PLANNING FOR AIRPORTS AND LOGISTICS: CASE OF DUBE TRADEPORT

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Submitted for the requirements of the Degree of Doctor of Philosophy in Public Management in the Department of Public Management and Economics at the Durban University of Technology.

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Co-Supervisor: Prof J.J. McCarthy

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ABSTRACT

This study on planning for airports and logistics is concerned with how airports, as precincts containing specialised infrastructure and related uses, interact with the flow of goods distributed across multiple modes and transportation networks and land uses across local, regional, national and global scales. These flows indicate regional economic activity and have recursive relationships with transport infrastructure and industrial uses, including warehouses, logistics, business parks, and commercial uses. The research explores the role of airports to support the distribution of goods between global and regional economies and interrogates the integration of air cargo logistics in local production processes.

The purpose of this qualitative case study is to explore the multi-scalar role of airports in the flow of goods in order to develop a normative framework for planning that integrates land use and transportation planning towards developmental outcomes. The international movements of goods originate and terminate in cities at either maritime port terminals or international airports, and these act as the nodes where international trade interfaces with regional and local trade flows. The complexity of these global and regional flows across multiple locations and modes of transportation impacts on cities, with challenges for better planning for the movement of goods around airports. Historically, the focus of international trade flows on urban development relates to ports. However, over the past two decades, air transportation has grown internationally and airports play a more critical role in the internationalisation and globalisation of trade, particularly related to the relative value of goods to volume of goods handled by air as opposed to maritime shipping. The integration of global flows with local city flows presents complexities for both the management of materials within the supply chain, as well as the dispersed distribution of goods between places of production and consumption and within multi-scalar production processes. Research on the movement of goods and freight distribution is recognised as a persistent gap within transportation geography; specifically the intersection between

transportation planning and urban planning. The rationale for the study relates to the role of airports in the relationship between the flow of goods and urban development, drawing from the field of transport geography and developing new knowledge related to logistics in the planning. The impact of increased movements of people and goods by air is expressed in emerging airport related urban forms. Despite contested claims that airports are generators of regional economic growth, there a number of negative impacts resulting from the growth around airports. The literature points to sustainability concerns and externalities of airports, questioning the role of planning to act in the public interest

The objectives of this study are firstly concerned with relationships between transportation infrastructure and urban development, specifically in the context where the state is pursuing an infrastructure led development path. Secondly, the relationships between airports and logistics are explored in order to understand how airports interact with the multi-scalar movement of specific goods; thirdly, the interaction between airports with ports, roads and rail infrastructures; and fourthly how airports relate to spaces of production and distribution within the context of the case study in order to propose a normative framework for the planning of airports and logistics. The case study of Dube TradePort development, incorporating the King Shaka International Airport, is approached from within a constructivist paradigm, while acknowledging the subjective nature of truth, and the concomitant fact that the role of multiple perspectives and sources of information are necessary to such a study. The qualitative case study is both the object of inquiry, bounded to the Dube TradePort site, as well as the study design, used to explore how the movement of goods through a purpose-built cargo terminal integrates with land use. Integration between modes of transport improve the overall cost and efficiency of moving goods and improved integration between transportation and land use planning, which has implications for overall efficiency of the urban economy.

The study contributes to the body of knowledge emerging from a developmental context on how planning for airport and logistics provides a critical reflection on the practice of airports and logistics for the field of urban planning. It is recommended that a regional spatial development framework process is initiated within a normative

framework of spatial transformation. The study points towards substantive issues for inclusion in plan-making processes related to how positionality in airfreight flows is important to understand the multimodal and multi-scalar connectivity between air transport, with road, rail and sea-based modalities and secondly to understand how planning for airports can be integrated with planning for productive land uses within the city structure. The implication being that the plan-making process requires a layered approach that considers horizontal integration in local economies and multi-scalar approach to integrating with global economies in terms of investment flows and material flows.

DECLARATION

I declare that unless otherwise acknowledged in the text, this thesis is my own original unaided work. I have not previously in its entirety or in part submitted it for obtaining any qualification.

Robynne Jean Hansmann

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GLOSSARY OF TERMS AND ACRONYMS

ACSA	Airports Company South Africa
ACSP	Association of Collegiate Schools of Planning
ADBG	African Development Bank Group
ADC	Aerotropolis Development Corporation
Aerotroplis	An aerotropolis is an airport-integrated region extending as far as 60 miles (97 kilometres) from the inner clusters of hotels, offices. Distribution and logistics facilities (Kasarda and Lyndsay, 2018:174). Airport centred development model that offers air transport related and dependent firms the infrastructure and connectivity for people and goods.
AESOP	Association of European Schools of Planning
Airport City	Area covering the location of KSIA and DTP
AJI	Aerotropolis Joint Initiative, between Tongaat Hulett and Dube TradePort, 2008-2011
ANT	Actor Network Theory
Atlas.ti	A qualitative data analysis software programme
ATNS	Air Traffic and Navigations Service
AU	African Union
AUC	African Union Commission
B-BBEE	Broad-Based Black Economic Empowerment
BEPP	Built Environment Performance Plan
BRICS	Brazil, Russia, India, China and South Africa are five emerging national economies
C8 link	C8 link between the city and KSIA through the Integrated Public Transport Network (IPTN) is planned for 2026
COGTA	Cooperative Governance and Traditional Affairs
CSIR	Council for Scientific and Industrial Research
CTIA	Cape Town International Airport
DBN	Aviation code for KSIA located in the place of Durban and the jurisdictional boundary of eThekwini Municpality.
DCT	Durban Sea Port Container Terminal

DED	National Department of Economic Development
DIA	Durban International Airport
DoRA	Division of Revenue Act
DOT	Department of Transport
DTI	National Department of Trade and Industries
DTP	Dube TradePort refers to the portion of land held by Dube TradePort Corporation, including the King Shaka International Airport and the Special Economic Zone.
DTPC	Dube TradePort Corporation
DUT	Durban University of Technology
EIA	Environmental Impact Assessment
EDTEA	KZN Department of Economic Development, Tourism and Environmental Affairs
FMCG	Fast Moving Consumer Goods
GCC	Global commodity chains
GDP	Gross Domestic Product
GHG	Green House Gases
GIS	Geographic Information Systems
GPN	Global production networks
GVC	Global value chains
IAS	Integrated Aerotropolis Strategy
IATA	International Air Transport Association
ICT	Information and Communication Technology
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
IMF	International Monetary Fund
IPTN	Integrated Public Transport Network
IUDF	Integrated Urban Development Framework
KSIA	King Shaka International Airport
KZN	KwaZulu-Natal
KZNDEDT	KwaZulu-Natal Department of Economic Development and Tourism Affairs
LAP	Local Area Plan
LMJVC	La Mercy Joint Venture Company

LPI	Logistics Performance Index
LUS	Land Use Scheme
MOU	Memorandum of Understanding
M&E	Monitoring and Evaluation
N2	The N2 is a national route in South Africa that runs from Cape Town through Port Elizabeth, East London and Durban to Ermelo. It is the main highway along the Indian Ocean coast of the country
NATCOR	The freight and passenger rail corridor between the port of Durban and City Deep.
NDOT	National Department of Transport
NDP	National Development Plan
NEG	New Economic Geography
NEPAD	New Partnership for Africa's Development
NUDC	Northern Urban Development Corridor, a spatial development framework of the eThekwini Municipality
ORTIA	OR Tambo International Airport
PGDS	Provincial Growth and Development Strategy
PIDA	Programme for Infrastructural Development in Africa
PPP	Public-Private Partnership
PRASA	Passenger Rail Agency of South Africa
PT	Provincial Treasury
SAA	South African Airways
SADC	South African Development Community
SANRAL	South African National Roads Agency
SAPOA	South African Property Owners Association
SARS	South African Revenue Services
SDBIP	South Durban Basin Industrial Programme
SDF	Spatial Development Framework
SDFs	Spatial Development Frameworks
SDG	Sustainable Development Goals
SEDA	Small Enterprise Development Agency
SEZ	Special Economic Zone
SIP	Strategic Integrated Programme

SIP 2	Strategic Infrastructure Programme 2 is the development of the Durban-Free State-Gauteng logistics and industrial corridor is included in the spatial framework eThekwini Municipality
SIPS	Strategic Integrated Programmes
SITA	State Information and Technology Agency
SPLUMA	Spatial Planning and Land Use Management Act
TCC	Transnational Capitalist Class
TEU	Twenty foot equivalent unit
THDev	Tongaat Hulett Development
TMC	Transnational Migrant Networks
TOR	Terms of Reference
UN	United Nation
WB	World Bank

CHAPTER ONE

INTRODUCTION AND OVERVIEW

1.1 Introduction

This research focused on the role of airports to support the efficient movement of goods between the global and regional economies, through improved logistics at the local planning scale, within eThekwini Municipality and a portion of the Province of KwaZulu-Natal, South Africa (Hansmann 2017: 369). The introductory chapter provides a brief overview of the study, and is divided into seven sections, namely the background and rationale to the study, clarification of concepts and terminology in the third section, followed by the identification of the research problem, the aims of the study and the fifth section posits the research questions. The sixth section deals with the research design for the study and includes the justification for the design. Section seven concludes with the organisation of the study into seven chapters.

1.2 Background and rationale

This section provides the theoretical background to the study, arguing that at a conceptual level, the geography of logistics intercepts with airport related development on the cargo side (Hesse and Rodrigue 2006; Hesse 2013), where the geography of production, distribution, and consumption are complex processes, and are difficult to separate from the complexities of distributing goods through airports. The distribution role of logistics has emerged with, and enables the fragmentation of supply chains, by managing time and distance constraints related to dispersed production, consumption and storage activities (Rodrigue 2012: 15). As a consequence, the complex flows of materials, components and completed goods, supported by flows of information, people and capital through airports are understood in this thesis as being tied to a wider set of social relations within a local and global context.

The emergence of logistics is understood through changes in the supply chain, where airports play a role in enabling organisational fragmentation and geographic dispersal of production reorganisation (Yeung and Coe 2015: 29). The multi-scalar nature of the study means that while networks between actors, firms, places operate *vertically* between local, regional, national and international scale, these networks are also *horizontally* and locally grounded. This study is focused on the multi-scalar, airfreight logistics role that the Dube TradePort, incorporating the King Shaka International Airport, plays in the local planning scale. Local scale is taken to extend beyond the jurisdictional boundary of eThekwini Municipality, to the adjacent local municipalities of Ndwedwe and KwaDukuza, falling within the iLembe District Municipalities. These municipalities form part of the Province of KwaZulu-Natal on the east coast of South Africa.

This background section aligns existing knowledge to the cargo side of airports, and highlights gaps in qualitative research as these relate to the field of planning. Planning in this study includes activities and processes that initiates and manages changes in the natural and built environment (Watson 2002: 28). While these activities and processes are initiated by public and private parties, including government, business, communities, individual, non-governmental organisations, the distinguishing characteristic of planning is that outcomes are mediated by public interest concerns within a normative framework.

Growth in the quantity of freight traded internationally, combined with the complexities of goods moving between dispersed origins and destinations, points towards the important role of international transportation in supporting local and regional economies (Rodrigue, Comtois and Slack 2013: 164). Approximately 90 percent of global trade volume is handled by ports and maritime shipping. However, although airports handle less than one percentage of the 0.2 percent of global tonnage carried by air, they account for approximately 35 percent of the of global trade value (Boeing 2018: 30). Road and rail infrastructure play a marginal role in international trade, but are critical in moving goods to and from port and airport terminals with the challenge of integration between modes of transportation at the local scale. With

improved technologies and changes in the supply chain, airports have become important nodes in the movement of people, and the production and distribution of goods, specifically high value and perishable goods. However, despite the well reported environmental externalities of aviation (Charles *et al.* 2007: 1013; Kivits, Charles and Ryan 2010: 199; Hesse 2013: 37), the use of airports continue to grow and provide the infrastructure to deal directly with international trade with the potential for local and regional economic growth (Schaafsma 2010: 33). With the increase in passenger and freight volumes and their contribution to regional and national growth, there has been academic and practical interest in issues related to airport development (Hesse 2013: 37).

1.2.1 Complexities of integrating the movement of goods

There are complexities to achieving integration between the airports and other modes of transportation in the distribution of goods (Rodrigue, Comtois and Slack 2013: 181). Rodrigue, Comtois and Slack (2013: 181) argue that these complexities relate to the interface between global trade with city logistics, where cities have their own dislocation between production, distribution and consumption, combined with globally dispersed places of production and consumption. The lack of integration is reflected in the transportation geography literature that tends to focus on specific modes of transportation rather than in the linkages between multiple modes in the distribution side of logistics (O'Connor 2010: 355; Hesse 2013: 33). Similarly, in the field of planning, there is a silo approach, where the provision of transportation infrastructure (ports, rail, road and airports) and related land use allocation are planned separately. However, the practice of logistics requires timeous coordination of activities and integration between multiple modes of transport across distance depending on the goods and value chains (Rodrigue, Comtois and Slack 2013: 175). This inquiry into the mobility of goods draws on the domain of transport geography in order to understand the spatial organisation of these movements. Transport geography emerged from economic geography in the second half of the twentieth century (Rodrigue, Comtois and Slack 2013: 8), where transport was an important factor in the location of economic activities and costs of distance. However, transport

is not simply a locational factor for economic activity, but is integrated into production and distribution activities (Hesse and Rodrigue 2004: 173). This concerns the movement of goods across supply chains within agreed upon time, and at agreed upon quality and cost, invoking the domain of logistics within transport geography. The geographic lens aids an understanding of how spatial relations are produced when goods move through supply chains, interacting with international airports. This qualitative research study explores the role of airports in the movement of goods, and how airports integrate with other modes of transportations in the distribution of goods across geographic space.

Hesse (2008: 167) has argued that modern logistics shape urban development patterns due to changes in supply chain management practices. Based on empirical research, Hesse (2008) has identified so-called "*new geographies of distribution*", attributed to changes in supply chain management and logistics management design, and the impact of this on cities. Transformations includes the redevelopment of warehouse districts, railway yards, and freight consolidation facilities by more competitive uses, and the relocation of logistic services related to the storage, consolidation, and distribution of goods, towards strategic places outside of the urbanised centre (Hesse 2008: 184). Hesse (2008: 184) has identified the locational requirements of relocating logistics firms to include the availability of land, access to transportation, as well as distribution networks, as some of the factors behind the suburbanisation of logistics-related uses. However, exceptions exist, where customers of intermodal services have fixed locational behaviour and require close access to ports, railyards, or airports (Hesse 2008: 185). In subsequent work (Hesse 2013: 33) has argued that transport networks (related to ports and airports) display concentration and dispersal flows on urban places. Integration, as a policy and planning strategy, is difficult to achieve, due to complex systems' dynamics and the individual logic of each sector. In consideration of a combined analysis of sea and freight activity on city regions, O'Connor (2010) explored the effect of infrastructure on logistics locations within global city regions. He concludes that global city regions with multiple seaport and airports play a particular role in attracting logistics firms, where the dynamics of these places create challenges for strategic urban planning policy (O'Connor 2010: 354). Much of the

research on airports and logistics are based on the developed world, yet in developing countries, the impact of these flows, particularly those related to the production of goods, require further exploration. Such is the case of South Africa.

Integration refers to more than the physical infrastructure to support efficient goods handling in the distribution process, but also includes the economic and spatial dimension of how the distribution of goods integrates with the production of goods and ultimately with places of consumption and reuse. The location of land uses and activities that deal with distribution, production, and consumption processes have implications for the field of planning. Planning, as a practice, attempts to mediate private and public investment and locational decisions in the public interest (Forester 2013: 5). While the framework for planning could suggests a rational process for supporting land uses, the actual practice of planning is uncertain, with unintended consequences, conflictual decisions, and contested power between actors. Given the extent of investment in airports and logistic infrastructure to support trade, involving a range of actors, the context warrants research and reflection on planning theory that considers social, environmental, and economic perspectives within a normative framework.

1.2.2 Airport research

The bulk of airports research related to planning occurred in the twenty first century, with some of the more influential work on airport models emanating from practitioners and research groups surrounding North American airports, Europe and Australia. Debates were focused on how to manage the negative externalities of airport expansions, noise impacts, sprawl and environmental concerns (Charles et al. 2007; Kivits, Charles and Ryan 2010) against prospects for growth (Brueckner 2003; Green 2007; Schaafsma, Güller and Amkreutz 2010; Kasarda and Lindsay 2011; Kasarda, Appold and Peoples Jr 2014; Appold 2015; Banai 2017). Substantial work on suitable planning models to mediate land use conflicts are discussed in the Australian context (Freestone and Baker 2010; Freestone 2011; Freestone and Baker 2011). Freestone and Baker (2011: 267) discussed models of airport related development that introduce

terminology to describe different planning formations including '*airfront, decoplex, airport city, airport corridor, aerotropolis, and airea'*, each with their differential geographies relates to differing contexts.

The challenges and prospects for planning were identified as threefold: firstly, planning holds the potential to mediate normative concerns for balancing local sustainability concerns with regional and national economic interests; secondly, there is a need to integrate airport master planning with city planning; and thirdly, there is importance in collaborative planning to align future visions (Freestone and Baker 2011: 274-275). Locally, planning research on South African airports focused on empirically informed descriptions in order to explain the economic fundamentals that drive the forces of attraction in airports (Mokhele 2016b, 2017; Mokhele 2018a, 2018b; Mokhele and Geyer 2018). Case studies focused primarily on OR Tambo International Airport (ORTIA) and Cape Town International Airports (CTIA), with some work on Braam Fischer Airport, and commentary on King Shaka International Airport (KSIA). The study contributes towards a spatial economic theory of airport-centric developments, by arguing that airport-centric firms are characterised by intra-firm and inter-firm linkages, and makes the distinction between geographical space, and economic space of airport-centric firms, resulting in a combination of spatial clustering and organisational clustering. However, the case of King Shaka International Airport differs from these models: firstly, in terms of the greenfield and purpose-built nature of the development, including an air-logistics platform; secondly in terms of the development containing greenfield, purpose-built passenger and cargo terminals with differential ownership, operational strategies, and geographies; thirdly, where the relative infancy of the project within the long term development of the site; and lastly, in terms of the contextual location of a development within a Special Economic Zone related to a port city with dominant containerised traffic and related industrial development.

1.2.3 Air cargo and passenger connectivity

Air connectivity in South African is based on a hub and spoke model, where ORTIA is the main hub, supported by CTIA and KSIA as keys spokes, along with a number of regional centres. However, air cargo and air passenger's connectivity demands differ in the goods, destinations and trip length and produce differential geographies and dynamics nationally, across Sub-Saharan Africa, and internationally. Internationally, air cargo is more concentrated than passenger flows (Mayer 2016: 54), and these concentrate on relatively few trade lanes, especially in the world's two largest trade routes of East Asia–North America and East Asia–Europe (Boeing 2018: 8). Similarly, global logistic functions also tend to concentrate, whether these related to airports, ports or distribution centres, at places with high flows (Hesse and Rodrigue 2004: 171). Passenger connectivity is more dispersed and includes destinations where cargo demand is minimal. The implications are that the mix of cargo and passenger activities, related connectivity and logistics operators all have a bearing on the cargo role of the airport.

According to Mayer (2016), airports acts as nodes with three typologies of air cargo business flows. The first relates to local air cargo based on domestic consumption and export; the second when airports develop as gateways for manufacturing in the hinterland, and thirdly transhipment hubs, where cargo moves from air to air, and the destination is located outside the region (Mayer 2016: 54). In terms of global air cargo flows, only four African cities feature as secondary international cargo hubs, namely, Cairo International Airport, OR Tambo International Airport (Johannesburg), Jomo Kenyatta International Airport (Nairobi), and Murtala Muhammed International Airport (Lagos). Some of the characterises of these secondary international cargo hubs are related to their hub role for smaller airlines such as South African Airways or Kenyan Airways, where the proportion of cargo weight relative to passengers is low; with passengers numbers generating around 17,19 million passengers, of which 70 percent are international, the proportion of international cargo is high, and the number of dedicated freighters account for less than four percent of commercial movements (Mayer 2016: 54). In other words, the category of air cargo operations that African cities participate in are largely passenger focused, with cargo as a by-product. The

focus on the passenger side of airports is also reflected in research. Airport research tends to either focused on the passenger side, or subsume cargo within passenger flows, and hence tends to overlook the heterogeneity of airports from a cargo perspective (Mayer 2016: 54).

1.2.4 Air cargo

The term air cargo comprises scheduled freight, charter freight, and mail, and thereafter scheduled freight can be further disaggregated into general and express or integrator freight. In support of e-commerce and transportation of express freight, many of the world's major passenger lines have also developed dedicated cargo integrators such as UPS, DHL, FedEx (incorporating TNT), SF Express, and even Amazon with its own logistics network (Boeing 2017: 2). While air cargo is the umbrella term, scheduled freight accounts for approximately ninety percent of all world air cargo traffic (Boeing 2017: 6). There are a number of characteristics of the air cargo industry that point to its uniqueness in international trade. Air cargo occupies a relatively marginal position in the movement of goods by weight, relative to world trade. Despite this marginal role, the relative value of air cargo and the growth in air cargo markets are substantial. Geographically, air cargo is highly concentrated.

Historically, the geographic focus of international trade was on urban development as this relates to ports, and this is still reflected in recent literature, which poses a gap for airport related trade and development. This gap persists despite the prominence of air transportation in international trade over the past two decades (Button and Taylor 2000), particularly considering the relative value versus volume of goods handled by air, as opposed to sea. Air cargo accounts for less than one percent of world trade tonnage, but also accounts for some 35 percent of world trade value carried by air (Boeing 2017: 6). Although international trade is largely sea-based, and a small volume moved by air, the landside modal choices between air, road, and rail to move cargo within price, time and quality parameters falls within the field of logistics and supply chain management. Within international trade, the modal competition between sea and air distribution of goods in the supply chain is relatively negligible, with air

cargo therefore fulfilling a small component of the global goods distribution network. It is estimated by Boeing that in 2017, the world maritime industry carried some 11.6 billion tonnes, compared to 61.9 million tonnes for the air cargo industry (Boeing 2018: 13). Despite well-established logics of speed, reliability, and pricing that favour moving high value goods by air, there are supply side consideration (infrastructure and security) impacting on expanding shares in air cargo in Africa. African intraregional trade has rapidly expanded its share of African air trade in recent years, with a 12 percent increase between 2016 and 2018 (Boeing 2018: 46). This growth is attributed by Boeing to the opportunities of new intra-regional air cargo lanes related to over the African Continental Free Trade Area agreement and Single African Air Transport Market, but also current ground infrastructural limitations and the preference for air cargo (Boeing 2018: 46).

