that began in May 2008. In spite of this downturn, the Boeing Aircraft Company estimates that world air-cargo traffic will triple over the next 20 years, compared with 2009 levels (Boeing, 2010:8). This translates to an average annual growth of 5.9% (Figure 9 below). Boeing (2010) further expects the number of aeroplanes in the freighter fleet to increase by more than two-thirds over the same period.

Figure 9: World air-freight growth, 2009–2029



Source: Boeing, 2010.

Overall, Boeing expects the world air-cargo traffic to increase from 166.8 billion revenue tonne-kilometres[13] in 2009 (down from its 2007 record of 191.4 billion) to more than 526.5 billion Route Tonne Kilometres in 2029. In Table 10, the historical and forecast air-freight growth rates are reflected for the world and its main regional markets.

[13] Revenue tonne-kilometer usually used interchangeably with freight tonne-kilometer (Boeing:2010)

Table 10: Historical and forecast air-freight growth rates by market, 1999 - 2029

Area	Growth rates (% per annum)	
	Historical 10-year (1999–2009)	Forecast 20-year (2009–2029)
World	1.9	5.9
Intra-North America	-2.5	3.0
Latin America-North America	-0.7	5.7
Latin America-Europe	2.5	5.6
Europe-North America	-1.5	4.2
Intra-Europe	0.1	3.6
Middle East-Europe	6.5	6.0
Africa-Europe	3.3	5.1
Asia-North America	1.4	6.7
Europe-Asia	4.1	6.6
Intra-Asia	3.4	7.9
South Asia-Europe	4.1	6.5
Domestic China	13.1	9.2

Source: Boeing, 2010:8.

Table 10 indicates that Asia's air-freight cargo markets will continue to lead the world air-cargo industry in average annual growth rates, with domestic China and intra-Asia markets expanding 9.2% and 7.9% per year, respectively. Markets linking Latin America with North America and Latin America with Europe and also markets between the Middle East and Europe, will grow at approximately the world average growth rate, with the Africa-Europe market at slightly less than the world average growth rate. The more mature markets of North America and Europe reflect slower and thus lower-than-average traffic growth rates.

4.9 Conclusion

This chapter has outlined the importance of transport as an essential input into all spheres of the socio-economic fabric of communities, regions and countries. It is virtually impossible for any country to exist without an effective and efficient system of transportation. Transport is required to take people to work, school, and play and to ship raw materials, intermediate goods and finished products to factories and, eventually, to consumers. The need for a reliable transport system is boundless and without an efficient system of carriage, societies would not be able to operate effectively.

Managing the complex web of global production, transportation and consumption requires more effort. Logistics is the series of activities required for goods to be made available to markets. This mainly includes purchase, orders processing, inventory management and transportation. As the range of production has expanded, transport systems have adapted to new demands in freight distribution where the reliability and timely deliveries can be as important as costs. Logistics has consequently assumed an increasingly important role in the global economy, that of supporting a wide array of commodity chains.

The modern economy is characterised by a decrease in the friction of distance and a spatial segregation of production. This process is acutely dependent on both the capacity and the efficiency of international and regional transportation systems.

This chapter has shown efficient logistics to be an important determinant of a country's competitiveness. The international transport system may suffer from insufficient cross-country coordination of the network, such as non-integrated time schedules, customs delays, incompatible standards or an inadequate flow of information about delays. It is becoming rare for all the production stages of a good to occur at the same location. Consequently, commodity chains are integrated with transport systems, with logistics being utilised as a strategy for reducing time. For instance, commodity chains are also progressively being managed by demand, thus implying that what is being produced is done so as to match, as closely as possible, what is being consumed. Logistics services are becoming complex and time sensitive to the point that many firms are subcontracting parts of their distribution activities to specialised logistics providers.

Specialised logistics service providers typically assist clients to save costs by concentrating cargo flows, reducing the ratio of empty voyages and favouring the sharing of information across transport operators. Over time, the transport system has therefore evolved into a multimodal structure that is integrated by logistics companies. Efficient logistics services do not only reduce transport costs and transit time, but they also decrease production costs (WTO, 2004). If logistics services are inefficient, firms are likely to maintain higher inventories at each stage of the production chain, which require additional working capital (bigger warehouses to store larger inventories). Guasch and Kogan (2006) estimate that developing countries could reduce the unit cost of production by as much as 20% by reducing inventory holdings by half. At the sectoral level, logistics is most important in the electronic, pharmaceutical, fashion clothes and automotive sectors, in which timeliness is important (WTO, 2004).

Further to the importance of factors such as logistics costs and the air-freight environment that were addressed on an international level in this chapter, Chapter Five focuses on narrowing the air-freight and logistics environments down to the South African situation. In addition, the LED environment within which the two sectors have to operate is analysed in detail.

5 LOGISTICS AND LOCAL ECONOMIC DEVELOPMENT IN SOUTH AFRICA

5.1 Introduction

Chapter Two outlined changing trends with regard to the location of economic activity. Chapter Three explained the development of the concepts of logistics centres and logistics cities. Chapter Four, while describing the importance of transport and logistics in the international economy, it also emphasised the importance of logistics as an economic driver and further outlined the major changes that have occurred in the industry internationally. Against this backdrop, the present chapter turns to discussing the freight and logistics environment in Africa and, more specifically, in South Africa. Three important questions guide the discussion in this chapter:

- What are the characteristics and limitations of logistics in respect of economic development on the continent and more specifically in South Africa?
- How does South Africa position itself in respect of policies and strategies to benefit from improved logistics?
- Are there possible LED benefits associated with air freight and logistics and, more specifically, for peripheral areas?

In order to achieve the above aim, the chapter starts off by providing an overview of the African and South African logistics environments. This is followed by an overview of the air-freight market in Africa and in South Africa. These overviews are then followed by both a discussion on LED from an international perspective and one on how LED in South Africa has progressed since 1994. Special attention is devoted to LED in small towns. The chapter concludes with an analysis of LED policy in South Africa from a logistics and air-freight perspective and a discussion on government interest in air-freight hubs and logistics in South Africa.

5.2 Overview of the air-freight market in Africa and in South Africa

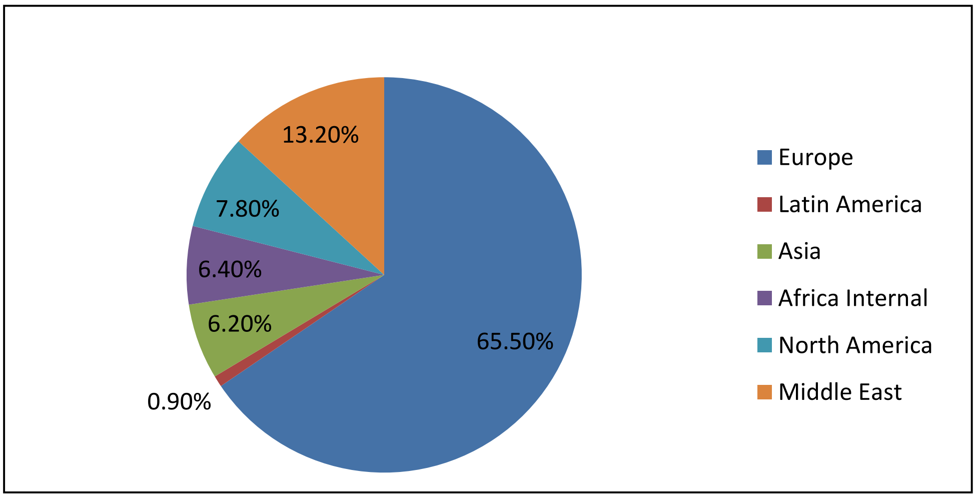
In 2005, Dr John Kasarda argued that "[A]irports will shape business location and urban development in the 21st century as much as highways did in the 20th century, railroads in the 19th and seaports in the 18th" (TIACA Times, 2005:5). Bearing this in mind, the section first provides an overview of air freight in Africa before turning to a similar review in respect of South Africa. The third and final subsection considers logistics costs and performance indicators in South Africa.

5.2.1 Air freight in Africa

In 2007, the continent had over 4000 airports and airfields, of which only 20% had paved runways (United Nations Economic and Social Council, 2009). Although the number of airports and airfields in the region seems enormous, a significant number of these do not meet International Civil Aviation Organization (ICAO) standards and recommended practices. Only 117 of Africa's airports are classified as international airports. Africa's share of global air transport remains modest at about 5.2% of the passenger traffic, approximately 3.6% of freight and roughly 8.5% of the number of departures for 2006 (United Nations Economic and Social Council, 2009).

Directly and indirectly, air transport creates about 470 000 jobs across various sectors and generates revenue of about USD 1.7 billion in Africa (Chingosho, 2011). Figure 10 gives a generalised indication of the air-freight flows from Africa to its trading partners.

Figure 10: Air trade between Africa and its partners, 2010



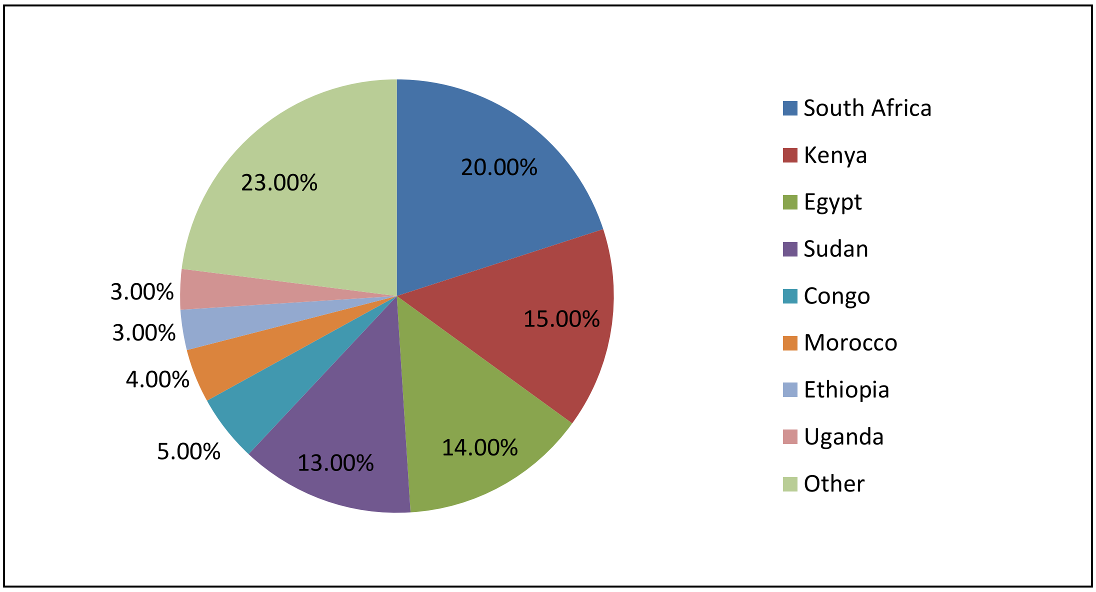
Source: Boeing, 2010:44.

In 2010, Boeing estimated that air trade to and from Africa amounted to about 1 559 000 tonnes. Europe is by far Africa's largest air trade partner with approximately two-thirds (65.5%) of all Africa's air-freight trade flowing to destinations in Europe. This amounts to just more than a million tonnes (1 021 145 tonnes). Asia is still a relatively small trading partner at 6.2% or 96 658 tonnes in 2010 (Boeing, 2010).

Total world air-freight volumes are not readily available and, as reflected in Chapter Four, information and statistics often vary between various sources. The United Nations Economic and Social Council estimate the total Africa air-freight volume to be in the order of 3.6% of world air freight (United Nations Economic and Social Council, 2009). However, according to Boeing (2010), the Africa-Europe market alone accounts for approximately 3.0% of the world's air-freight tonnage and 3.2% of the world's tonne-kilometres. Following on these statistics, it means that if the Africa-Europe tonnage represents 3.0% of world tonnage in 2010, (and the volume of 1 021 145 tonnes as reflected in the paragraph above is accepted as a fair volume estimate), world air tonnage, using simple mathematics amounts to just more than 34 million (34 038 166) tonnes.

Counter-seasonal cut flowers and other perishables account for just more than 50% of the northbound air freight from Africa to Europe, but there is relatively little return cargo from Europe to Africa. The Netherlands is a major recipient of cut flowers and Kenya is a major exporter of the product. A further one-third of the northbound air-freight transport is manufactured goods, primarily from South Africa. The southbound trade into Africa, which is growing at a faster rate than the northbound traffic out of Africa, consists primarily of capital equipment, intermediate products and transport equipment (World Bank, 2009b). Figure 11 below gives an indication of how air freight is generally distributed between countries in Africa. As it is a generalised distribution, the data are not indicative of a specific year.

Figure 11: Generalised distribution of air freight between countries in Africa. 2008



Source: World Bank, 2009b.

Figure 11 indicates that three countries, South Africa, Egypt and Kenya distribute nearly 60% of air freight on the continent. Sub-Saharan Africa has two airports with significant cargo operations, namely Johannesburg and Nairobi – interestingly enough *both are inland cities* (World Bank, 2009b). Johannesburg benefits from a provincial economy (Gauteng) and a distance that requires air transport that is compulsory for most exports of perishables to Europe. Nairobi has a relatively strong domestic demand for imports shipped by air and also for exports of cut flowers. It has leveraged this scale to become one of Africa's growing gateways. Nigeria benefits not only from the demand associated with its oil industry and other natural resources, but also from relatively higher consumer demand. According to the World Bank (2009b), cargo carriers have demonstrated an interest in serving the Nigerian market despite experiencing problems with infrastructure and governance. Other countries with significant potential for agricultural exports by air, such as Uganda and Ghana, have difficulties with landside access and transport services, especially cold chains (World Bank, 2009b).

Transit times on African transport corridors are unduly lengthy because of factors such as unclear and sometimes conflicting rules and regulations, inefficient service providers, road blocks and also cumbersome administrative and customs procedures (United Nations Economic and Social Council, 2009). These problems lead to excessive traffic delays that result in substantial increases in transport and logistics costs and they impact negatively on the logistics performance of both the continent and affected countries. As far as air transport is concerned, political commitment at high levels is required to encourage a stronger air-transport industry in the continent through liberalisation and fair competition. At the same time, a favourable climate for investment should be established to attract private-sector capital into the airline business.

5.2.2 Air-freight transport in South Africa

South Africa has nine international airports[14] controlled by the Airport Company of South Africa (ACSA). The country additionally has a number of commercial airports, such as Lanseria Airport, Kruger-Mpumalanga International Airport and Polokwane International Airport, that are not owned by ACSA. Furthermore, the country also has a number of smaller airports that are mostly used for general aviation purposes.

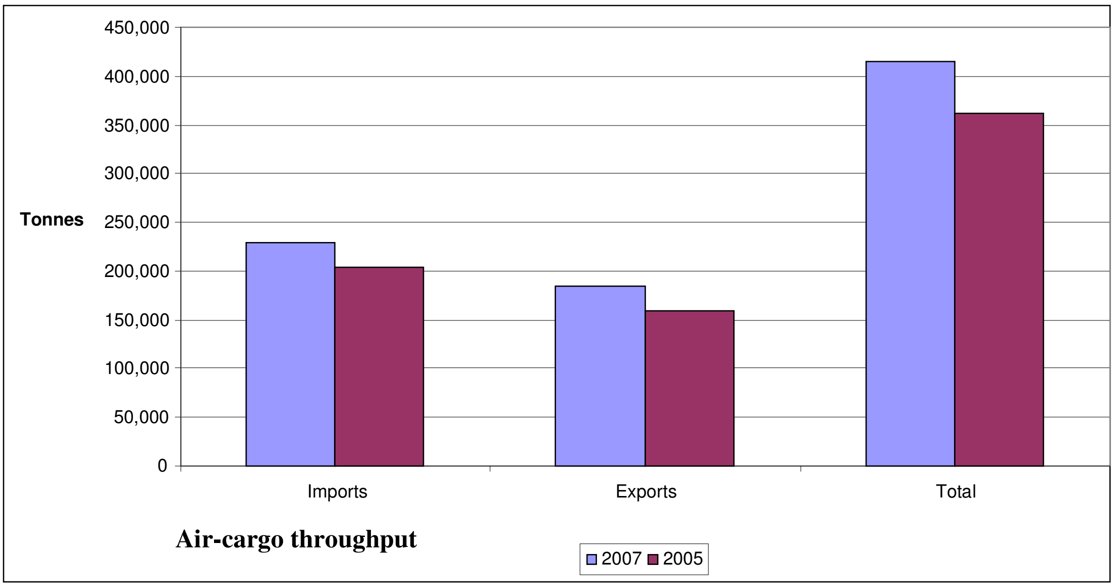
It should be noted that although all nine ACSA airports have international status, not all of these offer regular or scheduled international departures or arrivals. Having international status is understood to mean that, should such services be required, services such as customs and passport control can be rendered on an as and when required basis after prior arrangement with the relevant authorities. ORTIA, as the largest and busiest airport in South Africa, plays a vital role in both the local and the national economy because of its passenger and cargo activities. The only other airports that handle some regular international freight are Cape Town International Airport and King Shaka International Airport (previously Durban International Airport).

Information on actual air-freight volumes is difficult to come by. Nevertheless, the NFLS estimates that approximately 522 000 tons of freight are moved by air freight in South

[14] ORTIA in Johannesburg, Cape Town International Airport in Cape Town, King Shaka International Airport in Durban, Bram Fischer International Airport in Bloemfontein, Port Elizabeth International Airport in Port Elizabeth, East London International Airport in East London, George International Airport in George, Kimberley International Airport in Kimberley and UIA in Upington

Africa every year (DOT, 2005:18).[15] This represents just less than 0.06% of the total volume of freight transported by surface transport (road and rail) in 2005. This is done by scheduled passenger services and also by scheduled and unscheduled air-freighter services. In terms of the volume of freight, most of the air freight (between 80% and 90%) is passenger related, which means it is carried by passenger aircraft (DOT, 2005:18). By contrast, in other countries the split between belly freight and dedicated freighter aircraft is roughly 50% (Doganis, 1985:318; DOT, 2005:18). Figure 12 reflects the split between import and export air freight in South Africa

Figure 12: Total air-cargo throughput in South Africa, 2005 and 2007 (tonnes)



Source: DTRPW, 2009.

The figure shows that air cargo in South Africa is split two-thirds to imports and one-third to exports. A more detailed indication of freight volumes for ORTIA and Cape Town International Airport is provided in Table 11 below.

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15 It should be noted that the volume was estimated based on the prevalent economic conditions at the time and will differ from current volumes.

Table 11: Monthly import and export data for ORTIA and Cape Town International airports, 2005 and 2007 (tonnes)

		2005												
		January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Year total**
ORTIA	**Imports**	12,210,334	13,872,827	15,294,923	16,349,656	15,305,971	15,533,146	15,859,531	15,099,920	15,198,501	18,185,172	17,602,281	15,058,431	*185,570,693*
	Exports	10,187,580	10,751,990	12,688,235	11,966,010	11,356,806	10,539,537	10,308,626	10,554,486	10,642,140	10,610,389	11,300,866	12,338,926	*133,245,591*
	Total	22,397,914	24,624,817	27,983,158	28,315,666	26,662,777	26,072,683	26,168,157	25,654,406	25,840,641	28,795,561	28,903,147	27,397,357	*318,816,284*
CPT	**Imports**	1,353,482	1,534,217	1,848,999	1,356,997	1,371,330	1,271,313	1,305,147	1,414,636	1,437,123	1,632,409	1,938,900	1,527,146	*17,991,699*
	Exports	2,447,407	2,383,719	2,204,183	1,965,461	1,837,949	1,777,514	1,478,463	1,455,084	1,872,317	2,259,935	3,009,344	2,907,635	*25,599,010*
	Total	3,800,889	3,917,936	4,053,182	3,322,458	3,209,279	3,048,827	2,783,610	2,869,720	3,309,440	3,892,343	4,948,244	4,434,781	*43,590,709*
BOTH AIRPORTS	**Total Imports**	**13,563,816**	**15,407,044**	**17,143,922**	**17,706,653**	**16,677,301**	**16,804,459**	**17,164,678**	**16,514,556**	**16,635,624**	**19,817,581**	**19,541,181**	**16,585,577**	***203,562,392***
	Total Exports	**12,634,987**	**13,135,709**	**14,892,418**	**13,931,471**	**13,194,755**	**12,317,051**	**11,787,089**	**12,009,570**	**12,514,457**	**12,870,324**	**14,310,210**	**15,246,561**	***158,844,601***
	Total Throughput	**26,198,803**	**28,542,753**	**32,036,340**	**31,638,124**	**29,872,056**	**29,121,510**	**28,951,767**	**28,524,126**	**29,150,081**	**32,687,904**	**33,851,391**	**31,832,138**	***362,406,993***

		2007												
ORTIA	**Imports**	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Year total**
ORTIA CPT	**Exports**	14,018,634	16,610,453	19,671,880	17,081,829	16,389,902	18,716,267	17,292,630	16,994,950	17,085,252	19,690,398	20,396,438	18,276,949	*212,225,582*
	Total	9,987,011	10,842,158	13,809,844	12,376,472	13,986,294	13,684,631	12,093,015	11,435,795	12,245,215	13,488,257	14,602,135	15,298,699	*153,849,526*
	Imports	24,005,645	27,452,611	33,481,724	29,458,301	30,376,196	32,400,898	29,385,645	28,430,745	29,330,467	33,178,655	34,998,573	33,575,648	*366,075,108*
CPT BOTH AIRPORTS	**Exports**	1,378,596	1,502,229	1,675,090	1,274,203	1,225,138	1,262,174	1,207,938	1,222,037	1,201,820	1,543,294	2,053,649	1,616,130	*17,162,298*
	Total	3,237,734	2,592,277	2,898,743	2,158,030	2,355,784	2,140,634	2,181,555	1,866,952	2,128,544	2,450,281	3,563,870	3,561,424	*31,135,828*
	Total Imports	4,616,330	4,094,506	4,573,833	3,432,233	3,580,922	3,402,808	3,389,493	3,088,989	3,330,364	3,993,575	5,617,519	5,177,554	*48,298,126*
BOTH AIRPORTS	**Total Exports**	**15,397,230**	**18,112,682**	**21,346,970**	**18,356,032**	**17,615,040**	**19,978,441**	**18,500,568**	**18,216,987**	**18,287,072**	**21,233,692**	**22,450,087**	**19,893,079**	***229,387,880***
	Total Throughput	**13,224,745**	**13,434,435**	**16,708,587**	**14,534,502**	**16,342,078**	**15,825,265**	**14,274,570**	**13,302,747**	**14,373,759**	**15,938,538**	**18,166,005**	**18,860,123**	***184,985,354***
		28,621,975	**31,547,117**	**38,055,557**	**32,890,534**	**33,957,118**	**35,803,706**	**32,775,138**	**31,519,734**	**32,660,831**	**37,172,230**	**40,616,092**	**38,753,202**	***414,373,234***

Source: DTRPW, 2009.

In 2007, imports and exports handled at ORTIA and Cape Town International airports amounted to just more than 400 000 (414 000) tonnes. ORTIA handled nearly 90% of the imports and exports flowing through ORTIA and Cape Town International airports. The cargo throughput at these two airports increased by 16.5% between 2005 and 2007. Imports at the two airports amounted to 45% of the total 2007 throughput. ORTIA exports amounted to 154 000 tonnes in 2007 (or 42% of total air cargo handled at the airport), whereas Cape Town handled only about 31 000 tons. In the case of Cape Town, exports were almost double that of imports in 2007, with 31 000 tonnes of export cargo handled and 17 000 tons of import cargo handled at the airport.

The other ACSA airports handle small amounts of air cargo, using the belly-hold capacity of passenger aircraft on scheduled services, mainly for domestic distribution services.

Industries that typically use air-cargo transport include those involved in the manufacture of vehicle components, electronics and communication technology, textiles and clothing, food, animal products, chemicals and pharmaceuticals and in the production of cut flowers, fruit and plants (DOT, 2005; DTRPW, 2009). The above products indicate that the air-freight market is dominated by perishables and high-value items similar to the situation globally. Imports and exports of high-value specialist components related to the automotive sector are beginning to dominate the air-freight market (DOT, 2005).

Passenger aircraft are responsible for moving between 80% and 90% of air freight within South Africa (DOT, 2005; DTRPW, 2009), while the remainder is being moved by both scheduled and non-scheduled freighter aircraft. Furthermore, domestic freight is largely dominated by mail and courier customers. Owing to the lack of dedicated facilities for freight, this dominant role of passenger aircraft for freight is high and is expected to remain high. The disadvantage of an overreliance on passenger aircraft in the provision of air-freight services is that it leads to poor predictability of available capacity. Essentially, passengers and their baggage determine the available capacity for air freight. During busy passenger periods, air freight not related to passengers, which often constitutes perishables or urgent high-value cargo, may be left behind (or ‘bumped’ in air freight parlance) as the additional weight may cause safe take-off parameters of the aircraft to be exceeded. This situation obviously reduces the air-freight value proposition to customers in that passengers are priority business for the airlines.

Market forces in combination with investment decisions by ACSA have caused ORTIA to evolve as the natural hub for air freight. However, ORTIA productivity levels as air-freight throughput per m^2 are significantly less than international benchmarks (DOT, 2005). The relatively low productivity levels and relatively old facilities lead to congestion and slow turnaround times (Brown, 2009). Therefore any increased demand for air freight will put the air-freight infrastructure at ORTIA under further pressure.

As reflected earlier, air freight in Africa tends to be strongly northbound and is dominated by mining, communication, oil and military customers (DTRPW, 2009). Freight operators registered in other African countries tend to have lower cost structures than do South African freight operators. This is due mainly to the weaker enforcement of safety regulations in these countries and the high levies imposed on South Africa and other foreign operators by certain African countries. Furthermore, poor enforcement of regulations (safety, security) within South Africa and in other parts of Africa allows non-compliant operators to undercut compliant operators (DOT, 2005).

A number of concluding comments need to be made. First, the foregoing discussion has shown the air-freight market within and between South Africa and international markets to be characterised by different competitive conditions. Secondly, South Africa faces a number of strategic issues regarding air freight in the country, such as service reliability, tariff differentials and airport productivity levels as measured by throughput and operations issues. Thirdly, even though the South African air-freight environment is relatively small in comparison with the world air-freight environment, South African airports do play a crucial role in both the country's own economy and in the regional African economy.

5.2.3 Logistics costs and performance indicators

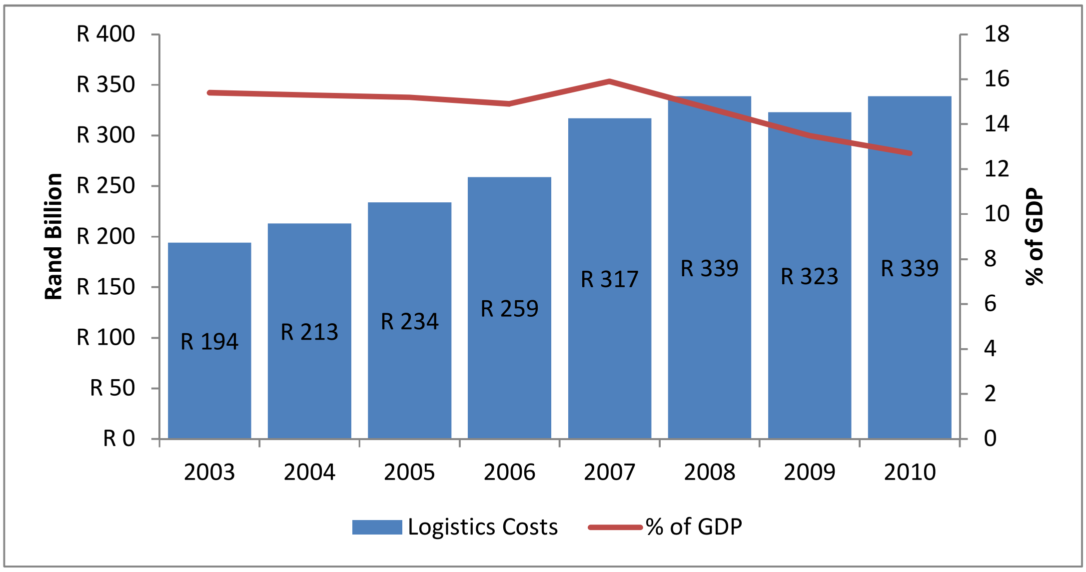
The focus now shifts from air-freight transport to logistic costs and performance indicators. It is necessary to understand logistics performance at the country level in order to minimise the impact of the costs of logistics on the economy. Lower costs for logistics reduce the cost of delivering products, thereby also encouraging sales, increasing trade, opening new markets and generally encouraging business. Performance evaluations also help to improve the efficiency of supply chains and the functioning of related infrastructures, services, procedures, policies and regulatory measures. On account of the complex supply chains and globalisation, the cost of logistics operations could comprise as much as half of the value of general commodities (International Transport Forum, 2012).