Air cargo growth grew at 10.1 percent in 2017, which is more than double long term growth of 4.2 percent in air cargo growth (Boeing 2018: 4). According to Boeing, the upturn in the air cargo market is attributed to global economic expansion, increasing industrial production and world trade growth (Boeing 2018: 4). In addition to the underlying macroeconomic trends, e-commerce is also expected to continue to play an increasingly important role in air cargo markets (Boeing 2018: 4). In 2017, global retail e-commerce sales were $2.3 trillion, more than double the $1.1 trillion spent in 2012 (Boeing 2018: 4).

There are differing logics behind the global geography of air passenger and air cargo flows. Bowen (2014: 44) argues that air cargo flows are more strongly localised than air passenger flows. Air passenger traffic tends to reflects patterns of consumption, specifically the volumes and growth in the middle class, whereas the air cargo traffic reflects the concentration spaces of production output. Both geographies reflecting spatially differentiated services, where Africa plays a relatively marginal role in both geographies, and has weak air integration with European and East Asian trading partners, as well as weak integration within Sub-Saharan countries. It is argued in this research that the weak integration within Africa represents lost opportunities for

developing larger trading markets and economies of scale associated with regional trading blocs.

Air passenger and air cargo flows intersect not only through common ground based infrastructure, but also where air cargo flown in the belly holds of passenger aircraft. It is estimated that more than half of global air cargo is flown in air freighters, particularly where there are constraints for suitability of goods, size, frequency, routing and range of freight within wide belly passenger aircraft (Boeing 2017: 4). The significance of air cargo in transporting higher value goods that are time sensitive and economically perishable is widely documented (Budd and Goetz 2014). The related supply chains underpinning air cargo relate to the ability to absorb the higher cost of transport into the goods, such as biotechnology, pharmaceuticals, aerospace, microelectronics, fashion, and perishable foods (Budd, Ison and Budd 2015: 124).

Geographically, air freight demand is highly concentrated, approximately 85 percent of scheduled freighter flights operate out of the top fifty cargo airports across North America, Asia, and Europe (Boeing 2017: 6). Within African, air trade operates across a sparse network and air cargo accounts for some eight percent of the total 1,9 billion tons originating or destined for Africa; African air cargo is dominated by a few leading economies, with South Africa (18,4 percent), Egypt (15,2 percent), Kenya (13,1 percent), Nigeria (11,5 percent), and Ethiopia (7,7 percent) and others (34,1 percent) accounting for respective shares in international air cargo flows in 2017 (Boeing 2018: 46). Bilateral and free-trade agreements in Africa are encouraging new intra-Africa air cargo lanes. However, there are a number of factors hindering the expansion of air services including restrictions, protectionism (Meichsner, O'Connell and Warnock-Smith 2018), the cost and availability of current ground infrastructure (Button et al. 2015: 85), and limiting air cargo infrastructure (Abate 2016: 328; Boeing 2017: 36).

South Africa’s air cargo is highly concentrated at ORTIA which dominates national air trade, accounting for approximately 85 percent of total trade by weight (Dube TradePort Corporation, 2012a, Airports Company of South Africa, 2018). Dube TradePort (DTP), incorporating KSIA, is specifically designed to support air cargo

logistics, by providing air cargo capacity in Durban and KwaZulu-Natal. DTP proximity to the Durban Container Port serving Sub-Saharan Africa raises some interesting issues regarding how this air and sea infrastructure investment can engage with existing trade-related flows, and in the long run play a role in regional integration. It is estimated that in the Southern African Development Community (SADC) region, approximately 62 percent of exports come from South Africa (Hartzenberg 2011: 11) and are distributed on predominantly road-based networks. Infrastructure is identified as a constraint to trade in Southern Africa as in the rest of Africa, with extensive distances and transportation costs constraining landside distribution networks (Hartzenberg 2011: 3-4; New Partnership for Africa's Development (NEPAD) 2016; Meichsner, O'Connell and Warnock-Smith 2018). These constraints reduce productivity gains, increase inventory stocks, and limit the development of new supply chains in Africa.

Imperatives for intra-African trade is well-documented in policy and practice-based research, however, the role of infrastructure-led development and specifically airport led development in achieving inclusive economic growth, while achieving poverty reduction outcomes, is debatable. While some of the critiques of airport led development related to equity and environmental consequences, the underlying development path is based on planning and development of supply-side infrastructure investment to support trade and related economic growth. Logistics through airports, and the relationship to other modalities and land uses, provides a useful entry point for this research to explore the role of Dube TradePort development in international trade, with locally embedded and inclusive growth.

1.3 Research problem

The research problem focuses on the complex relationship between transportation and development, both theoretically and practically. The broad practical issue relates to the implementation of infrastructure-led development policies, focusing on air transport and logistics to support economic growth, with challenges for planning. The theoretical problem relates to the broader debates on the merits of the relationship

between transportation and development and how the emerging role of air transportation relates in the process of spatial change in contemporary cities. As identified in section 1.2.2, local research on planning and airports overlooked the contextual dynamics of the Dube TradePort and King Shaka International Airport. Consideration of how Dube TradePort differs from the other established airports in terms of the greenfield and purpose-built nature of the development, differential ownership arrangements, operational strategies, and geographies; and relative infancy of the project. Dube TradePort is centred on cargo related development with specific dynamics related to the Special Economic Zone and Durban Container Terminal in order to fulfil national imperatives for improved logistics performance.

Governments worldwide are investing significant resources in logistics in order to engage in the global freight transportation network (Rivera, Sheffi and Welsch 2014a: 1). South Africa is no different in this regard. Logistics are both a factor in the competitiveness of the economy as well as an output that reflects the performance of the economy (Ittman 2010:1). In South Africa, the annual reports on the relationships between transportation infrastructure and logistics are reported in the Annual State of Logistics surveys. The Annual State of Logistics Surveys between 2004 and 2014 provides quantitative reports by the Council for Scientific and Industrial Research (CSIR) on the movement of goods and freight in South Africa. In the last State of Logistics Survey published, the logistics costs as a percentage of Gross Domestics Product (GDP) have remained stable for the period 2011-2013 at 12.5 percent, and are estimated to have been R423 billion in 2013 (Council for Scientific and Industrial Research 2013: i). South Africa is ranked as 33rd out of 160 countries in the 2018 study, according to the Logistics Performance Index (LPI) for South Africa, and this is compared with 20th out of 167 countries two years prior (Ittmann 2018: 1). Transport costs forms the largest component of logistic costs in South Africa, where, in "*2012 transport costs accounted for 61.2 percent of logistics costs, in 2013 this percentage is estimated at 61.6 percent. In 2003, the global average for transport costs contribution to total logistics costs was 39 percen*t" (Council for Scientific and Industrial Research 2013: 9). The Annual State of Logistics Surveys between 2004

and 2012 are relatively silent on the role of airports in logistics performance. However, the Tenth Annual State of Logistics Survey recognised airports as logistics enablers. It was reported that approximately four hundred thousand tons of cargo annually are transported by air and 80 percent in the belly of international passenger flights (Council for Scientific and Industrial Research 2013: 37). The originality of the research aims to draw attention to the issue air cargo, by critically reflecting on the role of airports in logistics, both as a function of distribution and within production processes.

South Africa is strongly committed to infrastructure-led development and this is reflected in the National Development Plan (2012) plan to eradicate poverty and reduce inequality in South Africa by 2030 (National Development Commission 2012: 14). Part of the strategy targets the expenditure of 10 percent of GDP on public infrastructure investment. The income to support expenditure on transport, energy, and water infrastructure will be financed through tariffs, public-private partnerships, taxes, and loans (National Development Commission 2012: 24). The focus on public infrastructure investment to support efficient movement of goods suggests a reduction in the cost of trade, and this in turn impacts on economic growth and poverty alleviation. Furthermore, the National Infrastructure Plan (2012) identified a number of Strategic Integrated Projects (SIP), which largely entail socio-economic infrastructure investments to support freight growth (South Africa 2012d: 17) and this includes the Durban-Free State-Gauteng logistics and industrial corridor (SIP 2), which intends to strengthen the logistics and transport corridor between South Africa's main industrial hubs and to improve access to Durban’s export and import facilities (South Africa 2012d: 18). The research contributes to a broader debate on the validity of large scale air infrastructure to support an inclusive growth path. Such a debate is pertinent to a context where state resources are limited and approach to economic recovery are constrained.

The Dube TradePort site, incorporating King Shaka International Airport and Dube Cargo Terminal, and surrounding development zones, operates as an air logistics platform, and are currently being planned and developed as the largest infrastructural

project in the Province of KwaZulu-Natal (Dube TradePort 2015: 1). Furthermore the Dube TradePort development is planned and purpose-built to move freight efficiently as part of the strategic infrastructure required to support the Provincial Growth and Development Strategy (South Africa 2013a: 33). However, despite South Africa policy and expenditure support for the efficient movement of goods, the optimal integration between the airport, within the Dube TradePort site, with other modes of transport (roads, rail, and ports) is unclear (South Africa 2013a: 97). This research will explore how the airport integrates with the distribution of goods in order to improve efficiencies of the system.

The growth in freight and flow of goods and the related land use to support logistics have placed demands on the current distribution and production systems globally, prompting a policy and planning response (Hesse 2008: 145-165). The key issue is that logistics activity comes with planning and sustainability challenges, which is compounded when economic, social, and environmental interests engage in struggles over public interest objectives. However, aspects of logistics and especially the movement of goods, is not necessarily completely open for public engagement, despite public impact and policy imperatives for engagement (Hesse 2008: 145). Parastatals, government and local interests have differential access to influence over investment and operational issues. Within the broader logistics phenomena, the case of the Dube TradePort provides an opportunity to explore the planning making processes and policy implications emanating from reflective practice. Forester (2013: 1) in his work on critical pragmatism and building on ideas from Donald Schön (1983) on the *Reflective Practitioner* argued that '*reflective practice'* provides planning with analytical tools to construct alternatives from conflict (Forester 2013: 5-6). While there is substantial research on airports, this study contributes to the body of knowledge emerging from a developmental context on how planning for airport and logistics provides a critical reflection on the practice of airports and logistics for the field of urban planning.

1.4 Aim of the study

By exploring the role of airports in the movement of goods emanating from the use of land in both the production and distribution activities, a normative framework that integrates multimodal logistics and urban planning can be developed. This can help in the integration between transportation infrastructure and land uses related to the production, distribution and consumption of goods, to support the efficient movement of goods. The aim of the study is to analyse the planning of airports and logistics in the case of Dube TradePort.

The aim of the study is achieved through the following objectives:

1. to explore the relationships between transportation and urban development;
2. to explore the relationships between airports and logistics in terms of how goods move across local, regional, national, global scales;
3. to explore the relationship of how the distribution of goods through airports integrate with ports, rail and road infrastructure relate to land use;
4. to explain how airports integrate with ports, rail and road infrastructure in the context of the case and how airports integrate with spaces of production and distribution of goods in the context of the case; and
5. to develop a normative framework for the planning of airports and logistics in the context of the case.

The following research questions are explored in the study:

1. What is the relationship between transportation and urban development?
2. What are the multi-scalar (local, regional, national, global) roles of the airport in terms of the flow of goods?
3. How do airports integrate with ports, rail and road infrastructure and land use in the context of the Dube TradePort Case?
4. How do airports integrate with spaces of production and distribution of goods in the context of the Dube TradePort Case?

5. What is a normative framework to respond to the challenges for urban planning related to airports and logistics?

1.5 Clarification of concepts

For purposes of clarity, the key terms are explained in relation to the context of this research. The literature review for the study is more extensively developed in Chapter Two, however there are some broad points and theoretical framing issues that are useful to emphasise in this section and are based on a previously published review informing this research (Hansmann 2017: 36; 2018, 2019).

1.5.1 Logistics

The complexities and shifts in how goods are produced, distributed and consumed across the world underpins this study. Of specific interest is the field of logistics which involves a range of activities to support the movement of goods within supply chains across space. The definition of logistics from a transportation geography perspective has relevance for this study and the framing of the research questions. Logistics, according to Hesse and Rodrigue (2004: 172) refer to

> "*the 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 as well as the related information flows*."

This definition implies two major interrelated functions of logistics. The first relates to the physical distribution function, with the derived transport segment, and the second to the materials management function with the induced transport segment (Hesse and Rodrigue 2004: 172). Physical distribution refers to the

> "*movement of goods from the point of production to the point of consumption and materials management includes all the activities related in the manufacturing of commodities in all their stages of production along a supply chain*" (Hesse and Rodrigue 2004: 173).

The definition of logistics suggests consideration of both the physical distributions of goods, and the flow of goods in the production process, requiring relevant interventions to minimise "*logistic friction*" that impede flows (Hesse and Rodrigue 2004: 179).

Inherent in this spatially constructed notion of logistics is the idea of pursing optimal integration between modalities as one layer, and the integration between places of production distribution and consumption as another layer. This framework allows for a relational understanding of how infrastructure, designed to interact with the flow of goods across networks, holds possibilities; and how these flows can integrate with broader land use processes.

The geographic bias in the study of logistics specifically relates to how goods move across space, and how local land based transportation modes integrate with sea and specifically air modes of transport in order to support trade. The globalisation of these supply chains means that goods are produced, consumed and distributed through complex networks internationally, however, Africa has historically played a marginal role in international trade. In the past decade, the study of air-logistics has gained both academic and practitioner-based interest, given the value of goods transported by air, however much of the recent research is still focused on airfreight outside of African networks.

1.5.2 Integration

Integration in this study refers to the physical and spatial dimensions drawing from the field of transportation geography. This is distinct from a planning conceptualisation, where Schoeman (2015: 42) refers to "*processes and methodological approaches and procedures followed in planning processes through application of specific instruments and/or planning tools*." He goes onto argue that given the methodological and process emphasis in planning, the terms '*alignment'* and '*integration'* are sometimes used interchangeably.

Air transportation forms part of the networks and nodes in the physical distribution and the materials management function, and would need to integrate with other modes of transportation and production, storage and distribution uses, in order fulfil this logistic function.

Air transportation forms part of the networks and nodes in the physical distribution and the materials management function, and would need to integrate with other modes of transportation and production, storage, and distribution uses in order fulfil this logistic function. Rodrigue, Comtois, and Slack (2013: 22) define networks, nodes, flows, and argue that transportation networks underlie the territorial organisation of economic activities in space. Networks provide the

> "*framework of routes within a system of locations, identified as nodes. A route is a single link between two nodes that are part of a larger network that can refer to tangible routes such as roads and rails, or less tangible routes such as air and sea corridors*" (Rodrigue, Comtois and Slack 2013: 22).

The impact of hub and spoke networks versus point to point networks has implications for how and where goods move. Freight and passenger services tend to hub and spoke models, and while there are efficiency arguments, places outside these hubs have additional trans-shipment costs, and hubs experience congestion issues (Conventz and Thierstein 2015: 134). A recent review of urban logistics and airport centric development, has argued for the emergence of city logistics to deal with the congestion challenges of growing demands for freight transportation and distribution within city regions (Boloukian and Siegmann 2016: 801). A Europe-based study also identified complexities and conflicts between city logistics with broader national, international logistics, making the case for the convergence between logistics and airport-centred development on issues of urban competitiveness (Boloukian and Siegmann 2016: 802-804). However, in the context of a secondary South African city, firmly outside of main air hub and spoke, but acting as a major port and container gateway to South Africa, the dynamics of integration pose broader issues than the physical dimension to integration. How does the city region interact with the movement of goods to balance strong integration with local employment creation and yet promote a more optimal

modal split to ensure broader national efficiencies and competiveness, all with in a normative sustainability framework?

The integration involves more than the physical infrastructure and efficient goods handling in distribution process, but includes the spatial dimension of how the distribution of goods integrate with the production of goods, and ultimately with places of consumption. The location of land uses and activities that deal with distribution, production and consumption processes have implications for the field of planning. The formal scope of the planning system in terms of the Spatial Planning and Land Use Management Act No 16 of 2013, includes the preparation of future spatial development frameworks by government based on principles, norms and standards that guide planning and land development, as well as the management of land use and the procedures and processes for approval of future land development (Republic of South Africa 2013: 14). While the framework for planning suggests a rational process, the practice of planning deals with the unintended consequences and impacts of land use decisions. Airports and their logistics have significant impact on adjacent land use, which warrants planning decisions that balance social, environmental and economic interests through a normative framework.

1.5.3 Agglomeration

There is a broader debate on the concentration or dispersion of logistic activities and how these relate to airports. Specialisation in logistics is posited as a strategy for increasing competitiveness in regions (Kasarda and Green 2005; Kumar *et al.* 2017) with locational benefits related to as access to labour, greater access to goods, and increased productivity. Implicit in descriptions of clustering of firms the agglomeration economies at play. Rivera, Sheffi and Welsch (2014b: 223) differentiate between external economies of scale, where a number of firms agglomerating geographically, as opposed to internal economics of scale, where a single firm expands its production. The distinction echoes earlier, between two types of agglomeration economies, as related to the work of Marshall (1928) and Jacobs (1966). Localised economies or '*Marshallian externalities*' are produced when firms

in the same industry co-locate (Marshall 2009: 526). These firms tend to cluster geographically due to specialised local providers of inputs, secondly a concentration of firms employing workers of the same type of labour market pool, and thirdly clustering offer benefits from sharing information and knowledge. Urbanisation economies or '*Jacobs externalities*' (Jacobs 2016) are those that result from the agglomeration in a particular place of a large and diverse set of business activities not necessarily in the same industry, providing access to services and promoting exchange of knowledge and technology. External economies of scale are then achieved from multiple sources, including a reduction in transport costs, sharing common overheads and services with other firms, access to the labour market, as well as access to information and knowledge.

When related to transport infrastructure, Rodrigue, Comtois and Slack (2013: 259) define economies of agglomeration as "*the benefits of having activities locate (cluster) next to another, such as the use of common infrastructures and services*." The real benefits of economies of agglomeration as they relate to transportation are from high densities and from economies of scale related to high mobility demands. According to research by (Rodrigue, Comtois and Slack 2013: 259) and (Rivera, Sheffi and Welsch 2014b: 223), transport and logistics related firms tend to cluster geographically and derive befits from agglomeration and localised economies. The notion of logistics spatial clusters is related to efficiencies derived from location, and is different to the (Porter 1998a) cluster as a regional economic strategy to achieve competitive advantage in a particular sector, although logistics can advantage specific clusters (Kumar *et al.* 2017: 26). Logistics clusters could relate logistics related companies, freight forwarders, third party logistics providers, transporters, carriers, warehousing, airport, port, rail terminals, etc.

1.6 Research design

The following section deals firstly with the philosophy underpinning the research and locates the approach largely within a constructivist paradigm, secondly outlines how

the research is designed in response to the philosophical approach and lastly the methods chosen to answering the inquiry.

1.6.1 Philosophical orientation

An exploration of the phenomena of airfreight logistics necessitates an inductive research process and a qualitative research design (Creswell, 2009:4). The proposed qualitative research design draws from the constructivist paradigm (Hussain, 2013: 2374) and this approach seeks to better understand the phenomena of airport related development in its context and where the understandings of the social reality and interpretation of reality are intertwined. Lincoln and Guba (1994: 111) argue for a transactional and subjectivist paradigm where the distinction between ontology and epistemology blur when the "*research findings are created as the investigation proceeds*". A qualitative research design has been chosen for this study relates based on the type of evidence premised by the research question (Babbie and Mouton 2001: 75). The main research questions are exploratory, and the constructivist approach to the inquiry aims to understand the meaning of a phenomenon within society (Schwandt 1994: 119). Schwandt (1994: 125) points to the process of understanding the construction of knowledge through concepts and schemes to make sense of experiences and building new knowledge, rather than accessing existing knowledge. This research inquiry is designed to explore how the phenomena of airport led development is conceptualised, and to explore how the movement of goods through the airport interact with other modes of transportation and land uses, through a case study design.

The rationale for choosing a case study as a research design type draws on Yin (2014), who outlines the following criteria for choosing case studies over other designs is based on: 1) the main research questions being '*how*' or '*why*'; 2) the researcher having little control over the behavioural events; and 3) focus being a contemporary phenomenon, as opposed to a historical one (Yin 2014:2). This research is broadly designed to address the question of how and why goods move through the airport located within Dube TradePort, in order to understand the integration with multimodal

logistics and integration with land uses containing production, distribution and consumption activities. The development of a greenfield airport at La Mercy,[i] north of Durban, purposefully designed to move goods through the air cargo terminal, is a relatively recent phenomena. The case is bound in terms of both time and extent. The case study site relates to control of the site of Dube TradePort development, and includes influence over the King Shaka International Airport, opened in May 2010-2018. The purpose of undertaking a case study design is to generalise findings in order to develop and reflect on theoretical constructs emerging from the case and applicable within the context of the case. According to Yin (2010: 3) analytics generalaztion based on case study findings are a two step process. Firstly the analysical generalization process allowed for a particular theory or theoretical construct to emerge and secondly involved `*applying the same theory to implicate other, similar situations where analogous events also might occu*r' (Yin 2010). Conceptually the case study design, reflected on airport led development, and generated of theoretical constructs within the field of urban planning. The application value is limited to compable contexts.

1.6.2 Case study approach

A common misconception of case studies is that the '*case'* represents the sample (Yin 2014:21). The purpose of the research is not to generalise to a broader population, but allowed for analytical generalisation through the development of theory (Flyvbjerg 2006: 219). In qualitative research, sampling relates to process of selecting a case and selecting units to be included in the study. There is no intention to identify a representative sample as theoretically sampling, is applicable, whereby the emerging theory decides the '*sample'* (Glaser and Strauss 2009: 10). The motivation for a single case also related to the unique nature of Dube TradePort in South Africa, which was specifically designed as an '*air logistics platform'* to support trade (Dube TradePort 2015). There are no other examples of greenfield airports specifically designed to handle airfreight with the potential to link into a seaport in Southern Africa. In South Africa, all other existing airports have been retrofitted to deal with the air cargo.

1.6.3 Units of analysis

In order to achieve the research aim and the objectives outlined in Section 1.4 above, the thesis is designed as a case study approach, with associated methods to collect data and answer the inquiry. Given the case study approach is important to clarify the units of analysis that have guided this study.

Babbie and Mouton (2001: 84) referred to the unit of analysis as the object, phenomena, entity, or process being studied. In this case, the phenomena of airfreight logistics is investigated through the case of Dube TradePort, to best understand the research problem (Creswell 2013: 98). Stake (1994: 237) differentiated between the purposes of case selection, where '*intrinsic'* cases are selected for understanding the specific case better or as in this study, the '*instrumental'* case, to give insight into the issue of airfreight logistics through the Dube TradePort case. The embedded units of analysis in the case study are the Cargo Terminal Precinct and the TradeZone Precinct, within the Dube TradePort Precinct. The firms will be represented by the analysis of the land use types at the level of the property subdivision. The type of design for the case study in summary is a single-case design with multiple embedded units of analysis (Yin, 2014:50).

1.6.4 Research methods

Chapter Five provides more details on the methods used. In summary, data collected from primary sources within the case study included in-depth semi-structured interviews, land use survey, and field observations. Secondary data sources included documents in the public domain policy and legislation, annual reports, and eThekwini Municipal planning documents that informed investment decisions.

From a constructivist perspective, the measuring instruments to collection data are designed to make sense of respondents meaning and to interpret meaning (Creswell, 2003:9). The case study method relied on multiple instruments to collect and triangulate data, and these instruments included field in-depth semi-structured

interviews, field observations, documents reviews, land use and GIS reviews. Triangulation, according to Yin (1994: 237), provides further learning from a particular case by clarifying meaning through a process of using multiple perceptions to understand a phenomena.

The data from the semi-structured interviews was analysed through multiple strategies in the qualitative thematic analysis. Maxwell (2008: 236-237) suggested three combined strategies for data analysis in qualitative research, namely categorising strategies (coding and thematic analysis), connecting strategies (case studies), and memos.

Coding is the main categorisation strategy in this study, and the purpose thereof is to rearrange the data into categories that allows for comparisons within the category or between categories. These categories will, on one level, relate to conventional content analysis of the topics covered in the interviews or "*organisational category*" (Maxwell 2008: 237). The data will at another level also be analysed in terms of "*substantive categories*" that describe the participant's concepts and lastly the data will be analysed in terms of "*theoretical categories*" that "*place the data in a more general or abstract framework*" (Maxwell 2008: 238). These theoretical categories move the research towards the researcher's concepts. Atlas.ti was a tool used to code documents, identify themes, and relate these back to the original research questions through a rigorous process.

The connecting strategies form an important part of the research analysis by providing context that cannot simply be analysed or generated through coding. The case study allows for connections to context to be made by coding for similarities and differences and for contextual themes to emerge. The final strategy of memos is a form of analysis that captures reflections on methods, observations or theory that are not necessarily directly related to the interview transcripts or case study reports.

Geographic Information Systems (GIS) is a method to study and analyse spatial data through multiple strategies. The land use survey will be captured in GIS and will form part of the spatial analysis and case study report. GIS will be used to spatially analyse the land use data, by querying land use relationships with places of distribution, production and consumption spaces across local, regional, national scales. Thereafter the maps will be coded with memos in Atlas.ti as a means of reflecting on how goods move and the relationships with the airport. GIS will form part of the data analyse phase, but also form part of the engagement and communication process as a map that represents information. Wilson (2013: 120) argued that the role of GIS in the research process needs to be clarified. In this study, GIS as a map prompting discussion is excluded from the analysis phase, as some of the objects in the study (buildings, airports, roads) are already represented by existing data.

1.6.5 Issues of reliability and validity

Validity can be defined as "*a term describing a measure that accurately reflects the concept it is intended to measure*" (Babbie and Mouton 2001: 648). In qualitative research, the research design needs to deal with threats to validity. Maxwell (2008: 243) suggested two main threats to validity is qualitative research, namely researcher bias and the effect of the researcher on the setting, or *reactivity*. These aspects may impact on the credibility of the research conclusions. Yin (2014: 45) proposed a number of tactics within the case study design to minimise threats to validity. First, the study design ensured that data is collected from multiple sources of evidence. Secondly, the researcher validated data by reviewing case study findings with key informants in the data collection phase. Data was collected though a review of intitutional annual reports, planning reports between 2010 and 2018, interviews and land use surveys. The combination of data collected through verbatim transcripts, combined with long term involvement and intensive interviews, assisted with overcoming mistaken conclusions due researcher bias Maxwell (2008:244).

The generalisability of qualitative studies is not based on the representation of a broader population to which the results can be applied, but rather the development of

a theory that is relevant to other cases Maxwell (2008: 246). The purpose of this study is to "*generate context specific analytical generalisation*," but not attribute these to other populations (Flyvbjerg 2006: 219).

Reliability refers to the "*quality of the measurement method*" (Babbie and Mouton 2001: 646). Reliability will be established in the case study design by implementing case study protocol to collect data and feedback from case study reports to the respondents interviewed, as well as the design of the case study database to record repeated observations of the same phenomena. Triangulation strengthened the reliability of the research by confirming data evidence through methodological triangulation techniques. Appendix C, D, E indicated how data was triangulated within data collection methods by checking for conflicting and supporting observations and statements. Methods to analyse observations and findings were developed in Chapter 6 of the study.

1.6.6 Anonymity and confidentiality

Anonymity means that the identity and response of a research participant cannot be identified (Given 2008: 16), not even by the researcher. Confidentiality is understood as those assurances made to protect the privacy of research participants. In other words, information disclosed in the interviews cannot publicly identify a participant. In this study, confidentiality, rather than anonymity, was ensured, as only the researcher and the supervisor had access to the identity of the participant. However, the need for privacy was also considered in relation to participants who requested ownership of statements and allowed identity disclosure. Pseudonyms were used to obscure reference to names and designation or other contextual references, which could lead to the identification of a participant. The researcher was guided by the participant's informed consent in the recording of interviews. In some cases, participants were prepared to be recorded, and not in other cases.

Confidentiality is important in the study, as individuals and the organisations are not the unit of analysis under investigation, and without confidentiality may inhibit

participation. The data is accessible to the researcher and supervisor, but not publically available. This data collected will be stored for five years before being deleted and shredded and the data will not be used for research purposes in the future without requesting permission.

1.6.7 Ethical considerations

The Durban University of Technology's Research Ethics Policy and Guidelines have been complied with by identifying possible ethical issues and detailing how these can be addressed in the most appropriate manner. The research proposal and ethical clearance from Durban University of Technology was received on 11 February 2016.

1.6.8 Uniqueness of the study

The study has the following main attributes that make this study unique to the topic of planning for airports and logistics. Firstly, airports and logistics are generally approached from a quantitative perspective, however this study uses a qualitative approach to better understand how the dynamics of airport related development on the cargo side are shaping and producing space within the context of the case study. Within the limitations of the literature review discussed in Chapter Two, the study contributed to gaps in existing knowledge from a qualitative case study design approach, making a contribution on an under-researched topic within Sub-Saharan and South Africa within the field of urban planning

The specific contribution of the study lies in generating a theoretical framework based on empirical research on the phenomena of airfreight related development in the context of a purpose-built greenfield airport. The study allowed for theoretical generalisation to better understand how the dynamic of air cargo interact with other modes of transport and land uses involved in the production, distribution and consumption of air freight.

1.6.9 Limitations

Chapter Seven discusses the extent to which the aims and objectives of the study were achieved. The limitations of the study differ from the delimitations in terms of sphere of influence that the researcher has over the research interest. Although the outcome of the study is not negatively affected by the limitations per se, there are considerations for the research methods employed, as well as the nature of the data collected in this study.

The study aims to understand the relationship between airports and logistics in terms of how goods move across scales. The ability to observe goods is partly curtailed by customs and security processes limiting access and observation. As a consequence, people who had more access to cargo were interviewed using the following prompts: "*what is in the box*" and "*how do you know what goods are moving through the airport*". Land use surveys were also conducted on the adjacent sites as a proxy for the type of firms and goods in the airport precincts. However, there is a further limitation to studying the movement of goods. Observations, annual reports and land use surveys tend to take a snap shot of the mobile world in order to study mobility (Jonas, McCann and Thomas 2015: 95). The research therefore may take a '*freeze'* view of cargo, but understands conceptually that the object is mobile.

A further limitation of methods related to the conservational approach taken in the semi-structured interviews. Specific strategies were employed to overcome the discomfort of recording the conversation, such as including informal conversations, and being flexible with conversation topic rather than breaking a line of thought. However, in the spirit of reciprocity, there was scope for bias in the methods by introducing the researcher's own experiences in the discussion. In a few cases, the interviewees declined electronic recording in the interest of being less guarded.

These limitations do not pose a threat to internal validity, as the interview data on goods, moving, data on land uses, annual reports, observations are compared from multiple sources in order to triangulate findings.

1.6.10 Delimitations

The choice of the theoretical framework employed in the study delimits the study by focusing it on the integration between airports and other modes of transport, secondly by also relating integration to land use that produce and distribute goods, and lastly in the intention to development a normative framework, prompting action from the knowledge of the study.

Secondly, the case study selection delimits the focus of the research on a greenfield airports, with a purpose-built facility in a secondary coastal city, where an established container port shapes road based logistics. Furthermore, the case study design and the case study selection is limited in terms of both time and extent. The study is bound in time between the date of opening in May 2010 and the end of 2018 and is bound geographically to the Dube TradePort site and the embedded units of analysis of land use lease areas within the TradeZone Precinct and the Cargo Terminal. The experts interviewed were purposively drawn from the organisation of Dube TradePort and includes employees and consultants to Dube TradePort, Tongaat Hulett Development, and eThekwini Municipality local government officials working on projects related to Dube TradePort with expert and insider knowledge of the planning and implementation stages of the project.

1.6.11 Organisation of the thesis

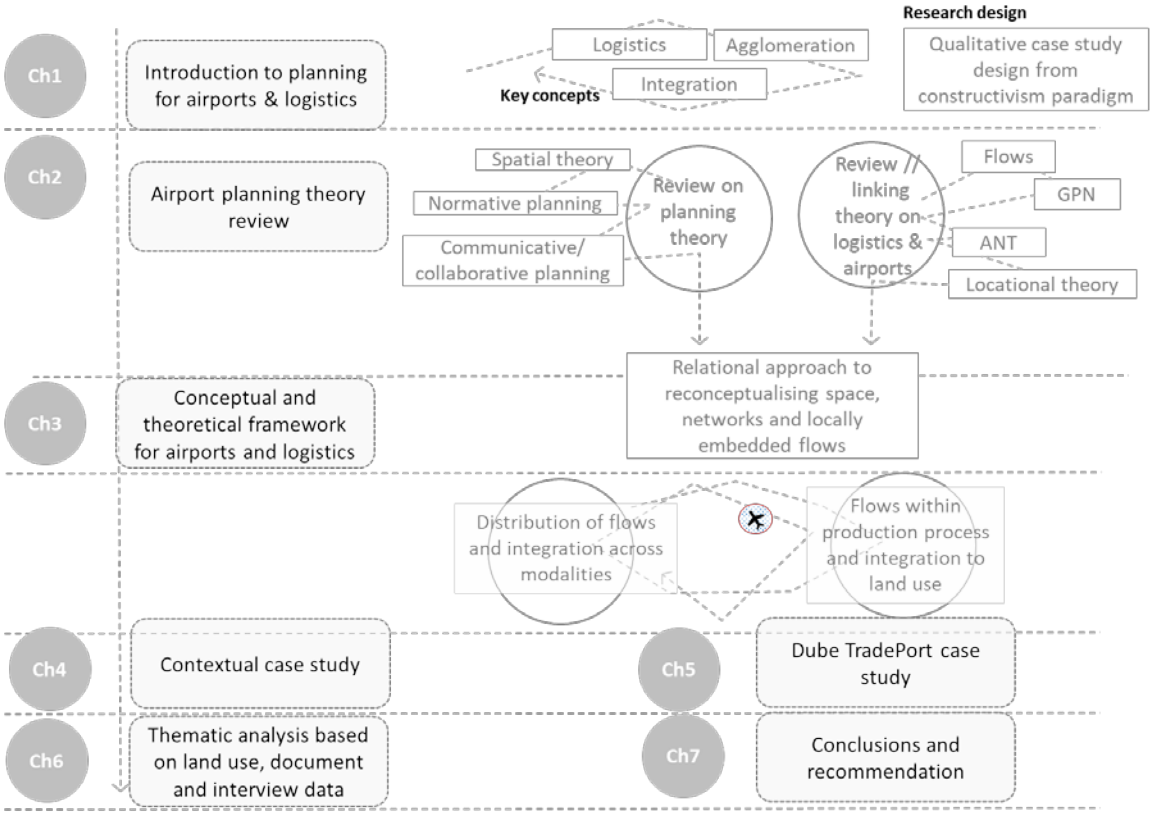
In response to the research questions, the study is structured as follows (see Figure 1.1.):

- Chapter One provides the introduction to the study, outlining the nature of the research, structure and logic of the study, as well as the justification for the approach and design of study;
- Chapter Two provides a review of airport related development and review of planning theory informing the study. The literature review draws on explanatory and normative theory related to planning theory, secondly reviews theory related to restructuring global production systems and emergence of airfreight logistics

and thirdly reviews studies on planning and airports. Previous studies are also analysed to inform the methodology and research gap;

- Chapter Three generates the theoretical framework of planning for airports and logistics. The relational framework draws on transportation geography, economic geography and planning domains to conceptualise airport related development;
- Chapter Four introduces the Sub-Saharan African and South African policy frameworks to frame airport related development in South Africa;
- Chapter Five deals with the research design and method and introduces case study and the context for Dube TradePort;
- Chapter Six is the case study: Dube TradePort Development and outlines the case study with data analysis, emerging themes and findings; and
- Chapter Seven provides conclusions to the study.

Figure 1.1: Structure of the research



Source: Devised by the researcher

1.7 Chapter summary

Chapter One provides the foundations for the case study design and is structured to answer the research questions related to planning for airfreight and logistics at Dube TradePort. In the background and rationale, the study acknowledges the complexities of trading materials, component and finished goods, between local and regional economies with international economies. While ports handle the bulk of goods, airports tend to focus on high value, time sensible and perishables goods. The complexities relate to the non-linear movements of materials and goods between modes of transport, and multi-scalar movements between places of production, distribution and consumption locally, regionally, nationally and internally. A relational approach is proposed to better understand these complexities of flows

between goods, actors, firms and land uses relate. The research gap on the planning side of airports is broadly established in the literature, as well as limited research contributions on the cargo side of airports and particularly greenfield airports in Africa. Within the local context, the case of Dube TradePort, including King Shaka International, is also identified for further research into planning for airports and logistics. Passenger and cargo connectivity have distinct geographic dynamics, with passenger connectivity internationally largely reflecting dispersed consumption patterns and cargo reflecting more concentrated production. The case study presents an interesting case of interacting with air-freight flows, outside of traditional air-cargo concentrations, and yet in close proximity to sea-based flows. The research problem questions the merits of planning for infrastructure led development to support trade and investment. More specifically airport infrastructure, specifically airfreight logistics, is planned to support increased trade in Africa and internationally, through local and regional investment. The aim of the study is to explore the role of airports in the movement of goods emanating from the use of land in both the production and distribution activities, and to develop a normative framework that integrates multimodal logistics and urban planning. The study is designed through a case study approach to respond to the objectives of the study. The overview provides an introduction for the overview of planning and airport related theory.

CHAPTER TWO

AIRPORTS AND PLANNING THEORY

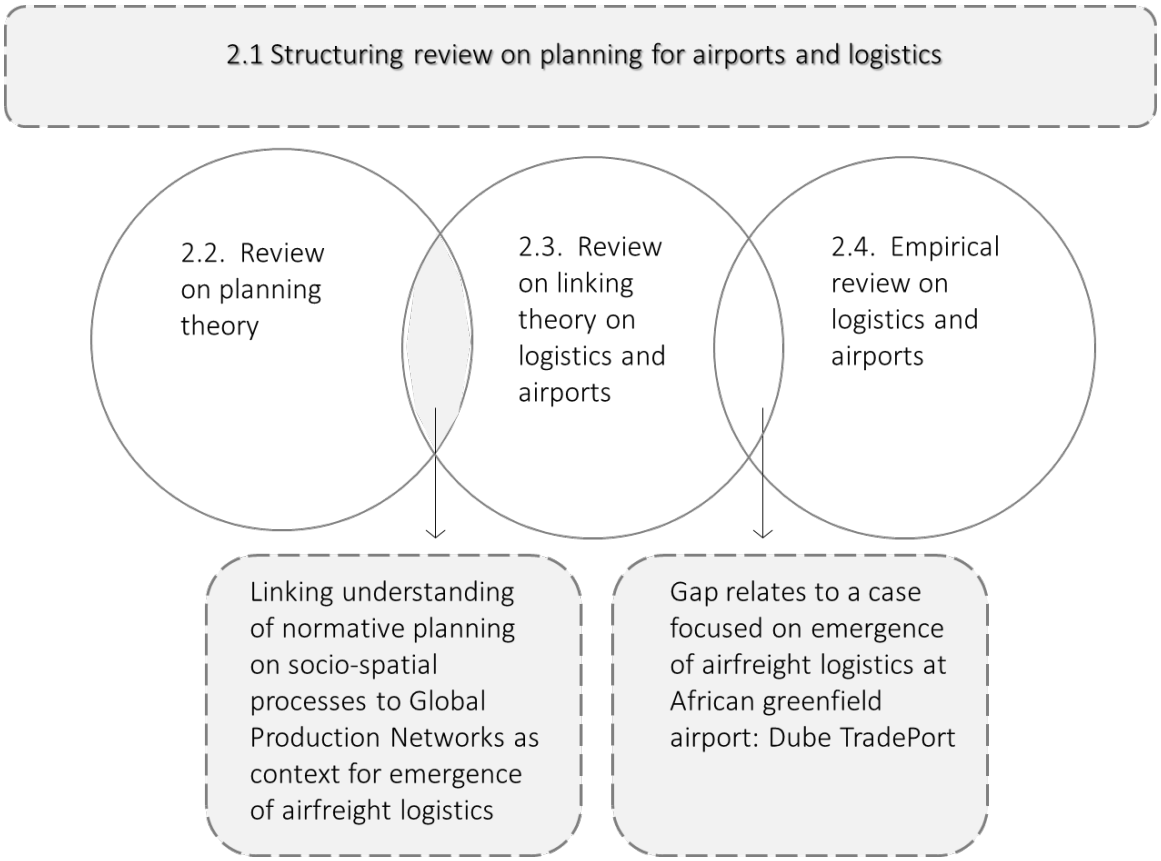
2.1 Introduction

The purpose of this chapter is to undertake a review of explanatory and normative planning theory related to the planning[ii], in order generate the context for a more focused review on planning air logistics infrastructure within city-regions. Explanatory theory tends to analyse existing planning practices in order to transform existing practices (Fainstein and DeFilippis 2015: 12). The normative idea of planning rests on the notion of seeking a better outcomes or future (Healey 2007b: 16), as intrinsic to the field of planning. The review will indicate that although planning is theoretically embedded in social theory and influenced by broader debates in the social sciences (Allmendinger and Tewdwr-Jones 2002: 1), there is substantial theory relevant to understanding airports and logistics that falls outside of planning. The review is framed from a social constructivism paradigm, where ontological assumption of relativism[iii] are evident in understanding the construction of the planning theoretical landscape.

The review is structured in three parts, in order to understand theory that informs planning for airports and logistics within the local context. The review will show that while planning theory does not substantively and specifically relate to airports and logistics, '*exogenous theory*' developed in the fields of transport geography, and economic geography have been incorporated for explanatory purposes to better understand planning for airports and logistics. The second section of the review focuses on the emergence of logistics with globalisation, with shifts in global production networks (GPN), in order to give insight into the freight role of airports within logistics networks. The third section focuses narrowly on empirical studies on the role of airfreight and logistics in airport related development. To delimit the scope of the review, this inquiry focuses on the air cargo side of airports, where the cargo integrates with other logistics infrastructure including ports, roads and rail, and

excludes studies that focus on passengers and airport centred development. Conceptually, the review aims to understand how the flow of air cargo goods relates to broader land use within city regions. While there is research on airport centric development, air cargo flows are subsumed in the land use impacts (Freestone and Baker 2011; Kasarda and Lindsay 2011; Mokhele 2017). The premise of this research is that the flow of freight through airports requires a broader contextual view to link to city regional land uses with other modalities supporting logistics.

Figure 2.1: Structure of the literature review



Source: Devised by the researcher

2.2 Review on planning theory

The review on planning theory is structured historically to make temporal sense of the thinking underlying planning theory, methods and practice within the twentieth century relevant to this study. While the epistemological roots of planning thought and practice are strongly influenced by modernism and positivism (Allmendinger and Tewdwr-Jones 2002: 4), so too have normative theories as a critique and as alternative to modernism, in the forms of communicative, post-modernism, post-colonialism, and post-structuralism theory. These theoretical shifts are neither linear nor evolutionary. Remnants of modernist thought, ethics, methods, and practices continue to coexist and conflict with normative planning approaches. Similarly, within the critiques of modernists planning, the ontological and epistemological variations combine and contradict within in the patchwork of planning thought. Thinking about the current planning landscape as a mix of post-positivists understandings with a leaning towards communicative or collaborative planning thought has challenged traditional and binary conceptualisations of planning thought. Allmendinger (2002: 79) has argued that the traditional separation of substantive and procedural theory is based on the *persistent typology* of Faludi (1973). This typology resonates with the systems approach and its rationale comprehensive emphasis on planning procedures (process) over substantive (analysis). This review supports the post-positivist argument that the substantive-procedural separation presents a false dichotomy (Allmendinger 2002: 86). While planning theory may continue to emphasis process-related engagement over plan-making outcomes, both the process and outcomes are developed in the presence of substantive theory. As an alternative typology for planning theory, Allmendinger (2002: 91-92) made the distinctions explicit between exogenous theory (not specifically concerned with planning), social theory (developed from sociology to understand society), philosophical underpinnings, and indigenous planning theory. The introduction of exogenous theory, as related to transportation geography, and applied to indigenous planning theory, creates layered theoretical constructs in planning for airports and logistics.

2.2.1 Understanding planning

Planning in this research is taken to encompass actions that produce future plans for people, uses and activities, as well as the process and methods for achieving normative outcomes. The practice of planning typically refers to both the process and the outcome, where the field of planning

> *"is divided amongst those who define it according to its object (producing and regulating the relations of people and structures in space) and those who do so according to its method (the process of decision making as it relates to spatial development). These different approaches lead to two largely separate sets of theoretical questions and priorities that undermine a singular definition of planning"* (Fainstein and DeFilippis 2015: 1-2).

Emphasis is placed on the object of planning as opposed to the methods of planning, have taken on relative importance in the multiple histories of planning theory. The relative importance of the planning process and planning outcomes are reflected in debates on planning theory. Planning theory is viewed as inherently normative, as the purpose of taking planning action is motivated by change (Fainstein and DeFilippis 2015: 12). However, this does not mean that planning is inherently transformative, as the values and norms of planning are embedded in the socio-economic context and are at times resistant to structural change (Sayer 2000: 176).