The importance of lowering logistics costs has also been acknowledged on the national, regional and global levels. Logistics costs are significant and affect the competitiveness of nations (United Nations Economic and Social Commission for Asia and the Pacific, 2002), and also national-level policymaking, infrastructure development and investments (Farahani et al., 2009). Guasch and Kogan (2006) have also identified logistics costs as one of the major drivers affecting competitiveness. In the South African context, Havenga (2010) also states that as a more efficient logistics system is the key to sustainable economic growth, it is therefore a macroeconomic imperative to track the major cost components.

There is no agreement on a definition of logistics costs. A review of the literature reveals significant discrepancies regarding the activities that should be included in the definition of logistics costs. Generally logistics costs include the following components: transaction costs (those related to transport and the trade-processing of permits, customs, standards), financial costs (inventory, storage, security), and non-financial costs (insurance) (Gonzalez et al., 2008). In the South African context, the calculation of logistics costs is based on four main cost components, namely transport costs, storage and port costs, management, administration and profit costs and, lastly, inventory-carrying costs (CSIR, 2005; 2007; 2009; 2011).

The question arises as to the usefulness of components such as logistics costs and logistics performance indicators. The World Bank (2010) argues that the logistics performance indicator is of special significance. They argue that, by plotting the average relation between country income and logistics performance, it is possible to identify over- and underperformers in the logistics sector. An overperformer is a country with a higher LPI score than would be expected based solely on its income level; an underperformer is a country with a lower-than-expected LPI score. Figure 13 reflects the logistics cost profile of South Africa for the period 2003 to 2010 and also the percentage that the logistics costs represent of the country's GDP.

Figure 13: Logistics costs as a percentage of GDP in South Africa, 2003–2010

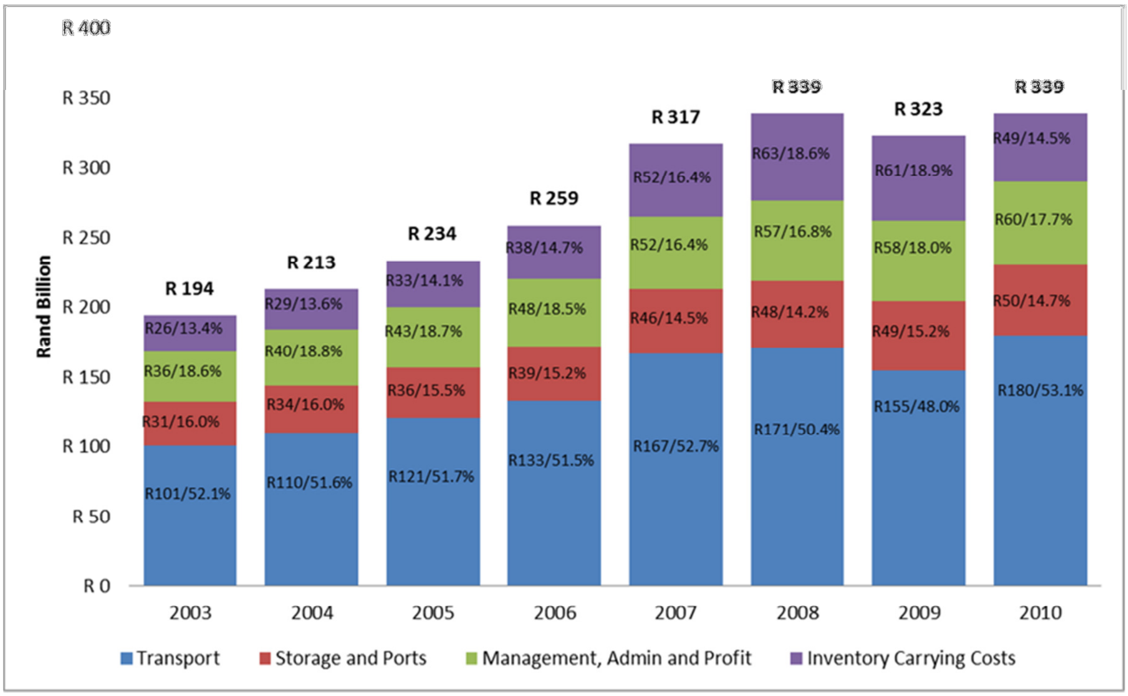


Source: CSIR, 2005; 2007; 2009; 2011.

South Africa's freight logistics bill increased from R194 billion in 2003 to R339 billion in 2010. With the exception of the recorded highest value of 15.9% in 2007, the cost of logistics as a percentage of the country's GDP exhibited a declining trend from 15.4% in 2003 to 12.7% in 2010. On a year-to-year basis from 2009 to 2010 South Africa's logistics costs increased by 4.9% from R323 billion in 2009 to R339 billion. However, logistics costs as a percentage of GDP improved from 13.5% to 12.7% over the same period. The continuing downward trend in South Africa's logistics costs as a percentage of GDP to its lowest point since measurement stands in contrast to recent movements in the USA, where this percentage increased from its lowest ratio of 7.7% to 8.3% in 2010 (CSIR, 2011; Wilson, 2010). There are at least two apparent reasons for this dissimilarity. The first is that the composition and dynamics of the two economies differ, the USA being the biggest developed economy in the world and South Africa being a fast-developing economy (CSIR, 2011). Secondly, the logistics challenges surfacing in the USA's mature economy are causing the upward creep and should serve as warning signals for South Africa on its own growth path (CSIR, 2011).

As reflected above, the calculation of logistics costs in South Africa is done based on four main cost components, namely transport costs, storage and port costs, management, administration and profit costs and, lastly, inventory carrying costs. Figure 14 shows a detailed trend analysis of the four major logistics cost components since 2003.

Figure 14: Components of logistics costs in South Africa, 2003–2010



Source: CSIR, 2005; 2007; 2009; 2011.

Figure 14 indicates that transport costs were consistently the highest contributor to logistics costs in South Africa at more than 50% on average. Of particular concern is the general rising trend in the contribution of transport to total logistics costs from 52.1% in

2003 to 53.1% in 2010. The transport component of total logistics costs alone added R180 billion to the logistics cost profile in South Africa in 2010. In contrast, storage and port costs were on the decline as a percentage of logistics costs from 16.0% in 2003 and 2004 to 14.7% in 2010. There was also a slight decline in management, administration and profit costs from more than 18% in 2003 and 2004 to 17.7% in 2010. After a significant rise in its contribution to 16.4% and 18.6% in 2007 and 2008 respectively, it seems as though inventory-carrying costs were stabilising at 14% (14.5% in 2010).
From an economic perspective, the increasing trend in the transport component of logistics costs is especially problematic in that all consumer goods contain a transport-cost element in their consumer prices. Apart from the impact of increasing transport costs on consumers in peripheral areas, rising transport costs may also negatively impact on the profitability and sustainability of businesses, and then especially of smaller businesses. The transport-cost component is also in many cases negatively affected by factors beyond the direct control of producers, transport-service operators and consumers alike. These factors include aspects such as the cost of fuel and costs related to transport infrastructure and technology (aircraft, airports, rail projects and road infrastructure). In addition, economic externalities, such as fluctuations in the oil price and the exchange rate, may also further negatively impact on the transport-cost component of total logistics costs.

The South African logistics cost profile is further analysed in Table 12 below, in terms of six logistics performance indicators. These logistics performance indicators, as developed by the World Bank, are customs issues, infrastructure performance, international shipments, logistics quality and competence, tracking and tracing, and timeliness. Table 12 reflects the performance of South Africa against both the five best logistics performers in the world and the five worst logistics performers in the world. South Africa is also placed in context within the SADC region.

Table 12: Logistics performance indicators by country and indicator, 2010

Category	Country	2010 world ranking and score		Customs		Infrastructure		International shipments		Logistics, and quality-competence		Tracking and tracing		Timeliness	
		Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Five top performers	Germany	1	4.11	3	4.00	1	4.34	9	3.66	4	4.14	4	4.18	3	4.48
	Singapore	2	4.09	2	4.02	4	4.22	1	3.86	6	4.12	6	4.15	14	4.23
	Sweden	3	4.08	5	3.88	10	4.03	2	3.83	2	4.22	3	4.22	11	4.32
	The Netherlands	4	4.07	4	3.98	2	4.25	11	3.61	3	4.15	9	4.12	6	4.41
	Luxembourg	5	3.98	1	4.04	9	4.06	7	3.67	21	3.67	19	3.92	1	4.58
Southern African Development Community (SADC)	Angola	142	2.75												
	Botswana	134	2.32	126	2.09	119	2.09	152	1.91	119	2.29	99	2.59	123	2.99
	The Democratic Republic of Congo	85	2.68	59	2.60	98	2.27	109	2.56	49	2.93	119	2.43	94	3.20
	Lesotho	N/A for 2010													
	Madagascar	88	2.66	87	2.35	60	2.63	53	3.06	102	2.40	109	2.51	128	2.90
	Malawi	N/A for 2010													
	Mauritius	82	2.72	50	2.71	96	2.29	33	3.24	97	2.43	100	2.57	127	2.91
	Mozambique	136	2.29	145	1.95	124	2.04	87	2.77	130	2.20	135	2.28	150	2.40
	Namibia	152	2.02	152	1.68	148	1.71	145	2.20	144	2.04	144	2.04	151	2.38
	Seychelles	N/A for 2010													
	Republic of South Africa	28	3.46	31	3.22	29	3.42	31	3.26	25	3.59	24	3.73	57	3.57
	Swaziland	N/A for 2010													
	Tanzania	95	2.60	74	2.42	129	2.00	85	2.78	105	2.38	103	2.56	80	3.33
	Zambia	138	2.28	111	2.17	140	1.83	128	2.41	149	2.01	130	2.35	131	2.85
	Zimbabwe	N/A for 2010													
Five worst performers	Somalia	155	1.34	155	1.33	154	1.50	155	1.33	155	1.33	155	1.17	155	1.38
	Eritrea	154	1.70	154	1.50	155	1.35	154	1.63	150	1.88	154	1.55	153	2.21
	Sierra Leone	153	1.97	110	2.17	152	1.61	134	2.33	154	1.53	152	1.73	152	2.33
	Namibia	152	2.02	1.68	148	1.71	145	2.20	144	2.04	144	2.04	151	2.38	1.68
	Rwanda	151	2.04	153	1.63	150	1.63	67	2.88	152	1.85	149	1.99	154	2.05

Source: World Bank, 2010.

Unfortunately, the World Bank logistics indicators for 2010 are not available for all of the SADC countries. South Africa fared the best in respect of the logistics and quality-competence performance indicator, achieving an indicator ranking of 25. This ranking, for example, compares favourably with Luxembourg's overall ranking of fifth in the world and a logistics and quality-competence performance indicator of 21st in the world.

South Africa fared worst in the area of timeliness, achieving a ranking of 57th in the world, while Luxembourg, for example, was, in this case, ranked first in the world. Even though Mauritius is way behind South Africa in terms of its overall world ranking (82nd as against South Africa's 28th), the country competes very well with South Africa in terms of the international shipments indicator where it achieved a ranking of 33 as against South Africa's ranking of 31 for this particular indicator.

Improving logistics performance has become an important development policy objective in recent years because logistics has a major impact on economic activity. Evidence from the 2007 and 2010 LPIs indicates that, for countries at the same level of per capita income, those with the best logistics performance experience additional growth to the extent of 1% in GDP and 2% in trade (World Bank, 2007; 2010). These findings are especially relevant today, as developing countries need to invest in better trade logistics to develop to a stronger and more competitive position that will assist in narrowing the gap between rich and poor. It is therefore important that logistics feature prominently in national, regional and local policy and development directives in an effort to lower the cost of logistics to the economy at all levels.

5.3 The logistics policy context in South Africa

The above section provided an overview of air freight and logistic performance in Africa and more specifically South Africa. The emphasis now shifts to the policy context in relation to logistics and freight. Two sub-questions guide this section. The first question pertains to the ways in which the South African policy environment is currently addressing the above realities, if at all. The second question, taking into account the changes in logistics and air freight discussed in Chapter Four, pertains to the extent to which South African policy is currently taking international trends into account. The Sixth Annual State of Logistics Survey in South Africa compiled by the CSIR states that "[I]mproving logistics performance has become an important development policy objective in recent years because logistics have a major impact on economic activity" and that "[T]he importance of efficient logistics for trade and growth is now widely acknowledged. Analysis has shown that better logistics performance is strongly associated with trade expansion, export diversification, ability to attract foreign direct investments and economic growth" (CSIR, 2009:1).

Logistics was identified by the South African government in the Accelerated and Shared-Growth Initiative of South Africa (ASGISA) as one of the six potential hurdles that may limit future growth in the country. Strategies were put in place to address this potential threat. The NFLS was developed specifically in response to the specific logistics environment in South Africa (DOT, 2005). It aims specifically to address a number of issues that both undermine the competitive advantage that South Africa enjoys and render the country less competitive and relevant in world markets.

5.3.1 The National Freight Logistics Strategy

The NFLS, published in 2005, is the only national strategy on logistics and freight transport in South Africa. This section analyses this important document in more detail by focusing on nine elements in this regard.

The vision for the freight-logistics system

As the department responsible for transport policy at the national level, it is necessary to start with the National Department of Transport's (DOT's) general vision for transport in the country before moving on to the freight and logistics vision for the country. The vision of the DOT is to provide safe, reliable, effective, efficient and fully integrated transport systems and operations and also infrastructure that will best meet the needs of freight and passenger customers and commuters by improving levels of service and cost in a way which supports government strategies for economic and social development, while simultaneously also being environmentally and economically sustainable (DOT, 2005). In line with this general vision, the DOT formulated the following vision of the freight-logistics system in South Africa: "The vision of the freight logistics system is to respond to problems in institutional and regulatory frameworks, infrastructure, ownership, management, operations, skills, financing structures and methodologies for the freight system" (DOT, 2005:ii).

This vision requires government to adopt a more interventionist approach to regulating the freight system so as to ensure that the incidental costs of externalities and inefficiencies are not merely passed on to cargo owners, but correctly allocated (DOT, 2005). Although it cannot be expected that the national freight and logistics vision should be based on or even take cognisance of the critical enablers of the logistics city concept as discussed in Chapter Three, it is apparent that, in a sense, the vision for a freight-logistics system acknowledges the importance of at least four of the functional enablers of a logistics city, namely infrastructure, the workforce (skills) and capital (financing structures) in addition to the integrating enabler of governance ("problems in institutional and regulatory frameworks"). By including the fact that certain core areas suffer from problems that the NFLS aims to respond to, sets the scene for a strategic framework for system reform.

The vision for a freight-logistics system does however not make any mention of three important enablers identified by the logistics city concept, namely the service enabler, the knowledge enabler and the competition enabler. These three enablers have very strong links with the concept of clustering as discussed in Chapter Two and with the process of globalisation. Although not directly excluded, clustering has no prominence in the vision as a modern mechanism prevalent in the logistics environment.

Institutional arrangements

The NFLS is clear on the problems regarding the institutional environment within which the freight logistics system operates in South Africa. It recognises that the freight transport industry is a complex institutional model that varies across input sectors (DOT, 2005). It accepts that government is generally responsible for the development of policy and the execution of regulatory functions, while commercial government entities (the so-called state-owned enterprises, such as Transnet, Portnet and the South African National

Roads Agency Limited) also play important roles in the provision of freight transport services – from policy development through regulation to service delivery. The role of the private sector varies significantly across the input sectors, from a very limited scope in rail and ports, to complete domination in road freight and air transport (DOT, 2005). On the one hand, the operating environment is therefore characterised by open competition (road and air-freight sectors), while, on the other, it is characterised by monopolies that reduce the efficiency and the value proposition for customers (rail and port sectors). The NFLS acknowledges that this particular situation – a mix between open competition and monopolies – contributes negatively to the country's logistics cost burden (DOT, 2005).

The NFLS also identifies the fragmented nature of the regulatory environment as a major problem (DOT, 2005). Because the regulatory environment is poorly articulated in terms of the roles and responsibilities of the different bodies involved, the regulatory functions overlap. There are however few effective legislative powers to enforce such functions (DOT, 2005).

Planning frameworks

The NFLS identifies another very important contributing factor to system inefficiencies, namely that of a lack of integrated policy, strategy, planning and forecasting at both the national and the regional level (DOT, 2005). The NFLS argues that there is a total lack of integrated planning between the various spheres of government, parastatals, agencies and the private sector. Even though the NFLS focuses its attention on the lack of integrated planning mainly in respect of infrastructure, this is certainly also the case on a policy level. The said lack of integrated development planning also hampers LED (a point I shall examine in more detail later in this chapter).

This leads to a disjuncture between national plans and regional planning, which in turn leads to unequal development of infrastructure and maintenance. The lack of integration is particularly relevant to regional airports: freight activities at the primary South African airport, namely ORTIA, are effectively left to continue growing in response to market demands without there being a clear role for regional airports in the process.

A significant portion of these inefficiencies is attributable to the complex institutional structure of the freight industry. Government is generally responsible for the development of policy and the execution of regulatory functions (DOT, 2005). Government's commercial entities, or the so-called state-owned enterprises, perform a significant role in policy development, the regulation of the industry, infrastructure development and in freight operations or service delivery. The role of the private sector moreover varies from a very limited scope in rail and ports to complete domination of road and air-freight transport (DOT, 2005). The above situation manifests itself in a mixture of open competition on the one hand (as in road and air freight), to monopolies that reduce efficiencies and the value proposition (rail freight and port sectors), on the other.

The lack of integrated planning, coupled with the fragmented nature of the regulatory environment, has obvious and serious implications for the efficiency of the freight-logistics system in the country.

<u>Air-transport infrastructure</u>

The NFLS describes the various modes of transport and logistics in South Africa. In respect of air transport, it notes the overall lack of information regarding this sector. The airports are divided into three international airports and seven regional airports. The NFLS also acknowledges the existence of numerous other airports that are of regional and local importance. However, the strategy does not reflect on a role for regional airports. In fact, many of the regional airports are not regionally owned or managed but are centrally owned by ACSA.

<u>Nodes and corridors</u>

The NFLS indicates that, generally, the intermodal interfaces in the country are poor, so that operational problems are caused by the inefficient use of intermodal facilities and a lack of the appropriate technology to enable seamless freight movements (DOT, 2005). The strategy document further indicates that, in many instances, freight-related nodes are located mainly in urban areas and that the main freight routes and corridors often exclude peripheral areas from connecting to the distribution system. This increases their cost of economic interaction, which thus hampers regional development. In terms of corridors, the NFLS identifies seven[16] primary freight corridors in the country. All of these corridors emanate from Gauteng as the main business hub in the country and are road- and rail-related. The NFLS does not specifically link any of these corridors to air freight.

Inefficiencies in respect of freight and logistics

In the context of the critical role that the freight system plays in building and maintaining the South African economy, the NFLS has formulated the following problem statement regarding freight in South Africa: "The freight system in South Africa is fraught with inefficiencies at system and firm levels. There are infrastructure shortfalls and mismatches; the institutional structure of the freight sector is inappropriate, and there is lack of integrated planning. Information gaps and asymmetries abound; the skills base is deficient, and the regulatory frameworks are incapable of resolving problems in the industry" (DOT, 2005:ii).

The main element recognised in the problem statement is that of inefficiencies over the entire spectrum of the freight system. These inefficiencies, as reflected in the NFLS, are caused by three main factors (DOT, 2005). Firstly, system inefficiencies are exacerbated by low levels of investment in certain infrastructural and operational equipment, most notably those in respect of rail stock and port-operating equipment. Secondly, rigid management practices moulded by supply-driven strategies undermine an undertaking's responsiveness to clients' requirements. These management practices are particularly evident in the rail sector. Thirdly, rigid costing approaches that are not activity based hampers reducing the cost of doing business, which in turn leads to higher logistics costs in general. Unfortunately, these inefficiencies are directed only at the rail sector in the strategy document.

Transport infrastructure

According to the NFLS, the main challenge confronting transport performance is that the funding and financing of transport infrastructure, network development and maintenance

[16] These corridors are: Gauteng-Durban, Gauteng-Cape Town, Gauteng-Port Elizabeth, Gauteng-East London, Gauteng-Beitbridge, Gauteng-Maputo and Gauteng-Lobatse-Walvis Bay.

are not over the long term constant and responsive to transport demand and infrastructure utilisation. Government's vision is a transport sector that contributes to sustainable socio-economic growth and development. Government envisages a transport system that promotes access by rural producers of goods and services to international and national markets while promoting and maintaining supply chains focused on the First Economy, on export and on high value. Transport should contribute to South Africa's socio-economic development in the short, the medium and the long term through significantly reducing logistics costs that will then reduce both the cost of living and of doing business and, as a result, increase system capacity. Improved transport logistics are also vital in eradicating systemic and operational bottlenecks in the country and farther afield on the African continent. These impediments to continental economic and transport integration need to be addressed by 2015 if we are to comply with the strategic requirements of the Presidency and multi-lateral obligations (DOT, 2005). Although transport and logistics are seen as contributing towards socio-economic development this view is held at a national level with very little reference to the potential role of airports in regional and LED.

Available information

Another result of the lack of integrated planning between the various spheres of government, parastatals, agencies and the private sector has been that the most appropriate and optimal infrastructural solutions are not always possible (DOT, 2005). This has major implications for time and cost efficiencies in transport and logistics. A further complication of the existing infrastructure system, one that is specifically relevant to this study, is that it largely bypasses nodes in peripheral areas (such as Upington), thereby leading to the underdevelopment of these nodes, which in turn ensures that production in these areas is largely restricted to serving internal markets because of the last-mile costs of accessing external markets (DOT, 2005).

Even though much of the NFLS focuses on rail- and road-freight transport, the document does contain a small section on air freight. Right at the start of its analysis, the document identifies a major problem regarding the air-freight industry, namely that of available information. The document states that "[T]he available information about the industry (aviation industry) is largely commissioned by vested and sectoral interests, and is targeted at furthering the particular interests of that component of the sub-sector. The available information from neutral sources is largely systemic and not of a level capable of supporting in depth analyses" (DOT, 2005:17). The lack of suitable information, too, was found to be a problem in this study.

Limited focus on air freight

From the perspective of this study, the NFLS unfortunately deals extensively with only road freight and rail freight in addition to the issue of consolidation centres (or hubs) but only within the context of these two modes. Owing probably to the size of the air-freight market and the strategy's focus on internal freight movements, no specific strategies have been developed regarding air freight or the improvement of the entire logistics and freight-transport system in the country.

Evaluating the National Freight and Logistics Strategy (NFLS)

The relevance of logistics and transport in trade and the economy has been discussed in Chapter Four. Recognising this relationship, the NFLS has developed the strategy with a view to enhancing South Africa's competitiveness in the global economy. In addition, the strategy accentuates the importance of investment in transport infrastructure (as discussed in Chapter Four) and this investment is regarded as a mechanism for preventing the perpetuation of infrastructure-related problems (such as congestion, time-related problems and system inefficiencies) in the freight-transport environment.

The NFLS deals extensively with the two main freight modes in South Africa, namely road and rail. The necessity to integrate the two modes is strongly promoted in the document, especially given that the intermodal interface situation has been identified as poor, which results in bottlenecks and inefficiencies, thereby negating the positive effects of intermodal facilities as discussed in Chapter Four. The NFLS also notes that the integration of air with road and rail is particularly constrained. This situation is exacerbated by the tendency of airlines to be passenger focused, which often results in freight being 'bumped' as discussed in Section 5.2.

When the NFLS is mirrored against the six main international logistics trends discussed in Chapter Four, two observations need to be made. Firstly, the NFLS focuses mainly on formulating a comprehensive problem statement of the logistics environment in South Africa. Unfortunately, the strategy does not report on any international trends in logistics or supply chains whatsoever, nor does it mirror the South African situation against such general trends.

Secondly, the NFLS refers to four main factors that are crucial to an efficient transport and logistics system, namely cost-effectiveness and efficiency, warehousing and storage, information technology and customer satisfaction (DOT, 2005). Although not directly linked to the six general logistics trends as identified in Chapter Four, there are certain commonalities with these trends such as the specific references to the importance of warehousing and storage, and to the importance of information technology in logistics.

The NFLS very clearly regards freight logistics as fundamental towards promoting national and regional economic development and it also highlights the fact that the less developed countries in the world are increasingly turning to freight logistics as a mechanism for achieving greater economic growth and that these countries position freight logistics "at the centre of their economic development plans" (DOT, 2005:36). In addition, the strategy states that freight logistics is a means of achieving the integration of regional economies through the harmonisation of transport systems. Although no direct reference is made to the impact and effect of logistics costs on the economy (as discussed in Section 4.6.2), the document reflects an understanding of the role and function of freight logistics in the regional and national economies. This is borne out by the statements in this paragraph.

It is interesting to note that although the NFLS understandably does not contain any specific reference to a logistics city, it does contain a number of statements that are broadly linked to some of the critical enablers of a logistics city as discussed in Chapter Three, albeit on a macro scale. The market (base enabler of the logistics city concept) forms the basis of the NFLS and the distance of South Africa from its main trading partners is regarded as a major disadvantage to the country. The absence of reference to the logistic city concept is probably indicative of both the fact that local economic planning ideas have not yet gained a foothold in the freight and logistics environment, and that the concept is a fairly new one.

Regarding the functional enablers of a logistics city, the NFLS gives prominence to the issue of infrastructure. The NFLS deals with infrastructure from a national perspective and not from a nodal perspective as is the case with the logistics city concept. The NFLS considers the existing infrastructure in South Africa to be inappropriate for the development of the country (DOT, 2005).

The importance of a proper and well-developed skills base (the workforce enabler of the logistics city concept) is addressed in the strategy, with the strategy being particularly outspoken on the fact that appropriate skills development in the freight-logistics sector has largely been ignored in the face of the fundamental changes globally occurring in the sector (DOT, 2005). Whereas a scarcity in the unskilled/semi-skilled section of the workforce has been identified in Chapter Three as a possible constraint in the workforce enabler of a logistics city, the NFLS holds a diametrically opposite view in stating that the shortage of skills in the South African logistics sector is at the highly skilled end of the workforce spectrum (DOT, 2005). The NFLS goes further and identifies skills shortages in specific fields such as high-level e-commerce skills (required by globalisation and the clustering of activities as discussed in Chapter Two and Chapter Three), data management and interface solutions, logistics and supply-chain management skills, supply-chain distribution skills and new technology skills applicable to supply-chain distribution centres (for example logistics centres). Although not referred to as such in the NFLS, these skills shortages are all applicable to the so-called knowledge workers of the modern economy as discussed in Chapter Two. The shortage of highly skilled workers in the logistics sector is significant in the sense that such skills are normally required to manage the industry efficiently and effectively. Given to the institutional dissonance and lack of integrated planning processes in the country, the inefficiencies in the South African logistics system are almost to be expected.

On a national level, the document highlights the availability of capital as an enabler for the improvement of the South African logistics infrastructure to more appropriate levels as an area of particular concern. There are strong similarities with the capital enabler of the logistics city – especially in respect of the functional responsibilities of government and the private sector. In terms of capital as a logistics city enabler, the role of the private sector is regarded to be to provide the direct capital required to finance the elements of the logistics city, while that of the public sector is seen to be to provide capital for infrastructure investment. In the NFLS, the private sector is regarded as the entity that has to invest in transport infrastructure from both a debt and an equity perspective (DOT, 2005).