Planning is predominantly concerned with the interconnections of people and places, activities and territories (Healey 2007b: 13). Airports as places, and particularly those related to airport logistics, are a slice of city-regions, which raises complex challenges for planning practice. Airport related logistics are associated with dynamic production and distribution processes operating through complex relations across local, regional, national and global networks. Juxtaposed with these multi-scalar relations are the daily social and economic practices embedded in the built environment (Friedmann 2010: 154). Cities can be understood in terms of the dynamics of agglomeration and

urbanisation and the related "*unfolding of an associated nexus of locations, land uses and human interactions*" (Scott and Storper 2015: 1). While some generalised urbanisation and agglomerations processes interact in city building processes, context sensitive dynamics shaped by historic rounds of accumulation and colonial legacies, differentiate places from the global north (Roy 2016). This research takes the view that sub-national planning, incorporating normative ideas of spatial transformation, encompasses the subjective human actions of the planner, engaged with a messy, complicated processes of engagement and plan-making that may influence but not alter global structural inequalities.

2.2.2 Emergence of segregated planning in South Africa

Planning practice in the last century has shifted from an emphasis in the planning object as an end plan to an emphasis on method and process after the 1950s. The 1960s saw the emergence of transportation planning as a sub-discipline in the 1960s, and the emergence of exogenous transport theory in planning. Despite significant shifts from planning as a '*craft*' to planning as a '*science*', no coherent or indigenous theory of planning emerged during this period (Hall 2005: 342).

In the last century, until the post war period, planning practice focused on utopian, visionary end state physical plans, such as garden city new town development (Hall 2005: 344). South African cities, saw elements of imported garden city ideas applied to suburban developments from the 1930s (Duncan-Brown 2000: 154). However, this was not the dominant means of shaping urban development. The South African urban planning system relied on state power to influence and direct urban development from the late nineteenth century. Mabin (1997: 199) argues that urban planning managed to engage with the main shapers of urban development by regulating speculative private sub-division of land and secondly controlling black settlement. Effectively, urban planning was relegated to technical expertise, largely employed towards minority interests. In Europe and America, urban planning, together with post-war reconstruction, influenced city development, however, this was not the case in South

Africa where planning separated people into racially constructed groups. The Natives (Urban Areas) Act of 1923 separated planning for black '*locations*' from planning for the rest of urban South Africa (Mabin 1997: 199).

The modernist planning system, overlain with racial zoning and comprehensive land use plans, built on previous colonial planning, to formalise a race and class based urban structure by the 1950s. Mabin (1997: 208) explain the difficulties of separating urban planning practice from Apartheid planning after the 1950s, where

> "*planning as an activity had come to mirror the divisions in society itself, and the profession could be divided into two distinct groupings. One group worked mainly in the private sector or for 'white' local authorities and presided over vigorous activity in the land and property markets of South African cities… (t)he second grouping of planners worked largely for national or regional (provincial or 'Bantustan') government (or in the private sector in the service of these tiers). A major concern of planning at those scales dealt with planning for 'black areas', a process which had become increasingly centralised over time*".

The legacy of differential planning systems persists in the current planning context, despite common planning legislation nationally. In the former Natal, now Kwazulu-Natal, provincial planning legislation was introduced with the Town Planning Ordinance No 27 of 1949, as amended, and saw the establishment of planning institutions such as the Town and Regional Planning Commission, Appeal Board, Private Township Board, advising on planning decisions outside of '*black area*'.

The Natal legislation was based on similar legislation to that of the British Town and Country Act passed in 1947. Brooks and Harrison (2012: 96) argue that in the 1940s, modernist planning discourse on reconstruction and development was imported from Britain, and applied to a particularly South African form. Although local planning

capacity was not yet being produced through local universities, the Natal planning legislation put in place resource intensive, rational comprehensive procedures for the approval of plans, including town planning schemes controlling land use, and the subdivision of land through township establishment procedures. The 1949 Ordinance shifted the practice of planning from focusing on end plans (simplified schemes, general plans and subdivisions) to an emphasis on procedures from the 1950s, derived from the introduction of 1949 Natal Town Planning Ordinance. The positivist influence of controlling land use through binary categories, underpinned by standardised land use regulation procedures based on standardised planning standards emanating from the Ordinance are still evident in planning today. In response to the institutionalising of planning as a state activity and the related demand for planners, some seven university planning schools opened from 1965. Although four of these schools were legally closed to black students, it was only from the late 1970s that black planners were graduating in South Africa (Mabin 1997: 208) and the mid-1980s from the former ML Sultan Technikon. Hall (2005: 345), in his review of European and American planning theory, identified the separation of planning theory from practice as a significant challenge for planning. He argued that where planning becomes legitimate and institutionalised in the mid-1950s, the separation emerges between academic institutional and states and private practitioners. Prior to this, he argued that planning was focused on physical, end-state plans, where planning theory was taught and influences by professors trained as architects, landscape architects, and engineers. In South Africa, prior to planning programmes being offered from the mid-1960s, theory and practice informing planning was influenced and imported from Britain, where colonial ties were strong.

The separation between planning practice from the development of theory was not uniquely South African. Reflecting on Europe and America over the past century, Hall (2005: 343) has argued that the academic world of theory separated planning practice from the mid-century onwards, with two fold implications. Planning theory for most of its history is insufficiently informed by planning practice, and given the internal focus of planning theory, practitioners focused on planning mechanisms without

deeper understandings on what theory can offer (Hall 2005: 352). The call for a closer reciprocal relationship between practice and theory persists today in the current context.

2.2.3 Emergence of transportation planning within planning

The modernist context in which transport planning developed within the field of planning was dominated by a positivist epistemology, which privileges scientific and technical knowledge (Allmendinger and Tewdwr-Jones 2002: 4) over other forms of knowledge. However, although transport methods influenced the field of planning with their independence from theoretical interpretation, the field of transport and planning were treated as separated domains. Modernist notions that separate planning of land uses from transportation uses are still perpetuated through separated, silo government departments.

Hall (2005: 344) has argued that by the 1960s, some theory existed in planning, but no substantial theory of planning or indigenous planning theory was arrived at. It was the 1960s '*systems revolution*' where the discipline of planning changed more in a decade than previously (Hall 2005: 346). Markusen (2015: 148) attributes the shift from design-based planning to an evolving normative framework, incorporating issues of equity, diversity, democracy, efficiency and stability, to the influence of social scientists in planning. However, the influence of geographers and engineers saw a more fundamental paradigm shift to planning as a science. Logical positivism found a place in geographic models on locational theory and rationale planning changed the role of planner to technical expert.

The mid-1950s saw the intellectual influence of German locational theorists in planning such as Johann Heindrich von Thünen (1826), Alfred Weber (1909), Walter Christaller (1933) and August Lösch (1940). Elements of logical positivism in geography influenced planning through the work of Walter Isard (1956) on locational analysis and input output models in regional science. The science of urban transportation planning emerged to combine spatial interaction patterns with computer

data generating capabilities and as an outcome lay claims to predict future urban land use patterns (Hall 2005: 346). Initially, the systems approach to transport planning assumed transport as a derived demand of land use, and this gave way to an interactive system of land use-transportation planning, where transportation infrastructure also reciprocally was seen to shapes land use (Hall 2005: 347). Hall (2005: 346) has argued that initially, these models forecasted traffic patterns from land use and then altered methodologies to plan land use in response to predicted transport capacity. The inclusion of new methods in planning an interactive system of land use-transport planning saw the systems influence of engineering-based approach in the traditional land use planner practice (Hall 2005: 347), including local practices. While airports have significant impact on adjacent land use planning, airport planning in the 1950s fell under the Minister of Transport. The period of airport construction at the time included the previous Durban International Airport (DIA), formerly Louis Botha Airport, opened in 1951, the OR Tambo International Airport (ORTIA), formerly Jan Smuts Airport in 1953, and Cape Town International Airport (CTIA) in 1954 (de Freitas 1968). From a practice perspective, the period of airport planning and development in South Africa served a transportation and engineering function.

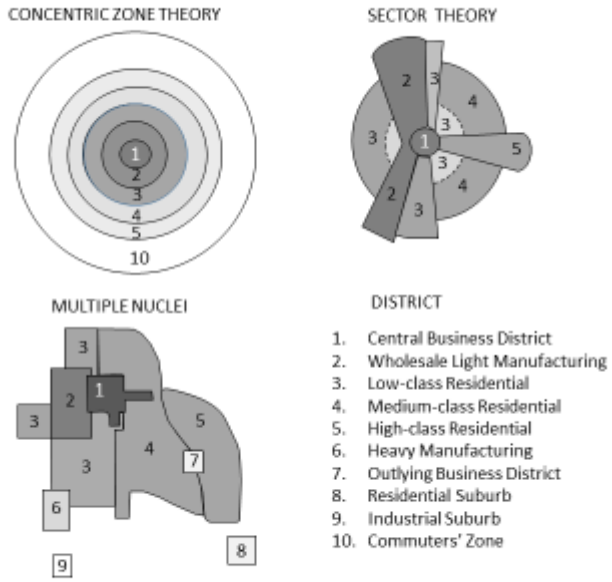
2.2.4 Traditional spatial theory

Traditional spatial theory has been broadly concerned with the role of transportation costs and the exchange of goods and the related impact on urban development (Hesse and Rodrigue 2004: 171). The influence of traditional spatial theory comes from geographic and economic models, which were incorporated into planning from the 1960s. Early spatial theories include work by Von Thünen (1826) on land value (Knowles, Shaw and Docherty 2008: 11), Burgess' concentric model (1925) (Rodrigue, Comtois and Slack 2013: 200), and the work by Christaller (1933) on central place theory (Herbert and Thomas 1997: 64). This research draws on locational theory to draw the broad linkage between economic activities, the use of space and transportation costs. Early location theories were influenced by the work of Von Thünen (1826) who provided a model to understand how the economy organises the use of space and considers transportation costs through an analysis of land rent and

use (Krugman 1991: 26). Central place theory also assisted locational theories in exploring how economies of scale and transportation costs interact to produce a spatial economy, through the work of both Christaller (1933) and Lösch (1940) (Krugman 1991: 26). While these models are useful in terms of relating transport, economic activity and urban development, they should be understood within their historically context, prior to the complexities of globalisation.

Notions of cities as places where people and goods concentrate and where interaction are derived from connectivity fostering change is fundamental to understanding the interaction between place and flows. Figure 2.2 illustrates the generalisations of the internal structure of cities related to concentric zone theory, sector theory, and multiple nuclei.

Figure 2.2: Traditional spatial models indicating generalisations of the internal structure of cities



Source: Adapted from Harris and Ullman (1945:11)

The theory of the multi-nuclear city developed by Harris and Ullman (1945: 9-15) identified "*cities as transport foci and break-of bulk point*" and related services. The model is conceptually significant as it recognises: 1) the cargo related functions, such as transhipment, packing, distribution; 2) the role of ports, stations and airports identified in the model related to the system of goods exchange; and 3) multiple urban centres with specialisations and differentiated functions. The spatial interaction between flows and places was captured at a city scale through traditional spatial models, and extended to the interaction between adjacent places in the work of Isard (1949: 505). He outlined a general theory of space economy argued that locations cannot be explained without accounting for trade and trade requires a simultaneous understanding of multiple locations, although not explicitly linked to global trade.

Transport and Locational Theory Locational theories can be applied to explain the links between transport and urban development. Classic locational theory assumes that accessibility determines the value of land in particular locations and that as transport costs change so do rent levels (Banister 1995: 7). The classic locational theories provide limited explanatory factors, specifically exogenous considerations to the dynamics between places, across scale and over time (Banister 1995: 7). In addition to accessibility, Krugman (1998) argued that transportation costs are a consideration in locational choices of firms. Economic geographers however tend to assume the iceberg effect with respect to transportation costs. The argument is that transport costs are incurred at a constant rate when goods move and that a portion of the goods' value simply '*melt away*' in transit (Krugman 1998: 11). New economic geography seeks to explain the spatial structure of the economy through modelling the concentration of economic activity (Krugman 1998: 10; Fujita, Krugman and Venables 2001: 8). The new economic geography marks a departure in the 1990s from location theory and the work is primarily led from the writing of Paul Krugman on geography and trade. New economic geography argued that "*better and cheaper transport will generally promote*

concentration of economic activity in favoured locations" (Knowles, Shaw and Docherty 2008: 12).

The shift from transport as an external cost to an integrated role in the production and distribution systems, with more complex relationships to costs, is implicit in the review of transport geography debates. Transport was traditionally regarded as the means for overcoming distance or space. Logistics, incorporating a transport cost, conceptualised as a mechanism for overcoming time. The physical distribution of goods, as derived transport demand, is only part of logistics equation and the management of materials in the production process induces further demand with expanded logistics functions (Hesse and Rodrigue 2004: 173). The emergence of logistics was "*achieved by shifts towards vertical integration, namely subcontracting and outsourcing, including the logistical function itself*" (Harvey, 1989 cited in Hesse and Rodrigue 2004: 175). Imperatives to overcome space and time constraints of globally dispersed production are therefore tied to transport and technological developments that in turn further restructured global production systems.

Early locational theories isolate the cost of transport as a factor in the organisation of economic activities. For example, the Von Thünen model relates the land bid rent price to minimising combined cost of producing and transporting the supply of food (Fujita, Krugman and Venables 2001: 16). However, in order to overcome the endogenous shortfall of the model, the influences of neighbouring towns was considered. Theories of agglomeration based on external economies helped explain the dynamic between multiple towns. The concept of agglomeration economies was introduced by Alfred Marshall in order to explain spatial concentration of industrial activity. He argued for localised economies to develop or Marshallian externalities, and these are produced when firms in the same industry co-locate (Marshall 2009: 526). These firms firstly tend to cluster geographically due to specialised local providers of inputs, where secondly, a concentration of firms employing workers of the same type of labour market pool, and thirdly, to enjoy the benefits to be had from

sharing information and knowledge (Fujita *et al.* 1999: 19). The transportation costs within localised economies would largely accrue to the producers. The central place theories of Christaller (1933) and Lösch (1940), are considered as locational theory. These describe a trade-off between economies of scale and transportation costs in producing spatial economies with the emergence of a lattice of central places serving the surrounding farms (Fujita *et al.* 1999: 26).

The clear relationship between location and market forces to reduce transportation costs was challenged by empirical studies in the late 1960s and the 1970s. These empirical studies identified factors outside of transport costs impacting on performance of firms and location decisions. For example, firms indicated slowed economic activities in the periphery regions where import competition existed, despite low transport cost, as well as changes in industrial location decisions made by large, multi-location and multi-nationals independent of transport costs (Pedersen 2001: 85). Pedersen (2001) argued that as transportation costs relative to the unit costs in production fell, so too the decisive role of transportation costs in production location diminished. The benefits of agglomeration, economies of scale and increasing returns are identified by NEG as important in shaping cities and regions (Storper 2011), particularly given the reduced transport costs. Although the average transport unit cost fell, the overall transport costs increased due to the changing geography of globally dispersed production and fragmented production processes associated with globalisation. In this section, the argument is not necessarily about isolating the cost of transport, but understanding firstly how the role of transportation changed with the process of globalisation and secondly how locational dynamics, in terms of economies of scale, agglomeration and supply side integration relate to transportation, and air transportation.

While the new economic geography may provide insights into concentrations of economic activity in contemporary economies, there are critiques on the assumed role of the state to promote a free market. Peck and Yeung (2003: xiv) critiqued the new

economic geography approach as associated with neoliberal policy implications of the discourse. The debate on competition and competitiveness between city and regional economies is polarised. On the one hand, Krugman (1998) argued that places and regions do not compete, but firms do; while Porter (1998b) focused on the competitive region, with gains related to the clustering of firms in particularly cities. The latter view created a strong argument that transport and information and communications technology (ICT) infrastructure underpin the positive development of regions through the flow of goods, services, information and people (Docherty 2004: 342).

Despite the extensive literature on the shifts in the organisation of economic activities within the context of globalisation, the field of transportation geography partially addresses concerns related to the physical distribution of goods related to economic activities on space and urban development (Hesse and Rodrigue 2004: 171). Transportation geography emphasises the movement of passengers over the movement of goods. Over the past decade a number of academic contributions have responded to this gap and the transportation geography of logistics and freight distribution has emerged albeit with a developed country context bias (Rodrigue, Comtois and Slack 2013: 356).

The development of large scale transportation infrastructure to facilitate the flow of goods, and industrial land uses that generate and depend on the flow of goods, is an enduring feature in the planning and development of cities across history (Hesse and Rodrigue 2004: 183). However, it is interesting that the field of planning, and particularly local planning research, is relatively silent on the substantive issues related to air logistics infrastructure more broadly and airport development in particular. The planning literature tends to equate investment in airports and ports as mega projects invoking critiques framed as the consequence of neoliberal discourse. In the built environment, the local contributions to airports literature tends to be project-specific critiques located in the broader neoliberal discourses (Todes 2014: 257; Robbins 2015: 197). However, these critiques do not necessarily reflect on the practice of how

airports relate to local or regional spatial economy in order to inform and change planning contributions, nor do they engage wth the dynamics of connectivity between global and local economies. Mokhele (2016a: iii), in the context of South Africa, has contributed towards a framework that describes and explains forces that drive the location and mix of airport-centric developments around the Cape Town and OR Tambo airports. The study found that transport-oriented firms (such as couriers and freight carriers) enhanced airfreight services at the airport to the benefit of other air-centric firms. Although the study makes a useful conceptual contribution between economic, organisational and geographic space of firms, the work is based on established airport within existing industrial areas and not emerging ones.

2.2.5 Emergence of normative planning

In contrast with rational planning systems of the 1960s, the reality of social and political unrest challenged the technocratic basis of planning. Planners voiced concerns that plans were not implemented as intended. Responses to these problems ranged from attempts to make the system model work better (Harris, 1975), advocacy planners offering alternatives (Davidoff 1965), and Marxists challenging the urban form under capitalism (Castells 1977). From the 1970s onwards, the emergence of planning theory emphasising the planning process and engagement with diverse stakeholders from paradigms outside of positivism and modernism. Allmendinger and Tewdwr-Jones (2002: 5) argued that normative planning is contrasted as an alternative approach to positivists' epistemologies by questioning positivist understanding of knowledge as universal. In other words, alternative methods and theory were understood to belong to a larger social and historic context where they are applied and developed (Allmendinger and Tewdwr-Jones 2002: 5).

Planning attracted substantial critiques from the social movements in the 1960s and 1970s. This critique is encapsulated in Jane Jacobs' (1961) book *The death and life of great American cities* reviewed by Jacobs as "*an attack on current city planning and rebuilding… on the principle and aims that have shaped modern orthodox city*

planning" (Jacobs 1992: 4-7). Fainstein (2012: 162-163) attributes the crisis in legitimacy of planning practice to the assumptions within rational models that expertise in the process of planning and planning outcome lie outside of the social base.

Within the context of apartheid, the undemocratic critiques of the planning process were even more valid. The development of planning theory on improved planning processes was not sufficiently based on critiques of post-colonial and apartheid contexts, but largely on American and European experiences. Within the field of planning, Klosterman (1978: 37-38) argued for "*normative planning*" in contrast with value-free "*logical-positivist*" position of the "*instrumentalist planner*". His post-positivist argument is based on the assertion that ethical decisions can be rationally justified through defensible principles that evaluate the end and means of public policy. In a sense, he argued that values are made explicit within normative principle. His argument amplified previous calls by Davidoff (1965) on advocacy planning, Friedman (1966) and Faludi (1973) for normative planning, although there was variation in what was meant by '*normative*'. Advocacy planning made goals and objectives explicit, unlike the system and blueprint approaches, as a mechanism to empower the public of alternatives and expose the underlying values (Hall 2005: 349). Davidoff (1965: 331) argued that "*appropriate planning action cannot be prescribed from a position of value neutrality, for prescriptions are based on desired objectives*". However, Faludi (1973) argued that normative planning was not reflected in given goals and objectives, but where the goals are the object of rational choice.

The use of the term normative as a category in decision making (Faludi, 1973) differed from the broader use of normative paradigm to include communicative theory, collaborative planning, postmodern planning, etc. Hall (2005: 350) argued that the critique of modernism was evident in the renewed engagement with process informed by normative principles. As a consequence, planning thought emphasised planning process from what was being planned, and as an outcome, substantive theory in

planning is neglected. Rather, the development of indigenous planning theories tended to emphasise processes of engagement in planning processes, while drawing on substantive ideas from social theory. Following the legitimacy of planning '*paradigm crisis*', substantive theories applied to planning, particularly from the 1970s included the wave of Marxist contributions from David Harvey, Doreen Massey, Manuel Castells and Henri Lefebvre. Much of the emphasis was placed on the role of the state, and given the alignment of planning activities with the state, the role of planner to resolve the conflict between accumulation of capital and collective action was questioned (Hall 2005: 351). In effect, the role of planning was negated by the inability of planning to shift inequalities inherent in socio-economic relations of capitalism.

Attempts by planning theorists to pin down the rather elusive definitions of planning reflects broader debates within normative theory. A widely cited definition of planning is the relationship between knowledge and action (Friedmann 1998: 248), which builds on the view that planning denotes a normative action of improving planning practice. Despite the merits of the normative outcome, such as achieving redistribution outcomes, Fainstein (2012: 165) argued that the underlying theoretical premise of the normative positions needs to be explicit. In this way, the underlying strategies and conditions can better align with intended results (Fainstein 2012: 165). One strength of planning lies in the normative intention of putting in place the shared knowledge of what ought to happen. However, what needs to be made explicit is the question on the values that underpin normative planning, who determines these, and in whose interests.

2.2.6 Communicative theory and collaborative planning

The current planning theory context is taken to be post-positivist, where the world is understood as ambiguous, complex, constructed, and open to interpretation (Allmendinger 2002). Planning thought has been influenced by Habermas, through his work on communicative theory (Habermas 1981). Theorists have drawn from non-

positivist philosophy and social theory of post-modernism, post-structuralist and pragmatism, to engage with this broad communicative paradigm (Harrison 2002: 157). Communicative theory and collaborative planning are one of the dominant[iv] normative theories that have emerged in development planning as a response to modernism, and attracted significant debates and modification. Allmendinger and Tewdwr-Jones (2002: xi) acknowledge that no singular position represents communicative and collaborative planning with substantial variations that incorporate differential aspects of social and critical theory.