In conclusion, it can be stated that from an industry perspective, the NFLS identifies the main problems in the logistics sector specifically, comprehensively and accurately. Unfortunately there are at least two main shortcomings. The first shortcoming is that the concept of clustering does not feature prominently in the document. There are a few low-level, indirect references to clusters, mainly with reference to Gauteng as the main industrial hub of the country. The absence of a prominent acknowledgement of clusters and of the role they play in the logistics sector means that the strategy does not contain any directives that could guide policy development, thereby losing the advantage of proactively exploiting and directing the development of clusters in the freight-transport system. This lessens the chances that provincial and local policies will proactively regard clustering to be part of both their freight and LED policy frameworks.

The second shortcoming is that air freight plays a minor role in the strategy. Again this creates a possible situation in which the air-freight industry continues to be left to its own devices at especially the regional and the local levels. A more formalised and integrated approach (a specific problem area identified in the NFLS, but by no means adequately addressed) to air freight in the national strategic environment may have the effect that the industry receives more appropriate attention in local freight, logistics and economic development policies and frameworks.

5.4 The LED and policy environments

In Chapter Four, attention was paid to the fact that certain cities have positioned themselves as logistics cities. Examples in this regard are Dubai (Bagaeen, 2007; Jacobs and Hall, 2007; Hesse, 2008; Hvidt, 2009), Hong Kong (Bagaeen, 2007), Zaragoza (Sengpiehl, 2010), Hamburg (Laepple, 1999; Dapple, 2000; Grossmann, 2008), Melbourne (ILSCM, 2007a; 2007b) and Duisberg (Tioga Group, 2006). A number of general papers dealing with the relationships between logistics and urban development have also appeared (Hesse, 1995; 2002; 2008; O'Conner, 2010).

In South Africa, too, a number of urban areas (mainly smaller urban areas / peripheral areas) have also attempted to position themselves as logistics areas – mostly but not exclusively linked to the availability of or the construction of an airport. Examples in this regard are Polokwane, Mafikeng, Welkom, Harrismith and Upington. Unfortunately no academic literature has reflected on these attempts. The question therefore remains whether there are potential LED benefits to be had from air transport and logistics.

The next section starts off by discussing LED in its international context. This is followed by reflections on the development of LED policy in South Africa. The section concludes with a review of LED research in the country.

5.4.1 LED: an international perspective

In developed countries, recent scholarship highlights the priority attached to LED activities. Among the prominent LED research foci are issues of local governance and promotional strategies (Coulson and Ferrario, 2007; Hackler, 2007; Park, 2003, 2005), the influence of charismatic individuals and academic consultants in shaping LED policy and LED projects (Boland, 2007; Ozcan, 2000), institutional arrangements and the importance of fostering multi-agent initiatives or partnerships (Bennett et al., 2004; Ramsden et al., 2007), the development of social capital (Evans and Syrett, 2007; Lukkarinen, 2005), and the critical role of local industrial clusters (Brenner, 2006; Holmstrom, 2006; Brenner and Gildner, 2006; Chaminade and Vang, 2007; Cooke and Lazzeretti, 2007; Tolliday and Yonemitsu, 2007). The body of research seems to indicate that both logistics in general and air freight in particular, do not play significant roles in

LED research and activities in developed countries. In order further to investigate the potential relationship between air freight and LED, this section starts off by discussing the development of LED approaches since the early 1960s as seen by the World Bank (2012) and the Gesellschaft fűr Technische Zuzammenarbeit (GTZ) (2008) (see Table 13).

Table 13: Phases in LED according to the World Bank and GTZ, 1960s – 2000s

	World Bank	GTZ
Terminology	**Wave 1**	**Stage 1**
Timeline	1960s to 1980s	Not stated
Core focus	On attracting manufacturing investment, and hard infrastructure investments	Marketing of locations to investors
Tools utilised	Massive grants, subsidised loans, tax breaks, subsidising hard infrastructure, industrial recruitment techniques	Incentive schemes, tax breaks, reducing the costs of public infrastructure
Terminology	**Wave 2**	**Stage 2**
Timeline	1980s to mid-1990s	Not stated
Core focus	Focus on manufacturing, but also on local business	Focus shifted to endogenous economic potentials.
Tools utilised	Direct payments to business, incubators, technical advice	Entrepreneurship development and training programmes, business support and business linkage mechanisms
Terminology	**Wave 3**	**Stage 3**
Timeline	From late 1990s onwards	From late 1990s onwards
Core focus	Making the entire business environment more conducive to business; soft infrastructure investments, public/private partnerships	Providing a competitive local business environment, networking and collaboration between businesses, public/private and community partnerships
Tools utilised	Adapting a holistic strategy aimed at growing local firms, providing a competitive local investment climate, networking and collaboration, encouraging the development of business clusters	Facilitating workforce development and education, focusing inward investment to support cluster growth, supporting quality-of-life improvements

Sources: GTZ, 2008; World Bank, 2012

The first wave of development, as identified by the World Bank, occurred between the 1960s and the 1980s and the focus was on the attraction of manufacturing investment, on attracting outside investment (especially attracting foreign direct investment) and on hard infrastructure investments. To achieve this, cities used tools such as massive grants, subsidised loans usually aimed at inward-investing manufacturers, tax breaks, subsidising hard infrastructure investment and using expensive “low-road” industrial recruitment techniques (World Bank, 2012). Marais (2010) also notes that during the early phases of LED, the investment in infrastructure was usually related to manufacturing. The World Bank's first wave is broadly similar to the first stage of LED development as described by GTZ.

The second wave of development, as identified by the World Bank, occurred between the 1980s and the mid-1990s (World Bank, 2012). While it saw a continuation of the focus on manufacturing, new aspects came to the fore, such as retention and the growing of existing local businesses. The emphasis was still on attracting inward investment, but this was increasingly being channelled to specific sectors or from certain geographical areas (Marais, 2010; World Bank, 2012). To achieve this focus, these cities used tools such as providing direct payments to individual businesses, business incubators/workspace, advice and training for small- and medium-sized firms, technical support, business start-up support and also some hard and soft infrastructure investment (World Bank, 2012). According to GTZ, the second phase focused on endogenous economic potentials, striving to support the competitiveness of existing firms, promoting entrepreneurship and business start-ups. The focus of the GTZ stage on creating business-linkage mechanisms displays links with the cluster concept as discussed in Chapter Three. In addition, GTZ also identified rural development and sectoral development approaches as part of their second phase, components that are absent from the World Bank typology.

The World Bank's third wave of development (late 1990s onwards) saw a shift in focus from individual, direct, firm financial transfers to one of making the entire business environment more conducive to business. During this, most recent, wave of LED, more focus is placed on soft infrastructure investments, public/private partnerships, networking and the leveraging of private-sector investments for the public good and, lastly, targeted inward investment attraction to add to the competitive advantages of local areas (World Bank, 2012). To achieve this, cities are developing a holistic strategy aimed at growing local firms, providing a competitive local investment climate, supporting and encouraging networking and collaboration, encouraging the development of business clusters, encouraging workforce development and education, closely targeting inward investment to support cluster growth and, lastly, supporting quality-of-life improvements (World Bank, 2012). According to the GTZ, its third stage of LED development focuses on providing a competitive local business environment, on encouraging and supporting networking and collaboration between businesses and public/private and community partnerships, on facilitating workforce development and education, on focusing inward investment to support cluster growth and on supporting quality-of-life improvements (GTZ, 2008).

Unfortunately, none of the World Bank waves or the GTZ stages of LED development directly incorporates the issue of logistics in their typologies. GTZ does, however, explicitly list the cluster concept, which could be applied to logistics as forming part of their typology of LED development. The overall picture is a reasonably accurate reflection of the change in the world economy from a production-dominated economy, to an economy in which services and knowledge play an increasingly important role (Marais, 2010). It is therefore not surprising that Saxenian (1989) identifies the following factors that play a role in successful regions and localities: a distinguished research centre, access to venture capital, a skilled labour force, a nearby international airport, cultural and natural amenities, and a high quality of life. It is noteworthy that some of these factors (such as the research centre, a skilled labour force and an international airport) are all elements of both the cluster concept and the logistics city concept discussed in Chapter Three. However, the high quality-of-life factor (as listed by GTZ in their third stage of LED development) forms part of the NEG concept as discussed in Chapter Two.

An important worldwide process that has an impact not only on development in general but also on LED, namely globalisation (as discussed in Chapter Three), has not been explicitly discussed by either the World Bank or GTZ as part of their phases of LED development. Given the importance of the process of globalisation, it is important to reflect on its effect on development-planning approaches, as will be discussed in the following section.

5.4.2 LED in South Africa

Despite the increasing range of LED research in South Africa (see Human et al., 2008; Malefane, 2009; Nel, 2005; 2007; Nel and Rogerson, 2005, 2007; Nel et al., 2009; Rogerson, 2000; 2006a; 2006b; 2009; 2010a; 2010b; 2011; 2012), academic literature focusing on the relationship between air transport, logistics and LED is virtually non-existent. The existing thinking and available literature are mostly in the hands of consultants in the transport industry. This section comprises three subsections. The section sets out first to trace the evolution of LED policy in South Africa. The second subsection reviews the research efforts in LED in South Africa. The third provides some reflection on LED in peripheral areas (small towns).

LED policy development in South Africa

In the period preceding 1994, heavy emphasis was given to top-down national government-directed regional policy interventions (Rogerson, 2011). One consequence was that LED activities were undeveloped. Before 1994, LED planning in South Africa was limited in scope, being confined mainly to isolated local development interventions that were pioneered by municipal authorities within the country's largest cities (Nel, 2001). After 1994, the promotion of LED initiatives emerged as a central aspect of policy and planning for both urban and rural reconstruction (Human et al, 2008; Nel and Humphrys, 1999; Rogerson, 2006a; 2011). The new emphasis accorded to LED promotion was inseparable from a need to accommodate forces of globalisation in order to ensure South Africa's re-entry into the global economy, to make the country attractive to international investors and to enhance the role of the private sector (Rogerson, 2000). However, the development of LED policy in South Africa since 1994 has been characterised by a tug-of-war between political-economic paradigms.

Nel and John (2006) provide a reasonably good overview of these conflicts in policy development with regard to LED. What is fairly clear from the assessment by Nel and John (2006) is the way in which the pendulum has swung between private-sector orientated LED and the LED driven by the public service. Early LED discourse (1990–1998) varied between the urban entrepreneurialism proposed by the Urban Foundation, proposals by the South African Civic Organisation with regard to community-based LED and proposals from the then Reconstruction and Development Programme Office on LED. Nel and John (2006:211) summarise the conflict between the three approaches in the following words: "The three organizations … differed considerably in their focus and orientation, ranging from the populist leanings of the Sanco document, to the Urban Foundation's market-focused approach, to the government's middle of the road statements".

The legislative context for LED activity in South Africa was established in 1996 with the requirement in the Constitution that local authorities implement social and economic development (Republic of South Africa, 1996). Then, in 1998, the Local Government White Paper introduced the notion of *developmental local government*. This document defines the central responsibility of municipalities as being one of working together with local communities to find sustainable ways to meet their needs and improve the quality of their lives (Republic of South Africa, 1998). Local municipalities would therefore have a critical role to play both as influential policy makers and as institutions of local democracy. It is in this regard that local municipalities today are increasingly being pressurised to become strategic, visionary and vastly influential in the way they operate. Subsequent legislation, such as the 2000 Local Government Municipal Systems Act, further defined the duties of municipalities, while the requirement that all municipalities engage in integrated development planning (with LED as a core component) ensured that LED was firmly positioned on the development agenda of local authorities (Nel and Rogerson, 2005). In many respects, these legislative developments occurred in something of a policy vacuum because, while LED was mandated, there were, at the time, no definitive policy documents on the topic and little guidance was offered to local authorities as to how they might go about implementing LED (Nel and Rogerson, 2007; Rogerson, 2008). The outcome was that many municipalities remained deeply uncertain as to what LED meant, what they were supposed to do, and how they were supposed to organise it (Meyer-Stamer, 2004).

Parallel to the policy-development processes described above, the then Department of Local and Provincial Government embarked on a range of processes to popularise the

LED concept. Nel and John (2006) argue that this led to a more pro-poor orientation in respect of LED. At the same time, the LED fund was created and implemented but with limited success (Marais and Botes, 2007; Nel and John, 2006).

Rogerson (2008) argues that the period 2005–2007 marked a significant watershed in the historical development of LED policy in South Africa because of the finalisation and release of a draft of national policy initiatives, including the 2005 Policy Guidelines (DPLG, 2005), the 2006 National Framework Document (DPLG, 2006a) and the five-year Local Government Strategic Agenda and Implementation Plan that also appeared in 2006 (DPLG, 2006b). The 2005 Policy Guidelines and 2006 National Policy Framework generally furnish a clear and sound basis for reconstituting local-authority activities surrounding LED (DPLG, 2005; 2006a). As reflected in these two documents four themes dominate the contemporary policy environment, namely, good governance, promoting competitiveness, enterprise development, and the Second Economy. Two of these policy environments, namely promoting competitiveness and enterprise development are directly in line with promoting clusters, which includes logistics clusters at airports and also sheds some light on the legislative shortcomings described in Section 5.3.1 above.

The 2005 LED Policy Guidelines provide a checklist for the responsibilities of municipalities in LED. The Policy Guidelines indicate that municipalities should develop innovative solutions to local challenges, learn to market the local area effectively, address localised socio-economic challenges and promote LED while also contributing to broader national socio-economic objectives, mobilising local resources effectively, encouraging local initiative, creating the conditions for local action to emerge, and seizing development opportunities. Of particular importance is the emphasis that municipalities should "insert the locality into the global economy as a key centre of production, investment and innovation" (DPLG, 2005:22–23). Overall, in line with international best practice, South African local government is allocated a facilitative or enabling role in LED processes (Rogerson, 2011).

The 2006 framework provides the clearest picture of the roles and responsibilities of local government in LED (Rogerson, 2008). Three core roles are identified. Firstly, the framework provides leadership and direction in policy making (having to cut red tape, having to improve the business environment). Secondly, it administers policy, programmes and LED projects, and, thirdly, it is the main initiator of economic development through public spending, regulatory powers and the promotion of industrial, small-business development, social enterprises and cooperatives (DPLG, 2006a).

Beyond the policy activities of DPLG, LED is also impacted by a number of other significant policy developments, including the Department of Trade and Industry's Accelerated and Shared Growth Initiative (DTI, 2005), the National and Industrial Policy Framework (DTI, 2007), the National Spatial Development Perspective (The Presidency, 2006; 2007), the Integrated Small Enterprise Development Strategy (DTI, 2006a), and the Regional Industrial Development Strategy (RIDS) (DTI, 2006b).

An important theme for LED is the relationship or linkages of LED within wider spatial planning frameworks that have emerged and grown in significance over the past few years in South Africa. The most significant policy document that sets a framework for spatial planning in South Africa is the 2006 National Spatial Development Perspective (NSDP) (The Presidency, 2006). The NSDP constitutes a foundation document for spatial planning and, overall, it describes government's spatial development vision and sets out the normative principles that underpin this vision. Moreover, the NSDP is a key framework designed to inform the respective development plans of provincial and local government in terms of, respectively, Provincial Growth and Development Strategies (PGDS) and local Integrated Development Plans (IDPs) (Rogerson, 2008). The 2006 NSDP must also be considered as an overarching framework for LED planning. In terms of planning principles, the NSDP is committed to achieving 'people-equity' rather than spatial equity in South Africa (The Presidency, 2006). Importantly for LED activities, the NSDP argues that government spending on fixed investment should be focused on identified areas/localities of economic growth and/or economic potential (Rogerson, 2008). By contrast, in those localities with low economic potential, the government should focus on the provision of essential services, concentrate both on human-capital development, poverty-relief programmes, and moreover reduce migration costs by providing information to enable outmigration (Van Rooy and Marais, 2012) to regions of higher economic potential (The Presidency, 2006; 2007). Specifically, the NSDP raises the importance of LED strategies in those parts of the country classed as ‘low economic potential’, which includes much of small-town South Africa and its vast rural areas (Rogerson, 2008). The focus of the NSDP on people-equity rather than on spatial equity, supported by the provision of essential services and poverty-relief programmes may result in municipalities not rigorously pursuing the responsibilities reflected in the 2005 policy guidelines (most notably those only imploring municipalities to “insert the locality into the global economy as a key centre of production, investment and innovation”). Also, this focus is cause for concern in that the role that clusters and, specifically, logistics clusters in peripheral areas (which would include air-cargo hubs) may play in addressing the freight-system inefficiencies − as stated in the NFLS and discussed in Section 5.3.1 above − may be overlooked. The principles of the NSDP have been challenged in existing literature (Atkinson and Marais, 2006; Marais, 2006; Van Rooy and Marais, 2012), the main point of criticism being the predetermined nature of potential that has a negative impact on small-town LED initiatives.

Another important document against which to mirror LED strategies is the National Development Plan (NDP) (NPC, 2011). The vision statement of the NDP has as its main focus the elimination, by 2030, of poverty and inequality. This echoes some of the planning principles of the 2006 NSDP, such as poverty-relief programmes to be implemented in areas of low economic potential. The NDP recognises the importance of transport in the economy by stating that government will ensure that investments in the transport sector will enable economic development by supporting the movement of goods from points of production to points of consumption, thereby facilitating regional and international trade (NPC, 2011). The NDP states that South Africa is a transport-intensive economy and that the country’s comparative advantages in resources are rapidly being eroded by high transport costs. This indicates a realisation of the effect of high transport costs on the economy, even if the NDP does not specifically comment on the high cost of logistics to the South African economy, a point discussed in Section 5.2.3

above. The focus of the NDP is on land-freight transport (road and rail) and specifically on increasing the capacity of the main corridors, while also simultaneously seeking to improve the performance of ports and inland terminals, which it recognises to be a priority. The NDP is silent on the role of logistics (not just transport) in the economy, as it also is on air freight and airports as freight terminals (NPC, 2011).

According to Rogerson (2011), the growth of LED in South Africa over the recent past is broadly consistent with the 'new regionalism' or 'new localism'. The concept of industrial clusters has been particularly influential in the new regionalism (Cooke and Morgan, 1998; Gordon and McCann, 2000; Turok, 2010). As discussed in Chapter Two and Chapter Three, the core idea is that proximity between firms helps personal relationships to develop and builds trust. Local business networks promote a sense of shared interest and encourage longer-term thinking and greater risk-taking. Firms act together for mutual benefit through business associations that provide common support services and encourage innovation. The result is local-sector clusters that enjoy distinctive and differential advantages over other places. The public sector can assist by providing supporting finance and infrastructure to strengthen these networks. Local universities and investors can also help to translate scientific research into commercial products and processes, which, in broad terms, links to the logistics city concept as discussed in Chapter Three. South Africa's draft Regional Industrial Development Strategy (DTI, 2006b) in aiming to establish unique programmes in each region to develop local sector strengths through bottom-up partnerships with the private sector, reflects these ideas.

Against the above background, Rogerson (2010a) has identified thirteen strategic challenges for LED in South Africa. He argues that there is still a fair amount of ideological cluttering of LED between market-driven and community-based approaches. Furthermore, there seems be limited integration and cooperation between LED stakeholders from DPLG, DTI and the Industrial Development Corporation. Rogerson (2010a) moreover argues that the appropriate scaling of LED is not well understood, saying that much more can be done to create cooperative environments between local and regional role players. Closely linked to the scaling of LED, Rogerson (2010a) suggests that there is room to reinvigorate the role of provinces. He also argues that there is a need to reduce the gap, in LED practice, between cities and small towns. Other themes, which, according to Rogerson (2010a), should receive urgent attention in policy, are the dissemination of LED practice, an appropriate understanding of the role of the private sector, the urgent need to take LED more seriously, the building of LED networks and sustainable knowledge platforms, LED capacity training, LED funding, the availability of appropriate data, and, an appropriate link between LED and the Second Economy.

A review of LED research in South Africa

Rogerson and Rogerson (2010:471) argue that "[O]ver the past 15 years South Africa has become a laboratory for LED practice and research in Africa". Against the significant body of literature that has appeared on LED in South Africa, Rogerson and Rogerson (2010:471), in what are key observations regarding research trends, firstly argue that LED research has been dominated by empirically and pragmatically orientated research and that theoretical research has consequently been limited: "The bulk of writings engage with policy development and critical evaluative research on unfolding LED activities in particular localities, with a view to advancing the practice of LED". In this respect LED policy development (as outlined in the previous section) has been one of the hotly debated aspects of the body of academic literature on LED (Nel, 2001; Nel and John, 2006; Rogerson and Rogerson, 2010). Secondly, Rogerson (2000) and Rogerson and Rogerson (2010) acknowledge that the dominant successes achieved by cities in South Africa that have followed the notion of place entrepreneurialism is in line with North American and Western European experiences. Many of the said initiatives were geared towards positioning cities like Johannesburg and Cape Town as 'world cities' (Gibb, 2007). Thirdly, LED advantages of tourism and urban restructuring have received some attention. Finally, Rogerson and Rogerson (2010:472) are fairly pessimistic about LED in small towns, concluding that "[S]uccessful LED programmes, however, have proven elusive in most small towns and rural areas …"

LED in small towns

Historically, research on small towns has not received much attention. In as early as 1982, Van der Merwe (1982) already noted declines in small urban areas, while in the early 1990s, Dewar (1994) saw the need for the reconstruction of small towns. Since then there has been a steady increase in literature on small towns. A recently published book on small towns in Africa – in which most of the papers are on small towns in South Africa – reflects inter alia on some of the LED successes in small towns (Donaldson and Marais, 2012). In this regard Hoogendoorn and Nel (2012:21) note that "… many small towns have found new roles in the post-industrial era as tourism centres and retirement villages, while others, sadly, appear to be in a long-term spiral of economic decline". It should be noted that one of the first reflections on LED in post-apartheid South Africa came from an assessment of LED in the small town of Stutterheim (Nel, 1994). A number of themes have since emerged in respect of LED in small towns in South Africa. Some of the most prominent themes in respect of small town research are:

- The notion of community-based LED (Binns and Nel, 1999; 2002a; Nel, 1997; Nel and Binns, 2002; Nel et al., 2009; Van Rooy and Marais, 2012)
- The role of social capital (Nel and Mcquaid, 2002), government planning, investment and LED (Human et al., 2008; Van der Merwe et al., 2005)
- Small towns and policy-related issues (Van Niekerk and Marais, 2008)
- Mine downscaling and its impact on small towns (Binns and Nel, 2001; 2002b; Marais et al., 2005; Nel and Binns, 2002; Nel et al., 2003; Pelser et al., 2012) and, in some cases, the possible impact of new mining opportunities (Van Rooyen, 2012)
- General reflections on struggling small towns (Nel, 2012; Xusa, 2005; 2007)
- The development of niche areas such as book towns (Donaldson and Vermeulen, 2012)
- Small-town redevelopment (Gibb and Nel, 2007)
- Tourism (Atkinson, 2012; Donaldson, 2007; Halseth and Meiklejohn, 2009; Ingle, 2008; Marais, 2004; Marais et al., 2012; Nel and Binns, 2002; Rogerson, 2007; Spenceley and Goodwin, 2007; Toerien, 2012)
- The business environment (Rogerson, 2010b; 2012)
- The role of the natural resource base in small-town development (Ferreira et al., 2007)

- The relationship between transport infrastructure and small-town development (Ingle, 2012; Van Staden and Marais, 2005).

A recent, new theoretical contribution comes from the work of Hoogendoorn and Visser who have managed to link some successful small-town developments around tourism to the concepts of post-productivism and second homes (Baker and Mearns, 2012; Hoogendoorn and Visser, 2010; Hoogendoorn et al., 2009), while Toerien and Marais (2012) have shown that a number of towns have managed to position themselves and have benefitted from tourism activities. However, Hoogendoorn and Nel (2012) rightfully ask whether the benefits some small towns have received from second-home investments can be replicated. The link between small-town development, freight, logistics and air freight seems to be absent from the research agenda on small towns.

Small-town development in South Africa has been hampered by a range of factors. Nel (2005) has outlined the following key challenges in respect of small towns:

- A demise of rail transport leading to a decline in growth of small towns.
- A decline in agricultural output combined with a switch to game farming, resulting in a decline in the growth of the dependent towns.
- The loss of local government functioning of some small towns after the amalgamated local government system came into effect in 2000
- Improvements in the transport sector have caused many small towns to lose their functions as rural service centres. In many cases, town residents and inhabitants of the rural hinterland bypass their nearest town to larger urban settings for a range of commercial and other activities.
- Former mining towns (single-resource towns) have in some cases struggled in that the main reason for their existence closed down.

Other reasons for the economic decline of small towns relate to the slow pace of land reform, an inability to emphasise sustainable local economies, weak local government capacity, resource constraints, absence of guiding policies, a lack of local political and institutional mechanisms and limited engagement with local economic potential (Binns and Nel, 1999; Nel and Rogerson, 2007). Certainly, within the African context, planning for LED in South Africa is the most advanced and the longest established LED planning (Nel, 2007). The 2006 survey of LED in South African small towns revealed that despite nearly a decade of government encouragement, only 48% of small towns had developed a defined LED policy, only 56% established some form of LED unit, and only 12% had a councillor with LED responsibilities (Nel and Rogerson, 2007). Smaller local authorities, as a whole, place a much stronger, if not exclusive, emphasis on 'participation' by marginalised communities in LED rather than by the private sector (Rogerson, 2011). Furthermore, huge infrastructure backlogs and low tax bases have caused public administration in much of small-town and rural South Africa to focus only on meeting immediate needs in terms of provisioning basic services (Cohen, 2010; Human et al., 2008). An assessment of the small town LED successes furthermore indicates that most of the success stories in this regard are not related to government institutions but rather to communities, individuals, the private sector or partnerships. Despite some work internationally on the role of regional and rural airports (Donehue and Baker, 2012), and some attention, in South Africa, in the form of consultancy reports, the role of airports, freight and logistics in LED has received no attention in work of an academic nature.

5.5 Conclusion

This chapter has attempted to answer three questions: What are the characteristics of air freight and logistics in Africa and South Africa? What does logistics policy say in this regard? Are there LED opportunities beyond those in the core urban centres of South Africa? It was demonstrated in the chapter that the freight-transport system is fraught with inefficiencies, a situation that is explicitly acknowledged and analysed in the NFLS. Although not clearly stated as such in any of the policies or research consulted and discussed in the chapter, I have argued that these inefficiencies contribute to the high cost of logistics in the country. I have also indicated that air freight and logistics are virtually absent from any LED policies, including those of small towns. One wonders why this is the case, especially given that there is seemingly an existing enabling environment for logistics in the country.

The enabling environment is firmly established. In 2006, the South African Government, in its Accelerated and Shared-Growth Initiative of South Africa identified logistics as a potential hurdle that may limit future growth in the industry. Moreover, the NFLS (2005) was developed specifically for the logistics industry in South Africa. In addition, LED is also firmly entrenched at the local municipality level.

Some inhibiting factors have been identified. The first inhibiting factor is institutional dissonance. The NFLS recognises that a significant portion of the freight-system inefficiencies can be attributed to the complex institutional structure of the freight industry. There are overlapping areas of functionality between government and its state-owned enterprises in areas such as policy development and regulation of the industry. This situation is further exacerbated by the mixture of open competition (as in air and road freight) and monopolies in the rail and port sectors. There seems to be a tendency to allow the private-sector freight operators to do as they please without clear direction from the national level in terms of policy direction regarding improvement in the freight-logistics system.

A second inhibiting factor that actually flows from the institutional dissonance-inhibiting factor is one of a lack of integrated planning between the spheres of government, parastatals, agencies and the private sector. The NFLS has identified this lack of integrated planning on the strategy, policy, planning and forecasting levels to be prevalent at both the national and the regional level. This situation results in a disjuncture between national plans and regional planning that manifests itself in unequal infrastructure development. This lack of integration is also evident between specific LED stakeholders, such as DPLG, DTI and the Industrial Development Corporation. Without a proper vision with which proactively to strive towards integrated planning on all levels, peripheral areas will probably suffer more than will urban areas in this regard.

A third inhibiting factor is that, although the importance of logistics in the efficiency of the freight-transport system is acknowledged in the NFLS, there seems to be a lack of appreciation of this role in the lower spheres of government, especially within the LED environment. This is evident in the lack of research, and especially of theoretical research (as discussed in Section 5.4.2 above) in the field of logistics in LED. The pro-poor focus of LED practice, as discussed above, may further add to the lack of attention being paid to logistics and freight transport in LED policy and strategy.

A fourth inhibiting factor, particularly with regard to the air-freight environment, is that of a lack of information that makes effective and integrated planning much more difficult. The annual State of Logistics Survey published in South Africa provides a sound basis for the state of the industry on a national level and it provides very useful time-series information for mostly road and rail. However, similar information on a regional and local level is virtually non-existent and such information as does exist is mostly in the hands of parties with vested interests who do not make the information readily available.

A fifth inhibiting factor concerns the location of peripheral areas specifically. Geographical distance to markets is a major problem confronting such areas, and the focus on logistics is mostly on the operational side of the collection and distribution of products. As far as the logistics industry itself is concerned, it is very seldom regarded as a possible strategic and growth industry from the perspective of globalisation and clustering. The LED climate is thus often not conducive to the development of logistics clusters in suitable peripheral areas. The industry often loses sight of the fact that geographical distance is mostly not that important under certain conditions, particularly since the products transported by this mode are mostly high-value goods. The skills level of the workforce in peripheral areas has been identified as a possible constraint for the development of the logistics industry in general. However, since almost all operational activities in the industry relevant to air freight are undertaken by private-sector companies, the quest for highly skilled workers is not regarded as a main detractor.

What is clear from this chapter is that logistics costs in South Africa are high and that the eradication of freight-system inefficiencies will go a long way towards reducing these costs. However, it has also transpired that logistics and particularly air freight do not feature prominently in LED research and that much of the research currently being undertaken in the field is being done by private-sector consulting companies. Given the current interest in the development of the UIA as an air-cargo hub, Upington will, in the next chapter, be used as a local case study to explore the status of logistics and air freight within the LED environment in the town.

6 LOGISTICS, AIR FREIGHT AND LOCAL ECONOMIC DEVELOPMENT IN UPINGTON

6.1 Introduction

The previous chapter revealed that although LED initiatives have been prominent in post-apartheid South Africa, logistics in general and air freight in particular have not received significant attention in policies and strategies, especially at the local government level. This problem seems particularly relevant to the local economic environment of Upington, which falls within the //Khara Hais Local Municipality. Even though there are clear references to a cargo hub at UIA in the LED and Incentive Plan (//Khara Hais Local Municipality, 2010) of the //Khara Hais Local Municipality, there seems to be a lack of understanding both of how cargo airports function and of the logistics and air-freight environments. This lack of understanding manifests itself in the obvious absence of a properly defined vision or development framework for the airport as they pertain to logistics centres and air-cargo hubs. The aim of this chapter is therefore to investigate the attempts from //Khara Hais Local Municipality, the Northern Cape Province and also ACSA – as the owner of the UIA – to position Upington as a freight and logistics node.

The chapter starts off by providing an overview of the history of Upington, then turns to mirroring Upington within the provincial socio-economic profile. The emphasis next shifts to a discussion of the developments and strategic thinking around the UIA. The chapter concludes with a number of comments in relation to the current attempts to use the UIA as an LED initiator for the economy of the region.

6.2 History and development of Upington

Upington can best be described as a bustling Kalahari town and is indeed an emerald oasis on the banks of South Africa's largest river, the Gariep. It is both a holiday town, with all the amenities required for the many tourists who stay over in Upington, and an agricultural hub for one of the most intensive sultana grape farming areas in the country. It is located in an arid, sandy region of South Africa with an average annual rainfall of less than 200 mm (DWAF, 2012). Upington is well known for its heat with summer temperatures often rising above 40 degrees Celsius.

The following section traces the history of the town since its establishment in the 19th century.

6.2.1 The first settlement

Upington is located in what was once (in the mid-19th century) colloquially known as Koranaland, an area mostly inhabited by indigenous Koranna people. Their soil stretched from Augrabies roughly north to a place called Kheis in what is today known as the independent country of Botswana (Cornelissen, n.d.). The spot on the river where the town of Upington has grown was originally a drift crossing for people, animals and later ox wagons (Lange, 2006). White hunters and traders called the place Olyvenhoutsdrift after the proliferation of wild olive trees in the area. The Koranna people who inhabited the immediate area where Upington is today located called it //Khara Hais, which in the Nama language means 'the place of trees' or 'the place of the big tree'. This, apparently, refers to a large tree under which the Koranna leader Klaas Lucas had his kraal (//Khara Hais Local Municiaplity, 2010).

The history of what is today known as Upington originated in the mid-19th century when the distant and poorly protected northern areas of the Cape colony were the home of cattle thieves, miscreants and criminals who terrorised the local population and settlers (Erasmus, 2007). The islands in the Gariep River were very popular hiding places for these people. The area at the time was sparsely populated by some Khoikhoi clans and a few white settlers. A prominent local Khoikhoi chief called Klaas Lukas (some sources, for example Green (1948) refer to Klaas Lukas and his people as Basters) lived close to a place known as Olyvenhoutsdrift. Lukas, who grew up in a mission station, realised the value of being able to read and write (Southafrica-travel.net, 2012). As early as 1860 he tried to obtain the services of a teacher to teach his people to read and write (Cornelissen, n.d.). Lucas also expected protection against marauding Khoikhoi groups from neighbouring areas (Southafrica-travel.net, 2012). Lukas persisted in his efforts to obtain a teacher to teach his people to read and write and, in June 1870, the first official missionary visit was paid to the area of Olyvenhoutsdrift (Cornelissen, n.d.). After this visit, Chief Lukas agreed to donate some land to the church for establishing a mission station. On Sunday 21 May 1871, the first official church service was held at Olyvenhoutsdrift (Cornelissen.d.). In 1871, Reverend Christiaan Schröder was sent from Cape Town to the Orange River to formally establish the Olyvenhoutsdrift Dutch Reformed Mission station (Erasmus, 2007; Olivier, 2005). The first service in the newly completed church was held on 11 September 1885 (Cornelissen, n.d.). The original mission station now houses the Upington town museum, known as the Kalahari Orange Museum.

Shortly after the establishment of the Mission, various pioneer settlers including the well-known irrigation engineer, Japie Lutz (Olivier, 2005), and the Reverend Schröder realised that the area was ideal for irrigation development and the first irrigation canals were hand-dug in 1880 – some of which are still in use today (DWAF, 2012). Since then, Upington grew rapidly and became the main commercial, agricultural and educational centre of the northern parts of the Northern Cape Province. Japie Lutz constructed the first proper house in the settlement of Olyvenhoutsdrift in 1882 (Green, 1948).

6.2.2 Olyvenhoutsdrift settlement becomes Upington

In 1879, after the second and last Korana War, Sir Thomas Upington, Attorney-General of the Cape Colony, sent 80 policemen to Olyvenhoutsdrift to maintain law and order along the river. By 1885, formal barracks had been built where later the first formal police station was erected (Southerncape, 2012). In 1884, Sir Thomas Upington visited the settlement of Olyvenhoutsdrift (Erasmus, 2007; Olivier, 2005). The settlement was forthwith renamed Upington in his honour (Green, 1948).

Reverend Schröder was never in favour of the establishment of a formal town at the mission station. On 11 February 1884 he mentioned in a letter that he wished that Upington would not become a town, but would remain a missionary station (Cornelissen, n.d.). This was also, reportedly, the first time that Schröder used the name of Upington. On 31 August 1886, Reverend Schröder wrote that the mission station was then formally known as Upington and that the different inhabitants lived in harmony (Cornelissen, n.d.). In another letter, Reverend Schröder wrote on 24 March 1893 that Upington was no longer a mission station but a town, with six general trading shops, a hotel and two canteens (Cornelissen, n.d.). Upington was afforded municipal status in 1898 (Erasmus, 2007).

6.2.3 From mission station to present-day regional centre

As long ago as 15 August 1883, and even before Upington was accorded municipal status, Reverend Schröder started the construction of the Upington Channel, later known as the Orange River Project (Cornelissen, n.d.). This undertaking was probably the first step in transforming the settlement of Upington from a mission station to a fully fledged regional centre. The project culminated in a final phase costing R500 million, which was opened by the then Prime Minister, Mr BJ Vorster, on 18 November 1966. The completion, in 1966, of the last phase of this project increased the agricultural production around Upington considerably and had an obvious impact on the growth of the town.

The central business district of Upington has developed gradually along the banks of the Gariep River (then called the Orange River) since the building of the mission station in 1873. Because of certain physical limitations, like the Gariep River in the east and the railway line in the north, the business district has expanded westwards (//Khara Hais Local Municipality, 2012). Upington has well-developed, large bulk infrastructure facilities that provide the town with water, drainage, electricity and good access to the road network. Over time, smaller suburban shopping centres developed in all the residential areas. The shops in the suburban centres are mostly capable of providing residents of the surrounding residential areas with their day-to-day necessities. Informal traders concentrate mainly on the central business district and on high-activity nodes like taxi ranks, street crossings and main traffic routes (//Khara Hais Local Municipality, 2012). A large number of major regional economic role players have their offices in Upington. Among these are the Oranjerivier Wine Cellars and the SA Dried Fruit Co-operative (SA Venues.com, 2012).

Upington has a well-defined business centre with numerous residential areas spread out over the rest of the municipal area. Secondary economic activities in the area are mainly light industries, warehousing and light engineering works. Upington has two industrial areas located on the northern and the south-western sides of the town. These two areas, commonly known as Updustria and Laboria, have access to railway facilities. Although growth in these two areas has taken place gradually over a protracted period, the premises in Updustria are used to 90% capacity, while those in Laboria are used to 74% of capacity. Although there is a large variety of industries, there is, however, a shortage of manufacturing industries (//Khara Hais Local Municipality, 2012).

Over time, Upington has developed into a modern, bustling regional centre with all the facilities and amenities to serve a large hinterland as many other small towns also do (Marais and Donaldson, 2012). The //Khara Hais Local Municipal Area currently has seven high schools and 23 primary schools. In addition, there are also a number of institutions of higher education that have campuses or satellite campuses in the town, namely, the Northern Cape Rural FET College, the Vaal Triangle University of Technology, the Universal College Outcomes and the Technikon SA (//Khara Hais Local Municipality, 2012). As for medical facilities, the //Khara Hais Local Municipal Area boasts two hospitals and eleven clinics. The Provincial Department of Health also renders primary health services to eleven areas. Over and above the facilities already mentioned, Upington has four police stations, a bomb squad, a dog unit and a satellite police station that all provide services to the community. Formal sports facilities include a golf course, three swimming pools and eight formal sports fields.

Unfortunately, much of present-day Upington is fast losing its former charm with every old building being razed to make way for other, modern ones. The once unpredictable Gariep has been tamed, its banks contained and, sadly, polluted with the detritus of present-day good living. The wide streets, laid out so that a wagon with a full span of oxen can comfortably turn around in them are the only legacy of the past. Nevertheless, Upington is the main town of the //Khara Hais Local Municipality and has, since its inception, developed into a regional hub that serves a large hinterland from where many people travel to Upington to have their needs filled. In the minds of the broad South African community Upington fits a number of broad descriptions and perceptions, such as ‘portal’ to Namibia , ‘frontier’ to the Kalahari and Kgalagadi Transfrontier Park, ‘oasis in the desert’, ‘agricultural hub’ of the Northern Cape and ‘portal’ to the Kalahari’s hunting grounds.

6.2.4 Upington's economic base

Today Upington is an important commercial and agricultural centre serving farms along the Gariep River. Much of Upington's economy is based on agriculture. The fact that Upington is situated on the banks of the largest river in South Africa undoubtedly contributed to its strong agricultural base. Vineyards are prevalent around the town and are irrigated from the river with kilometres of pipes. The grapes are exported as table fruit, pressed to wine or dried as raisins. The Oranjerivier Wine Cellars is the largest co-operative in the country and processes up to 110 000 tons of grapes each season (Olivier, 2005). More than 10% of South Africa's vineyards or 23.5 million vines are cultivated along the lower Gariep River. Products are distributed to the United Kingdom, Germany, Japan, Canada, Switzerland, the Scandinavian countries and Argentina (NCPG, 2012).

Upington is also the centre of the country's dried-fruit industry. The dried-fruit factory at Upington is the second largest of its kind in the world (Olivier, 2005) and is primarily known for its sultanas produced from the sultanina grape, which has been grown along the lower Gariep River since 1918 (Olivier, 2005). Other crops include cotton, lucerne, groundnuts, peas and lentils. The district used to produce the bulk of South Africa's karakul lamb pelts before the social ban on animal products made karakul farming unprofitable.

6.2.5 Provincial perspective

The aim of this section is to mirror Upington's socio-economic profile against that of the Northern Cape Province. Although Upington's economy is mainly associated with agriculture, it is surrounded by a province richly endowed with important mineral deposits that include diamonds, copper, manganese, iron ore and small quantities of nickel, lead and zinc. Despite the largely semi-arid and arid environment in the province, the fertile land that lies alongside the Gariep and Vaal rivers supports the production of some of the country's finest quality agricultural products. Wheat, fruit, peanuts, maize and cotton are produced at the Vaalharts Irrigation Scheme near Warrenton. The province has become a major exporter of table grapes produced along the Gariep River (Upington, Kakamas and Keimoes) and is internationally renowned for the quality of the meat – Karoo lamb, ostrich, beef and venison – produced in the province. The Northern Cape is also well known for the production of wool, mohair and karakul pelts, dates, citrus products, wine and raisins (NCPG, 2004).

In 2001, the Northern Cape had the smallest provincial population in the country of 822 727 (1.8% of the population of South Africa) at an average density of 2.27 persons per km^2. Nearly 83% of the population in the Northern Cape resided in urban areas, while only 17.3% resided in rural areas (StatsSA, 2001). According to the 2011 mid-year population estimates there was a slight increase in population since 2001 to 1 096 731 (or 2.7% of the estimated RSA population). The population pyramid indicates that the Northern Cape population can be classified as a young population, with 57.7% of the population being younger than 30 years old (NCPG, 2004). This percentage increased slightly to 58.4% in 2011 (StatsSA, 2011a). An apparent trend among people in the 20–24 cohort is that those in this age group are moving to other provinces in search of a better career, better job opportunities and tertiary education (NCPG, 2004). There is also a trend for people to move from the more rural areas to the larger towns where access to opportunities and services are significantly better.

That the Northern Cape economy is a minor contributor to the South African economy is evident from Table 14, which offers an overview of the economy of the Northern Cape by comparing the provincial economy with the national economy and by comparing the economy of //Khara Hais Local Municipality with that of the provincial economy.

Table 14: Gross value added by region (GDP), 2010 prices (xR1,000.00)

Sector	National	Northern Cape	National Total	Northern Cape % of SA	Northern Cape industry % to prov GDP	//Khara Hais Local Municipality (sector % of Northern Cape)	//Khara Hais Local Municipality (% to provincial GDP)
Agriculture	58,644,330	3,795,964	2.20	6.47	5.97	12.81	11.48
Mining	227,117,111	16,187,173	8.53	7.13	25.45	0.62	2.36
Manufacturing	332,469,720	1,458,333	12.49	0.44	2.29	10.98	3.78
Electricity	71,403,410	1,903,241	2.68	2.67	2.99	6.22	2.80
Construction	102,801,254	1,320,886	3.86	1.28	2.08	9.83	3.07
Trade	342,749,690	6,956,491	12.88	2.03	10.94	9.21	15.13
Transport	203,673,000	4,159,833	7.65	2.04	6.54	6.75	6.64
Finance	522,047,960	7,823,853	19.62	1.50	12.30	9.87	18.24
Community services	551,584,330	13,879,793	20.73	2.52	21.82	6.94	22.76
Total industries	2,412,490,805	57,485,568	90.65	2.38	90.36	6.35	86.25
Taxes less subsidies on products	248,944,000	6,129,349	9.35	2.46	9.64	9.50	13.75
Total (GDP)	**2,661,434,805**	**63,614,917**	**100.00**	**2.39**	**100.00**	**6.66**	**100.00**

Source: IHS Global Insight, 2012.

Table 14 indicates that the economy of the province contributes only 2.39% to the South African economy. Agriculture and mining are the only sectors to contribute more than 5% to the South African agriculture and mining sectors at 6.46% and 7.13%, respectively. These two sectors are also major contributors to the provincial GDP at respectively 5.97% and 25.45%. Of concern to the air-freight industry, which focuses on high-value items, is that the manufacturing sector in the province is the second smallest contributor (after construction) to the provincial GDP at 2.29%, which is in contrast to the national contribution of the sector of more than 12% (12.49%). Although the Northern Cape Province has the smallest economy of the nine provinces, the GDP of the province per capita is generally higher than the national average (NCPG, 2004).

The economy of Northern Cape is heavily dependent on the primary sectors of the economy, which in 2002 made up 31.0% of the GDP of the province (NCPG, 2004). This percentage increased to nearly 34% (33.71%) in 2010 (Table 14). The exceptional mineral wealth of the Northern Cape Province has ensured the importance, both nationally and internationally, of the province's mining industry. The minerals economy of the Northern Cape is 150 years old and yet it still today remains the mainstay of the provincial economy.

At the local level, the //Khara Hais Local Municipality is a small contributor to the Northern Cape provincial economy at 6.66% (Table 14). At the sectoral level, agriculture contributed 12.81% to provincial agriculture, with manufacturing contributing nearly 11% (10.98%) to provincial manufacturing. At the local municipal level, agriculture in //Khara Hais Local Municipality is the third largest contributor – at more than 11% (11.48%) – after the finance and trade sectors. Manufacturing in //Khara Hais Local Municipality contributes less than 4% to the local economy.

There are two relatively simple analytical tools that are commonly being used in regional economic analyses to obtain further insight into a region's economy, namely the tress index and the location quotient. The *tress index* measures the levels of diversification or concentration of the region's economy on a scale of zero to one. A tress index value of 0 indicates a totally diversified economy while an index closer to 100 indicates a concentrated economy. The latter is vulnerable to exogenous shocks, such as the international business cycles (for example price fluctuations) and adverse climatic conditions (for example droughts) (DBSA, 2001). The tress index of the Northern Cape, which was calculated at 53.8 in 2004 (NCPG, 2004), indicated an over-dependence on only a few economic activities, particularly mining, government services and agriculture at the time, but improved slightly to 48.59 in 2010 (IHS Global Insight, 2012). This value should be seen against the tress index value for South Africa of 40.75 in 2010 (IHS Global Insight, 2012). Interestingly, //Khara Hais Local Municipality has a tress index value of 46.31 (IHS Global Insight, 2012), which indicates that the local economy is slightly more diversified than the provincial economy. When an economy is diversified, it means that the local economy is not particularly dependent on or dominated by a single economic sector, which also prevents the entire local economy from being vulnerable to changes occurring in one specific sector.

The second analytical tool is the location quotient (LQ). Following accepted economic theory, a LQ greater than one indicates that an area has a proportionally larger number of workers employed in a specific industry sector than does the larger comparison area (DBSA, 2001). This implies that an area is producing more of a product or service than is consumed by its own residents. The excess is theoretically available for export to beyond the area. An LQ of at least 1.25 is required to consider classifying an area industry as an exporter. Still, an LQ greater than 1.25 does not necessarily mean that an area industry is exporting – there may simply be excessive local demand.

Identifying area export industries (LQ > 1.25) is useful in that it provides a measure of the extent of industry specialisation within an area. A high LQ in a specific industry may translate into a competitive advantage in that industry for the specific local economy. Economic development opportunities may exist for additional growth of the exporting or related industries because of the presence of an existing skilled-labour pool or other resources such as suppliers, facilities or transportation hubs in the region. An LQ significantly less than one may indicate an opportunity to develop businesses in the local area to meet area demand. Table 15 below reflects the location quotients for South Africa, the Northern Cape and also the //Khara Hais Local Municipality by economic sector.

Table 15: Location quotient (LQ) by economic sector, 2010

Economic sector	South Africa	Northern Cape	//Khara Hais Local Municipality
Agriculture	1.00	2.72	5.48
Mining	1.00	2.99	0.29
Manufacturing	1.00	0.18	0.32
Electricity	1.00	1.12	1.10
Construction	1.00	0.54	0.83
Trade	1.00	0.85	1.23
Transport	1.00	0.86	0.91
Finance	1.00	0.63	0.98
Community services	1.00	1.06	1.15
Total industries	1.00	1.00	1.00

Source: IHS Global Insight, 2012.

The table clearly reflects the dominance of agriculture both in the province and in //Khara Hais Local Municipal Area. The relatively low LQ for manufacturing is an indicator that the Northern Cape is a net importer of such goods. These figures are supported in that the Northern Cape is a low exporter, with only 1.6% of its GDP being generated by exports; //Khara Hais Local Municipality fares significantly better, with 3.7% of its GDP being generated through exports (IHS Global Insight, 2012).

Given the relatively low contribution of the Northern Cape to the economy of South Africa and especially the low manufacturing output, it is important to form some idea regarding the likely freight volumes in the province as an indication of possible locally generated freight. There is, generally, a dearth of freight-volume information in South Africa and it seems as such information as is available is mostly obtained from intricate volumetric modelling techniques. In deriving freight-volume estimates for the Northern Cape (as reflected in Table 16), a methodology based on GDP growth rates was adopted.

The link between the growth in the economy and the growth in freight volumes has been established in Chapter Three. This is further supported by a number of reputable research reports (CSIR, 2011) and consultant reports (Blue IQ, 2011; DTRPW, 2009). The basic methodology entails escalating a base volume of the selected economic sector(s) to the desired year based on the general GDP growth rates of the relevant level of the economy over the period under consideration. The three economic sectors generally responsible for the largest freight generation are agriculture, mining and manufacturing. In Table 16 below, the freight volumes for the three economic sectors are estimated based on the relative GDP growth rates and the relative economic contribution of each economic sector to its particular geographical level. The base year is 1998 and the freight volumes for 2010 are estimated.

The purpose of the estimate is to obtain likely freight volumes for the Northern Cape Province, the Siyanda District Municipal Area as well as the //Khara Hais Local Municipal Area (the latter two being the areas in which Upington and the UIA are situated). The average provincial growth rate of 1.92% over the period 1998 to 2012 was obtained by calculating the weighted average based on constant 2000 prices (1998 to 1992) and the constant 2005 prices (1992 to 2010) (StatsSA , 2011b). For comparative purposes, the 2010 freight volumes for South Africa were also determined.

Table 16: Estimated 2010 freight volumes for Northern Cape, Siyanda District Municipality and //Khara Hais Local Municipality

Region	Geographical level	Sectors	% split per sector	Average % growth of province @ 1.92	
				1998 (tonnes)	2010 (tonnes)
South Africa	National GDP	% of National	**100%**	**1,165,206**	**1,730,328**
		% of three sectors	**23.22%**	**270,561**	**401,782**
		Agriculture	2.20%	25,635	38,067
		Mining	8.53%	99,392	147,597
		Manufacturing	12.49%	145,534	216,118
Northern Cape	Northern Cape	% of National	**2.39%**	**46,660**	**58,691**
		% of three sectors in province	**33.71%**	**15,727**	**19,782**
		Agriculture	5.97%	2,784	3,502
		Mining	25.45%	11,873	14,934
		Manufacturing	2.29%	1,070	1,345
	Siyanda District Municipality	% of province	**25.62%**	**11,954**	**15,037**
		% of three sectors in District Municipality	**49.37%**	**5,902**	**7,424**
		Agriculture	7.20%	860	1,082
		Mining	39.78%	4,756	5,982
		Manufacturing	2.39%	285	359
	//Khara Hais Local Municipality	% of province	**7.02%**	**3,276**	**4,120**
		% of three sectors in Local Municipality	**17.62%**	**577**	**726**
		Agriculture	11.48%	376	473
		Mining	2.36%	77	97
		Manufacturing	3.78%	124	156

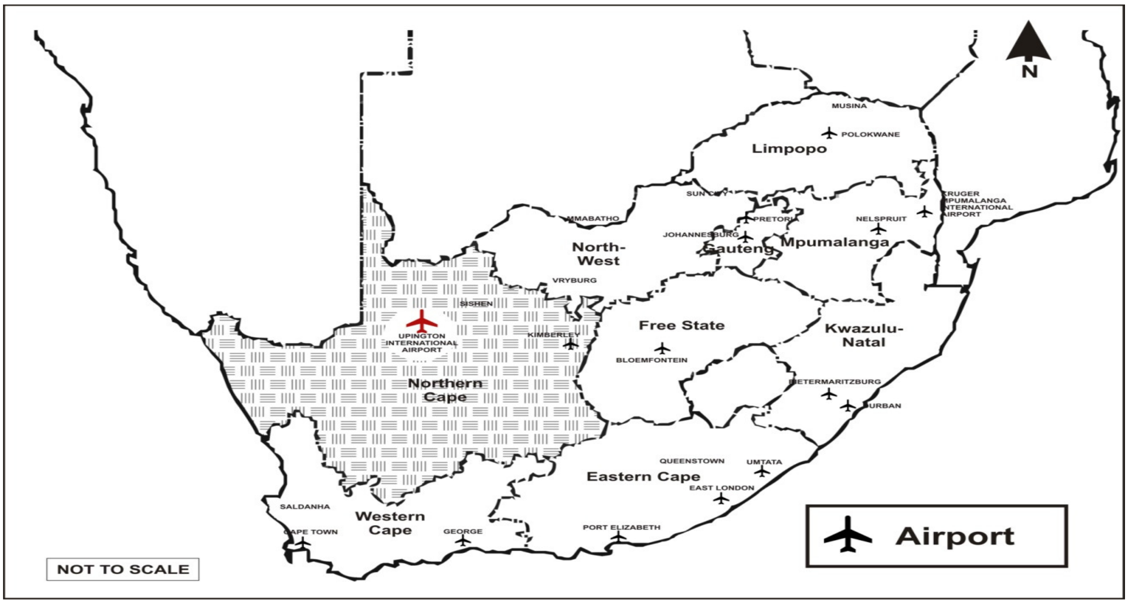
The table indicates that, for South Africa, the freight volumes are estimated to have grown from a base figure of 1 165 202 tonnes in 1998, to 1 730 328 tonnes in 2010. This compares favourably with the estimated 2010 volumes of the CSIR (2011) of 1 628 000, the difference being only 6.2%. Given the purpose of the estimates, the methodology adopted is deemed accurate enough for application in the Northern Cape and its selected regions.

Freight volumes in the Northern Cape are fairly low at an estimated 59 000 tons (58 691). Of this volume, less than 10% (1 345 tonnes) is generated by manufacturing, which is normally the main sector from which air freight is generated. The entire //Khara Hais Local Municipal Area had an estimated freight volume of 726 tonnes in 2010. It should be remembered that, typically, less than 1% of the freight moved worldwide, is moved by aeroplane. If this ratio is applied to the Northern Cape, it means that, potentially, less than 600 tonnes could be generated within the province. Locally generated freight in //Khara Hais Local Municipality would under similar circumstances be less than 10 tonnes per annum. From the above it is apparent that the two airports in the province, namely the airports at Kimberley and Upington will be hard pressed to develop organically into self-sustaining cargo facilities. However, it should be borne in mind that both the NEG and the market enabler of the logistics city concept, theoretically, support the establishment of an air-freight and logistics hub at a location dependent on a non-local freight market.

6.3 Upington and its airport

Following on the sections on the history of Upington and a contextualising of Upington within the economic profile of the Northern Cape, this section now turns to a discussion of the UIA and an assessment of the policy and strategy documents intended to support the development of the airport in relation to freight. Figure 15 places Upington and the UIA in both provincial and national context.

Figure 15: Upington and its airport in provincial and national context



6.3.1 Historical development of the Upington International Airport

UIA[17] is owned and managed by ACSA and has one of the longest runways in the world. The airport is located on the northern outskirts of Upington and is accessible via the N10 to the Namibian Border. Subsequent to the demise of the Portuguese regime in Angola, South African Airways lost its landing rights in Luanda. In addition to restrictions on overflying African states, there were concerns that the country would lose its landing rights in the Ivory Coast and on Ilha do Sol (Cape Verde). To counteract these problems, a new airport was considered. Upington was chosen because of its strategic position, the availability of land and Upington's comparatively lower height above sea level than Johannesburg. The lower height above sea level is advantageous for especially large and heavy aeroplanes, as it affords shorter take-off distances that are due to the higher density of the air, all other things being equal. Airport construction started in the early 1960s and the facility was officially opened in 1968. The airport was named the Pierre van Ryneveld Airport, after Colonel (later Sir) Pierre Van Ryneveld who, together with

[17] The section on the history of the UIA was compiled based on assistance and communication from ACSA's Corporate Office: Technical Support

Quinton Brand, in 1920, was the first person to fly from England to Cape Town, thereby establishing an air route across the African continent.