The initial work by John Forester (1988) *Planning in the Face of Power* takes a pragmatic approach with ethnographic methods to understand the agency of planners in relation to power. Forester (1988: 27) argued that

> "*if planners ignore those in power, they assure their own powerlessness. Alternatively, if planners understand how relations of power shape the planning process, they can improve the quality of their analysis and empower citizen and community action.*"

Communicative planning was initially associated with Forester (1988), Innes (1998), and Forester (1999) in applying Habermas's theory to planning and subsequently with collaborative approach undertaken by Healey (2007a). Collaborative planning draws on philosophical and theoretical inspirations including Giddensian structuration theory and Habermas's concern with communicative action (Huxley 2000: 367). In response to perceived shortfalls, Healey (2007) modified her approach towards collaborative planning to strengthen institutional understanding influenced by structuration theory (Giddens 1986). She describes collaborative planning as bringing together communicative theory to planning with institutionalist sociology and regional economic geography. Collaborative planning is a form of practice, that Healy describes as "*spatial strategy-making for urban areas*" rather than a theory (Healey 2007b: xi). She develops a collaborative framework for place-centred concerns and applies a relational understanding to space that is relevant in this research. Healy

(2007), drawing from the institutionalist view, emphasises the strategic and systemic institutional changes to planning practices and systems within government and planning (Harris 2002: 37). In particular, she finds that conceptualisations of space are underplayed in planning theory, and develops arguments for placed focused concerns by acknowledging the geography of public policy (Harris 2002: 34) within a relational framework.

2.2.6.1 Critiques

Critiques of collaborative planning tend to be either directed at the theoretical understanding underpinning Habermas's communicative theory or critiques related to the planning interpretation thereof (Harris 2002: 30). Harrison (2002: 157) in his pragmatic assessment of communicative planning notes that Habermas's "*consensual theory of truth*" points towards claims of universal consensus. In a similar view Habermas is critiqued for universalisation and top down moralisation (Flyvberg and Richardson 1998). Furthermore, Habermas requirements for an '*ideal speech situation*' for participants to engage in dialogue is critiqued, as this fails to acknowledge the issues of identity and power that inhibit communication. The main criticism of Habermas's work are his conceptions of power in communicative theory. Foucault's conceptions of power as diffuse, capillary like, transcending the social body are juxtaposed with Habermas's narrow conception of power (Huxley 2000: 372). While it has been argued that Habermas incorporates a hierarchical view of power his analysis is restricted to its application to the state and bureaucracy (Huxley 2000: 372). The issue being that power is treated as external to the process of communication, which ideally can be separated from the communication process. Huxley (2000: 372) argued that Habermas "*conceives of the lifeworld as being free from this kind of power, and communicative rationality as being dependent on its absence but constantly threatened by it*."

Critiques of communicative action paradigm challenge the conceptualisation of planning as a consensus building approaches with "*oppressive mechanisms of control*"

(Yiftachel 1998: 395) associated with power. These critiques draw on Foucault's concepts of rationality as an alternative to Habermas's communicative rationality, as well as alternative understandings of power where communicative approaches are arguably deficient (Flyvberg and Richardson 1998). In effect, critiques of communicative action approach questions whether democratic engagement and consensus building are able to shift entrenched power relations within the social context (Fainstein 2012: 166)

Contemporary planning theory is strongly influenced by post-structural and postcolonial epistemologies that question singular interpretations of reality and recognise the value of context specific knowledge with subjective and multiple truths. Foucault's version of power has also shaped post structuralists' perspectives. Unlike structuralists, who focus on hierarchical articulation of power with positional power, Foucault developed a social relational view of power (Given 2008: 667). The appeal of Foucault's conception of power is its pervasive nature, where it operates in everyday social relations, and needs to be understood within this context.

The controversy over how power relates to planning theory ensued at the start of the new millennium. Friedmann (1998) argued that planning theory needs to build power into conceptual framework. Similarly, Flyvberg and Richardson (1998) argued that power analysed by Foucault offers better prospects for bring about implementable change, as opposed to the use of power in communicative theory of Habermas suggesting the type of change required. In effect, the lack of implementation in planning is attributable to the incorrect reading of real power (Flyvberg and Richardson 1998), or the incorrect reading of the context in which power is constructed.

2.2.7 Synthesis

A review of planning theory identifies themes that are relevant to this research. First, there is general agreement in the literature reviewed that planning theory is not a coherent body of knowledge, and that any claims to a dominant planning approach are largely contested. Furthermore, the epistemological question of what constitutes planning theory, given the dominance of planning theorists from European and American contexts, in light of the knowledge generated in the Global South. A key issue being raised in post-structuralist and post-colonial debates is the value of situated knowledge as a challenge to the universal application of planning theory. Recently, accusations of universalism have been topical. There is an alleged tendency to write as if the theoretical analysis and procedural recommendations are equally relevant everywhere, both in the global North-West and the global South-East (Watson 2002, 2006; Yiftachel 2006). At stake here is not the broadening empirical examples from elsewhere, but opening up understandings that reconceptualise theory as contextually attentive to histories of colonial and imperial differences (Roy 2016: 1). At a general level, planning theory tends towards abstraction and is widely critiqued for being separate from social conditions and planning practice (Beauregard 1990: 212). This research aims to contribute from the practice of planning for airports and logistics.

Fainstein and Campbell (2012:159) suggested that planning theory is weakened by "*isolating process from context and outcome*" and that planning outcomes be gauged by producing better cities for all citizens or so-called "*just cities*". While planning as a normative project is widely accepted, at a meta-ethical level Winkler and Duminy (2016: 1) argue that planner's value-judgements are questionable. It is therefore a question as to how a planner knows that a '*just city*' is better than a '*sustainable city*' when intervening in the space between knowledge and action (Winkler and Duminy 2016: 5).

Planning theory has been critiqued for undue preoccupation with process at the expense of substance (Sager 2009: 3). This problem is acute when dealing with

strategic plan-making processes on airport infrastructure and searching for applicable theoretical frames of analysis. The critique is that planning discourses insufficiently inform the planning of airports, but also that planning theory is weakly developed in relation to the plan-making process. Reflecting on the plan-making processes at airports, and specifically how plans support air cargo logistics with developmental outcomes, suggests that there is space to make substantive contributions from practice. In a similar vein, Fainstein (2012: 160) critiques planning theorists for disregarding the city, echoing the argument forwarded by Beauregard (1990) that few planners are theoretically engaged with the physical form of the city. She attributes theoretical weakness to the separation of planning process for the object of planning (Fainstein 2012: 160).

2.3 Review on theory linking airports and logistics

This next section reviews concepts and theory that relate transport and the impact of restructured global production systems on the emergence of airfreight logistics. The review supports the argument that the relationship between flows and places have changed with innovations in technology and transport related to globally restructured production processes.

2.3.1 Understanding flows

Globalisation processes are represented in the literature as flows or networks engaged with geographically dispersed economic activity. Flows are representative of capital, information, capital transactions, and networks as rational constructs between actors, institutions and economic processes. A seminal understanding of how the globalisation of economic activity in contemporary cities has impact across scales draws from the work from Castells (1996) in his book *The Rise of the Network Society*, conceptualises how networks of flows operate at multiple scales, and how flows can be applied to distinguish between physical and functional definitions of cities or regions (Castells 1996: 442). Castells (1996: 453) makes a useful conceptual distinction between "*space of places*" and "*space of flows*". The space of place is a

physical "*locale whose form, function and meaning are self-contained within the boundaries of physical contiguity*" (Castells 1996: 453), and where the "*space of flows*" is more relational as the "*material organisation of time-sharing social-practices that work through flows*" and networks (Castells 1996: 442). Furthermore, the work of Castells (1996) also clarifies various dimensions to flows and assists to narrow the focus for the study on how goods flow as the physical expression of flow. Flows in the broader sense refers to the "*flows of capital, flows of information, flows of technology, flows of organizational; interaction, flows of images, sounds and symbols*" and "*representation of processes dominating*" economic, political and symbolic life (Castells 1996: 442). In this study, flows refer to the observable movement of material flows, while recognising that other flows may accompany these.

2.3.2 Understanding globalisation

Globalisation provides the broad context for understanding the relationships between the economic activity and the movement of materials, component parts and goods in geographic space. The impact of internationalisation and globalisation on economic activity have profound spatial implications for the relationships between producers and consumers and the transportation intermediators that connect them (Hall and Jacobs 2010: 2). However, despite the long distant spatial extent of these relationships, the increasingly integrated nature of the supply chain systems also characterise how the production, consumption and distributions of goods relate. Dicken (1998: 5) in his discussion on the "*global shif*t" in the world economy makes the distinction between "*internationalization*" and "*globalization*" processes at work in contemporary economies (Dicken 1998: 5). Internationalisation processes are simply the "*extension of economic activities across national boundaries*", whereas "*globalization processes are qualitatively different"* and relate to the "*functional integration of such internationally dispersed activities*" (Dicken 1998: 5). In this research, overcoming global dispersal through vertical and horizontal integration is considered. Globalisation provides the context for understanding the movement of completed goods, goods and materials within production processes that relate to the activities that

distribute, store, handle, package, produce, consume, reuse, and dispose in city regions.

2.3.3 Understanding global production networks

It is widely recognised in economic geography literature that freight distribution networks feature more prominently, as a consequence of fragmented global production networks (GPN) (Hesse 2006: 570; Coe, Dicken and Hess 2008: 272). Additionally, the volume of global trade and associated infrastructure has grown, both a consequence and in support of global production networks. In particular, seaports and airports have emerged and expanded as nodes within GPN in order to engage in global production systems. While GPN are central to understanding the changing geography of the global economy, these are not the only global networks[v] at play. These networks are, however, relevant to how goods flow through airport nodes and the related uneven territorial processes. Dicken (2004: 16) notes that

> "*such processes are not only geographically grounded and embedded (in the sense of deriving some of their characteristics and resources from place-specific contexts), but they also generate geographically specific, highly uneven, concrete outcomes.*"

The relational and geographic focus to understanding globalisation is identified in the review through the work of Dicken (2004) and Hesse (2006), and is discussed further in Chapter Three.

According to Yeung and Coe (2015: 29)

> "*global production networks (GPN) are organizational platforms through which actors in different regional and national economies compete and cooperate for a greater share of value creation, transformation, and capture through geographically dispersed economic activity*."

This research considers how these organisational platforms and activities are expressed in the geography and structure of city regions. GPN have emerged as a consequence of innovations in transportation and communications technology, with distinct but interrelated roles in globalisation (Hesse 2006: 572). Coe *et al.* (2004) and Dicken (2003) point to the underpinning roles of transport and ICT in the increasing degree of global economic and social integration known as globalisation. It is conceptually important to recognise how processes of fragmentation and integration operate together in global production systems at a geographic and operational level. The term '*fragmentation'* relates to the physical separation of different aspects of a production process across countries (Gereffi, Humphrey and Sturgeon 2005: 79) and regions, whereas '*integration'* refers to value adding relationships in the production process, independent of ownership. The geographic dispersal of global production systems means that countries and regions are differentially integrated into these production systems (Dicken 2003: 110). On the one hand, a key feature of global production systems is the geographic and operational fragmentation of production along the value chain. On the other, and operating in tandem with this vertical disintegration, are the organisational processes of integration to overcome dispersed trade in component and intermediate goods (Coe and Hess, 2012: 159). The emergence of logistics to integrate the global value chain is concomitant with changes overcome dispersal in global production networks.

Industrial and finance capital are not the only elements shaping globalisation, and consumer capital has also featured more prevalently as a feature of capitalist accommodation at the global scale (Coe and Hess 2012: 159). Global production is reconfigured not only through the international expansion of outlets, buying power and global sourcing strategies (Coe and Hess 2012: 159), but through the demand created by on-line shopping. The impact is tangentially dealt with in research related to the conflicts between city logistics and freight transport, and is an emerging research

area, albeit underdeveloped within transport geography and '*mobilities'* literature (Cidell 2012: 2012).

The key issue for understanding the ascendance of logistics with economic globalisation is the argument that the geography of production changed with global crisis in the accumulation of capital (Coe and Hess 2012: 158). Changes in the production process initially changed the role of transportation and later changed the value-added services related to how goods move in the production process.

Coe and Hess (2012: 157) argue for a multi-scalar approach for analysing the global, national and region/local scales at play in complex geography of production. Production in this context refers to "*the social processes through which economic value is created*" (Coe and Hess 2012: 158), and is widely related to ebb and flows of manufacturing goods.[vi] Coe and Hess (2012: 158) identify two critical issues in global production system: firstly, the growing role of finance capital to support outsourcing and off-shoring to maximise value; and secondly, the changing role of the state where public and private actors are shaping the global division of labour under neoliberalism. The dynamic of outsourcing is important in this study, as well as how logistics works to create trade integration in the supply chain, while production drives vertical disintegration. Coe and Hess (2012: 158) argue that the fragmentation of production along the value chain, or vertical disintegration, works hand-in-hand with the integration of trade through component and intermediary goods as a key features of global production systems. As a consequence, managing the global supply chain is then key to establishing competitiveness. The relevance for this study is how logistics emerged as integrated in the production process to overcome the dispersed geography of production.

2.3.4 Global production network theory

Global production has over the past three decades become organisationally fragmented and geographically dispersed. It is estimated that more than 80 percentage of international trade is organised through global production networks (Yeung and Coe 2015: 30). While there is substantial empirical literature on global production networks, theoretically, the emergence of GPN is underdeveloped (Yeung and Coe 2015: 29). Within the literature on international trade and production networks, the term '*commodity chains*', later '*global commodity chains'*, and most recently '*global value chains'* feature as concepts distinct from global production networks. Bair (2009: 1) in her work on the genealogy[vii] of global commodity chains, argued that broadly these terms "*describe the sequence of processes by which goods and services are conceived, produced, and brought to market, each of these chain constructs has its own history*."

Research on global commodity chains (GCC) was initially led by Gereffi (2001), Humphrey (1995) supported by Gereffi, Humphrey and Sturgeon (2005) to explain the dynamics underpinning functional integration of globalization processes. According to Gereffi and Korzeniewicz (1994: 2), GCC

> "*consists of sets of interorganizational [sic] networks clustered around one commodity or product, linking households, enterprises, and states to one another within the world-economy. These networks are situationally specific, socially constructed, and locally integrated, underscoring the social embedded-ness of economic organization [sic]*."

The initial research on global commodity chains introduced buyer and consumer driven commodity chains to the global organisation of industries (Gereffi 2001). A key contribution in this regard is the analysis of the dimensions to GCC, where Gereffi and Korzeniewicz (1994: 96-97) identified the following: (1) an *input–output structure*: "*a value-added chain of products, services, and resources linked together across a range of relevant industries*"; (2) a *territoriality*: that is, a pattern of

geographical distribution that may be spatially dispersed or spatially concentrated; (3) a *governance structure*: the

> "*authority and power relationships between firms that determine how financial, material, and human resources are allocated and flow within a chain*" and (4) an *institutional framework*: "*that identifies how local, national, and international conditions and policies shape the globalization [sic] process at each stage in the chain*."

A key criticism is that despite the analysis of multiple dimension of GVC, Gereffi focused primarily on governance structures. GCC tended to underplay the spatial dimensions to global value chains and through the contribution of more relational approaches, emerged as a modified GVC approach.

Broadly speaking, the economic geography work on GVC relates to value chain governance patterns or relational network patterns. While initial work focused on governance patterns related to GVC, the work of Henderson *et al.* (2002); (Dicken 2003) draws on the organisational complexity of firms in global economy through relational approaches. Of significance is the coordination and control of global scaled production, relations between firms, without direct ownership (Gereffi, Humphrey and Sturgeon 2005: 81). Yeung and Coe (2015: 29) argue that existing frameworks on global value chains to under-theorise the origins and dynamics of global production networks, echoing earlier critiques by Sunley (2008) that the relational approaches are insufficiently explanatory. As a prescription, Yeung and Coe (2015: 29) offer theoretical insights into the causal drivers of global production networks in terms of their competitive dynamics (optimising cost-capability ratios, market imperatives, and financial discipline) and risk environments. They identify how these dynamics produce different strategies for organising global production networks in terms of intrafirm coordination, inter-firm control, inter-firm partnerships, and extra-firm bargaining.

The review of global production networks is therefore limited to understanding the role of transportation and airports in relation to how goods move within global supply chains. The debate as to how globalisation relates to regional development from the perspective of new regionalism or from the perspective of global commodity chain/global value chains (GMC/GVC) have been excluded from the review. The new regionalism literature has been critiqued for the preoccupation with local transactions and institutional forms at the expense of connections beyond the region, while GMC/GVC have been critiqued for the preoccupation with the national scale (Coe *et al.* 2004: 469).

The work of Gereffi (2014: 441) relates GVC to economic development at a national level through participation in the global economy. The connection to GVC through trade and investment relies on efficient global supply chains in order to support growth. Underpinning these supply chains are infrastructure development in ports and airports that improve efficiencies with information and communication technologies, in order to improve trade flows and investment. Implicit in the argument forwarded by Gereffi (2014: 441) is an export-orientated industrialisation development path. While some of his initial work was influenced by dependency theory, his later work included comparative analysis of industrial strategies across regions and how these interact with domestic policies and global industries (Bair 2009: 10). GCC/GVC provides an alternative to orthodox trade focus on final goods, by including material flows in the production process. Despite the analytic value of GCC, the critique that Gereffi (2014) tends to emphasise the role of lead firms as the drivers of global production networks is debatable. The GCC/GVC framework identifies multiple actors shaping GVC, where government support of infrastructure, domestic policy workforce all exhibit some form of relative agency at times Bair (2009: 17-19). At a more fundamental level, there is debate regarding whether participation in GPN promotes positive development outcomes, and the unit of analysis (national, regional,

local, firm scale) to determine outcomes, as well as questions on whose interests are promoted (Bair (2009: 30).

An understanding of global production networks is important to understanding the emergence of distribution and logistics functions within the production process. The general emphasis on firms and performance of specific sectors overlooks the explicit role of supporting infrastructure on the territorial side, and how this relates back to city structure.

2.3.5 Actor network theory

In addition to the global commodity chains framework for analysing the global economy (in section 2.2.1), relational thinking drawing on actor-network theory also provides a basis for understanding the global economy (Dicken *et al.* 2001: 89). Relational approaches have come to be associated with post-structural thinking and are associated and influenced by actor network theory (ANT), as developed by Latour and Callon (Latour 1996; Callon 1999; Latour 2014). ANT thinking also influenced the work of Graham and Marvin (2001) on networked infrastructures, and more recently, has been applied by Jacobs (2012) and McFarlane (2011) in their concept of '*assemblage*' as a new ontology for the urban (McFarlane 2011). ANT provides a post structural relational perspective on the "*subtle linkages between technologies and the social worlds*" (Graham and Marvin 2001: 184). By relational, in this context, Graham and Marvin argue that relations are constructed between "*the social nature of infrastructural and technological innovation and the active constitutive roles of technologies as well as people*" (Graham and Marvin 2001: 184). The emphasis in ANT is on "*the process of ordering or the ways in which societal order is achieved and the role material elements and other nonhumans play in that process" and is based on the* "*ontology of relational practices*" (Jóhannesson and Bærenholdt 2009: 15). The ANT perspective emphasises the complexity and assemblies of social and technology elements across space and time, and resonates with the sociology concerns with the "*mobilities paradigm*". ANT is not a coherent approach to network analysis,

nor is it a theory. Even the main contributors to ANT, namely (Latour 1996: 374); Callon (1999: 194) state that ANT is not a theory per se.

The value of ANT as an analytical approach is, however, the way in which human and non-human (or social and technical factors) are brought together in the same analytical frame. In other words, neither the social nor technical meanings take precedent as a predetermined unit of analysis. These meanings are co-constructed in the process. However, given that in this study the unit of analysis relates back to land use structure, and is conceptualised as the material outcome of relational processes, ANT as a method is of limited value to this study. It is understood that actor-networks do not have technical dimensions or meanings as transport infrastructure, neither are they representative of social networks (Latour 1996: 369), where networks are essentially relational processes. It was previously argued that in terms of this research, networks are viewed as both relational and structural (section 2.2.1), providing structural understandings of power relations in the global economy.

The understanding of relational approach in this research does not embrace ANT and its associated ontologies. This argument is based on the ontological critique of ANT as flat (Sunley 2008: 10), with insufficient contextual appreciation outside of the network. A key concern is that if space is conceptualised as "*geographically extended spatial flows*", where "*space is frequently being imagined as a product of networks and relations*", that territorial fixes of the socio-spatial context are underplayed (Massey, Amin and Thrift 2003: 6). ANT emphasises the interaction between human and technological and other artefacts across space and time delinked from geographic space (Graham and Marvin 2001: 184-189). While it is acknowledged that air infrastructure networks are able to transcend space and time impediments, resonating with the concept of air infrastructure networks, these infrastructures are still territorially fixed with specific geographies (Hesse 2010b: 80). Air infrastructure is therefore to be understood as both territorially fixed and as a relational position

between cities globally, as a "*relationality/territoriality dialectic*" (McCann and Ward, 2010:175).

In summary, the concern therefore lies with the ontological aspects of ANT, and not with relational approaches to understanding networks, space, and airport redevelopment. ANT provides useful analytical aspects that focus on the detailed ways in which relations are constructed, encompassing social and technical connections, across space and time (Graham and Marvin 2001: 184). However, while it is useful to study relations and networks in the context of airfreight connectivity, abstracting these connections from institutional and social contexts provides a partial understanding on the subject (Sunley 2008: 19).

2.3.6 Conceptual understanding on geographies of production and distribution

Growth in the circulation of freight flows is indicative of economic changes across cities with both structural and operational considerations (Hesse and Rodrigue 2004: 171), and impacting on the respective geographies. The structural changes relate to changes in the geography of production, while operational changes to freight transportation and the related geography of distribution. The argument that new modes of production are inextricably linked with new modes of distribution informs the definition of logistics as the activities related to both the physical distribution of goods (from raw materials to completed goods), and to the management of materials in the production process through to reuse and disposal (Hesse and Rodrigue 2004: 173).

The argument being developed here is that transportation infrastructure, supported by capital and information flows, supports the flows of materials and the distribution of goods as a value-added activity of logistics within the supply chain. Airfreight logistics, given the ability to distribute goods globally within time definite margins, has supported this role. In addition to the changed role of transport as integrated into the supply chain, the function of logistic itself has become outsourced to ensure productivity gains related to time. As supply chains are predominantly managed on the demand side, logistics services are becoming more sensitive to time with elements

of supply chain management outsourced to third party logistics providers benefiting from economies of scale (Hesse and Rodrigue 2004: 175).