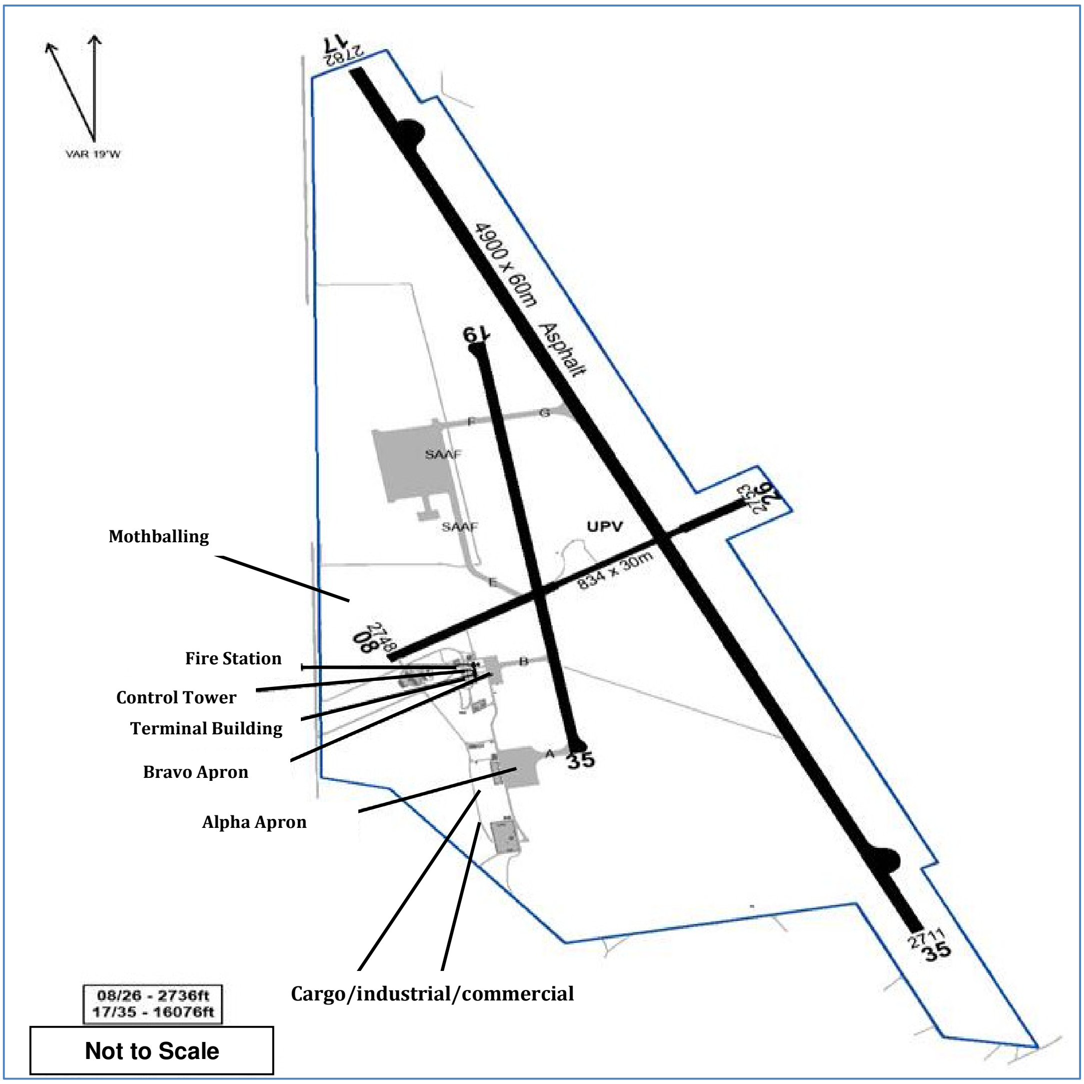
In 1974, a corrugated iron fire station was erected but this structure was converted into administrative offices for airport management and other administrative staff in 1996, and the fire station was relocated. In early August 1975, LTA Earthworks Construction Company was awarded an R8.5 million government tender for the construction of South Africa's first 'launching pad' for heavy aircraft and non-stop flights to Europe. This project, inter alia, entailed the construction of a main runway at Upington Airport with a specification to accommodate a Boeing 747 with a full load of passengers, cargo and fuel, so that it could take off for Europe without having to stop en route. This was the largest civil engineering contract ever undertaken within such a tight schedule in South Africa and it was completed within five months. Upon completion of that project, the airport boasted one of the longest runways in Africa at 4.9 kilometres (Africa's busiest airport ORTIA, has a runway length of 4.4 kilometres). The airport is also an approved NASA Southern Hemisphere Spacecraft landing site, while Concorde also did flight testing at the airport in the mid-1970s – both aspects probably being closely related to the length of the runway.

Over decades, the airport fulfilled different functions of which six are worth mentioning in this section. First, between August 1976 and December 1996, South African Airways (SAA) made use of Upington as a refuelling station for two-weekly scheduled Boeing 747 flights to London and Zurich. Secondly, the airport was, in the 1970s and 1980s, also used by the military and SAA to train pilots. The SA Air Force and SAA used the airport as a training base for their 747 and 707 aircraft pilots. The SAAF also used the airport to train pilots for the South African presidential jet. Thirdly, up to 2007/2008, large freighter aircraft (in the jumbo jet class) frequently landed at Upington during the months of November and December to export top-quality seedless table grapes to Europe where they fetched very high prices, especially during a short three- to four-week period when South African table grapes were the only grapes available worldwide (DTRPW, 2009). Exporting grapes by air is obviously dependent on price in the destination countries and, since 2008 the combination of lower consumer prices (probably fuelled by the general decline in the economy) coupled to increasing air-transportation costs rendered this option unprofitable for the grape producers. Fourthly, Major German car manufacturers bring their cars and commercial vehicles to Upington to test them in the hot, dry and sunny conditions. There are very few places in the world where the desert conditions experienced in Upington come with many thousands of kilometres of tarred roads and the necessary support facilities in the form of service centres, qualified mechanics and airport facilities. There is even a large test circuit near Upington where cars can be driven continuously under test conditions to evaluate performance in a controlled environment. Information on such activities is virtually unobtainable given the secrecy demanded by the car manufacturers. The airport management declined to give any detailed information such as time periods, volumes or even flights involved. Fifthly, there seems to be a large degree of mothballing, for example aeroplanes are stored at the airport. In 2011, there were 27 aircraft from the Alitalia fleet being mothballed at the airport (personal observation). Finally, while UIA backs up the Windhoek and Cape Town airports, it also serves as a diversion airport for South American flights to or from the ORTIA in Johannesburg.

6.3.2 Technical specifications of and facilities at the Upington International Airport

Following on the historical development of the airport, some consideration of the technical specifications and facilities at the UIA is required. Figure 16 shows the airport layout and existing facilities. Table 17 gives not only an indication of certain technical specifications of UIA, but also the flying distances to certain main cargo airports in Europe.

Figure 16: The UIA layout, 2010



Source: ACSA, 2012.

Table 17: Technical specifications of UIA and ORTIA

Indicator	UIA	ORTIA
Designation	FAUP (ICAO) UPN (IATA)	FAJS (ICAO) JNB (IATA)
Elevation	2782 ft / 847.95 m	5558 ft / 1694.08 m
Runways	**Main Runway 17/35** 16076 x 197 ft / 4900.0 x 60.0 m **Runway 08/26** 2736 x 98 ft / 833.9 x 29.9 m	**Runway 03L/21R** 14495 x 200 ft / 4418.1 x 61.0 m **Runway 03R/21L** 11155 x 197 ft / 3400.0 x 60.0 m
Distance from major international airports (cargo focused)		
Jomo Kenyatta IA (Kenia)	1851 nm/3429km	1565 nm/2899km
Zaragoza Airport (Spain)	4368nm/8089km	4368nm/8090km
Frankfurt-Hahn (Germany)	4734nm/8768km	4670nm/8648km
Frankfurt IA (Germany)	4739nm/8777km	4674nm/8657km

Sources: Airport-data.com, 2012

Five comments are called for in respect of the above table and figure. Firstly, the flying distance and flying time between the major South African destinations and Upington and Johannesburg do not differ much. The table indicates that flying distances to airports in Kenia and Germany vary slightly between UIA and ORTIA. The flying distance between the two airports in question and Zaragoza Airport in Spain is virtually identical. In terms of actual flying time, the differences are even less obvious. The difference in flying time between UIA or ORTIA and Frankfurt IA in Germany is calculated at eight minutes if a speed of 490 knots (approximately 900km/h) for a Boeing 747 is assumed (Airrouting.com, 2012).

Secondly, the main runway at Upington airport can handle up to category 4F aircraft without load limitations. Runway 01/29 can handle category 4E aircraft with some load limitations (DTRPW, 2009). The airport taxiway system of crossing and interlinking runways is not adequate for the runway capacity. As a result of the effect of their being interlinked and because they are used as taxiways, the airport can be considered to have only one runway in operational terms. The runway configuration can accommodate up to 30 flights flying under Instrument Flight Rules and even more flying under Visual Flight Rules (DTRPW, 2009).

Thirdly, the airport has five apron bays for B737-800 type aircraft. Some grass space is available for use as general aviation parking to increase the available capacity, which allows the available surfaced apron to be used for larger aircraft. Fourthly, Upington Airport has two terminals – one for arrivals and one for departures, an aircraft storage area, and also a fuel farm with a capacity of three million litres. The consolidated capacity of the new passenger terminal is planned to be 120 passengers per hour (DTRPW, 2009). Baggage handling is done manually. There are immigration and customs officials available for scheduled and unscheduled cross-border flights on a call-out basis. There are also pre-booked shuttle services and car-rental outlets at the airport.

Finally, as far as the supply of freight-related services is concerned, freight-handling services are already offered at UIA by the Upington Ground Handling Company. It is a private company owned by a Namibian citizen residing in Windhoek. The bigger companies, like Menzies and Swissport, are not willing to operate at UIA because of the low frequency of aircraft movements, which make the demand for additional ground-handling operators unfeasible. The absence of major industry players serves to accentuate the limited existing demand for their services.

6.3.3 Current air-freight volumes

UIA generally has low air-freight volumes, which is only to be expected because there is only one scheduled carrier (SA Airlink) operating from the airport. As there are no large-bodied aircraft operating scheduled international passenger services, there is no 'belly-cargo' (as discussed in Ch 5BBB) capacity available. The German car manufacturer who does yearly testing of new cars in the Northern Cape transports its vehicles directly to UIA by chartered freight carrier. Other than that, grapes are sometimes exported from the airport depending on market conditions in Europe (Barnes, 2011). Table 18 gives an indication of the air-freight volumes at UIA against those of ORTIA, the existing air-freight hub in South Africa.

Table 18: Air freight volumers for UIA and ORTIA, 2008

ORTIA						
Flight type	**Departure freight, 2010**	**Arrival freight, 2010**	**Departure freight, 2009**	**Arrival freight, 2009**	**Departure freight, 2008**	**Arrival freight, 2008**
Domestic (kg)	8,049,646	9,898,501	8,144,230	7,772,795	9,451,148	8,499,205
Regional (kg)	1,276,304	297,487	1,078,988	215,751	985,600	180,099
International (kg)	111,461,012	169,837,606	96,101,604	130,334,545	117,979,982	165,302,023
Total (kg)	**120,786,962**	**180,033,594**	**105,324,822**	**138,323,091**	**128,416,730**	**173,981,327**
UIA						
FLIGHT TYPE	**DEP FREIGHT 2010**	**ARR FREIGHT 2010**	**DEP FREIGHT 2009**	**ARR FREIGHT 2009**	**DEP FREIGHT 2008**	**ARR FREIGHT 2008**
Domestic (kg)	21,236	26,958	19,053	34,945	20,556	37,001

Source: Van Zyl, 2011.

The table clearly confirms both the expected dominance of ORTIA in the South African air-freight environment and the low volumes handled at UIA.

6.3.4 Recent infrastructural developments at Upington International Airport

In January 2006, ACSA appointed civil engineering and town-planning consultants to prepare a Spatial Development Plan for UIA based on ACSA conceptual guidelines (ACSA, 2006). The Spatial Development Plan addressed the landside and airside development of the entire airport, for example the mothballing area, terminal building development, the cargo apron (Alpha Apron in Figure 16) and the cargo/commercial/industrial area development. In the process, approximately R108 million has been invested since 2006[18].

Specific cargo-related developments at the airport were directed both at improving the cargo apron (Alpha apron on Figure 16) and at demarcating areas in the south-western part of the airport for cargo-related activities and for commercial and industrial activities.

[18] As ACSA declined to give specific cost breakdowns regarding the costs for developing the cargo facilities, total costs are given.

According to the Spatial Development Plan of the airport, land parcels earmarked to be used for warehousing amount to about 222 600m^2 or 22.6ha (ACSA, 2006). In total, 70 erven (//Khara Hais Local Municipality, 2011) have already been developed in terms of the zoning requirements and the provision of bulk services. The cargo apron (Alpha Apron) has been extended to more than 30 000 m^2. Two warehouses have also been constructed on site (1500 m^2 and 400 m^2). These facilities are almost exclusively being used by a German car manufacturer as part of its annual testing of new cars in the Northern Cape. An entrepreneur has constructed a cold storage facility of about 450 m^2 that is in use when needed, mostly for the export of grapes. According to the available information, grapes were last exported in 2007/2008, which means the facility has been idle since then. Apart from these facilities, the area designated for the mothballing[19] of aircraft is the only non-passenger related facility developed since 2006 that is currently in operation.

ACSA declined to divulge why they specifically invested in cargo-related infrastructure at the airport. One of their chief airport planners indicated that the internal rate of return of the project was acceptable to ACSA, hence their subsequent investment in the project (Van Zyl, 2011). As far as it could be ascertained there is no direct link between the decisions made by ACSA on the development of the airport and any of the national, provincial or local freight- logistics policies or local economic-development plans. This is a typical example of a lack of integrated planning as discussed in Chapter Five.

6.4 Assessing strategies to support airport development

In Chapter Five, I highlighted the potential relationship between logistics, air freight and LED. I now turn to determining the extent to which the current development and the future prospects are dependent on local initiatives and also the extent to which local planning and strategy may be able to assist in this regard.

[19] Mothballing of aircraft entails the storage, for an extended period of time, of aircraft withdrawn from service. At UIA, mothballed aircraft are kept operational by an approved maintenance organisation.

6.4.1 Attempts by //Khara Hais Local Municipality to support the airport development

Scrutiny of the various studies conducted in South Africa regarding the development of cargo hubs at airports (as reflected in Section 1.3.6), leads me to believe that there is a perception that the mere existence of a functional airport makes a cargo hub a possibility. UIA seems to be a case in point. Apart from the Spatial Development Plan developed in 2006 by ACSA, the //Khara Hais Local Municipality appointed a consultant to undertake a feasibility study on "Upington airport developing into an international air cargo transit facility for South Africa's international and regional trade" (//Khara Hais Local Municipality, 2006). In 2008, this was followed by the appointment of consultants to develop a business case for the development of an air-cargo hub at UIA (DTRPW, 2009). Even though the consultant developed a very thorough and detailed business case, no progress has since been made in terms of developing an air-freight and logistics hub at the airport.

In addition to the above attempts, the //Khara Hais Local Municipality published its Local Economic Development and Investment Plan (hereafter LED Plan) in 2010. This plan forms part of the municipality's overall strategic plan, as outlined in the Integrated Development Planning Process. The strategic plan seeks to promote viable local economic activities that benefit the local population through the creation of direct and indirect employment (//Khara Hais Local Municipality, 2010). This LED Plan has been developed in conjunction with an investment plan. The LED Plan is based on the underlying needs, opportunities and comparative and competitive advantages of the municipality and provides the municipality with guidelines to create and facilitate economic development so as both to realise the underlying development potential and encourage private- and public-sector investment and local job creation (//Khara Hais Local Municipality, 2010). The purpose of the investment plan is further to outline the available national level incentive schemes and programmes and to highlight the prospects for investment incentives in the //Khara Hais Local Municipality. Provision is also made for potential financial and non-financial incentives that could be introduced in the area to attract new businesses.

The LED strategy takes into consideration the priorities and concerns identified in the legislation, policies and strategies at the national, the provincial and the local levels to ensure a prosperous region that is able to serve the needs of the community. As such, the LED strategy identifies four strategic development thrusts, namely agricultural beneficiation and value-chain development, SMME and community business support, tourism-related development and the maximisation and enhancement of benefits to be derived from Upington's strategic location (//Khara Hais Local Municipality, 2010). In line with the four development thrusts, several economic sectors of the //Khara Hais Local Municipality have been identified as important in the LED Plan, with the most profound of these being the agriculture and the tourism sectors. These sectors are regarded by //Khara Hais Local Municipality as being responsible for the majority of the injections into the local economy, and are thus regarded by the municipality as priority development sectors. The focus on the agricultural sector – especially agro-processing and value adding – is in line with the NCPGDS as discussed earlier. The potential for tourism development in the Northern Cape and //Khara Hais Local Municipality was further identified by the NCPGDS and the IDP of the //Khara Hais Local Municipality as a market that should be developed and expanded in a way that promotes transformation, distribution and sustainability in the industry (//Khara Hais Local Municipality, 2010).

The LED Plan (2010) of the //Khara Hais Local Municipality (like the NCPGDS and the IDP of the //Khara Hais Local Municipality) considers the local manufacturing sector, specifically in Upington, to have substantial potential for expansion and diversification, and it suggests that funds be invested in this sector. The focus of the LED Plan is on labour-based production methods in that this will ensure employment in the local economy and will result in the upliftment of the local community.

The LED Plan (2010) of the //Khara Hais Local Municipality (2010) identifies the UIA as an alternative to or supplement for the ORTIA for cargo traffic. This is in line with the IDP of the //Khara Hais Local Municipality (//Khara Hais, 2012), which identified the airport precinct at which a business hub (note *not* a cargo hub) is to be developed. The reason given in the LED Plan of the //Khara Hais Local Municipality why UIA should be developed into an alternative for ORTIA is that UIA offers less congestion and quicker airport turnaround times, shorter to-market timeframes, which would enhance product freshness by one day, and improved supply-chain performance, thus offering greater benefits to cargo airlines and to importers and exporters of goods (//Khara Hais Local Municipality, 2010; 2012). The LED Plan contends that the uncommonly long runway and the strategically advantageous location of the Upington Airport make it ideally suited to serving the African continent.

The //Khara Hais LED Plan proposes the establishment of an industrial development zone (IDZ) of ± 400ha at the airport, with the express aim of further enhancing the strategic importance of the airport for the local, regional and provincial economies (//Khara Hais Local Municipality, 2010). In turn, the IDP (//Khara Hais Local Municipality, 2012) envisages an IDZ at the industrial precinct, which, unlike the LED Plan of //Khara Hais Local Municipality is not situated at the airport. The LED Plan makes strong, though unfortunately, unsubstantiated statements to the effect that a sufficient volume of cargo is generated in the western and eastern regions of South Africa and Namibia to warrant the establishment of a cargo hub at Upington (//Khara Hais Local Municipality, 2010).

According to the LED Plan, the proposed Upington IDZ to the west of the airport precinct will be a purpose-built industrial estate linked to the UIA and thus to the proposed air-freight hub. The IDZ will leverage fixed direct investments in value-added and export-oriented manufacturing industries and intends to promote the competitiveness of the manufacturing sector and to encourage beneficiation of locally available resources (//Khara Hais Local Municipality, 2010). The LED Plan (2010) identifies at least three main benefits generally associated with such a development: the IDZ will have a customs control area with dedicated SARS officials to provide support for customs and general tax requirements; the IDZ will contain world-class industrial support infrastructure; and it will provide links to an international port of entry.

The IDZ, while focused strongly on manufacturing, is supportive of the clustering concept as discussed in Chapter Two and the associated benefits of industrial-support infrastructure. The reference to an international port of entry, which by default must be the UIA, makes overtures to the *logistics city* concept discussed in Chapter Three. The

LED Plan (2010) also refers to local municipal support for high-technology initiatives such as a mixed-technology national solar park and support for the establishment of an electronics and ICT hub in the province. The document further identifies a number of benefits linked to such a hub, namely education benefits in the fields of engineering and science and economic benefits to be had from starting an electronics production and hardware development industry and innovation hub. The innovation hub, or centre of competence, is to be located in Upington and must be linked to the International Airport and the proposed solar park (//Khara Hais Local Municipality, 2010). While these initiatives fall clearly within the realm of clustering, the term is totally absent from the LED Plan.

According to the IDP of the //Khara Hais Local Municipality (2012), a comprehensive transportation plan is not currently in place for the municipal area. Given the proposed cargo hub, proposed high-speed testing facility and that the town of Upington is a strategic regional link, a transportation plan could be an important high-level strategic tool towards improving existing infrastructure and developing future infrastructure.

Off all the LED projects identified in the LED Plan of the //Khara Hais Local Municipality (2010), the only project relevant to the present study is one that is only mentioned in passing: "Support large anchor initiatives and develop spinoff opportunities" (//Khara Hais Local Municipality, 2010:62). As described in the preceding paragraph, numerous large anchor projects and/or initiatives have either been identified or are in the process of being targeted/implemented – for example the IDZ, cargo hub, solar park and electronics hub. The LED document states that support for the establishment of these large anchor projects and initiatives needs to be provided and that local spin-off opportunities from the large anchor projects must be identified and implemented. This however is one project to which neither proper budgets, time-lines nor responsibilities have been allocated. Also, not one project identified in the IDP specifically targets the development of the logistics industry nor, for that matter, does it target the development of the airport into a fully fledged logistics centre.

Although much thought went into compiling the LED document of the //Khara Hais Local Municipality document, it totally misses a golden opportunity of using clustering as a mechanism to develop these so-called anchor initiatives and projects. Similarly, logistics and the benefits it can bring to Upington are totally absent from any of the LED projects, even though the UIA and the proposed cargo hub feature strongly in the document. A similar situation exists in the IDP. Both documents lack a properly defined vision, approach and strategy to develop the UIA into a logistics centre. The findings confirm the opinion voiced by Nel and Rogerson (2007), namely that LED thinking and practice outside South Africa's metropolitan areas are limited. When studying the provincial policies and LED plans and related documentation as described in this chapter, there is a strong sense that although references are made to the cargo hub at the airport, it is almost as if that development is left to other parties, with no clear direction or participation from the institutional structures at both the provincial and the local levels. The entrepreneurial approach in respect of LED, which is present in cities like Johannesburg and Cape Town, seems to be absent in Upington.

6.4.2 Northern Cape Provincial Growth and Development Strategy

The NCPGDS (2004–2014) is probably the most important document currently guiding development in the Northern Cape Province (NCPG, 2004). The Northern Cape Provincial Goverment (NCPG) has determined that the role of provincial and local government in the promotion of economic development is essentially one of facilitation or of providing the appropriate environment for the private sector and other stakeholders – such as the cooperative movement – to take advantage of economic opportunity as and when it arises. It therefore positions itself as an enabler of economic growth and development in the province. The NCPGDS identifies numerous strategic interventions with the particular aim of enhancing transport and communication infrastructure for growth and development (NCPG, 2004). These interventions include promoting an efficient and effective transport system in the Northern Cape, enhancing competitiveness through cost-effective transport, ensuring advancement in ICT, identifying and developing critical infrastructure, establishing an Air Transport (Aviation) Co-ordinating

Forum, and developing a sustainable freight- and transport-logistics strategy for the province (NCPG, 2004).

The NCPGDS contains some references to core concepts discussed in this study. Clustering (discussed in Chapter Two) is an example. The strategy document clearly states that the provincial government will play a leading role in establishing a Northern Cape Manufacturing Cluster, which is to be a private/public-sector partnership that optimises the use of scarce resources within the province by coordinating joint programmes between firms within the sector. The Manufacturing Cluster should encourage firms to increase their competitiveness by either providing or leveraging a range of support that is differentiated according to specific industry needs and resource capabilities. Particular emphasis should be placed on programmes for upgrading management and technical skills in the sector (NCPG, 2004).

In addition, the NCPGDS also recognises that the recent advances in ICT provide an opportunity for growth and development at a number of levels (as discussed in chapter Three and Chapter Four). Firstly, from a narrow communications perspective, ICT enhances the efficiency of doing business in an increasingly competitive global economy. Secondly, from a broader industry perspective ICT offers a business opportunity for growth and development through the promotion of businesses providing ICT goods and services (NCPG, 2004).

From an air-cargo perspective, the NCPGDS identifies agro-processing as an important factor in the economic development of the sector. Fresh produce, such as table grapes, is sometimes (depending on market conditions) exported from UIA. Minerals, as another important contributor to the regional economy of the province, are also promoted as a possible growth factor in the document. These minerals are however in ore form and thus also suitable for rail transport and sea export and not only for export by air.

Though the NCPGDS formulates a number of strongly focused interventions – such as the re-development and expansion of the underutilised non-road transport infrastructure (which includes air and rail), the promotion of airport and air-service development, and the development of a strategy for air freight – specific responsibilities and timeframes are not clearly stipulated. The role of logistics in the economic development profile of the province is also unfortunately not regarded as a major element and receives virtually no attention in the document, except for a number of statements on the plight of rural settlements in gaining access to larger domestic markets.

6.4.3 The Northern Cape Freight Transport Strategy

In line with the publication of the NFLS and the NCPGDS as discussed above, the Northern Cape Department of Transport, Roads, and Public Works (DTRPW) has developed a Freight Transport Strategy for the Northern Cape Province (DTRPW, 2007). This particular strategy is aimed at implementing the NFLS in the province and improving the overall integration of freight needs in the transport-planning environment. The province recognises the potential role of freight transport in supporting a more competitive and equitable environment for economic development, and it recognises the role of government, industry and other stakeholders in facilitating freight-transport competitiveness through infrastructure investment and services improvement. The aim of the Freight Transport Strategy is to develop a clear strategic roadmap to achieve freight-transport competitiveness in the province.

The proposed air-cargo hub at the UIA features strongly in the Strategy document, and a strong and balanced case is made for the establishment of a cargo-focused airport at Upington (DTRPW, 2007). The document recognises the fact that aviation investments often get caught in so-called catch-22 situations: investors are unwilling to commit money without the assurance that an airline will commit to establishing operations, while airlines are unwilling to commit to future operations before facility investments have been made and before they have customers (freight forwarders and producers) who will use the service. Customers, for their part, typically want to see the service operating before they commit to using it.

The two main provincial strategies discussed in this section express an understanding and recognition of the role that an efficient freight-transport system plays in the provincial economy. The two documents, while acknowledging the need to utilise the existing non-road infrastructure (such as airports) more effectively, also moot the development of an air-cargo hub at UIA. Yet, because no clear direction, responsibility allocation or timeframes are given in these documents, it is almost as though only lip service is paid to these issues. It can be argued that a possible contributing reason for this situation is that there is a general lack of an integrated logistics and freight-related planning framework (such as the logistics city concept discussed in Chapter Three). This shortcoming is in line with the problem statement of the NFLS discussed in Chapter Five, which highlights the lack of an integrated planning framework as a major contributing factor to the inefficiencies prevalent in the freight and logistics system.

6.4.4 Airport Company of South Africa's strategies and policies

As reflected earlier in this chapter, ACSA declined to make detailed information available regarding why the investment was made to improve the cargo facilities at the airport. Very few ACSA documents (except annual reports) are in the public domain. This makes it very difficult to evaluate ACSA strategies objectively.

Nevertheless, a management consultant appointed by ACSA issued a report on a cargo strategy for ORTIA (then Johannesburg) International Airport (Districon, 2006). The report assessed the air-cargo business at the airport and found a number of weaknesses at the airport, namely the weak market position of the home carrier SAA, a limited freighter-aircraft network, poor security, outdated facilities, a fragmented handling market, bottlenecks being created by government inspections, and limited cooperation and coordination at the community level (Districon, 2006). The consultant conducted only a qualitative assessment based on observations and interviews and stated that there were no data available to allow for a more quantitative assessment of the logistical performance, for example cost efficiency, lead times, number of incidents, customer satisfaction measurements, etc.