Conceptually, the interaction between transport and urban development requires an understanding in terms of flows, nodes, networks and places. These terms draw in part from geographic terminology, as well as theoretical influences of Castells and Harvey. Hesse (2013: 33) explored the relationship between cities and (transport) flows overtime, reflecting on urban development in the context of ports and airports. Although territorially transport infrastructure can influence hinterlands, the theoretical application for material flows, freight distribution (Hesse, 2013: 30) and airports is under-researched. Hesse (2013) has argued that there is empirical evidence to support flows in cities and regions and theoretical understandings to explain related urban development. Cities are considered central places in the exchange of goods and recognised in the locational theory through the broader work of Christaller and Lösch. Hesse (2013) invokes the work of Hoyle to understand the interaction between flows through cities and port on industrial development. He argues that these ideas area based on spatial interaction (Ullman, 1954) and spatial reorganisation (Janelle, 1969). Although these geographic concepts are not specifically tied to airfreight, the relational notions of flows are applicable to this research and further developed in the conceptual framework. Drawing on relational ideas of Amin (1999); Hall (2003) and in methodological terms, Hesse (2013: 34) considers

> "*cities and flows as embedded in structure and agency, driven by social and economic stakeholders and institutions as much as by policy and planning – not just derived from mere distance, transport costs, location and infrastructure*."

This relational perspective draws on the complexity of flows in shaping socio-spatial dynamics of places, with relative roles of stakeholders, institutions, policy and planning in the process. According to Hesse (2013: 34), relational understandings of networks are argued to be "*both social structures and ongoing processes, which are*

constituted, transformed and reproduced through asymmetrical and evolving power relations by intentional social actors and their intermediaries. This relational view of networks emphasizes the role of human agency and the ongoing formation of networks that produce empirical outcomes." However, these concepts are not treated as direct representations and the relational understandings of place are evident in transport geography, specifically when it comes to airports.

2.3.7 Mobilities paradigm

The mobilities paradigm examines the complex relations between urban infrastructure and the mobilities they support from a social science perspective (Graham and Marvin 2001: 16). The concern for how moving goods and people move across geographic space is shared between geographic and the sociological '*mobilities'* perspective, however it has been argued that the research interest, research methods and epistemological underpinnings between the geographic and sociological perspectives vary (Shaw and Hesse 2010: 307). The mobilities paradigm provides a social and cultural element to air transport that assists in conceptualising the movement of goods, not simply as a flow, but likewise embedded in the context of local places with social and cultural-inflected perspectives (Adey, Budd and Hubbard 2016: 773). The notion that the movement of goods cannot be separated from the socio-economic context is important when considering the planning implications for dynamics of city-regions. Literature on the motilities of cargo also highlights the centrality of logistics underpinning capitalism and mass consumption of goods. Logistics is argued to be central to the accelerated movement of goods, the cutting of production costs, reducing inventories, as well as reducing the gap between production and consumption and supporting '*just in time*' production. In the work of '*cargo mobilities'*, Birtchnell, Savitzky and Urry (2015: 2-3) argue that logistics allows for 'neoliberal' policy reforms that include opening up foreign markets and globalising finance and trade. Furthermore, the concerns for changing mobilities to develop fairer trade relations that are less resource dependent are important from the '*mobilities'* perspective. This represents a slightly different focus to making the system work better.

In summary, the economic and transport geography literature provides a qualitative understanding that logistics is not simply derived to overcome transportation costs, but is integrated and conceptualised in relation to global production processes. Furthermore, due to the ability of airfreight to overcome distance within time-definite parameters, the emergence of airfreight segment of logistics is arguably concomitant with global productions restructuring, and assumed prospects for economic growth. The question of who benefits from such growth is relevant in this study.

2.4 Empirical studies on airports

2.4.1 Local planning on airports

Planning research on airports tends to focus on established airport regions, rather than emerging greenfield cases. Research on greenfield airports in Africa is limited to the role of public private partnerships (PPP) in infrastructure development, reflecting the three greenfield airports constructed in Africa since 2007 (Tomová 2009: 13). Changing the South African geography of air transportation in Africa is attributed to lifting of sanctions from 1990s, as well as to increasingly prominent political and commercial role in Africa (Pirie 1992; Pirie 2006, 2014). Within Africa, air trade functions across a sparse network and air cargo accounts for some eight percent of the total 1,8 billion tons of air cargo originating or destined for Africa (Boeing 2017: 36). While there is empirical work on air connectivity in Africa – and the prominence of South Africa, specifically ORTIA, in these flows – planning research on airports specifically related to air freight is, on the whole, relatively narrow.

Within South African, two recent airport related contributions are particularly relevant in the field of planning. Mokhele (2018a: 26) investigated the evolution of airport led development at CTIA and ORTIA, and picked up on the challenges of uneven planning and policy interventions in airport related development. Implied is the broader regional economic performance of the area to attracting development to brownfields redevelopment areas in close proximity to ORTIA and CTIA, where

passenger volumes are nationally significant in South Africa. DTP, including KSIA, falling largely outside of the established hub and spoke airport activity, provides a contrasting case for airport led development. In a local study, Coetzee and Swanepoel (2017) through a quantitative spatial and land use analysis, modelled air cargo industries in proximity to the OR Tambo International Airport to find that the airport impacts strongly on the locality of air cargo-related businesses to various degrees. Implied in the research is possibly the extent to which passenger volumes and the use of wide-bodied aircraft, support the movement of air cargo at the ORTIA hub. While studies on air cargo industry location are useful to informing land-use and planning decisions, the destination of imports and exports completes the picture on the regional trade role of these goods moving by air and how air cargo relates to road, rail and sea distribution networks.

Local literature echoes broader planning debates that question investment in large-scaled projects and megaprojects, such as a major airport. Robbins (2015: 1) identified the role of influential actors at Dube TradePort supporting infrastructure led development paths and influencing physical patterns of city growth. As with other critiques of megaprojects, he questions cost overruns, overstated benefits, and the value of the public investment, given competing and pressing interests of the urban poor. Robbins (2015) critiques King Shaka International Airport using a megaprojects analogy to problematise the relative influence of global and local actors shaping space, and to question the cost of the infrastructure relative the benefit. Also articulating powerful interests shaping space, Todes (2014) raises concerns over urban development form underway. Todes (2014) identifies tensions between the notions of compact city development and the suburbanisation to the north of Durban and the adjacent municipality of KwaDukuza, as well as how parts of the state and forms of regulations have influenced the development of the area. In relation to the airport it is argued that

> "*the municipality was forced to accept much more extensive development as a consequence of pressure by provincial government to allow the construction of a major airport in the area. Thus the municipality had to adjust its planning,*

> *and the pressure created by airport development led to new rounds of planning in the north. But tensions remained around infrastructure development*" (Todes 2000: 257).

Since the work by Todes (2014), the dynamics of industrial incentives at Dube TradePort combined with the delisting of Tongaat Hulett have influenced the production of space on the northern corridor.

In the local context, airports have attracted substantial critiques from planners relating to cost concerns of large scaled airport infrastructure (Robbins 2015: 1), problematic spatial form, and abetting sprawl (Todes 2014: 245). While these studies question processes shaping space near the airport, the insights into the merits of air logistics and the relationship to infrastructure led development paths was not a main focus area. Luthuli and Houghton (2019: 197) interrogate how the conception of the region is produced through the Durban Aerotropolis project in terms of thinking about the geographical scale, an economic interaction function and institutional jurisdiction form. This research presents insights into regional economic development, rather than deepening understandings of the merits of airports in regional economic development.

Outside of KwaZulu-Natal, the prospects for airfreight cargo at the established ORTIA hub (Coetzee and Swanepoel 2017: 1) and airport related economic growth (Mokhele, 2016) have received local attention, where those studies that indicate the growth potential related to airports, with the exception of Mokhele (2016), rely on international empirical studies as precedents, without making theoretical underpinnings explicit. Atkinson (2016: 129) has argued for the potential for regional airports to stimulate tourism and rural development in the Karoo, using international precedents, and similarly Coetzee and Swanepoel (2017: 1) suggest a land use framework to guide air cargo related business, with international precedents. In the

case of Mokhele (2016) his relational socio-economic spatial framework draws on growth pole theory to explain the land use dynamics at airports.

2.4.2 International planning concerns with airports

Airports research related to planning is relatively new, and has increased over the past decade. Some of the more influential planning work on airport related models emanated from practice based and research groups surrounding North American airports, Europe and Australia. Literature reviewed on airports and planning related to managing the negative externalities of airport expansions, such as noise impacts, sprawl, and environmental concerns, amenities of airports in terms of noise (Charles *et al.* 2007; Kivits, Charles and Ryan 2010). Juxtaposed with literature concerned with prospects for airport related growth (Brueckner 2003; Green 2007; Schaafsma, Güller and Amkreutz 2010; Kasarda and Lindsay 2011; Kasarda, Appold and Peoples Jr 2014; Appold 2015; Banai 2017). Substantial work on suitable planning models to mediate land use conflicts are discussed in the Australian context (Freestone and Baker 2010; Freestone 2011; Freestone and Baker 2011). Freestone and Baker (2011: 263) argued that airports have been somewhat neglected in planning literature, despite their historic role in shaping city form. In their discussion on models of airport related development they reviewed the models of "*airfront, decoplex, airport city, airport corridor, aerotropolis, and airea*", and noted the larger, more complex territorial impact displayed (Freestone and Baker 2011: 267). The challenges and prospects for planning, according to Freestone and Baker (2011: 274-275), are firstly in the potential of planning to mediate normative concerns for balancing local sustainability concerns with national economic interests and international dynamics; secondly, the need to integrate airport master planning with city planning; and thirdly, the importance of collaborative planning to align future visions.

2.4.3 Emergence of airfreight logistics activities within airports

In the previous section, it was argued that restructuring of global production systems over the past four decades how freight the geography of freight distribution has

changed (Hesse and Rodrigue 2004; Hesse and Rodrigue 2006; Rodrigue 2006; Rodrigue 2012). In this section, the emergence of airfreight as a component of logistics is reviewed and picks up on three themes. Firstly, airports tend to be studied from an airport-centric perspective, rather than using the structure of the city as the context and dynamic with airport related development. The airport is assumed to be central element in shaping urban development, as is evident in '*Aerotropolis*' literature (Kasarda and Lindsay 2012; Appold and Kasarda 2013; Kasarda, Appold and Peoples Jr 2014). Secondly, the assumption exists that airports provide the necessary infrastructure to support agglomeration economies and play a role in concentrating development, without explaining the underlying dynamics of how goods are moving within the broader context. Thirdly, there is the dominant assumption that airports generate growth, regardless of context, location, and mix between passenger and freight operations.

2.4.4 Review of key debates on airfreight and logistics

2.4.4.1 Airports as part of the city

The structure of the city region, together with transport-related infrastructure shape urban development. However, literature on airport-centric logistics in relation to multiple modalities such as ports and rail terminals, understood within city structure and processes, remains uncommon. In part, this is due to the marginal research interest in the topic from within urban planning, relative to other disciplines. Studies and theoretical insights into port-related logistics are also generally more prevalent than air-related logistics. This relates in part to the extensive historical influence of ports in city development, as well as the scale of activity and quantity of goods traded through them.

Airports are for the most part neither originators nor destinations for goods, but form part of infrastructure to support logistics within city regions. Airport-centred development tends to overlook the context of how local and global flows interact with multiple modalities and formal and informal processes within the city structure.

Airports with cargo capacity play a specific part in the supply chain, moving high value, low weight and time sensitive goods either as component parts or competed good either within the distribution or production processes of logistics. A few studies that consider airports as part of city regions include Prosperi (2015), who has argued that airports within city regions invoke literature on spatial structure. O'Connor (2010) considered multiple airports and ports as logistics infrastructure and Hesse (2013) related ports and airports, flows and space, arguing that integration is often accompanied by disintegration in planning outcomes.

Airports are associated with logistics infrastructure and air-cargo functions, however when approached from an airport centric view, the airport can be equated as the driver for that activity. Flows through airports tend to be argued as "*nodes within the network economy*", with reference to Harvey's (1996) `*space of flows*' or hub of flows (Freestone 2009: 163; Conventz and Thierstein 2015: 143). Airports are not necessarily the main or only driver in these flows. A similar argument is presented by Charles *et al.* (2007: 1007), critiquing the Aerotroplis models for the overstated and assumed hegemony of airports in freight distribution and logistics functions.

The influence of airport-led development on city-region structure is depicted through descriptive models, where the impact of logistics related uses are frequently mentioned (Schaafsma 2003; Freestone 2009; Schaafsma, Güller and Amkreutz 2010; Kasarda and Lindsay 2011; Appold and Kasarda 2013). However, if one considers the full spectrum of uses related to production, distribution, and consumption in city regions, the impact of logistics uses extends significantly beyond air-related logistics.

In summary, cities are places where the production and consumption of goods are concentrated. Cities are also places were infrastructure supporting trade and distribution of goods also tends to concentrate, such as ports, airports and inter-modal terminals. While it may be intuitive that urban development and air freight activity are

related, understanding how airports and logistic relate within city regions is an under-researched area. A key finding from the literature is further consideration the role of airport in relation to the distribution of freight from a city structure perspective, and relate the production and distribution of airfreight to flows through ports and land-based distributions systems.

2.4.4.2 Concentration or dispersal of logistics activity at airports

A further relevant debate concerns the concentration of material flows in cities and the concurrent dispersion of flows away from hubs or gateways (Hesse 2013: 33). Similarly, He (2018: 1) denotes two perspectives of logistics space research, either related to clustering, with the geographic concentration of logistics facilities and functions or secondly sprawl, with the movement of facilities from the urban core to peripheral places.

O'Connor (2010) analysed sea and air freight activity in global city regions and found global concentrations of logistics activity. In his study, it was estimated that around half of airfreight and two thirds of sea freight activity is concentrated in 44 global city regions (O'Connor, 2010: 1). While the study identified the importance of logistics infrastructure and hub role in attracting global logistics activity, the presence of transportation infrastructure is insufficient precondition in the performance or concentration of freight activity in global logistics regions (O'Connor, 2010: 7). Instead, he argued that the positionality and functions within the city region and how these relate to global capital circuits are more critical. While Sassen (1996: 629) confirms that the role of these global cities are globally significant financial and business centres, she also views economic globalisation role in relation to city and communities as embedded in local places. In the context of established global flows in North America, Rodrigue (2012) picks up on the distinctive geography of global supply chains and attributes the concentration of logistics activity to changes in outsourcing and supply chain management. Depending on the type of supply chain, he found a prevalence of clustering around airport terminals and cross-border ports of

entry was evident (Rodrigue 2012: 22). However, while the scale of logistics activities may concentrate in global city regions, Hesse (2013) notes the connection between consumption in developed countries and less visible manufacturing in developing countries. He argues counterintuitively that, despite global concentration, logistics activities at a city scale often display dispersal flows, such as logistics sprawl to the city peripheries, in order to accommodate space extensive land requirement. In conclusion, Hesse (2013) questions future trajectories, based on the assumptions in the New Economic Geography (NEG) models that agglomeration occurs in response to falling transport costs. He questions whether processes of de-concentration and dispersal may emerge as an outcome of increasing transport and logistics costs (Hesse 2013: 41).

In summary, the literature on how these processes of dispersal and concentration play out at city levels and are largely confined to studies where flows are visible or though hub city regions. The review picks up on substantial arguments that major airports influence local urban development patterns in proximity to airports and growth, and generators for regional development and planning due to the associated territorial, social and economic impacts (Freestone, 2009; Freestone and Baker, 2011). The arguments that airport-led development is gradually creating a completely new spatial pattern, as did other kinds of transportation modes historically, is a dominant theme in the literature (Derudder and Witlox 2016). However, the specific argument on the cargo side producing space outside of hub airports is less prevalent in the literature.

2.4.4.3 Airports and growth

A dominant theme in air cargo research relates to the remarkable growth of the industry and the significant value of the contribution to global trade (Lakew and Tok 2015: 15). According to the IATA, the key relationships underpinning air freight volumes depend on the state of global goods trade flows as well as specific factors related to airfreight (International Air Transport Association 2018a: 1). The relationship between the amount of economic activity (measured in global GDP) and

trade (measured in global goods traded) varies across economic cycles and trading regions. However, IATA distinguishes between the relationships before the global financial crisis and subsequent performace. It is estimated that for the decade before the crisis, global goods trade grow at around two times the pace of global GDP and there after broadly in line with global GDP (International Air Transport Association 2018a: 1). IATA speculates that the slowdown in trade growth relates to protectionism, slowdown in the fragmentation of supply chains, or on-shoring, and a broader decline in investment growth.

Airport-led development attracts both international and local attention through the convergence of practice based and academic interest in the perceived economic role of airports for growth and development. Proponents of economic and related regional development impacts of airports, argue that airports act as catalysts for urban growth and economic development in the era of globalisation (Addie 2014: 87). By extension, these arguments for airport infrastructure expansion rely on the growth potential of the airport regions, where branding such as an Aerotropolis (Kasarda and Lindsay 2012; Kasarda, Appold and Peoples Jr 2014), and related spatial descriptions of airport led development are evident (Freestone and Baker 2011). However, amidst the growth claims airport regions are not without sustainability critiques related to fuels, noise (Charles *et al.* 2007; Kivits, Charles and Ryan 2010), cost overruns (Flyvbjerg 2007; Robbins 2015), and contested political decisions (Todes 2014) or safety concerns related to terrorism targets (Graham 2006) and global pandemics (Hwang *et al.* 2012).

The literature on whether airport activity is a function or cause of economic activity echoes deeper debates within transportation literature questioning the merits of investing substantial state based on assumed relationships (Banister and Berechman 2000: 12). These debates on whether transport infrastructure investments can engender economic development reflect assumptions on economic potential growth paths. The neoclassic growth theories of the favouring supply side factors such as capital (investments and savings) and technology, for promoting short run economic growth

paths of a country. By way of contrast, endogenous growth theories point towards external factors to self-sustaining economic growth. Button and Taylor (2000: 214) note the prevalence of endogenous theories in airport relate research, and also argued for empirical evidence that infrastructure investment can act as a catalyst for higher economic growth in an area.

The section picks up on the scaled impacts, the direction of the causal relationships claims between transport investment and economic growth, as well as the methods employed in reaching conclusions, and argued for case based approach to understand connectivity with a greenfield airport on the east coast of South Africa.

The distinction between economic growth and economic development are relevant to the scale where impacts are measured. Economic growth, as it relates to changes in Gross Domestic Product (GDP), is usually indicated at the national level, whereas economic development refers to the effect of attracting additional investment can be specified at urban and regional scales. These micro economic measures of transportation investment impacts on urban and regional activity can be captured through micro economic measures on employment, firms, floor area, where as national activity at a macro-level through GDP (Banister 1995: 17-18). At the international scale, improvements in transportation infrastructure is considered as a mechanism to reduce trade barriers and enhance competitiveness of national economies (Rietveld and Bruinsma 1998: 1). There is some debate over the scale at which benefits are derived and the appropriate methods to determine the nature of the benefits derived.

In essence, the review supports contextually-based arguments that investment in transportation infrastructure is an insufficient precondition for growth and development but requires other factors to be in place. Banister and Berechman (2001: 210) identify factors such as positive economic externalities to benefit from agglomeration and labour market economics (including skilled labour) with a positive

underlying local economy to support growth, as well as investment and political factors in the argument. Banister and Berechman (2000: 12) also conclude that if transport capacity investments secures accessibility benefits impacting on market externalities, then it can be argued that transport development can potentially generate economic development. Banister and Berechman (2001: 214) argue for decoupling transport growth from economic growth. The decoupling argument is essentially a sustainability concern of continued investment in transportation to generate growth, rather than growth based on improved efficiencies of existing infrastructure (Loo and Banister 2016: 134).

2.5 Limitations of the review

The main purpose of this section is to review the broader spatial and economic context of logistics in order to understand the roles that transport infrastructure, and specifically airports play in global production systems, in moving specific types of goods across space. Drawing on research on airports and logistics from outside of the field of planning introduced debates on global production systems However, a key limitation in the review is that knowledge on global production systems is largely produced within the context of the Global North, both in terms of developing theory and citing examples of places were global freight flows are concentrated. The cases reviewed in Africa are predominantly related to passenger flows, raising concerns of how African trade integration relates to airfreight. Conceptually, the review picks up on divergent geographies of airfreight from passengers, and yet questions how this relates to a purpose-built and greenfield cargo terminal has not been researched in South Africa.

Research contributions on logistics though database searches are almost exclusively approached from public health and medical-related fields. When logistics is combined with the topic of airports, the research contributions are split between public health, transport and economic fields, with the spatial focus subsumed within the later contributions. Research is focused on the United States, England, Germany, China,

and Netherlands. This section of the review indicates that while there is research on airports in Africa, the study in relation to logistics is under-researched, and that certainly, the implications from qualitative studies for urban planning are limited.

The relationship between public investments in air transportation to economic growth, are largely explained through econometric studies at the macro level. However, this research prompts qualitative case study design in order to understand the phenomena an airfreight logistics investment, and how the development thereof relates to urban planning. This case study is complementary to the case study on brownfields redevelopment airports of OR Tambo and Cape Town International Airports by Mokhele (2016b).

2.6 Chapter summary

This review suggests that a more nuanced approach relating airport development to connectivity may offer useful insights into the nature of urban development. Firstly, there are differential logics behind the geography of passenger and air cargo flows and the implied air connectivity. In terms of global flows, Bowen (2014: 44) has argued that air cargo flows are more strongly localised than air passenger flows, reflecting tradition concentrations of global production output. Air passenger traffic tend to reflects patterns of consumption, specifically the volumes and growth in the middle class. Wandelt and Sun (2015: 55), in their study on international air transportation networks from 2002 to 2013, demonstrate a strong correlation between the Gross Domestics Product (GDP) of a country and topological and functional criticality of air passenger networks. Both geographies reflect spatially differentiated services, where Africa has a relatively marginal role on both low passenger and cargo numbers. However, despite the relatively low passenger numbers at a country level in Africa, South Africa has a high level of air connectivity, attributable to its important role in air traffic connections within Africa (Wandelt and Sun 2015: 63). In the study on prospects for African urban economies, Turok (2010) has argued the case for a regional agenda to support functionally integrated urban economies, that includes a

framework for coordinated investment, trade collaboration to deepen supply chains and planning services based on functional regions as opposed to political boundaries (Turok 2010: 23).

The review drew largely on the fields of economic geography and transport geography in order to firstly understand how contemporary economic process relates to transportation and space and secondly the specific emergence of airfreight logistics with global restructuring and changes in how space is produced with new geographies of production, distribution, and consumption, and thirdly the implications for planning. The theories underpinning the historical relationship between transportation and development of regions, as well as the related concepts of agglomeration economies and linkages, are dealt with in the theoretical framework (Chapter Three).