Far from being a comprehensive strategy document for ACSA on how to expand their airports, the document issued by the consultant does indicate that there are issues at ORTIA that impact negatively on the entire air-cargo system. Given the lack of belly-hold capacity at UIA explained earlier, it is interesting to note that the consultant's report found the lack of a freighter-aircraft fleet operating to and from ORTIA to be a problem. This observation could be interpreted in a way that would be advantageous to UIA in that the obvious direct competition between the two airports would be minimised as the two airports would compete in different market segments. Significantly, that the consultant remarked that in a high-growth scenario ORTIA would maintain its high share of the South African air-cargo market. In a medium- or low-growth scenario, ORTIA is likely to decrease its share in that the relative attractiveness of JNB compared with that of for example Cape Town and Durban, would decrease. The consultant concluded that ACSA's policy would have a significant influence on the market share of its airports (Districon, 2006).

On 25 May 2010, ACSA held a function to introduce the South African Property Owners Association members to the potential property-development opportunities available on ACSA land (SA Property Review, 2010). UIA was listed as one of the airports with potential property-development opportunities. However, in an editorial published in the August edition of the SA Property Review (SA Property Review, 2010), UIA was not included in the detailed overview of property-development opportunities at each airport.

The problem of the lack of coordinated planning frameworks has been identified in Chapter Five. The fact that ACSA owns UIA and most of the other main airports in the country contributes to this dilemma. It makes decentralised decisions virtually impossible since ACSA will for example not lower landing fees in Upington for fear of incurring fee-related losses. Such a lowering of fees would be possible if the airport were in private or local government hands.

6.5 Conclusion

There are a number of problem areas at ORTIA that could possibly open the door for UIA to develop into an air-freight facility. The information at hand indicates that one of the strengths of UIA is the availability of airside infrastructure, such as runway length, air-navigation services and a sufficiently large cargo apron for the loading and off-loading of cargo at the airport. In addition, ACSA has already developed a large tract of land for cargo and cargo-related activities at the airport.

A number of issues militate against using UIA as a cargo airport. Most prominent among these constraints is the lack of scheduled passenger services in aircraft of sufficient size. This situation is exacerbated by the fact that there are no scheduled international passenger departures from UIA, which means that there is no passenger-related cargo (belly freight) at the airport. A lack of information (such as that pertaining to the extent of the German car-testing activities undertaken annually), though frustrating, is not seen as an obstacle to the development of the airport into a fully fledged air-cargo hub. Such cargo movements are external to the normal operations of the air-freight market, which is more reliant on regular flights. Another main constraint is that the Northern Cape in general, and Upington in particular, are not major industrial areas. This means that there is very little organic growth potential (market conditions) for the airport. The dominance of ORTIA in the cargo environment in South Africa is also problematic for the development of UIA as a cargo hub.

There is no evidence that the decision taken by ACSA to develop the facility into a cargo hub was based on an interactive planning process in which both provincial and local institutional structures were involved. Even though the LED and IDP documents of //Khara Hais Local Municipality contain clear references to the development of UIA into a cargo hub, there are no supporting projects and responsibilities for the implementation of such projects in these documents. Nor are there any joint planning and implementation mechanisms between the //Khara Hais Local Municipaity and ACSA to direct and manage the development of the airport, which makes this situation a conspicuous example of one of the elements of the freight-logistics problem statement as defined by the NFLS (Chapter Five), namely that of a lack of integrated planning. This lack of integrated planning between the various parties should not necessarily be sufficient reason for not developing the airport into a logistics centre: in Chapter Five it was stated that an assessment of the small-town LED successes indicates that the majority of the success stories in this regard are not related to government institutions but rather to communities, individuals, the private sector or partnerships.

A fair and objective reflection on ACSA's strategic development focus for each of its airports is not possible because of the lack of freely available information. Certain deductions will thus have to be made. As ACSA owns virtually all of the major airports in South Africa, it may find itself in a situation where it is in competition with itself. If, for example, UIA were owned by another private party (as is the case with Lanseria International Airport) the airport could offer certain incentives to freight forwarders and freighter-aircraft operators to entice them to make use of the airport. Yet, given ACSA's monopoly, it is unlikely that such incentives will be offered at UIA that would result in a loss of income to ORTIA, which would effectively have a negative impact on ACSA's balance sheet.

Based on what has been discussed in this Chapter, it can be deduced that some other method than that of existing market forces will have to be found if the airport is to be developed into a cargo-hub facility. A possible alternative method is discussed in the next chapter.

7 ASSESSING THE POTENTIAL OF THE UPINGTON INTERNATIONAL AIRPORT AS A FREIGHT HUB

7.1 Introduction

As discussed in Chapter Four, one of the modern trends in international logistics concerns the restructuring of logistics systems where manufacturers achieve such restructuring by concentrating production and inventory capacity in fewer locations. This trend is in line with the NEG, as explained in Chapter Two, where it was noted that any particular spatial distribution of economic activity is based on forces that either discourage or encourage agglomeration, as explained under the concepts of agglomeration and clustering discussed in Chapter Two and subsequently expanded upon in Chapter Three. Chapter Three indicated that the modern advances in trade liberalisation, transport and information technology have, among others, given rise to the emergence of a new generation of logistics and distribution facilities around the world. These facilities are driven by changes in freight and logistics processes (as discussed in Chapter Four) and developed in response to the challenges posed by regional population and freight growth. In Chapter Four it was established that the increase in global production sharing, the shortening of product life cycles and the intensification of global competition all highlight logistics as a strategic source of competitive advantage. This opens up possibilities for regions – also peripheral regions – to develop competitive advantages through logistics, especially if such areas are able to compete favourably with traditional logistics centres in terms of the time-criticality factor highlighted in Chapter Four.

Although used very loosely, the term *logistics city* is perceived as providing a critical planning framework for addressing the challenges of globalisation and the increasing complexity of trade (Chapter Three) and also for incorporating the modern trends in international logistics as discussed in Chapter Four. As reflected in Chapter Three, the main function of the logistics city is to provide a planning framework and a logistical platform to accompany appropriate logistics infrastructure and physical facilities (for example roads, rail tracks, terminals and ICT) and substantial logistics services (for example warehousing – including cold storage – and freight forwarding). Concentrating production capacity enables companies to maximise economies of scale in production at the expense of making their logistics system more transport intensive and lengthening lead-time to customers. It was also noted in Chapter Four that another international trend in logistics is that international transport is progressively being concentrated at a smaller number of hub ports and airports so as to benefit from economies of scale.

Chapter Six assessed the ability of local government, provincial government and ACSA to establish common ground and find an appropriate strategy to develop the UIA as a freight airport. In essence, it was argued that the degree of decentralised planning with regard to the airport is insufficient and that the current cooperative planning frameworks and realities are not conducive to the development of a freight airport. It has already been noted there is ample interest in logistics, freight logistics and especially air-freight logistics in the country as manifested by the large number of air-cargo hub feasibility studies undertaken since 2000 (see Chapter One). It appears as if policy makers are aware of the possible economic benefits of airports (direct, indirect and induced impacts), hence the focus on feasibility studies for converting existing smaller airports into cargo hubs. The proposed cargo hub at the UIA is decidedly the air-freight hub project that has, to date, received the most attention and publicity. Apart from the efforts by government, which include incorporating the air-freight hub at the UIA in LED plans, awareness campaigns at Growth and Development summits and even a transport investors' conference (as mentioned in Chapter One), ACSA, as the owner of the UIA, has also invested large sums of money in upgrading the UIA cargo facilities. Besides making this investment, ACSA further effectively set the scene for the establishment of a logistics centre at the UIA by developing 70 erven at the airport.

Yet, despite the efforts alluded to above, and taking into account that the air-freight industry's consistent and at times even phenomenal growth and the fact that it has doubled in growth every ten years since 1970 (Chapter Four), the UIA has failed to succeed in increasing its freight volumes above the levels discussed in Chapter Six. This scenario gives rise to two questions. One firstly wonders why not and secondly whether it can indeed be done.

A three-pronged approach was adopted in an attempt to answer the above question. Firstly, an evalution of the UIA was performed based on the logistics city concept. In other words, given the activities at the UIA and mirrored against the logistics city concept, how does the airport fare as a logistics platform? As indicated in Chapter One, the analysis is based on a qualitative assessment of the current situation at the UIA for each of the critical enablers of a logistics city as discussed in Chapter Three. The critical enablers are evaluated both in terms of the UIA's *current* situation and of the available implementation plans in the short term. Secondly, the qualitative analysis is followed by a critical reflection on the air-freight hub at Upington viewed against the background of the theoretical perspectives discussed in chapters Two to Five and the LED policy environment as discussed in chapters Five and Six. Thirdly, a possible solution to the no-progress issue at the UIA is sought.

7.2 Evaluation of the Upington Internation Airport within the logistics city framework

Table 19 reflects the results of the compliance evaluation. The evaluation is based on a four-point rating and a score is given in terms of the level of compliance versus the level of constraint applicable at the UIA. Each of the critical enablers is then discussed in greater detail and a justification is provided for each score.

Table 19: UIA compliance with critical enablers

Critical enabler	Level of compliance	Level of constraint
	Base enabler	
Market	✓	✗ ✗ ✗
	Functional enablers	
Infrastructure	✓ ✓ ✓	✗
Service	✓	✗ ✗ ✗
Workforce	✓ ✓ ✓	✗
Knowledge	✓	✗ ✗ ✗
Capital	✓ ✓	✗ ✗
Competition	✓ ✓ ✓	✗
	Integrating enabler	
Governance	✓	✗✗✗

7.2.1 Base enabler: Market

Adequate, sustainable demand is the principal prerequisite for the establishment of a logistics centre. All the freight-forwarding companies interviewed indicated demand to be the main driver of an air-freight hub at the UIA. Some difference of opinion existed regarding the location of that market. Interviewees 1, 4 and 8[20] indicated a strong preference for an existing local (proximate) market. Interviewee 3 however expressed the opposite opinion: "My client mix allows me to operate from any airport." This means that the particular interviewee felt that his company might be able to create their own market at the UIA. A similar sentiment was expressed by Interviewee 10, who stated: "I go where my clients want me to go." Owing to the current lack of demand for air-cargo services (import and export), the UIA scores low in terms of the base enabler. As reflected in Chapter Six, existing demand at the UIA is low and mostly seasonal in nature. Both the current freight volumes and aircraft movement patterns at the UIA, and also passenger-related freight (belly freight) do not contribute to the potential cargo

[20] Interviewees 1 to 7 were from the freight forwarder category, 8 to 11 from the air cargo category and 12 and 13 from the general business category

volumes at the airport. Without exception, the freight-forwarding companies all indicated that bellyfreight capacity was important to them. Two freight-forwarding companies were particularly adamant that this lack of belly-freight capacity was a strong detractor regarding the establishment and subsequent growth of an air-freight hub at the UIA – not only because of a lack of existing belly-freight capacity at the UIA, but also because of the existing arrangements between freight forwarders and cargo airlines in respect of belly-freight capacity. Interviewee 5 succintly articulated this particular problem in saying that "freight forwarders cannot just let their belly space go at ORTIA". Interviewee 12 indicated that all their products werre transported exclusively as belly freight because of the inconsistent production volumes of these products

The lack of established passenger services constrains the establishment of the UIA as a logistics cluster, especially in the initial stages. A poor market is an obvious constraint in respect of the logistics city concept, irrespective of the level of progress of the existing facility. The poor market environment, too, can neither be divorced from low freight volumes to Africa nor from the fact roughly three-quarters of all air freight coming into and leaving South Africa and also all internal freight in South Africa are carried by passenger planes. The peripheral location of the UIA does not assist towards creating demand but demand can potentially be stimulated by initiatives such as lowering the landing fees and increasing the turnaround times (compared with those of ORTIA). Interviewees 3 and 10 indicated that initiatives such as charging lower landing fees would entice them to establish a presence at the UIA.

7.2.2 Functional enabler 1: Infrastructure

As reflected in Chapter Four, trends towards globalisation, integrated logistics and the development of ICT are all reshaping the world's trading patterns and consequently also physical trade flows. Provision of infrastructure as an enabler of the logistics city is linked to financial infrastructure, ICT and physical cargo-related infrastructure. Financial infrastructure relates to the availability of funds and budgets for the development of the logistics city. The logistics cluster requires major infrastructure investment on both the airside and the landside of the airport. The provision of ICT infrastructure is one of the key aspects of the successful operation of any logistics hub. This infrastructure helps to ensure the locational connectivity of the logistics city through effective communication systems. The development of a trade-integrated information platform will enable seamless information transfer. The UIA should ensure that this particular ICT system forms part of the development plan.

ACSA has already spent significant amounts with a view to ensuring that the airport is development friendly. Land has been set aside and rezoned, and bulk services have been provided for the development of logistics infrastructure such as warehouses (landside). In addition, the apron has been enlarged and can currently accommodate three large freighter aircraft. The UIA therefore scores high in terms of this enabler. Interviewees 1, 2, 3, 4, 5, 7, 8, 9, 10 and 11, while expressing satisfaction with the current facilities at the UIA, stated that warehousing and cold storage would have to be upgraded if volumes increased.

7.2.3 Functional enabler 2: Services

The quality of logistical services – such as storage, transportation, terminal operations and customs – is important for the development of a logistics cluster at the UIA. Other value-added business services – such as light assembly, customising and packaging – that are executed in warehouses are essential if the airport wants to develop as an air-cargo hub. These services must be supported by well-developed supply-chain management systems.

Given the existing low level of demand for air freight at the UIA and the subsequent absence of comprehensive air-freight services, the services enabler cannot but have a low compliance score. It is anticipated that this score can easily be improved once the cargo hub is in full operation. There are existing services such as ground handling and customs services and it is understood that the aircraft technical maintenance function has been established at the airport. Its focus is however on the mothballing project currently being undertaken at the UIA. Yet it is fairly easy to establish a maintenance facility that will meet the requirements of the cargo airline. The existing low compliance score is thus not regarded to be a major obstacle. Interviewee 10 indicated a need for access to A-check aircraft-maintenance services, whereas Interviewee 9 indicated no need for aircraft-maintenance services at the UIA.

7.2.4 Functional enabler 3: Workforce

Currently, the major employment group in logistics is the unskilled or the semi-skilled workforce. Available capacity in workforces in peripheral areas, too, tends to be in the unskilled and semi-skilled segments. The compliance score is high in that it will consequently be easy to augment the existing workforce as the cargo hub develops over time. This point of view was supported by interviewees 2, 3, 5 and 6. As already stated, essential services – such as ground handling services – are available at the airport. Interviewees 1, 2, 3, 4, 5 and 6 indicated that skilled labour in the form of logistics managerial services would be supplied by themselves from their existing in-house staff complement and that this was therefore not regarded to be a detracting factor as regards the UIA. In the words of Interviewee 1, "a freight forwarder cannot render a professional service without highly skilled management staff".

7.2.5 Functional enabler 4: Knowledge

As reflected in Chapter Three, logistics as an industry sector internationally, and consequently also in South Africa, does not have a long history so that systematic knowledge generation through tertiary education and dedicated research activities has only emerged in the recent decades. Given the importance of an increasingly knowledge-based economy, such initiatives are appropriate. The knowledge enabler scores low in the compliance evaluation because significant logistics activities are currently not taking place at Upington. Given the size of the town, it is also unlikely that future logistics-activity levels (such as those for a logistic city cluster) will be sufficient to sustain such research centres. This does not, however, preclude the airport from developing into a lower level of logistics cluster as discussed in Chapter Three (Table 4).

7.2.6 Functional enabler 5: Capital

Chapter Three explained the difference between public and private capital sources. It appeared that easy accessibility and the conditions regarding capital for logistics operations are important factors in the successful development of a logistics city. Although the accessibility of capital for logistics is not seen to be as critical as in the case in other sectors, its dynamic and diverse nature requires tailor-made solutions. The compliance score for this enabler is at the neutral level. This is mainly so because ACSA has already dedicated significant funds to developing the air-cargo facilities at the UIA, as indicated in Chapter Six (the apron, some warehousing space, land and services). The enabler is currently somewhat constrained due to the uncertainty of the private-sector contribution to future developments. Interviewee 3 unambiguously stated that "compared to the money spent by ACSA in developing UIA to the level [at which] it currently is, putting up warehouses and cold storage is small change". It would be fair to deduce that the capital required for the further development of the hub at the UIA – if such capital is to be forthcoming from the private-sector role players – may not be the most serious problem being faced by the airport, which serves to explain the neutral score.

7.2.7 Functional enabler 6: Competition

As indicated in Chapter Two and Chapter Three, competition has positive effects both for clusters and for logistic cities. Competition is also perceived as stimulating efficient logistics operations and catalysing the rapid adoption of new practices in response to client demand, all of which result in increased innovation and the introduction of competitive prices. It is however argued that the competition enabler is of lesser significance in a hub start-up situation in peripheral areas. In the case of the UIA, so it is argued, the lack of competition at the airport may actually act as an incentive for a freight forwarder to establish a presence at the airport. This particular sentiment was compellingly articulated by Interviewee 3 who stated that he was of the opinion that the lack of competition at the UIA "should be entrenched in some sort of agreement between the freight forwarder and ACSA". Based on the latter argument, the competition enabler has a relatively high compliance score.

7.2.8 Integrating enabler: Governance

Any cluster consists of many different stakeholders that have individual aims and requirements. However, it is crucial that the efforts of the stakeholders be aligned to enable a holistic development of the cluster. As discussed in Chapter Three, the Governance enabler is regarded as an integrating platform that informs and guides all stakeholders towards collaboratively achieving values that benefit the cluster as an integrated system. Logistics city clusters commonly involve separate public authorities and private stakeholders. If these parties do not act in a collaborative environment and align their activities and instrumentalities, no wider benefit will accrue to the system because of individual divergent objectives and motivations. A potential cargo hub at the UIA will have a number of stakeholders from both government and the private sector. It is imperative that stakeholders' interaction be coordinated and directed to the benefit of the facility and so as to allow the airport to develop to the highest progression of the logistics city concept. The lack of integrated planning, as discussed in Chapter Five, clearly has a negative impact on this enabler. Based on official support from government and references to the air-freight hub at the UIA in the provincial Growth and Development Strategy and Local Economic Development and Incentive Plan of the //Khara Hais Local Municipality (Chapter Six), the governance integrating enabler should actually receive a high score. However, despite the efforts put in by ACSA to develop the airport into a cargo hub, the score has been adjusted downward because of the lack not only of an integrated planning approach but also of the associated collaborative structures between the various role players. The downward adjustment reflects the seriousness of the lack of integrated planning on the development of the hub at the UIA.

7.2.9 Synthesis

The logistics city concept provides an academically sound basis for an evaluation of a cargo hub, especially with a view to addressing either potential problem areas or the issues that are standing in the way of the development of an air-cargo hub at the airport. The evaluation based on the logistics city enablers has demonstrated that there are both positive and negative aspects attached to the development of an air-freight hub at the UIA. The interviews showed that the lack of development stems only from insufficient levels of local demand. Indeed, only one freight forwarder, Interviewee 3, indicated that they were not detracted by the lack of proximate demand and that the nature their business was such that, if given the ideal circumstances, they could operate from the UIA.

One important aspect to emerge during the interview process was one of price. Without fail, all the freight forwarders listed price as being the most important driver in the development of an air-freight hub at the UIA. It transpired that, *ceteris paribus*, the clients of freight forwarders had no preference regarding whether their product was shipped through the UIA or through ORTIA. In turn, the cargo airlines also made it clear that if the freight forwarders secured sufficient business at the UIA, they would have no problem in utilising the airport. Interviewees 3, 5 and 8 stressed the point that southbound cargo (i.e. cargo coming into South Africa) would from their perspective be a crucial factor in the establishment of an air-freight hub at the UIA.

7.3 Critical reflections on the concept of an air-freight hub at Upington

This section is a critical reflection on the possible reasons why initiatives and activities have to date been unsuccessful in developing the air-freight hub at the UIA to any level above its existing functionality. Based on a qualitative assessment, five contributing factors have been identified: the lack of an integrated planning approach; airport ownership and ACSA policy issues; the lack of adequate institutional capacity, the lack of understanding of modern location-theory perspectives; and, a lack of a systems perspective.

7.3.1 Lack of an integrated planning approach

The problematic nature of the development of the UIA into an air-freight hub is partly ascribable to what the NFLS identified as a contributing factor to the freight and logistics system inefficiencies (see Chapter Five), namely a lack of integrated planning. As described in Chapter Five, the NFLS identified a lack of integrated policy, strategy, planning and forecasting at both the national and the regional level to be a major problem in the national freight logistics system.

The lack of integrated planning between the various spheres of government, parastatals, agencies and the private sector is a major cause for concern as it could be a major contributing factor to the inability of the UIA to develop into an air-freight and logistics hub. Research on the activities and initiatives around the UIA as described in Chapter Six has failed to produce evidence that an integrated planning structure is responsible for the development of the airport into an air-freight hub. At the institutional level, //Khara Hais Local Municipality and the NCPG clearly support the idea of an air-freight hub at the UIA. This is evidenced by the many references in the respective strategy and planning documents (see Chapter Six). ACSA, in turn, as the owner of the airport has for its part invested millions of Rand in the development of the airport, much of which has been directed at the development of cargo-related facilities. Yet, again, no evidence could be found either that the decision taken by ACSA had been based on any LED plan or strategy document or of any ongoing consultation process beyond the obligatory discussions with //Khara Hais Local Municipality regarding the provision of bulk infrastructure to the airport site.

Such a lack of integrated planning manifests itself in a situation in which no specific responsibility is allocated to any structure, institution or champion to further the development of the UIA. It is almost as if each party has decided that they have met their responsibilities in terms of the development, for example the institutional structures may argue that they give recognition to the development of the airport into an air-freight hub in their growth and development strategies and plans. In its turn, ACSA may argue that it has done its bit by ensuring that there is sufficient serviced land, infrastructure and airside apron space available for the freight hub.

One crucial role player is absent from this situation, namely the freight forwarder. As an industry role player – as explained both in Chapter Four and in Annexure A – the freight forwarder is a crucial link in the air-freight value chain. No evidence could be found that any individual freight-forwarding company or the industry's umbrella organisation (The South African Association of Freight Forwarders) had been approached, consulted or included in any of the initiatives for the development of an air-freight hub at the UIA. This practice would almost certainly lead to a situation in which the specific needs, requirements and conditions of the freight-forwarding fraternity to start operating from the UIA had been excluded from any planning activity, thus effectively precluding the implementation of an entrepreneurial approach to LED as was discussed in Chapter Five.

7.3.2 Ownership of airports by the Airport Company of South Africa

In Chapter Six, the ownership of the UIA by ACSA was identified as a potential problem for the development of the airport into an air-freight hub. This is so because it would be very difficult for the airport management to offer incentives to prospective air-freight airlines in terms of for example landing fees in that these would impact negatively on the company's bottom line, especially since the business for the UIA would have to come from the existing users of ORTIA. Another stumbling block for the UIA is that there does not appear to be a comprehensive strategy at ACSA that deals with regional airports – specifically the freight hub at the UIA. This makes the implementation of any incentive schemes extremely problematic for potential air-freight operators. It is almost as if the latest development initiatives at the UIA were individually launched and driven and were not necessarily part of a comprehensive and committed strategy to develop the airport into a freight hub.

7.3.3 Lack of institutional capacity

There appears to be a lack of provincial and local institutional capacity in conceptualising a project such as developing an airport into a freight and logistics hub. This is stated against the background of the project having been included in the Provincial Growth and Development Strategy and in the LED Plan of the //Khara Hais Local Municipality without there actually having been a sound basis for supporting the project (as discussed in Chapter Six). There is no evidence in any of the documents discussed in Chapter Five and Chapter Six that demonstrates that the provincial and local institutional structures have a clear understanding either of how the freight and logistics system operates or of the demands of establishing an air-freight hub at an airport. Apart from a clearly apparent lack of knowledge of the freight and logistics system in South Africa and particularly of the air-freight industry as such, there is moreover very little evidence of a sound knowledge of logistics hubs and their operational requirements. The term *hub* is freely used in the provincial and local strategy and policy documents discussed in

Chapter Five and Chapter Six, but there is no indication that there is an understanding either of the challenges or of the market conditions that are a prerequisite for the development of such hubs.

This lack of capacity is further evident in the absence of any reference to the advantages that clustering (as discussed in Chapter Two and Chapter Three) offer the transformation of the existing airport into an air-freight hub. This means that Porter's argument (as discussed in Chapter Two) – that agglomeration or the clustering of economic activities is an essential ingredient of economic development – does not form part of the institutional mindset. This absence is in line with the research, discussed in Chapter Two, that indicates that the knowledge of industry clusters in peripheral regions, and their competitive and cooperative dynamics, is limited.

Because, as discussed in Chapter Three, the logistics city concept is still relatively new, it is understandable that there may be a lack of adequate institutional capacity to ensure that the logistics facility at the UIA will progress from being a virtually non-existent entity to one that is sustainable. However, the opportunities inherent in globalisation (Chapter Two) are not as yet fully understood nor are they being harnessed to the benefit of Upington.

7.3.4 Insufficient understanding of modern location theory perspectives

An issue closely related to a lack of institutional capacity is the one regarding the strong likelihood that all role players (institutional and private-sector) have a mindset in which the traditional thinking on the location of economic activity in space is still deeply entrenched in classical and neoclassical location theory (see Chapter Two). In this mindset, the issue of 'first-nature' factors as being the drivers of location decisions is foremost in the minds of decision makers.

In Chapter Two, it was shown that these earlier theories in which geographical concentrations of production were bound by natural resource endowments, have, since the 1990s, been replaced by the so-called NEG. According to the NEG, location decisions are now the result of the complex interplay of various dynamic factors and the space-economy is the outcome of preference-seeking behaviour on the part of individuals, households, service firms and goods-producing firms. From this we deduce that cities and regions can develop because people decide that they like to go there (for example for amenities such as landscape and climate) and that production can follow. The converse can also be true: firms have some reason to go somewhere and they then attract a workforce.

On the face of it, it would seem that there is very little understanding of the changed dynamics in location decision making. There is no evidence in the provincial and local strategic documents, discussed in Chapter Five and Chapter Six, that the opportunities offered by the new spatial location dynamics are actively and constructively being explored in the Northern Cape. As reflected in Chapter Two, in terms of the NEG, the favourable characteristics of a location, such as availability of a good port (which in the case of Upington is an airport), typically play a catalytic role in the development of the region. There is some understanding of the role that an airport can play in regional development, as is borne out by the many studies pertaining to the feasibility of air-freight hubs at regional airports, but this understanding seems to be limited purely to the existence of the infrastructure, almost as if the infrastructure is then the 'first-nature' factor at Upington.

7.3.5 Lack of a systems perspective

Chapter Two demonstrated that one of the results of globalisation is that supply chains are getting longer in terms of both time and distance. Transportation, through logistics, links these geographically distant sources and markets. The implication of this is that there is a greater need for efficiency in, specifically, transportation and distribution networks. The integration of transport infrastructure into a logistics hub is seen as an enabler of distribution on a global basis. Furthermore, Chapter Four showed a competitive network of global logistics to be the backbone of international trade and that the costs associated with logistics have a major impact on the economy.

An analysis of the initiatives around the UIA (Chapter Six) revealed that there was no mention whatsoever in any written document of the effect that these initiatives would have on logistics costs. The documents included the provincial strategy documents analysed in Chapter Five and Chapter Six, and also the the LED Plan of the //Khara Hais Local Municipality. From this it is deduced that the possible positive effects of an air-freight hub at the UIA on the total South African logistics costs did not at all feature in the minds of the decision makers. The result is that yet another motivating factor towards ensuring that the hub is indeed developed has in no way been taken into account.

7.4 Towards a framework for the development of the Upington International Airport

What has been stated above does, clearly, not bode well for the development of a cargo hub at the UIA. The question is whether the UIA, despite its peripheral location, can indeed be developed into a cargo hub. If so, what are the requirements for making progress with the development of the hub? The logistics city concept and its enablers were used to evaluate the status of the UIA regarding the development of the hub at the airport as reflected above. The question now is: Can the concept of a logistics city also be used as a planning framework (as is the case in Melbourne as explained in Chapter Three) to possibly guide the development of the hub at the airport? In this section, the possibility of using the logistics city concept as a proactive planning framework is explored by means of a qualitative assessment based on deductive reasoning.

7.4.1 Proposed framework

Those enablers accorded high scores (such as infrastructure, workforce and competition) will form the basis of the framework. The governance enabler, despite having a low score, can easily be allocated a higher score should the principle of integrated planning be adopted and implemented. The focus should be on enhancing those enablers that currently score high and on launching conscious efforts to improve the scoring on the low-scoring enablers (such as the market enabler) by introducing certain intervention measures.

Given the progress made by ACSA with the development of the UIA (as discussed in Chapter Six), it is assumed that infrastructure will not be a constraint to locating at the airport. The parking and mothballing project launched by ACSA, which is already in operation, is by all indications a success. An approved maintenance organisation started work on the parked airplanes in the latter half of 2009. This is definitely a project that needs to be both expanded and actively marketed, as it will contribute to making the UIA known throughout the flying fraternity.

The UIA already operates at a Level-1 facility (Freight Focus Area) as reflected in Table 4 – Chapter Three) because the airport not only has the necessary airside facilities and services in place but charter flights also take place from time to time (Chapter Six). It is, however, assumed that, given the current freight volumes and aircraft-movement patterns at the UIA, passenger-related freight (belly freight) will not contribute to the potential cargo volumes at the airport.

The main reason why the airport is currently not developing into an air-freight hub − as the initiatives undertaken by ACSA and the prominence given to it by both provincial and local authorities would lead us to expect − is that there simply is no potential market. Certain measures therefore need to be introduced to establish, develop and grow a market at Upington. Given the provincial and LED profiles reflected in Chapter Six, this is a daunting prospect. These profiles indicate that it is highly unlikely that the manufacturing of high-value goods suitable for air freight will spontaneously develop in Upington. However, with the insight gained from the analysis of the NEG (Chapter Two), clustering (Chapter Two and Chapter Three), the logistics city concept (Chapter Three), the functioning of the air-freight industry (Chapter Four) and from the critical reflections portrayed in Section 7.3, the following interventions may facilitate the development of an air-cargo hub at the UIA.

<u>Special purpose vehicle</u>

The establishment of a joint planning and implementation body, typically a special purpose vehicle (SPV) to manage the development process must be prioritised. The SPV should at least comprise the UIA airport manager, the LED Manager of the //Khara Hais Local Municipality, a designated official from the Northern Cape Department of Transport, Safety and Liaison as the department responsible for transport in the province, The Northern Cape Department of Economic Development and Tourism, and at least one of the bigger freight-forwarding companies currently located at ORTIA. During the interview process, Interviewee 3, openly expressed keenness to become part of such a SPV. Without a freight forwarder as part of the SPV, truly integrated planning would not be possible, as the freight forwarder is the primary agent for creating demand at the airport.The freight forwarder is the link between the producer and the cargo airline. It is therefore also advisable that the freight forwarder be an organisation that has established links with a cargo airline, as all freight being lifted from the UIA will have to be transported by cargo airline.

<u>Market establishment</u>

In order to establish a new market at the UIA it is suggested that the existing ORTIA market be tapped into by selectively targeting suitable industries and producers. In this instance, the distance by road between the area of origin and the UIA must be similar to the distance by road to ORTIA, all other things being equal. It is likely that initially <u>inbound</u> (and to a lesser extent also outbound) cargo will be heavily dependent on the motor industry in the Eastern Cape. This requires that freight be effectively routed from the UIA to the Eastern Cape (East London and Port Elizabeth) and not from ORTIA. This is a likely scenario in that the road distance from, say, Port Elizabeth to Johannesburg is very similar to that from Port Elizabeth to Upington as are the flying times from the two airports to Europe. Under this scenario, it is imperative that the freight forwarder be an organisation with established links in the motor industry. The fish industry in Namibia can, in turn, play a pivotal role in the <u>outbound</u> component, as almost all the fish from Namibia is transported by road to Johannesburg on a routing that actually takes the vehicles within about 150m from the UIA. The main reason why the fish products are transported by road to Johannesburg is that there are no international flights from the UIA. It is further important that the strong marketing advantage that the UIA has over ORTIA in its shorter turnaround times be exploited to the full. This particular point was stressed by interviewees 2, 3, 4, and 10.

Additional potential markets

A further potential market that needs to be explored is the establishment of a transhipment component as an additional market. Transhipment products are typically products that will first land at the UIA before subsequently being distributed to other destinations (either ORTIA or other destinations in Africa). In addition, outbound traffic may have to make a stopover in Africa (probably Kenya) to load additional cargo such as fresh flowers. Apart from additional cargo, a stopover in Kenya has advantages for both increased aircraft and crew utilisation as indicated by interviewees 2 and 9.

Specific cluster initiatives

It is imperative that a special economic zone (SEZ) or something similar be established at the UIA because the advantages of a zone of this kind will be crucial towards ensuring the sustainability of the logistics cluster – especially if the cluster wants to progress to further levels. A SEZ holds certain trade advantages and also benefits regarding customs clearances and taxes. The SEZ should be established at the airport itself, as this will result in lower transport handling costs (terminal-related costs) than if the SEZ were situated at a more distant location. This is typically one of the marketing tools that could be used as part of the marketing of Upington as a logistics city. A SEZ will also have advantages for the transhipment of cargo at the UIA. Apart from the obvious advantages of increased economic activity at the hub and within the SEZ, it is also important to launch general economic-growth initiatives at the Industria and Laboria industrial areas. Such initiatives should entail efforts to entice export-oriented industries to locate in the SEZ, some of which are already incorporated in the LED and Incentives Plan of the //Khara Hais Local Municipality (Chapter Six). This is important with a view to starting to generate a natural demand for freight services.

7.5 Conclusion

Four main conclusions can be drawn from this chapter. Firstly, this chapter showed that despite the best intentions of, for example, ACSA, demonstrated by spending large amounts of money on the development of an airport, an air-cargo hub does not develop of its own accord. Only talking about a project of this kind and including it in provincial and LED plans is also by no means sufficient for the development of a hub. Secondly, the existence of well-developed and maintained airport infrastructure on its own also does not ensure that the location of the airport is suitable for the location of an air-cargo hub – especially when the airport in question is located in a peripheral area. Thirdly, the lack of integrated planning is an obvious shortcoming that needs to be rectified before real impetus will be given to the development of the hub. Fourthly, the logistics city concept offers a useful tool for evaluating a freight hub in respect of identifying compliance levels.

Despite the initiatives and the money spent at the UIA, it would seem as if its peripheral location makes the threshold for progressing from Level 1 (Freight Focus Area) to Level 2 (Freight Terminal), as indicated in Table 4 singularly unattainable. It is obvious that more needs to be done to stimulate the development of the UIA into a fully fledged air-cargo hub.

8 MAIN FINDINGS

8.1 Introduction

This study started off by providing an overview of the changes in the world economy (Chapter Two) and of what is known as the NEG. This formed the backdrop to the discussion in Chapter Three of the development of the logistics city concept and a review of the changes in logistics and air freight in the world. The study subsequently (Chapter Four) assessed freight and logistics trends in Africa and South Africa and additionally (Chapter Five) evaluated freight and logistics policy in South Africa. At the end of the latter chapter, the question was asked whether the current trends and policy environment did indeed make allowance for decentralised LED efforts especially in peripheral areas. Chapter Six assessed the LED efforts associated with Upington and, more specifically, the UIA. In Chapter Seven, I asked whether there is a fair chance that peripheral airports will be developed if we take the changing world economy and the lack/presence of the enablers related to the development of logistics cities into account. The present chapter reflects on the main findings of this study.

8.2 Main findings

8.2.1 Market conditions

<u>Main finding 1: Market conditions override opportunities presented by the new economic geography in peripheral areas</u>

Before the introduction of the NEG, natural endowments or so-called 'first-nature' factors typically explained why some regions had generally developed a particular concentration of economic activity whereas others had not. The NEG, with its focus on the interactions among firms in markets that may lead to the generation of self-sustaining processes of agglomeration which cause firms to cluster in space, was developed in the 1990s in response to the changes caused by globalisation and the advances made in technology (see Chapter Two). The NEG argues that the space economy is the outcome of preference-seeking behaviour on the part of individuals, households, service firms and goods-producing firms. The deduction is that cities and regions can develop because people decide that they want to settle there and that production can follow. It can also work the other way round: firms have some reason to go somewhere and they then attract a workforce. The NEG further argues that the favourable characteristics of a location – such as the availability of a good port (which could also be an airport) – typically play a catalytic role in the development of the region. The catalytic role that such locations may play makes it likely that once a new centre has become established, it grows through a process of self-reinforcement, and may thus attain a scale at which the initial advantages of the location become unimportant compared with the self-sustaining advantages of the agglomeration itself. This argument opens the possibility, theoretically at least, that peripheral regions could grow through the judicious development of clusters or agglomerations at the location of a good port, such as an airport.

When mirrored against the current reality at ORTIA in terms of capacity problems and bottlenecks (Chapter Six), the NEG should open the way for the development of a logistics facility at the UIA, the more so if viewed from the perspective of a logistics city (see Chapter Three). The qualitative assessment in Chapter Seven indicated that the UIA achieved high compliance scores on three of the functional enablers of the logistics city concept, namely infrastructure, workforce and competition. Yet it scored very low in terms of the base enabler (market). Given the lack of progress made in developing the hub, despite both the investment made by ACSA towards positioning the airport as a cargo hub and the prominence given to the hub in provincial and local strategic documents, it is reasonable to assume that the market enabler is still the overriding enabler when it comes to the establishment and development of an air-cargo hub at an airport located in a peripheral area. This means that in spite of the theoretical opportunities presented by the NEG and the logistics city concept, logistics centre development is still fundamentally dependent on market conditions.

8.2.2 Assimilation of logistics and air-freight industry into LED

<u>Main finding 2: Logistics and the air-freight industry have not been effectively assimilated into local economic development</u>

Despite the increasing range of LED research in South Africa (Chapter Six), academic literature focusing specifically on the relationship between air transport (specifically air freight), logistics and LED is virtually absent. A number of reasons contribute to the lack of appropriate LED links with the air-freight industry. Firstly, the study showed that the institutional capacity to utilise the development potential offered by logistics and air freight at the local level is limited. There seems to be a lack of institutional capacity in conceptualising a project such as developing an airport into a freight and logistics hub. Yet the project was included in both the provincial growth and development strategy and the LED Plan of the //Khara Hais Local Municipality without the planners actually having a sound basis for supporting the project. There is no evidence in any of the policy documents to indicate that the provincial and local institutional structures have a clear understanding of how the freight and logistics system operates, nor of what is required to establish an air-freight hub at an airport. Apart from an apparent absence of knowledge of the freight and logistics system in South Africa and specifically the air-freight industry itself, there is also very little evidence that there is a sound knowledge of logistics hubs and their operational requirements. Although the term *hub* is freely used in the provincial and local strategy and policy documents, there is no indication that the challenges and market conditions required for the development of such hubs are understood.

Secondly, the study indicated institutional dissonance between the spheres of government, parastatals, agencies and the private sector. The NFLS has identified a lack of integrated planning at the strategy, policy, planning and forecasting levels as being prevalent both in the national and the regional context. This situation results in a disjuncture between national plans and regional planning that manifests itself in unequal infrastructure development. This lack of integration is also evident between specific LED stakeholders such as DPLG, DTI and the Industrial Development Corporation, especially with regard to the development of the air-freight hub at the UIA. Without a proper vision proactively to strive towards integrated planning – specifically with regard to the freight and logistics industries – peripheral areas are on all levels probably going to suffer more in this regard than are urban areas.

Thirdly, LED efforts are seriously hampered by the dominance of ACSA and by the lack of clear policies on regional airports in South Africa, specifically as regards their developmental role in a situation where ORTIA is hampered by capacity constraints and bottlenecks. As was noted in Chapter Six, ACSA declined to make detailed information available as to why the investment was made to improve the cargo facilities at the UIA. Very few ACSA documents (except annual reports) are in the public domain. This makes it very difficult to evaluate ACSA strategies objectively. As ACSA is the owner of almost all of the major airports in South Africa – including the UIA – it may well find itself in competition with itself. If, for example, the UIA were owned by another private party (as is the case with Lanseria International Airport), the airport could offer certain incentives to freight forwarders and freighter-aircraft operators to entice them to make use of the airport. Given that ACSA has a monopoly, it is unlikely that such incentives will be offered at the UIA as it will detract from the income at ORTIA, effectively impacting negatively on ACSA's balance sheet.

Finally, the specific role and function of regional airports are not clearly articulated in national policy documents, such as the NFLS. This lack of national policy directives may have a negative effect on especially local policies in that there would be no basis for pursuing specific efforts at this level. Also, the lack of suitable policies on regional airports and their roles in the national air-freight system may effectively negate the LED opportunities presented by the NEG and the logistics city concept.

8.2.3 Information availability

<u>Main finding 3: Lack of disaggregated information on the air-freight industry</u>

There is generally a lack of accurate information and data on logistics and air freight in South Africa, particularly at the regional and the local level. Information on passenger air transport is much more readily available, but then mostly only on aggregated levels.

The State of Logistics Survey published annually in South Africa provides sound data for assessing the state of the industry at a national level, and it provides very useful time-series information for mostly road and rail. Virtually no information on the air-freight industry is contained in these surveys. Information related to air freight and data at the regional and the local level is virtually non-existent; whatever information there is is mostly in the hands of parties with vested interest (such as freight forwarders and cargo airlines) who are not however inclined to make the information readily available. The lack of recent and accurate air-freight and logistics data at the local level impact negatively on LED policies, which only serves to exacerbate the lack of understanding of logistics and of air-freight industry requirements. This study represents an attempt to incorporate such data as is actually available in a single document. More importantly though, it outlines the implications of the lack of data for South Africa and for the peripheral areas in the country.

8.2.4 Logistics and country competitiveness

Main finding 4: Efficient and cost-effective logistics is an important determinant of a country's competitiveness

The modern economy is characterised by a decrease in both the friction of distance and the spatial segregation of production. It has been demonstrated that efficient logistics is an important determinant of a country's competitiveness. Logistics has assumed an increasingly important role in the global economy, so much so that logistics has emerged as a strategic source of competitive advantage (Chapter Four). For countries at the same level of per capita income, those with the best logistics performance (for example those with the lowest logistics costs) experience additional growth in the order of 1% in GDP and 2% in trade.

Developing countries produce 37% of the world's GDP yet they foot 48% of the logistics bill, whereas total logistics costs are estimated, on average, at 20% of total production costs in OECD countries. These figures indicate that transport and logistics costs are impacting negatively on the economic growth and development of these countries. The best economies in the world have achieved logistics costs of lower than 10% of GDP, while those that have fared worst could pay as much as 30%, with the average lying between 11% and 16%. South Africa's logistics-cost bill amounted to 12.7% of GDP in 2010. In contrast to this relatively good achievement in 2010, the country has since regressed in terms of its logistics performance from its 24th position in 2007 to its 28th position in 2010. The implication is that South Africa may lose competiveness because of both high logistics costs and low logistics performance levels.

The main findings are summarised in Table 20 below. The table also includes some proposals on the way forward. The latter are discussed in more detail in Section 8.3.

Table 20: Summary of main findings

Main finding	Chapter reference	Proposals
Market conditions override the opportunities offered by the NEG in peripheral areas	Chapters Two, Three, Six and Seven	Institutional planning structures (at all levels) and the industry role players should take note of the importance of the market enabler and that infrastructure on its own provides insufficient stimulus for the development of an air-freight hub.
Logistics and the air-freight industry are not well assimilated in LED	Chapters Five and Six	Where appropriate, LED plans should be revisited based on a thorough understanding and review of the air-freight and logistics industries. It is recommended that a strategic framework for regional airports be developed at the national level, which could result in properly developed LED policies on airports. It is recommended that in the review/updating of the NFLS, national government adopt a planning framework that includes the major role players in the industry in order to achieve a better understanding of the industry dynamics and to ensure properly integrated planning.
There is a lack of disaggregated information on the air-freight industry.	Chapters One, Five and Six.	Government and industry role players should actively promote the improvement of both the level and the availability of accurate information and data on the air-freight industry.
Efficient and cost-effective logistics is an important determinant of a country's competitiveness	Chapter Four	Strategic planning structures in government (all levels) and in the logistics and freight industries should actively pursue avenues to improve efficient and effective logistics in South Africa. National government, in the update of the NFLS, should actively develop implementable strategies so as to improve not only the logistics costs component but also South Africa's logistics performance indicators.

8.3 Proposals for the way forward

The aim of this section is to advance seven proposals in respect of the various key findings of the study. The context within which these proposals are made is one of initiating and stimulating debate among relevant stakeholders in the fields of LED, freight transport, logistics and regional airport development (academics, researchers, policy makers, government officials and politicians) on the application of the logistics city concept generally and specifically on the role of regional airports in LED.

The purpose of the said proposals should be seen in that context rather than as final recommendations. These proposals are largely informed by the need for policy makers and implementers to understand the realities of the air-freight and logistics environment and then to incorporate these realities in national and LED policies and strategic plans.

Proposal One: In Chapter One I argued that decision makers regard the mere existence of an airport as providing sufficient potential for its development into an air-cargo hub. This seems to be supported by the NEG that theoretically provides opportunities for regions that do not possess typical 'first-nature' factors to develop if there is a well-developed port (which could be an airport) in the region (Chapter Two). This theoretical opportunity provided by the NEG has further been supported by processes such as the advantages of clustering and the advantages of the logistics city concept (Chapter Three). The current reality at ORTIA (characterised by capacity problems and bottlenecks), as discussed in Chapter Six, coupled with the high score obtained by the UIA for the infrastructure enabler of a logistics city (Chapter Seven), should further be a stimulus for the development of the airport into an air-freight hub. However, the airport scored very poorly on the base enabler (market). Given the lack of progress made in developing the hub, and, despite both the investment made by ACSA in positioning the airport as a cargo hub and the prominence given to the hub in provincial and local strategic documents, we may deduce that the market enabler is still the overriding enabler when it comes to the establishment and development of an air-freight hub at an airport located in a peripheral area. This means that notwithstanding the theoretical opportunities offered by the NEG and the logistics city concept, logistics-centre development is still fundamentally dependent on market conditions. I would therefore propose that institutional planning structures (at all levels) and the industry role players should take note of the importance of the market enabler and of the fact that infrastructure alone is insufficient stimulus for the development of an air-freight hub.

Proposal Two: In Chapter Six, I pointed to the virtual lack of academic research literature on the relationship between air freight, logistics and the economy but conceded that there is a large body of LED research in South Africa. Chapter Five demonstrated the strong link between the economy and air freight. The dearth of research manifested itself in a lack of understanding of the air-freight and logistics industries so that the air-freight hub concept was mooted in LED documents (Chapter Six) without any firm basis of analysis. LED plans should therefore be revisited and due attention must be paid to the air-freight and logistics industries and their potential role in LED.

Proposal Three: Chapter Six demonstrated that the lack of a properly defined national strategic framework for regional airports (for example the UIA) – one that is moreover supported by clear policies – hampers LED efforts in peripheral areas such as Upington. ACSA documents in the public domain do not reflect any of the strategic direction that the owner of the regional airports in South Africa foresees for these airports. These airports thus seem to be left pretty much to their own devices, and all ACSA's development efforts are directed at ORTIA. It is therefore important that a framework for the strategic role of regional airports be developed, one that will guide efforts to improve on the freight-system inefficiencies as identified in the NFLS. It is accordingly recommended that a strategic framework for regional airports be developed at the national level and that this will form the basis for properly developed LED policies regarding airports in peripheral areas.

Proposal Four: In Chapter Six I indicated that the NFLS is a well-prepared document that identifies a number of core problems regarding the national freight-transport system. A major shortcoming of the document however is that it fails to address the air-freight component in as much detail as it does the road and rail modes. Actively pursuing the improvement of the air-freight component through involving major industry players in the next update or review of the NFLS should go a long way towards facilitating a better understanding of the industry. I therefore propose that in the review/updating of the NFLS, national government should adopt a planning framework that includes the major role players in the industry so as to achieve a better understanding of the industry dynamics and ensure properly integrated planning.

Proposal Five: The lack of recent and accurate local-level air-freight and logistics data impact negatively on LED policies. This exacerbates the lack of understanding of logistics and air-freight industry requirements. Accurate and freely available data will go a long way towards facilitating a better understand of the industry, which will, in turn, also lead to improved LED plans in cases where the existence of an airport is regarded as an opportunity for development. Therefore, government and industry role players should actively promote the improvement of the level and availability of accurate information and data on the air-freight industry.

Proposal Six: In Chapter Four I demonstrated the critical importance of logistics costs and logistics performance in the economy by reflecting that for countries at the same level of per capita income, those with the best logistics performance (and therefore the lowest logistics costs) experience additional growth in the order of 1% in GDP and 2% in trade. I further demonstrated that South Africa has regressed in terms of its logistics performance – from 24th position in 2007, to 28th position in 2010 – with a logistics bill amounting to 12.7% of GDP. It is therefore important for all role players, including government, to have properly developed strategies with which to work towards combating high logistics costs to prevent the country from losing competiveness as a result of high logistics costs and low logistics performance levels. Strategic planning structures, both in government (at all levels) and in the logistics and freight industries, should actively pursue avenues to improve efficient and effective logistics in South Africa.

Proposal Seven: Further to the proposals discussed above, it is crucial that national government take the lead in developing firm and implementable strategies that will lead to a reduction in logistics costs. This should not be left to industry alone: businesses active in the field may not necessarily care about national performance levels, especially since their main focus is to conduct business at the highest possible profit levels. Firm and implementable strategies incorporated in the NFLS should also provide LED practitioners with clearer ground rules for the incorporation of freight and logistics strategies in their LED plans. It is therefore proposed that national government, in the update of the NFLS, should actively develop implementable strategies to improve the logistics costs component and to improve South Africa's logistics performance indicators.

8.4 Proposals for future research

I have identified a number of research topics for future research. First, the logistics city concept should be empirically researched and adapted for South African conditions, particularly with regard to the set of enablers most suitable for local conditions. This research should also focus on developing a weighting system for the enablers in order to define the role, function and influence of each enabler in the development of a logistics hub. A second project could be to research the similarities and the differences in terms of the suitability of the logistics city concept for seaports and airports so as to establish their suitability for each type of port.

In both the international and the local research literature on logistics hubs no indication could be found of the actual, quantitative improvement in the efficiency of the freight system. This leads to the third proposal, namely that the impact of logistics hubs in general, and those at airports, in particular, needs to be researched so as to quantify their impact on the logistics-costs profile of the region and to determine their effect on the logistics performance indicators of the country. Fourthly, the theoretical role and functionality of regional airports in South Africa should also be researched. Research of this nature would lead to a better understanding of airports in South Africa, and it could form a platform for the development of more suitable policies on regional airports.

The fifth proposal is that empirical research should be conducted to gain a better understanding of the views of industry role players (freight forwarders, airlines and shippers) on industry requirements regarding effective airports and also on the determinants of their location-decision parameters, so as to determine the circumstances under which they would relocate to other airports. Given the nature of the industry, this will be a very challenging project.

The sixth proposal is that further research needs to be conducted at both the local municipal and even the provincial level to gain an understanding of the real capacity at these levels regarding the air-freight and logistics industries, especially in areas – like Upington – where there are well-functioning regional airports.

Finally, a very useful study would be to research the air-freight industry from the perspective of the State of Logistics Survey. Such research could be incorporated in the publication and add value to a very useful existing planning resource.

8.5 Value of study

8.5.1 First study on logistics city concept in South Africa

Although the term *logistics city* is used widely to denote cities that have major logistics activities as part of their economic bases – such as Dubai, Singapore, and Zaragoza (Chapter Three) – the heritage of theory development and empirical research on a unified concept of a logistics city is poor. The ILSCM at Victoria University in Melbourne was the first international attempt to give an academic and theoretically founded interpretation of the term *logistics city*. This work was followed up by Sengpiehl (Chapter Three) in research on the logistics city concept as a planning framework for the seaport of Melbourne, Australia. The present study is the very first South African study on the logistics city concept in general and specifically within the context of the LED of a peripheral area. It is moreover applied to a regional airport and not to a seaport in a metropolitan area as was the case with the ILSCM work.

This study has indicated that the logistics city concept offers a useful tool for evaluating a freight hub in terms of its critical enablers. The logistics city concept further reinforces the importance of market conditions as probably being the most important impetus for the development of a freight hub at a regional airport and underlines the notion that the existence of a well-developed and maintained airport infrastructure by itself definitely does not ensure that the location of the airport is suitable for the establishment and development of an air-cargo hub.

8.5.2 First study in South Africa to focus on the relationship between air freight and local economic development in a peripheral area

No evidence could be found of any previous postgraduate work on the role of air freight in the development of peripheral areas in South Africa (Chapter Six). Despite some work, internationally, on the role of regional and rural airports, and some attention in respect of consultancy reports in South Africa (Chapter One and Chapter Six), the role of airports, freight and logistics in LED has received no attention in academic work on peripheral areas (Chapter Six).

This study adds to the body of knowledge in this particular field in that it has identified that, apart from the general lack of adequate research described above, there is also a general lack of understanding of the logistics and air-freight industries within the LED fraternity in Upington (Chapter Six). The LED and Incentives Plan of the Khara Hais Locdoes not contain any specific analysis of the logistics and air-freight industry. The present study also found that the existing thinking and available literature are mostly in the hands of consultants in the transport industry.

8.5.3 Establishment of infrastructure alone is insufficient for development of a hub

The study has demonstrated that LED in peripheral areas faces a number of challenges as a result of the absence of major competitive advantages and other economic drivers (Chapter Five). Many smaller towns in South Africa are currently experiencing decline and are in search of bases for economic revival. The result of this reality is that decision makers often look for non-traditional development outcomes. The existence of infrastructure, particularly with regard to airports in peripheral areas is often regarded as a possible replacement for natural growth drivers such as resource endowments or agglomeration advantages and economies of scale (Chapter One). The study revealed that despite having a very high score on the infrastructure enabler, the UIA has to date been unable to make any progress as regards the development of an air-freight hub. This clearly demonstrates that the establishment of infrastructure alone is not sufficient to ensure the development of a logistics hub and, if such reasoning is indeed adopted by decision makers, it is based on false premises.

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SUMMARY

This thesis is the first study in South Africa to explore the concept of logistics cities in peripheral areas with in the context of local economic development. Although the term *logistics city* is used freely to denote cities in which logistics forms an important part of their economic base – as is the case in Dubai, Shangai and Zaragoza – the body of academic literature on the topic is extremely limited. The logistics city concept was formulated in Australia as an academic concept from approximately 2006 onwards. In South Africa, there is seemingly a tendency among decision makers to regard the mere existence of an airport, especially its potential transformation into an air-freight hub, as a possible local economic development initiative.

The aim of this study was to evaluate Upington (as a peripheral area within the South African economy) and its ability to utilise the Upington International Airport as a local economic development initiative, specifically from the perspective of a *logistics city*. The study analysed the latest theoretical developments in location theory, specifically the new economic geography (NEG) and cluster theory as a basis of the *logistics city*. The NEG, which was developed in the 1990s in response to the changes brought about by globalisation and the strides made in technology, argues that – theoretically at least – peripheral regions could grow through the development of logistic clusters at the location of an airport. In addition, given the current capacity problems at OR Tambo International Airport, the NEG should pave the way for the development of a logistics facility at the UIA, the more so from the perspective of the *logistics city* concept. The study confirmed that, in spite of the theoretical opportunities presented by the NEG, the logistics city concept and the incorporation of an air-freight hub in provincial policy and strategy documents, air-freight hub development is still fundamentally dependent on market conditions and that the existence of well-developed airport infrastructure alone is not sufficient reason for transforming a regional airport in a peripheral area into a logistics facility.