The review raised the following relevant key findings and points that inform the study further:

1. The planning practice and experience with airports relates to managing the impacts on people and land use. While planners have researched airports, albeit largely outside of Africa, the reflection back to theory and informing planning practice is limited. Furthermore, airports are largely treated by planners as passenger focused with limited interest on the freight side, despite the relative value of airfreight and related industrial uses. In addition to this, opportunities to reflect on the construction of greenfield airports are rare, specifically in the Global South. The nature of the questions surrounding airports in such a context of negligible growth, poverty, and inequality are pertinent to this context. In a sense, the expectations to deliver on airport-led development, with limited public resources available, requires further interrogation on the possibilities of infrastructure-led development to overcoming structural and spatial dysfunctions in South African cities.
2. Investment in air transportation infrastructure is an insufficient precondition for growth and development to be in place. The

relationship between airport development and economic growth is shown in the review to be contradictory and depends on the locational position in global economic capital circuits (O'Connor, 2010), and a positive underlying economy to support growth (Bannister and Berechman, 2001). The ability of airports to attract logistical-related uses are also contradictory, depending on factors such as accessibility, existing agglomeration, and the related economic conditions of the city region.

3. The review identified relational thinking on global production networks as one approach to understanding the emergence of airfreight logistics within the context of globalisation.

In summary of the review on the network framework is approach on the following basis.

1. Network approach, in the form of GPN, is an interpretive framework that allows for thinking beyond an infrastructural understanding of the airfreight and air passenger connection. Networks in the review are argued as both relational and geographic. The relational approach to understanding networks are also understood to be a relational process between multiple actors independent of proximity. However, some networks, particularly those dependent on local infrastructure and inputs, are territorially embedded with a local geography. The territorial interest in these airfreight and air passenger networks is of particular concern from a planning perspective as the review argued the importance of place-based context. Secondly, it is important to understand that where networks exist across a multiplicity of scales means that no particular scale provides the appropriate unit of analysis within the global economy and the intersection with air connectivity. However, in contrast to studies focused on the global and national scales, this research is concerned with the local embeddedness of networks as they relate to the planning of city regions.

2. These lay foundations for the conceptualisation of planning for airports and logistics through a relational approach discussed in Chapter Three to follow.

CHAPTER THREE

CONCEPTUAL AND THEORETICAL FRAMEWORK FOR AIRPORTS AND LOGISTICS

3.1 Introduction

This chapter conceptualises the emerging relationships between planning actions and the dynamics of place as they relate to airports and logistics through a relational conceptual framework. A relational approach is taken as an approach to understand space as heterogeneous, dynamic, networked, multi-scalar and temporal, in order to frame and conceptualising the socio-spatial dynamics of airfreight related planning.

The main line of enquiry relates to understanding how airfreight flows through airport spaces are expressed as socio-spatial processes, and how planning engages in these socio-spatial relations locally.[viii] Emphasis is placed on observable material flows in time and space, however a relational approach opens multiple other enquiries related to how actors and institutions more broadly engage with socio-spatial processes and how these relations interact with less visible flows.

The first section of this chapter is structured to explore relational thinking as a broad approach to developing the conceptual framework, as well as positioning the research by thinking about airports as relational places that are territorially embedded. Airports, specifically those engaged with airfreight and logistics, are representative of the places where globalisation and multi-scalar territorial processes engage with the distribution of flows. The second section deals with relational planning and practices and the conceptualisation of places as heterogenous, dynamics, networked, multi-scalar and temporal as a framework for understanding socio-spatial dynamics of airfreight and logistics. A relational understanding of planning is taken to include, not only the practice of planning between actors, but also the system of planning procedures, and the plan-making processes that shape future land uses in proximity to the airport.

3.2 Relational approach

Relational thinking, as a critique of modernism, is posited as an alternative approach to traditional thought in the planning and geography. Relational approaches question assumptions about the nature and treatment of space, and in particular those disciples engaged with the dynamics of economic processes in space. This research rejects the notion that relational thinking is a theory and rather takes relational thinking as a conceptual departure point (Dicken *et al.* 2001). The epistemological direction on relational thinking is questioned by Sunley (2008) and Jones (2014), who point to sufficient inconsistencies within relational contributors to claim a coherent theory. Ontological assumptions about how networks and spaces interact vary sufficiently with relational thinking to distinguish between relational approaches. Relationally, thinking can be broadly separated into post-structuralist contributions as influenced by actor network theory and '*assemblages*' (Murdoch 2005; McFarlane 2011; Jacobs 2012), and those approaches where relational contributors identify relations between structure and agency, and where territorial context is recognised (Dicken *et al.* 2001; Yeung 2005; Brenner, Madden and Wachsmuth 2011, 2012).

The proposed conceptual framework for this research is aligned with the latter approach, which takes into account that power is derived from social structure external to the network. Network in Actor Network Theory is a theoretical construct of how actants relate, rather than a material entity (Latour 1996: 369). Post-structuralists tend to highlight power constructed within the capillary-like network, where power resides through positionality in networks (Sunley 2008: 10). This form of network conceptualisation works against the understanding of agency within the context of social structure. For post-structuralists, agency is a purely relational process (Graham and Healey 1999: 632), whereas the approach taken in this research recognises relational constructs as relations between structure and agency.[ix] Places are understood to be constituted by social and economic practices, and are embedded in the built environment, recognising the interaction between agency and structure in cities as places (Dicken *et al.* 2001).

Differential meanings attached to '*relational*' reflect the broad approaches adopted in relational thinking. The first approach, originating in economic sociology, typically refers to relational as "*signifying interpersonal and inter-organisational networks and connections*"; the second when linked to post-structuralist thought, uses relational more "*broadly to point to all forms of networks and relationships between entities*" (Sunley 2008: 4). Relational in the context of this research refers to material and airfreight flows that are embedded in cities as concentrated sites of production and consumption, and how planners and other institutional actors engage with flows in planning for airports and logistics. For planners, the objective of relations is how space is produced and reproduced though practices, processes and relations between actors and within the built environment. Perspectives focused on the relations between actors only presents a partial understanding. Embedding these relations between actors in a socio-spatial context grounds these relations in territory.

The next section examines how a relational conceptualisation of space through a wider appreciation of socially produced relations may apply to the practice of planning.

3.2.1 Relational approach with territorial embeddedness

The term relational has been used interchangeably with ideas of change and movement attributed to network dynamics. McCann and Ward (2010: 176) counter places as relational and dynamics with notions of places as fixed and territorial, with qualities of unchanged place. They argue the tension between relational and territorial understandings of places where an

> "*appropriate approach to understanding contemporary urban governance in global context is to develop a conceptualization that is equally sensitive to the role of relational and territorial geographies, of fixity and flow, of global contexts and place-specificities (and vice versa), of structural imperatives and embodied practices, in the production of cities*" (McCann and Ward 2010: 175).

Juxtaposition of networked flows with fixity, draws on Harvey (2018) book on *Limits to Capital* for his conceptualisation of the dialectic of mobility and fixity of capitalism and the implications for investment and disinvestment in places (McCann and Ward 2010: 176). The issue of whether Castell's notion of '*spaces of flow*' dominates '*spaces of place*' questions stability or change in urban contexts. In response, Hesse (2010a: 67) has argued that processes of urban concentration and dispersal are concurrent with de-territorialisation and re-embedding often observed simultaneously. Jones (2009) also acknowledges the tension between flows and places in the relational making of space, with the term '*phase space*' as applied to expresses socio-spatial relations, recognising "*compatibilities between, rather the mutual exclusivities of, flow-like (networks, etc.) and more fixed (scales, territories, regions, etc.) takes on space*" (Jones 2009: 489). The idea that processes of concentration may also exhibit properties of dispersal is useful when looking at material and goods flows across transport networks as these impact on places differentially across scale. For planning, and particularly as shown in the planning map, the representation of change related to flows is an important element.

The concept of embeddedness links the relations between actors in networks to spatial and institutional contexts. Sunley (2008: 8) distinguishes between

> "*network embeddedness, which describes the network of actors in which a person or organization [sic] is involved*" and " *territorial embeddedness, which refers to the extent to which an actor in anchored and constrained in particular places, and societal embeddedness, which describes the societal and cultural background of individual that shapes their action*".

The use of territorial embeddedness, referring to the relationship to local place-based networks, recognises multiple forms of embeddedness, and particularly how networks operate across multiple scale. Territorial interest relates to the scale were planning engages with airfreight and logistics processes and flows. Related to the research questions, the linkages in the local economy are important for ongoing circulation of

capital. Of relevance is how airport infrastructure enables local material flows between places of production and distribution, where value and employment are generated in the process.

Conceptually thinking about networks as relational flows through airports is therefore considered in the context of territorial geographies, where production and distribution are concentrated in industrial city spaces and tied to local place based networks. These territorial geographies form part of structural imperatives shaping socio-spatial processes produced at airports, and are relative to other parts of the city. In the context of globalising supply chains and the emergence of a worldwide network of logistics services, it appears that the flow of goods and the associated infrastructure and uses is not tied to one particular place in cities. Airports may tend to deal with high value, low weight and perishable goods, where ports may deal with goods that are containerised, lower value, higher weights, and volumes. Airports, relative to ports in the same city, may both engage with the flow of goods, although deal with different goods, and could even vary in terms of the stage of production, with differential dynamics. While the network of logistics services, including airports and ports, may relate to multiple places, each place is territorially embedded with actors tied to particular places.

3.2.2 Agglomeration and territorial embeddedness

Through locational theory it has been observed that industries tend to cluster geographically, either as same industry co-locating as localised economies or '*Marshallian externalities'* (Marshall 2009: 526) or urbanisation economies or '*Jacobs externalities*' (Jacobs 2016), resulting in agglomeration from diverse business activities.[x] This agglomeration of firms that draws economic advantages from their geographic proximity was expanded by Stoper (1997). Storper (1997) focuses on competitive advantages within industrial clusters and suggests that clusters affect competition by increasing the productivity of the co-located companies, increasing innovation and stimulating the formation of new businesses. Furthermore, Storper

(1997: 5) argued that some networks are, by nature, more localised in terms of geographic agglomeration where, due to their dependence on traded and untraded interdependencies,[xi] they tend towards territorial embeddedness. The debate on territorial embeddedness revolves aroud how effectively local placed-based networks are able to hold down the global production networks.

Coe *et al.* (2004: 468) refered to the process of '*strategically coupling*' of GPN with regional assets to promote territorial embeddedness. They argue that the outcome of regional development may require the following interelated conditions to be in place: "*1) existance of economies of scale and scope within specific regions 2) possibility of localization economies within GPNs and 3) appropriate regional instutions to 'hold down' GPNs and unlease regional potential*" (Coe *et al.* 2004: 470). The '*regional assets*' component in Coe *et al. (*2004) framework is based on what Storper (1997:26) terms '*holy trinity*' of technology-organisation-territory. In terms of Storper's (1997) framework, airport infrastructure is considered as an aspect of '*technonology*', together with tacit knowledge and spillover effects related to agglomeration. The argument being that airport infrastructure, as a regional assets, has the potential to embed GPNs within regions under particular conditions. Underpinning the argument is the complexity of tying GPN to territories, when networks are not constrained by territorial embeddedness.

Fixed investment in large scale transportation infrastructure, and how thes are related to air and highway network accessibility, is shown by Bowden (2008) to correlate to the distribution of logistics facilities. While airports play a logistical role in specific supply chains for goods, there is substantial variation in proximity of different type of logistics intensive operations with air infrastructure. Lindsey *et al.* (2014: 94) distinguishes between logistics intensive operations, in terms of those that provide logistics services (third party logistics providers or transportation carriers), and those companies with logistics-intensive operations and the logistics operations of industrial firms. Conceptually, relational promoximity of logistic intensive operations at airports

is therefore distinct from geographically proximity. Airports with air cargo capabilities may attract airfrieght intensive operations to locate in close geographic proximity, while at the same time freighforwarders, shippers and distributors may chose to be situated in a location accessible to other modalities and have a relational connection with the airport. Depending on whether the operator is physically moving goods, selling space, or moving information and finance as electronically, there is an impact on relational proximity. Integrators such as FedEx (incorporating TNT), DHL, and UPS, who own assets such as planes, locate main operations at cargo hubs. Locally, the main freight forwarders warehouse or depot may locate at the port or on the freeway, with a transactional relationship to the airport. Airports also display characteristics that restrict the type of land uses in proximity to airports, particularly related to excluding residential uses due to noise impacts, height restrictions within the permitted Air Traffic and Navigations Service (ATNS) airspace. Congestion factors, over time, can work against time-critical uses.

3.2.3 Conceptualising space as heterogeneous

A relational approach to space is put forward as an alternative to positivist conceptualisation, which views space as independent of human existence (Tornaghi and Knierbein 2014: 4). Euclidean notions of space as having dimension, and being bounded or contained, are attributed to conceptual limitations in planning (Graham and Healey 1999) and economic geography (Sheppard 2002). In relational terms, space is understood as a process, generated by individual and social group actors, and in turn, space is transformed by everyday practices, and thus by social dynamics. Relational understandings conceptualise space as lived practices, and phenomena that can be explained by their social, political, and cultural context and the relations between people and objects, both at a given moment in time and in the course of history (Tornaghi and Knierbein 2014: 4).

Conceptualising space and the relationship to society invokes a historical and philosophical debate between absolute and relational space. Absolute space,

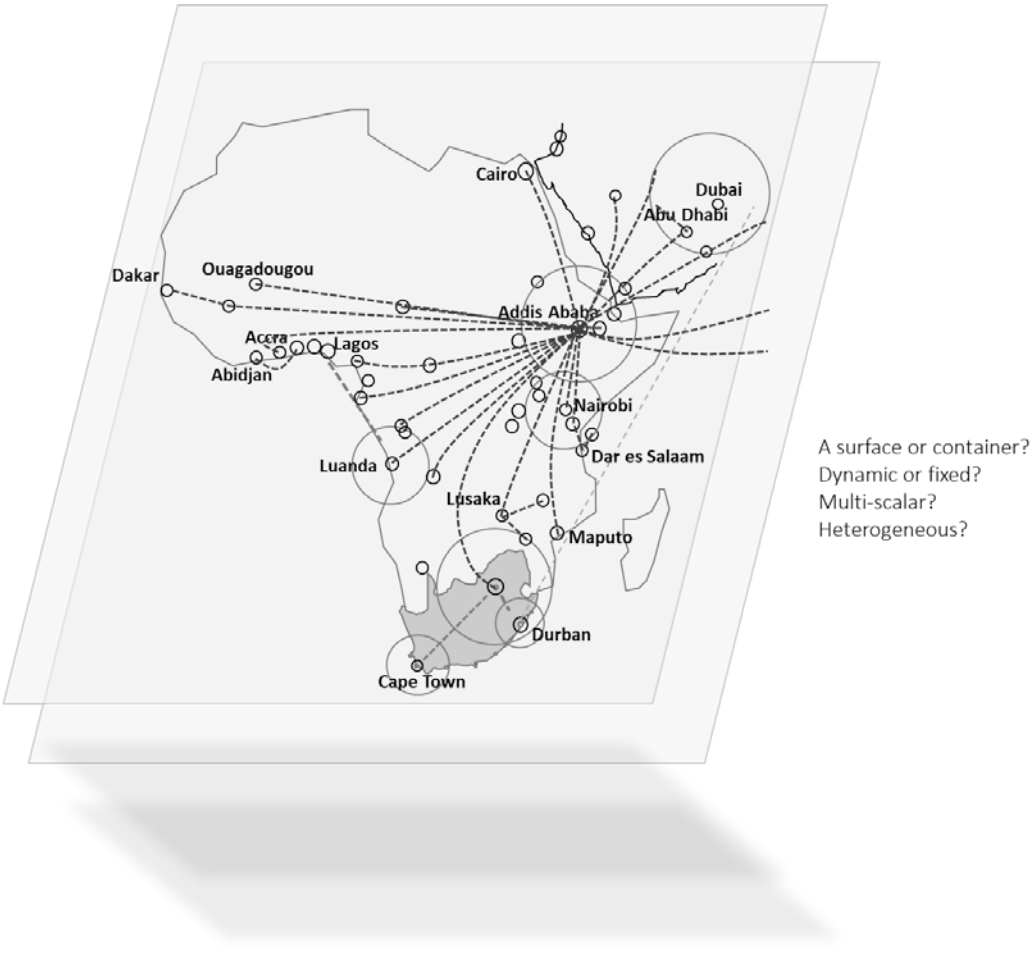
associated with Isaac Newton, and later positivist interpretation of space was initially challenged by relational notions of space, through the writing of Gottfried Wilhelm Leibniz in the eighteen century (Tornaghi and Knierbein 2014: 4). The debates on the relational notions of space were revisited by both Henri Lefebvre and David Harvey in their work on social space. Lefebvre (1991), in the *Production of Space,* critiques absolute or Euclidian space for reducing three dimension realities to two dimensional '*spaces of reference'* on maps (Lefebvre and Nicholson-Smith 1991: 285). He also critiques early relational accounts of space which reduce space to representations (Tornaghi and Knierbein 2014: 4). Lefebvre identifies "*(social) space as a (social) product*" that is indistinguishable from mental space and physical space (Lefebvre and Nicholson-Smith 1991: 26) and ultimately develops a relational approach to space based on social praxis. Lefebvre (1991), in what he terms a '*conceptual triad*', distinguishes spatial practices from representations of space and representational space (Lefebvre and Nicholson-Smith 1991: 285). His emphasis on the lived, everyday experiences and practices in space, as distinct from representation and meaning of space, captures some of the temporal issues that are important in relational notions of space in planning.

Similarly, Harvey (2010) builds on the argument that space is more than an absolute space independent of matter, and proposes that space should be understood as relative to objects or in relationships between objects. Harvey (2010: 13) argued that

> "*space is neither absolute, relative nor relational in itself, but it can become one or all simultaneously depending on the circumstances. The problem of the proper conceptualization of space is resolved through human practice with respect to it […] The movement of people, goods, services, and information takes place in a relative space because it takes money, time, energy, and the like to overcome the friction of distance*".

Massey (1999) extends a relational approach to space through the following propositions. First, space is a product of interrelations that operate across multiple scales from local to global, second, as these multiplicity of relations run through space, both space and multiplicity are co-constituted and thirdly that space is not closed and is open to possibilities (Massey 1999: 2). In other words, space is understood as more than modernist notion of space as a container, with physical and material functions devoid complexities of lived experiences. Space is taken as the outcome of contestation across a range of scales, between multiple actors across time, with differentials values, power, and meanings attributed to space.

Figure 3.1: Conceptualising space



Source: Adapted from https://images.cdn.centreforaviation.com.

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Figure 3.1 Figure 3.1 conceptually indicates that space cannot be understood outside of the social relations that produce it. In this research, the treatment of space in planning becomes important to reflect on the plan-making processes of airfeight related development, as follows: 1) where space is understood as porous and not confined to jurisductional boundaries; 2) thinking about socio-spatial relations as shifting and not an end plan surface to be determined; 3) reflecting on the relations between the site and parts of the city through horisontal integration of uses, layerered connectivity across scale with temporal appreciation. In other words, conceptualising space as heterogenous and understanding the path dependencies trajectories on future uses.

3.2.4 Networks and flows

The interest in relational approaches resonates with empirical observations on shifting global cities and flows, networked technologies, production networks, collectively associated with restructuring of economic production in late capitalism (Sunley 2008: 7). Networks have been used to conceptualise geographic relations in the age of globalisation, with several approaches to theorising networks, namely Latour's actor-network theory, Castells space of flows, global production networks, and Massey's power geometries. Post-structural conceptualisations of networks have not been

included in this conceptual framework, for the rationale outlined in the approach section 3.2.

This section has the following departure point for thinking about networks: 1) the conceptualisation of network as relational processes and structures; 2) role of GPN as geographic and organisational networks; and 3) multiple scales which networks manifest.

3.2.4.1 Conceptualising networks

Castells (1996: 453) makes a useful conceptual distinction between '*space of places*' and 'space of flows'. The '*space of place'* is a physical "*locale whose form, function and meaning are self-contained within the boundaries of physical contiguity*" (Castells 1996: 453), and where the '*space of flows*' is more functional and relates to the "*material organisation of time-sharing social-practices that work through flows*" and networks (Castells 1996: 442). Furthermore, the work of Castells (1996) also clarifies various dimensions to flows, by referring to "*flows of capital, flows of information, flows of technology, flows of organizational; interaction, flows of images, sounds and symbols' and 'representation of processes dominating*" the economic, political and symbolic life (Castells 1996: 442). The seminal work of Castells (1996: 442) claims that the '*space of flows*' is privaleged over '*space of place*' as a driver of spatial form. However, while the development of places are dependent on flows and connectivity, process of fragementation and dispersal are also evident. This framework agrees with the argument by Hesse (2010: 74) that "*the question of stability or change in urban contexts remains undecided, since forces of urban concentration and dispersal, and of de-territorialisation and re-embedding are often observed simultaneously*." A relational approach to networks allows for the connection and relationship to exist between actors (in space) without necessarily attaching geographic proximity to the relationship. A key issue is that neither geographic proximity nor centrality necessarily exert influence or control over flows through a network. The concept of '*positionality*', put forward by Sheppard (2002: 323), is useful to thinking about networks in relation to space and time but also denotes the elements of power relations

and historical trajectories. Positionality involves power relations over the unevenly distribution and influence of flows in value chains. For instance, the relative power of buyers, producers, and more recently shippers and distributors influencing flows (Hesse 2010a: 88). Positionality can also reproduce and potentially challenge historical path dependent trajectories shaping current development. However, the distribution of global flows would confirms the argument that historical trajectories rather than rupture characterises the relationship between cities and flows (Hesse 2010a: 88).

Air transportation infrastructure, combined with on-site and off-site land uses, creates the node of airport related development that supports air connectivity across cities and countries. Air transportation forms part of the networks and nodes in the physical distribution and the materials management functions, which integrates with other modes of transportation and production, storage and distribution uses, in order fulfil this logistic function. Rodrigue, Comtois and Slack (2013: 22) define networks, nodes and flows in the context of transportation networks that underlie the territorial organisation of economic activities in space. Networks provide the

> "*framework of routes within a system of locations, identified as nodes. A route is a single link between two nodes that are part of a larger network that can refer to tangible routes such as roads and rails, or less tangible routes such as air and sea corridors*" (Rodrigue, Comtois and Slack 2013: 22).