The study further showed that despite the increasing range of local economic development (LED) research in South Africa, academic literature focusing on the

relationship between air-freight transport, logistics and LED is virtually non-existent. Moreover, the study showed that LED efforts are seriously hampered by a number of issues, such as the lack of assimilation of the logistics and air-freight industries into local economic development policy and plans, a lack of capacity at the institutional level, the lack of integrated planning between the spheres of government, the LED stakeholders, parastatals, agencies and the private sector and also the lack of clear policies on the developmental role of regional airports in South Africa. The dominance of ACSA, and the company's own lack of a strategic focus on regional airports, has also been shown to be problematic.

The study further demonstrated efficient logistics to be an important determinant of a country's competitiveness and that South Africa may lose competiveness because both of high logistics costs and low logistics performance levels. The study also showed that there is generally a lack of accurate information and data on logistics and air freight in South Africa, particularly at the regional and the local level, which makes effective and integrated planning even more difficult.

Key words: logistics city, peripheral area, new economic geography, air-freight hub, local economic development, Upington International Airport, logistics

OPSOMMING

Hierdie proefskrif is die eerste Suid-Afrikaanse studie om die konsep van logistieke stede in randgebiede binne die konteks van plaaslike ekonomiese ontwikkeling te verken. Ten spyte daarvan dat die term *logistieke stad* vryelik gebruik word ter beskrywing van stede soos Dubai, Sjanghai en Zaragoza, waar logistieke aktiwiteite 'n belangrike deel van die ekonomiese grondslag vorm, is die akademiese literatuur oor die onderwerp baie beperk. Die konsep van 'n *logistieke stad* is vanaf omtrent 2006 en verder as akademiese konsep in Australië ontwikkel. In Suid-Afrika is besluitnemers geneig om die blote bestaan van 'n lughawe – veral die moontlike ontwikkeling daarvan in 'n lugvragspil – as 'n potensiële plaaslike ekonomiese ontwikkelingsinisiatief te beskou.

Die doel van die studie was ’n evaluering van Upington as ’n randgebied in die Suid-Afrikaanse ekonomie en sy vermoë om die Upington Internasionale Lughawe as ’n plaaslike ekonomiese ontwikkelingsinisiatief te gebruik, in die besonder vanuit die perspektief van ’n *logistieke stad*. Die studie bied ’n ontleding van die nuutste teoretiese ontwikkeling in liggingsteorieë, by name die nuwe ekonomiese geografie (NEG) en klusterteorie wat die grondslag van die konsep *logistieke stad* vorm. Volgens die NEG wat in die 1990’s ontwikkel is in reaksie op sowel die veranderings wat globalisering meegebring het as tegnologiese vooruitgang, kan randgebiede wel groei – ten minste teoreties – deur die vestiging van logistieke klusters by lughawens. Hierbenewens, en gegewe die bestaande kapasiteitsprobleme by die OR Tambo Internasionale Lughawe, behoort die nuwe ekonomiese geografie die weg te baan vir die ontwikkeling van ’n logistieke fasiliteit by die Upington Internasionale Lughawe, veral vanuit die perspektief van die konsep *logistieke stad.* Die studie bevestig dat ten spyte van die teoretiese geleenthede wat deur die nuwe ekonomiese geografie, die *logistieke stad*-konsep en die insluiting van ’n lugvragspil in provinsiale beleids- en strategiedokumente gebied word, marktoestande bepalend is in die vestiging van ’n lugvragspil en dat die blote bestaan van infrastruktuur, ongeag hoe goed ontwikkel, nie genoegsame rede bied om ’n streekslughawe in ’n randgebied geleë in ’n logistieke fasiliteit te ontwikkel nie.

Die studie dui verder aan dat ongeag die toenemende omvang van navorsing oor plaaslike ekonomiese ontwikkeling, daar feitlik geen akademiese literatuur bestaan wat op die verband tussen lugvragvervoer, logistiek en plaaslike ekonomiese ontwikkeling fokus nie. Die studie dui ook aan dat plaaslike ekonomiese ontwikkelingspogings ernstig belemmer word deur ’n aantal kwessies, waaronder die gebrek aan integrering van die logistieke en lugvragbedrywe in plaaslike ekonomiese ontwikkelingsbeleid en -beplanning, gebrekkige institusionele vermoë, gebrekkige geïntegreerde beplanning tussen die vlakke van regering, die plaaslike ekonomiese ontwikkelingsrolspelers, semistaatsinstellings, agentskappe en die privaat sektor, asook ’n gebrek aan duidelik geformuleerde beleid rakende die ontwikkelingsrol van streeklughawens in Suid-Afrika. Die totale oorheersing van ACSA, tesame met die maatskappy se eie gebrek aan ’n strategiese fokus vir streeklughawens het ook geblyk ’n probleem te wees.

Die studie het voorts aangetoon dat doeltreffende logistieke aktiwiteite ’n belangrike determinant van ’n land se mededingendheid is en dat Suid-Afrika van sy mededingendheid kan verloor vanweë sowel hoë logistieke koste as lae logistieke prestasievlakke. Die studie het ook gewys dat daar in Suid-Afrika in die algemeen ’n gebrek is aan noukeurige logistieke en lugvraginligting en -data, veral op die streeks- en plaaslike vlakke, wat effektiewe en geïntegreerde beplanning verder bemoeilik.

Sleutelwoorde: logistieke stad, randgebied, nuwe ekonomiese geografie, lugvragspil, plaaslike ekonomiese ontwikkeling, Upington Internasionale Lughawe, logistiek

ANNEXURES

Annexure A

Questionnaires and semi-structured interviews

Introduction

As mentioned in Chapter One, an information-gathering exercise was conducted so as to gain a better understanding both of the air-freight industry, the roles and functions of the core role players such as freight forwarders and cargo airlines as well as to gain an understanding of their requirements for using UIA as an air-freight hub.

Methodology

The methodology comprised two steps. **Step 1** entailed dispatching 74 questionnaires to those stakeholders listed in Table A1 below. The questionnaires were distributed electronically via email and were followed up by telephone reminders. (See questionnaires at the end of this Annexure.) Owing to a poor response rate, a follow-up initiative was launched. **In Step 2,** I secured and conducted semi-structured interviews with representatives of selected freight forwarders and cargo airlines. Table A1 reflects both the stakeholder groups targeted for the questionnaire research and those that were eventually interviewed.

Table A1: Stakeholder composition and respondents

STAKEHOLDER GROUP	QUESTIONNAIRES	SEMI-STRUCTURED INTERVIEWS
Freight forwarders	Safcor/Panalpina Schenker Kuehne&Nagel *SDV South Africa* DHL W.E. Deane	Safcor/Panalpina Schenker Kuehne&Nagel SDV South Africa DHL W.E. Deane Sabila Freight and Logistics
Dedicated cargo airlines	*Lufthansa Cargo* Cargolux *Martinair Cargo* *MK Airlines*	Lufthansa Cargo Martinair MK Airlines *SA Airlink Cargo*
Industry role players – general	ORPA (grape industry) OKLU (Agricultural Union) LAW (EU-approved abattoir) Karstens Boerdery McDonalds Transport Hudson Transport Fruit and Vegetable Distributors Peu Bezuidenhout (Rose Producer) KLK (an agricultural co-op) OWK (wine producers and marketers) *Upington Ground Handling Company*	
Industry role players – motor industry	Ford GM Volkswagen	Automotive Industry Development Centre
Northern Cape Chamber of Commerce and Industry (Upington Branch)	Mailed by NOCCI to members (50 were dispatched)	

Note: Italics denote respondents who returned questionnaires. SA Airlink Cargo completed the questionnaire only after the semi-structured interview was conducted with them.

At the outset it became clear that it would be very difficult to obtain detailed information (such as requested in the questionnaires), as only six completed questionnaires were returned. Most of these were also poorly completed. Given the incomplete nature of the returned questionnaires (low response rate and questions were often left blank) – the information is presented in descriptive format, rather than in tabular format. The nature of the information is also such that it allows generalised qualitative deduction only.

Freight forwarders

- **SDV South Africa**

SDV South Africa was the only freight forwarder that completed the original questionnaire. The company operates from ORTIA, importing about 100 tonnes per month. (Export figures were not provided.) All their shipments are by air, with 95% being international shipments and only 5% domestic shipments. They generally specialise in the handling of medical products, aerospace products and motor spares. Destinations served are in Africa and Europe and they make use of passenger aircraft to ship all their freight (belly cargo). The company listed that ORTIA allows it to serve a large number of possible destinations due to the airport being a hub. In addition the hub nature of ORTIA ensures frequency of services and a high quality and reliability of service to and from the airport. The availability of specialised ground handling services at the airport is also of particular importance to SDV South Africa. The company further indicated that they were not interested in using the Upington International Airport because of a lack of demand. During the follow-up discussions with the company this point of view was re-iterated, but with an additional comment that should market demand dictate otherwise, a presence in Upington would not be ruled out.

Cargo airlines

- **MK Airlines**

MK Airlines operate only from ORTIA on a regular basis and the company ships about 18 000 tonnes per year (10 000 tonnes inbound and 8000 tonnes outbound). Customer preference is stated as the main reason why the company uses ORTIA. They indicated that the reasons why the UIA is not at present utilised are that the airline mainly ships time-sensitive goods and that utilising the UIA would require additional transfers and handling activities. A lack of demand for shipment from the UIA was also listed as a reason for not using the airport. When asked what factors would prompt the company to use the UIA, reduced turnaround times, a dedicated cargo hub and no curfews on departures and arrivals were listed as factors.

From a maintenance point of view, the airline would require access to A-check services for their aircraft at the airport. Customer requests were listed as the single most important condition for the successful establishment of an air-cargo hub at the UIA. Interestingly though, trucking security was listed as a major risk factor pertaining to the use of Upington as a cargo destination. This is presumably because the main trucking routes would go through sparsely populated rural areas that would offer opportunities for theft and hijackings.

- **Lufthansa Cargo**

Lufthansa Cargo handles approximately 22 000 tonnes of freight to and from the UIA per year. These are mostly cars, car parts and some perishables such as fish and fruits. All of the said flights are chartered flights, as opposed to regular scheduled services. The airline did indicate that in principle they have no objection in increasing their flights to and from UIA, but that their decision in this regard is both price and customer driven. There would also have to be a freight-forwarding company at the airport to generate business.

- **Martinair Cargo**

Martinair Cargo does some charter services from Amsterdam to the UIA on an irregular basis. In response to customer demand, they operate mainly from ORTIA. The airline uses only freighter aircraft and carries about 15 000 tonnes of inbound cargo per year. No figures for outbound cargo were disclosed. Unlike MK Airlines, Martinair Cargo indicated that were they to use the UIA, they would not require technical maintenance services, as opposed to MK Airlines who indicated that they would require A-check service capability at UIA. The airline feels strongly that market demand and customer preference will be key success factors in the establishment of a cargo hub at the UIA. Provided the demand warrants it, they are prepared to operate from any airport.

- **Airlink Cargo**

Airlink Cargo indicated that they occasionally ships cargo to the UIA. The airline mainly carries general express cargo and they also use passenger aircraft for their freight services. As with the previous two cargo airlines, Airlink Cargo will make use of the UIA if demand is indeed sufficient. The company feels strongly that a critical success factor would be the establishment of an office by a major freight forwarder at the UIA.

The company further indicated that they had launched an initiative in mid 2009 to attempt to stimulate freight movements from the airport. Very competitive rates of R3.00/kg were offered. Unfortunately, the company received no support for this effort, mainly due to the lack of freight generation at Upington.

- **Upington Ground Handling Company**

Upington Ground Handling Company was the only company to respond of the market stakeholders approached. The company handles cars, automotive parts, fruit and even dangerous goods (such as ammunition, explosives, oils, gases) at the UIA, but no volumes were given. Cars are handled mainly between October and March and grapes are normally handled between November and January. Ammunition and explosives are handled biannually for air force training activities. The company can handle any type of aircraft. Between October and December 2008, the company handled just more than 252 tonnes of inbound cargo and nearly 186 tonnes of outbound cargo.

Step 2: Personal visits and discussions

Because of the poor response rate in respect of the questionnaires that were sent out, I arranged personal interviews with the stakeholders listed in Table A1 above. Even though the questionnaires dispatched to the particular stakeholder category were identical to those used as an interview guide, not much success was achieved in respect of improving the quantitative information that was sought. In addition, the interviews were secured on the basis that all interviewees would remain anonymous.

The following aspects/issues/comments were identified during the interview process:

Freight forwarders and cargo airlines

- Door-to-door transit time (on-forwarding logistics) is of great importance to the clients of freight forwarders (Interviewees 3, 4, 5, 6, 7 and 13).
- The critical mass of imports at that time came through ORTIA because of the role of Gauteng in the national economy (Interviewees 1, 4 and 11).
- The freight-related costs (to both the customer and the airline) would drive the success of the cargo hub (interviewees 2, 5 and 6). Clients found the total cost of transportation (trucking and air transport) to be a crucial factor. A case in point was the Namibian fish that was trucked to ORTIA and airlifted from there as opposed to being trucked to Upington and airlifted from the UIA. There would have to be a diversity of clients (client mix). At least one freight forwarder (Interviewee 3) felt that, for the UIA to work, care would have to be taken not to cultivate long-term dependence on a small number of clients.
- A major UIA selling point should be the advantages to be gained from shorter turnaround times (interviewees 4 and 6).
- Air-related feeder and distribution services should also be developed. In this case, a local carrier (SA Airlink) will play a very important role (interviewees 3, 5 and 11). .SA Airlink Cargo has indicated that the company is seriously considering introducing small freighter aircraft (in the 8-tonne category) in South Africa. If this happens, this will greatly enhance the UIA's capability as a transhipment and distribution centre.
- A freighter service run from the UIA will have to compete against passenger-related freight services from ORTIA. These services are progressively becoming more cost effective as airlines compete for freight (interviewees 1, 3, 5, 7 and 12).
- Freight forwarders will not surrender their belly-cargo space commitments in favour of freighter services at the UIA (interviewees 2, 5, 8 and 10)

- South Africa has a problem with unbalanced freight (interviewees 5 and 8). This means that, typically, more freight comes into the country than leaves it by air. This obviously poses challenges for especially the air-freighter services in terms of frequencies and schedules. In addition, it seems as if a fairly significant portion of the inbound air freight (into South Africa) is not planned freight. This makes it difficult to enter into contracts for securing block space. Some of the freight forwarders indicated that the automotive industry (which constitutes a significant part of the inbound freight) mostly makes use of 'flash freight', i.e. freight that has to take a maximum of 36 hours from Europe to South Africa (interviewees 2 and 6).
- Fish is mostly exported by passenger aircraft (interviewees 10 and 12) because flight schedules are more dependable than is road transport, with the latter often experiencing problems (such as breakdowns).
- From the perspective of the freight forwarders it can be deduced that cost (net differentials between ORTIA and the UIA), predictability of services (fixed flight schedules) and reliability of services at the airport (freight handling and turnaround times at the airport, and feeder and distribution services) are their main requirements at an airport.
- All the cargo airlines indicated that they basically operated from and to whatever airport the freight forwarders were able to secure sufficient loads.
- Initially, a set of incentives may have to be offered at the UIA so as to build momentum.

RESEARCH ON PROPOSED AIR CARGO HUB AT UPINGTON INTERNATIONAL AIRPORT

QUESTIONNAIRE TO FREIGHT FORWARDERS

Name of Company: ____

Location: ____

1. Please give an indication of the total annual airfreight tonnages your company handles on clients' behalf?

   Import: ________________________________

   Export (IATA figures)______________________

   Total: __________________________________

2. What percentage of your annual shipments are by air and from which airports in South Africa do you operate from?

   Percentage by air __________________

   Airports Operating from:____

   ____

   ____

3. What percentage of your air cargo shipments is international and domestic?

Percentage International: _______________

Percentage Domestic: __________________

4. What are some of the primary origins and destinations of your customer's freight?

Origins: ____

Destinations: ____

5. Please give an indication of the most important types of airfreight commodities handled by your company on behalf of clients.

Commodity 1: _____________________________

Commodity 2: _____________________________

Commodity 3: _____________________________

Commodity 4: _____________________________

Commodity 5: _____________________________

6. Does your company handle any seasonal products on behalf of your clients? If so please give an indication of the peak season periods and an estimated volume per peak season handled.

____

____

7. Are you using all-freight carriers (cargo planes) or commercial airlines (belly cargo) or both? If both, can you please indicate percentage split?

8. If you use OR Tambo International Airport, what are the reasons for using that airport?

Cities/Countries served from that airport.	
Frequency of service.	
Cost of service.	
Quality and reliability of service.	
Proximity of airport.	
Availability of specialised handling facilities at/near airport.	
Other [specify].	

9. Can you envisage any changes in circumstance that would cause you to forward a proportion of your air cargo through Upington International Airport and what changes would be necessary?

Yes	
No	

If no, please state reasons

If yes, please indicate which of the following would be applicable

Cities/Countries served from that airport.	
Frequency of service.	
Cost of service.	
Quality and reliability of service.	
Proximity of airport.	
Availability of specialised handling facilities at/near airport.	
Other [specify].	

10. Can you describe the reasons why you do not use Upington International Airport currently?

Time-sensitive goods.	
Too expensive.	
Air service not frequent enough.	
Lack of specialised air cargo facilities to handle goods.	
Cargo market too small	
Airport too far away/transportation costs too high.	
Too complicated (too many transfers).	
Other [specify].	

11. In your opinion, what would the pre-conditions have to be for the successful establishment of an air cargo hub at Upington Airport?

____

____

____

12. From your perspective, what are the likely risk factors associated with using Upington International Airport as an air cargo hub?

____

____

____

13. Any other comments?

____

____

____

Thank you very much for your co-operation

RESEARCH ON PROPOSED AIR CARGO HUB AT UPINGTON INTERNATIONAL AIRPORT

Questionnaire to targeted air cargo airlines

1. Provide/supply name of airline.

____

2. What commodities do you currently ship to/from Upington International Airport?

____

____

____

____

3. If the answer to question 2 is no, please answer question 3:

3.1 Which South African airports do you currently serve?

____

____

____

3.2 What are the reason(s) for using these airports?

____

____

____

3.3 Indicate the reasons why you do not use Upington International Airport?

Reason	Tick (✓) appropriate reason
Time-sensitive goods	
Too expensive	
Unfrequent air services	
Lack of specialized facilities	
Poor location of airport	
Too many transfers	
Other factors	

4. What type of commodities do you transport?

____

____

____

5. What type of aircraft do you use?

All-freight carriers/cargo planes ☐

Commercial airlines/belly cargo ☐

6. What is the total tonnage of your:

6.1 Inbound shipments?

____

____

____

6.2 Outbound shipments?

____

____

____

7.1 Taking cognizance of the following benefits that Upington International Airport pose, indicate whether you would consider using this airport in future:

- Dedicated air cargo hub
- Reduced air transport turnaround times
- Shorter road linkages to domestic destinations
- No airfews (departure and arrivals)

____

____

____

7.2 If the answer to question 7.1 is no, please state the reason(s). Also indicate any other requirement(s) you might have before using Upington International Airport.

8. Indicate the facilities you require at Upington International Airport

8.1 Maintenance and Repair facilities

Yes ☐ No ☐ Not applicable ☐

If yes, indicate what level maintenance and repair facilities is required.

8.2 Cold storage facilities

Yes ☐ No ☐ Not applicable ☐

8.3 Cargo Warehouse

Yes ☐ No ☐ Not applicable ☐

8.4 Aircraft storage

Yes ☐ No ☐ Not applicable ☐

8.5 Other (please specify)

9. Do any commodities require special handling equipment? If the answer is yes, indicate what type of handling equipment is required.

10. Are you currently engaged in code share agreements with other South African airlines? If yes, please specify with which airline(s).

11 In your opinion, what would the pre-conditions have to be for the successful establishment of an air cargo hub at Upington International Airport?

12. Please list any risk factors you may envisage using Upington International Airport as a cargo hub ?

13. Other comments

Thank you very much for your co-operation

BUSINESS CASE FOR PROPOSED AIR CARGO HUB

<u>Questionnaire to market stakeholders</u>

1. Provide the name of your company: ___________________________

2. Do you ship any commodities to Upington International Airport at present?

____

____

____

3. If the answer to question 2 is no, please answer question 3:

3.1 Which South African airports do you currently utilise?

____

____

____

3.2 What are the reason(s) for using these airports?

____

____

____

3.2 Indicate the reasons why you do not use Upington International Airport?

Reason	**Tick (✓) appropriate reason**
Infrequent air services	
Poor location of airport	
High transportation costs	
Too expensive	

Lack of specialized facilities	
Too many transfers	
Commodity not suitable for air transport	
Other factors (please specify)	

4. What type of commodities do you import/export?

4.1 Imported commodities

____

____

____

4.2 Exported commodities

____

____

____

5. Are any of the commodities transported seasonal in nature? If the answer is yes, indicate the time/period of year and frequency that air transport is required for such commodities.

____

____

____

6. Outline the market destinations of your commodities:

6.1 Inbound commodities

____

____

____

6.2 Outbound commodities

____

____

____

7. What type of aircraft do you prefer?

____

____

____

8.1 Outline the **actual** annual inbound and outbound tonnage transported.

____

____

____

8.2 Outline the **potential** inbound and outbound tonnages to be transported (based on the establishment of a cargo hub at Upington International Airport).

____

____

____

9. Would you consider using Upington International Airport in future? If the answer is yes, indicate which conditions are required before you would be willing to divert air cargo through Upington International Airport. Categorise your response as follows:

Factors	Specify requirement
Frequency of service	
Cost of service	
Proximity of airport	
Specialised handling facilities	
Storage capacity at airport	
On-site security	
Sufficient access to intermodal transport arrangements	
Other requirements (please specify)	

10. Do any co-operation agreements exist between yourself and a freight forwarder(s)? If the answer is yes, provide the name of the freight forwarder(s).

____

____

____

11. In your opinion, what would the pre-conditions have to be for the successful establishment of an air cargo hub at Upington International Airport?

____

____

____

12. Do you envisage any risk factors using Upington International Airport as a cargo hub ?

____

____

____

12. Any other comments?

____

____

____

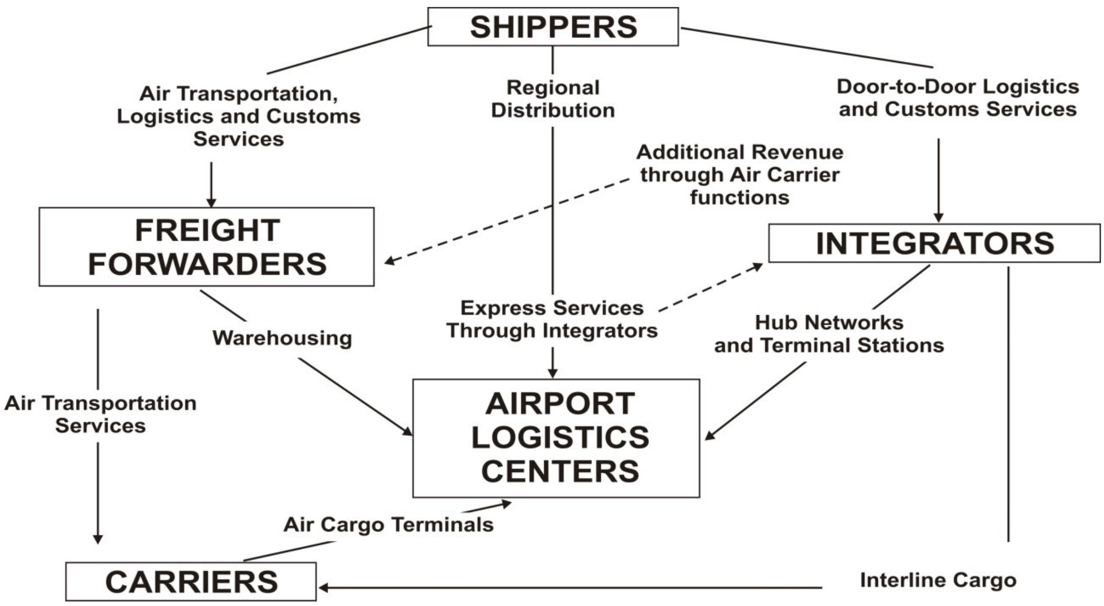
Thank you very much for your co-operation

ANNEXURE B

Main role players in the air-freight industry

Figure B1 reflects the generic structure of the main role players in the air-freight industry.

Figure B1: Main role players in the air-cargo industry



Source: Kasarda et al. (2004: 3)

The figure indicates that the main industry players in the air-cargo market can be categorised as follows:

- **Carriers**: Air-transport operators (airlines) handle both passengers and cargo. The cargo is transported in the belly of the passenger aircraft.
- **Service integrators**: These enterprises combine different means of transport (like ground and air shipment) and provide a complete door-to-door shipping service. Integrators move consignments from door to door, with time-definite delivery services (e.g. UPS, Federal Express, TNT, DHL). These integrated carriers operate multimodal networks, combining air services with extensive surface transport to meet customer demands. The integrators offer a variety of products to shippers, and supplement air services with extensive ground transport to provide time-definite

delivery with continuous shipment tracking and, if necessary, logistical expertise to support just-in-time (JIT) inventory-control strategies.

- **Freight forwarders**: These are sales agents of the carriers that offer distribution services that also include logistics. Examples of freight forwarders are Kuehne and Nagel and SafcorPanalpina).
- **Airport logistic centres**: These are airports and specifically hub airports.
- **Shippers:** A shipper is typically a business (a person or company) in the business of shipping freight. As such, a shipper can also be regarded as the consignor, exporter or seller (who may be the same or different parties) named in the shipping documents as the party responsible for initiating a shipment, and who may also bear the costs of freight.

To complete the picture of the main role players in the industry, it is important to analyse the carriers (airlines) in more detail as these have specific relevance in the Upington case study. There are three main categories of air-freight operators, namely line-haul operators, integrated/courier/express operators, and niche operators.

Line-haul operators move cargo from airport to airport and rely on freight forwarders or consolidators to deal directly with customers. Line-haul operators can be all-cargo operators (scheduled and non-scheduled), moving only freight in dedicated freighter or cargo aircraft (e.g. Cargolux, MartinAir and MK Airlines in South Africa). All-cargo operators offer relatively high reliability and have the capability to move large volumes over long distances. Line-haul operators can also be a combination of passenger and cargo operators, using both dedicated freighter aircraft and the storage compartments in passenger aircraft (commonly known as belly holds) to move freight (e.g. Lufthansa, South African Airways). For the combination carriers, the cargo operations are mainly of the long-haul variety, with a large quantity of freight being transhipped on to shorter-haul feeder services at their destination points. Lastly, line-haul operators can also be passenger operators, which use the belly holds in passenger aircraft. Passenger carriers move cargo in the belly holds of passenger aircraft, where it (the cargo) has traditionally taken second place to passenger services (South African Airlines). Passenger carriers tend to view cargo as a by-product of passenger operations.

Integrated/courier/express operators move consignments from door to door in the form of time-definite delivery services (e.g. UPS, Federal Express, TNT, DHL). These integrated carriers operate multimodal networks, combining air services with extensive surface transport to meet customer demands. The integrators offer a variety of products to shippers, and they supplement air services with extensive ground transport to provide time-definite delivery with continuous shipment tracking and, if necessary, logistical expertise to support just-in-time (JIT) inventory-control strategies.

Niche operators operate specialised equipment or possess expertise in order to meet extraordinary requirements. These operators attract business through their capabilities in respect of handling outside freight or special consignments, including line-haul to locations with poor infrastructure facilities.

Figure B1 plainly indicates that the air-cargo industry extends well beyond air carriers or airlines. The global air-cargo operating system is characterised by a network of relationships among carriers, brokers, handlers, motor carriers, integrators, airports, freight forwarders, customers, suppliers, manufacturers and logistics service providers. Moreover, today's air-cargo environment is becoming increasingly integrated and ground-linked and is characterised by door-to-door services from shipper to customer, as opposed to just airport-to-airport. In addition, time-definite services are also increasingly being expected by supply-chain members, this making it imperative that all the key players operate in an integrated, reliable fashion (Kasarda et al., 2004).

In the modern logistics environment the distinctions between shippers, freight forwarders and even integrators become somewhat blurred. Many of the original separate services may now be rendered by one integrated logistics provider of which DHL is a good example in that they provide a totally integrated service. The company also has its own freight-aircraft fleet.