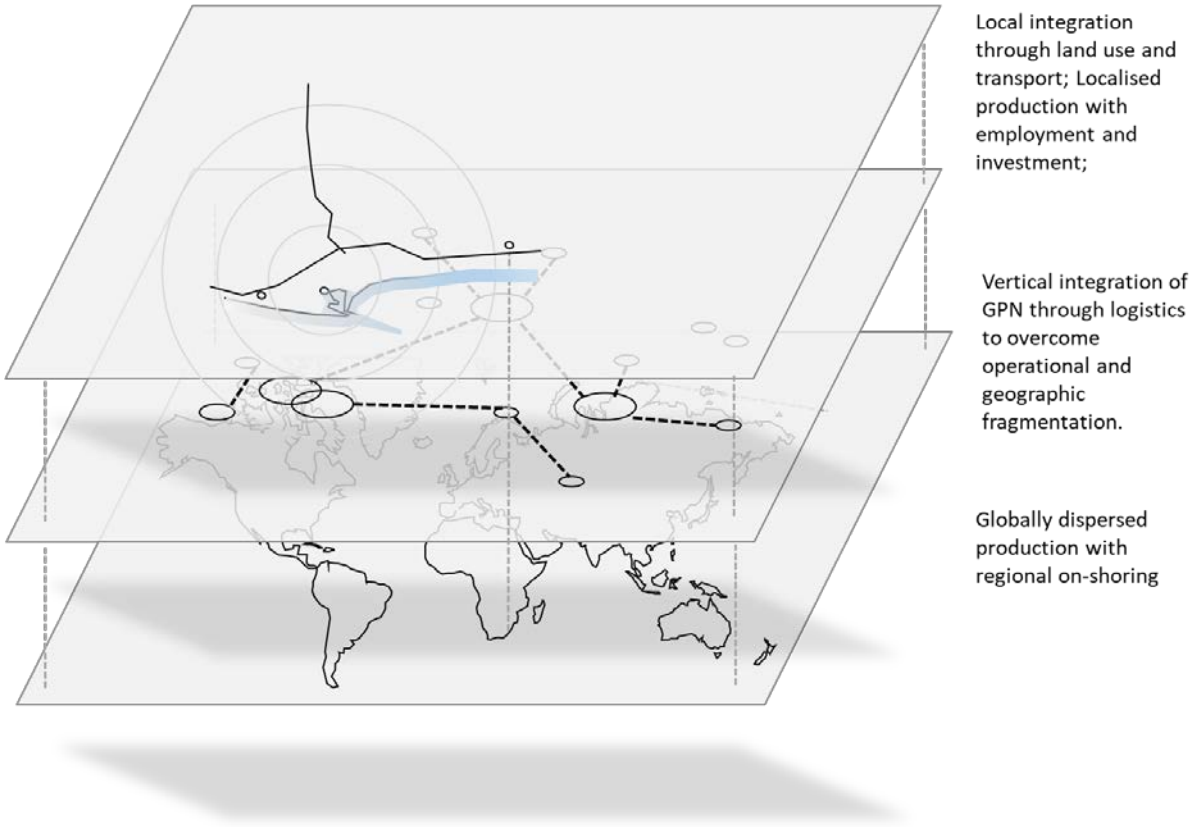
The impact of hub and spoke networks versus point to point networks have implications for how and where goods move. Freight and passenger services tend to hub and spoke models, and while there are efficiency arguments, places outside the hubs have additional transhipment costs and hubs facing congestion issues (Conventz and Thierstein 2015: 134).

3.2.4.2 Global production networks

Understanding networks as relational, draws on global production networks to understand globalisation processes. Figure 3.2 conceptually indicates networks as representations of economic proceses operating at multiple scale. This draws on the concept of networks reflecting both the "*fundamental structural and relational nature of how production, distribution and consumption of goods and services*" are geographically and organisationally organised (Coe, Dicken and Hess 2008: 272). This research supports the view that networks are seen as the foundation unit for analysising globalisation (Dicken *et al.* 2001: 89). Global production networks are platforms through which products or services are produced, distributed, and consumed (Coe, Dicken and Hess (2008: 274) and "*whose purpose is to create value through the transformation of material and non-material inputs into demanded goods and services.*" The notion of vertical structure in the network is counterposed with horizontal territorial embeddedness where "*each stage of a production chain is embedded in much wider sets of non-linear/horizontal relationships*" (Coe, Dicken and Hess 2008: 274-275).

Drawing from the understanding of embeddedness, network relationships can be understood as being *both* structural *and* relational. Networks are structural in the sense that the composition and interrelation of various networks constitute structural power relations, and they are relational because they are constituted by the interactions of variously powerful social actors (Dicken *et al.* 2001: 94).

Figure 3.2: Conceptualising networks



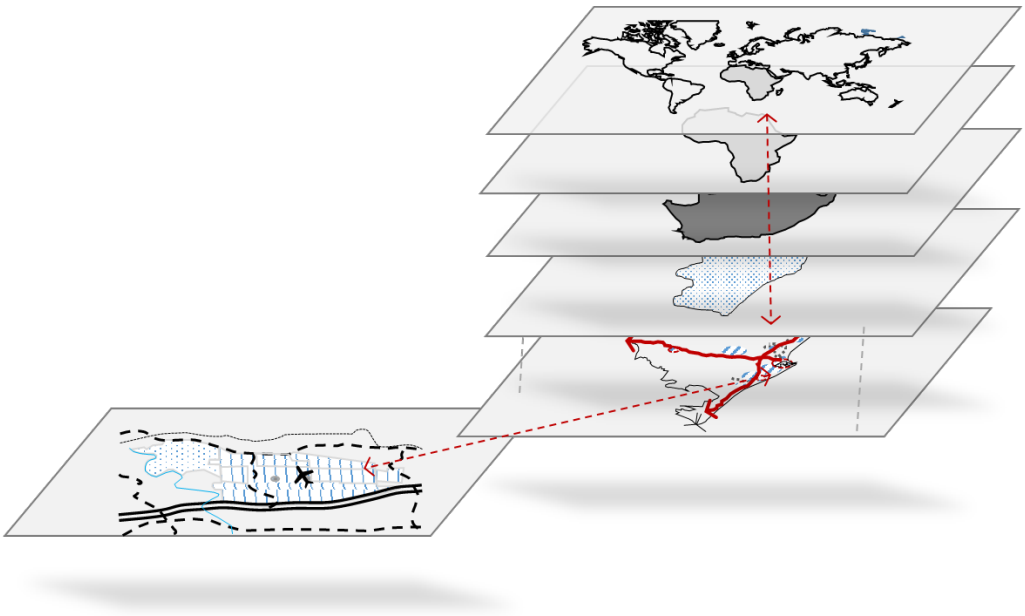
Source: Devised by the researcher

As discussed in Chapter Two Section 2.3.3 one of the features of global production networks is their vertical disintegration, which refers to the geographic and operational fragmentation of production along the value chain. In tandem are organisational processes of integration to overcome fragmentation dispersed trade in component and intermediate goods (Coe and Hess, 2012: 159). In other words, the emergence of logistics to integrate the global value chain is co-produced with changes to overcome the dispersal in global production networks. The ability to move materials, component and completed goods in specific time across complex and geographically extensive production networks, with the required coordination of operations, collectively generates logistics related functions.

3.2.4.3 Multiple Scales

Dicken *et al.* (2001: 89) argue that "*a distinctive feature of contemporary capitalism is its ability to operate on multiple scales*", where no single scale should be a privileged level of analysis in understanding the global economy. Although, in this research, the multiple scales of connectivity are recognised for their role in supporting production processes across scale, it is the local scale is important. This is the scale where investment in people and places and linkages to local production and employment indicators of inclusive economic growth. The local is also the scale when planning has influence of the supply of land and informs investment in infrastructure.

Figure 3.3: Multi-scalar connectivity and planning across scales



Source: Devised by the researcher

Furthermore, certain networks are, by their nature, more localised in terms of geographic agglomeration, where due to their dependence on traded and untraded interdependencies,[xii] tend towards territorial embeddedness (Storper 1997: 5) and support the importance of local place based planning.

The tension in planning is thinking about multi-scalar connectivity and flows interfacing with local territories, with connections to multiple modes of transport and integration with local land uses, all within the same framework. Figure 3.3. indicates the multi-scalar relations. Globalisation creates challenges for planning theory as the trajectories of accelerated global growth is often juxtaposed with local communities' development. The dilemma for planning is a shift from the traditional concerns of planning, namely design and management of land-based infrastructure networks (roads, rail, shipping), and nodes (zoning of residential, commercial, industrial and public space) (Fainstein and Campbell 2012: 14), towards multi-scalar flows. The question of whether planning can transform its concerns from as place based infrastructure and land use, and remain relevant within the 'space of flows' (Castells 1996: 453).

3.3 Synthesis

3.3.1 Thinking relationally about planning

A relational approach to planning for airports and logistics in this research makes explicit the conceptualisation of places as temporal, heterogenous and networked, and the practices between actors as effectively produced within and between places.

Relational thought in planning is a perspective to understand the changing socio-spatial nature of places, as distinct from modernist, euclidean based conceptualisation of space. This conceptual framework departs from a conceptualising of space as complex, heterogeneous and dynamic. As stated by Graham and Healey (1999: 623) the issue at stake here is that planners in practice fail to fully grasp complex dynamics of contemporary urban change. Planners tend to treat notions of cities as object centered where "*planners in practice continue to maintain the reductionist assumption that cities and places can be considered unproblematically as single, integrated, unitary, material objects, to be addressed by planning instruments*" (Graham and Healey 1999: 624). In other words, the conceptualisation of cities as heterogenous and

dynamic would imply engagement with intervention that are more open-ended than a fixed, resolved, completed land use plan.

In terms of fixed treatment of time-space conceptulisation, Graham and Healey (1999: 627) point to deficiencies in planning practice being able to adequately respond to notions that "*spaces and times are effectively produced and created through social actions within and between places."* Conceptulisations of cities and places, under this alternative approach, could consider multiple, layered, networks of space-time, as opposed to seperated, containered snapshots in time. The argument that planning practice is poorly served by theory, resonates with arguments that planning tools based on modernist ideas are juxtaposed with post modern planning approaches.

Modernist conceptions of space focus on the physical, material structure and functions on land. This ignores the changing dyanmics as an outcome of conceptial and on-going dynamics between social actors and power dynamics. In a similar point, de Jong, Suau-Sanchez and Dross (2008: 1) argue that traditional planning tends to be sectoral and territory-orientated, while relational planning considers the complexity of multi-level dynamics of current developments in airport regions. In response to viewing cities as inherently complex, the planning profession, and specifically plan-making socio-spatial processes, have struggled to conceptualise these complexities. Harvey (2010:23) argued that

> "*any general theory of the city must somehow relate social processes in the city to the spatial form which the city assumes*" and yet "*we have not yet devised adequate methods for generalizing [sic] about shape, pattern and form on Euclidean surfaces*" (Harvey 2010:29).

In effect, Harvey (2010) argued that planners cannot adopt '*appropriate geometr*y' or notions of spatial form independent of the process and context which defined it. According to Graham and Healey (1999: 623) and Harvey (2010: 22), the Euclidean

conceptualisations of space underlying problematic planning practices and as an alternative they argue for relational approaches in planning.

Globalisation, with its complex socio-spatial relations between places through multiple capital, technology, informational networks operating across scales, poses challenges to both the conceptualisation of place and to planning practice. The narrow conceptualisation of space and networks is only part of the issue. Drawing from Chapter Two, there is a broader planning concern that spatial planning, that is, socio-spatial plan-making processes, are under-theorised, and therefore offer insufficient theory on city building processes to informs the practice of planning (Beauregard 1990: 211). In the argument that echoes a deficit in planning thought informing spatial planning outcomes, Healey (2012: 215) also argued that the emphasis on theories of planning process (such as communicative theory) overshadowed theories informing context and outcomes. Planning as an applied discipline lends itself to the generation of socio-spatial theory from practice. This underscores the need to reflect on practices of, and empirical realities relating to, the planning of airport areas to generate applied and applicable theory.

In response to these issues on the deficit of planning theory, this research draws on Healey's argument of strategy-making and plan-making linked into substantive issues. The notion of the 'plan' is then not only about responding to a context and explicitly attempting to shape development, but also "*development investment programme in which funds are allocated to specific projects, or a specification of land-use and development rights and obligations, the rules governing physical transformations*" (Healey 2007b: 208). The substantive issues relate to how airfreight flows are understood in terms of connectivity to other modalities and integrated to other land uses. Is the plan-making process layered, so as to integrate horizontally into local economies and multi-scalar to link to global economies in terms of investment flows and material flows?

3.3.2 Places

Understanding of cities as places of exchange that interact and change with the movement of people and goods is well established within traditional spatial theory. As argued in Chapter Two, section 2.2.4, these early spatial theories include work by Von Thünen (1826) on land value (Knowles, Shaw and Docherty 2008: 11), land use in Burgess' concentric model (1925) (Rodrigue, Comtois and Slack 2013: 200), and the work by Christaller (1933) on central place theory (Herbert and Thomas 1997: 64). The notion of cities developing as central places was a significant contribution from central place theory, particularly the size, significance and spatial distribution of cities or settlements against the background of their function to provide goods and services. Furthermore, concepts such as range, the distance travelled to access a service, the threshold, the number of households to support a service, as were built into the theory (Christaller 1966). The concepts of range and threshold that underpin planning standards form part of the orthodox planning tools still applicable to practice (Hansmann, Lincoln and Musvoto 2018: 13).

From a relational perspective, the spatial models tend to approach places as interactions between economic processes, transport, and land use activities on a land surface at a moment in time, without accounting for the impacts of technologies and global production on territorial economies. Cities experience differential processes of agglomeration drawing people and economic activities into geographic proximity, nowadays more than at other stages of history. According to a universal definition of urban, Storper and Scott (2016) argue that

> "*the city represents a very specific scale of economic and social interaction generated by agglomeration processes and focused on the imperative of proximity, and almost always endowed with governance arrangements that attempt to deal with the problematical effects of density and propinquity.*"

From a postcolonial perspective, Roy (2016: 7) critiques these universal claims as insufficiently understanding of the impact of present day global capitalism on urban

futures. The relevance for this research is that the legacy of historical investment networks impact on the current development path and access to resources. The universal process of agglomeration attached to cities is not disputed, rather the recognition that historical, colonial and neo-colonial forms of development have structural relationships that impact on the nature of flows in African cities in particular.

Despite labels of ‘airport city’ or ‘airport regions’ or ‘aerotropolis’ to describe the area in geographic relation to an airport as a distinct city, airports are considered part of the city. Airports and their region of influence may contain many of the functions associated with commercial, industrial, residential, and recreational uses of cities. In addition to this, airports may also have strong relations with other airports, and yet the territorial embeddedness combined with local flows of people and goods, connects airports to cities and regions. The broader city structure is taken as the conceptual departure point in this research in order to overcome airport centric perspectives that conceive airports as positionally central in cities. Airports are considered nodes, emerging nodes, places related to flows, which are part of the broader cities structure with existing spatial logics.

The main implication of the city being the entry point to the study is that airports relate to other logistics transport infrastructure is not taken to be the main agglomeration force acting in the city. The possibility of access to industrial land, or access to intermodal rail or port facilities may play a role in the location of logistics related activities generally relative to air freight logistics.

3.3.3 Flows

The generic role of transport flows related to people and goods are traditionally considered in spatial models to inform the development of cities. Graham and Marvin (2001: 179) theorise socio-technical processes of contemporary urban change and how privatised infrastructures with new technologies are related to fragmentation of cities.

This observation resonates with Castell's 'spaces of flow' dominating 'spaces of place'. However, this framework, recognising both processes at work with no *a priori* assumptions about how flows or the absence may dominate places.

The impact of internationalisation and globalisation on economic activity have profound spatial implications for the relationships between producers and consumers and the transportation intermediators that connect them (Hall and Jacobs 2010: 2). However, despite the long distant spatial extent of these relationships the increasingly integrated nature of the supply chain systems also characterise how the production, consumption and distributions of goods relate. The implication of this is that flows are not only related to distribution of airfreight, but material flows and component parts in the process of production.

Literature on Global Production Networks (GPN), although critiqued for insufficient appreciation of the geographies related to production and distribution, provides conceptual insights into the organisational platforms underpinning globalisation. Although interrelated, the distinction is firstly made between the inter firms relations in the value chain as a whole, representing economic space, secondly the commodity chain that includes institutions and governance, and thirdly the logistics or supply chain that refers to distribution of materials, component parts and final goods (Hesse 2010b: 79). The relative influence of governance structures and actors within value chains is not definitive. GPN literature comprehends the complexities of exerting power over flows within multiple governance forms. A single value chain may include multiple lead firms as manufactures, retailers, and local supplier; all impacting on flows. Power relations may exist horizontally between lead firms and between suppliers, as well as vertically between buyers and suppliers. Outside of the value chain where Gereffi and Korzeniewicz (1994: 95) conceptualised the relative influence of the "*buyer and consumer driven value chains*", the relative influence of locally embedded actors and institutions, that as shipper and forwarders are also noted (Hesse, 2010).

The key value of GPN in this study is to understand how the integration function of logistics emerged in response to fragmentation of the supply chain. Logistics is effectively outsourcing of non-core activities to third party entities. Functionally, the role shifted from physical distribution and material handling to integrated logistics applying supply chain management principle to firm level competitive advantage (Notteboom *et al.* 2017: 278). Functions are as wide ranging as labelling, packaging, bar code track and trace, quality control, logistics management, and postponed manufacturing (Notteboom *et al.* 2017: 278). The definition of logistics from a transportation geography perspective has relevance for this study and the framing of the research questions. Logistics, according to Hesse and Rodrigue (2004: 172), refer to

> "*the 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 as well as the related information flows*."

The definition implies two major interrelated functions of logistics. The first relates to the physical distribution function, with the derived transport segment, and secondly the materials management function with the induced transport segment (Hesse and Rodrigue 2004: 172). Physical distribution is the

> "*movement of goods from the point of production to the point of consumption and materials management includes all the activities related in the manufacturing of commodities in all their stages of production along a supply chain*" (Hesse and Rodrigue 2004: 173).

The definition of logistics suggests the consideration of both the physical distributions of goods and flow of goods in the production process requiring interventions to minimise '*logistic friction'* that impede flows (Hesse and Rodrigue 2004: 179).

The development of large-scale transportation infrastructure to facilitate the flow of goods, and industrial land uses that generate and depend on the flow of goods, is an enduring feature in the planning and development of cities across history (Hesse and Rodrigue 2004: 183). However, it is interesting that the field of planning is relatively silent on the substantive issues related to logistics infrastructure more broadly and airport development in particular. The planning literature tends to equate investment in airports and ports as mega projects invoking critiques framed as the consequence of neoliberal discourse. In the built environment, the local contributions to airports literature tend also to be project-specific critiques of broader neoliberal discourses (Robbins 2014: 197; Todes 2014: 257). However, these critiques do not necessarily reflect on the practice of how airports relate to local or regional spatial economy in order to inform and change planning contributions.

3.3.4 Airports and Global Production Networks

The relationships between global production networks,[xiii] engaged with airfreight and their territorial relations, is complex. Production networks exist within a diversity of multi-scalar structures in the global economy. These networks exist in a context of supranational; national, and sub-nations scales of state organisations and civil society organisations. However, it is at the subnational scale where production networks engaged with airports become grounded in particular locations, either as firms or in terms of relational function with the airport. Coe, Dicken and Hess (2008: 279) describe this process of "*grounding*" in both material (fixed assets of production) and less tangible (localised social relationships and distinctive institutions and cultural practices). The review of firms operating in the Trade Zone indicated the prevalence of global production networks investing at the airport. In Chapter Five, the interviews explored whether institutional structures, subnational policy and planning processes played a role in engaging with global production networks through airport infrastructure opportunities.

The relations between production networks and regional institutional actors are challenging to coordinate given to the polycentric, multi-scalar nature of the networks, particularly where GPN comprise of actors from various national and local environments (Coe, Dicken and Hess 2008: 280). In other words, the relational proximity of GPN extends beyond territorial embeddedness. Coe *et al.* (2004) proposed that engagement between territorial institutions and GPNs are critical if the aim is to embed economies of scale within specific regions. This will require institutions and actors to complement regional needs with the strategic needs of trans-local actors in production networks. Figure 3.4 below indicates how dimensions to regional development are linked to local relations, and those aspects outside of local influence.

Figure 3.4: Local and non-local dimensions to regional development

Dimensions	Local relations	Non-local relations
Firms	Small medium and micro firms Industrial clusters	Global corporations Entrepreneurial subsidiaries Business and financial networks Global production networks
Institutions	Government entities Development Agency/ Provincial state owned entities Growth coalitions	Labour and trade unions Business associations National agencies and authorities Inter-institutional alliances Supra national and international organizations Special Economic Zone
Labour	Skilled and unskilled labour Unions Permanent migrants	Skilled experts and technologists Transient migrants Transitional business elites
Technology	Tacit knowledge Infrastructure and assets	Global standards and practice Intra-firm R&D activities Technology licencing Strategic alliances

Adapted from Coe *et al.* (2004: 470)

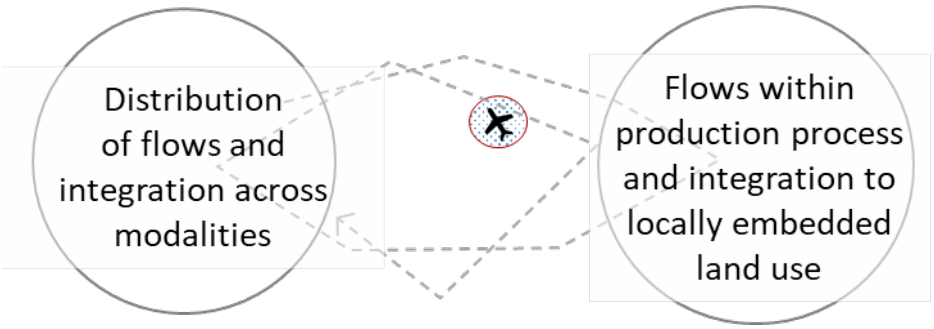
The challenge for planning and policy is to combine long-term investments in infrastructure with flexible investment incentives supporting local and regional

income and employment links, which are continuously reflecting on conditions in the global economy. Because production networks operate across different countries and places, the local plans need to reflect and respond to plans and strategies being made elsewhere. In addition to this, production networks can shift with new activities outsourced to new places. The tendency to overcome territorial embeddedness means places benefiting from previous rounds of investment, can quickly shift as GPN reorganise.

3.4 Proposed theoretical framework

Traditional approaches to planning tend to focus on the jurisdictional spatial arrangements within spatial representations, as opposed to more relational approaches that extend beyond these constructs. A relational approach potentially changes the unit of analysis from municipal entity tied to a municipal boundary, to multiple actors and processes operating at a range of scales across jurisdictions. In a traditional approach, Bathelt (2006: 224) argued that regions with identifiable attributes are treated as agents, rather than actors within the regions. In a similar line of thinking, airport regions, such as an aerotropolis, are motivated as the generator of growth, rather than thinking about agents, firms, and processes at multiple scales engaged with flows. A relational approach tends to focus on actors within these economic and social processes which may result in agglomeration, economic specialisation and uneven forms of development. By implication, this approach avoids the pitfalls of thinking about logistics from an airport centric approach defined by an airport region, by opening the inquiry to how goods flow across scales and modalities.

Figure 3.5: Distribution and production conceptual elements of airfreight logistics



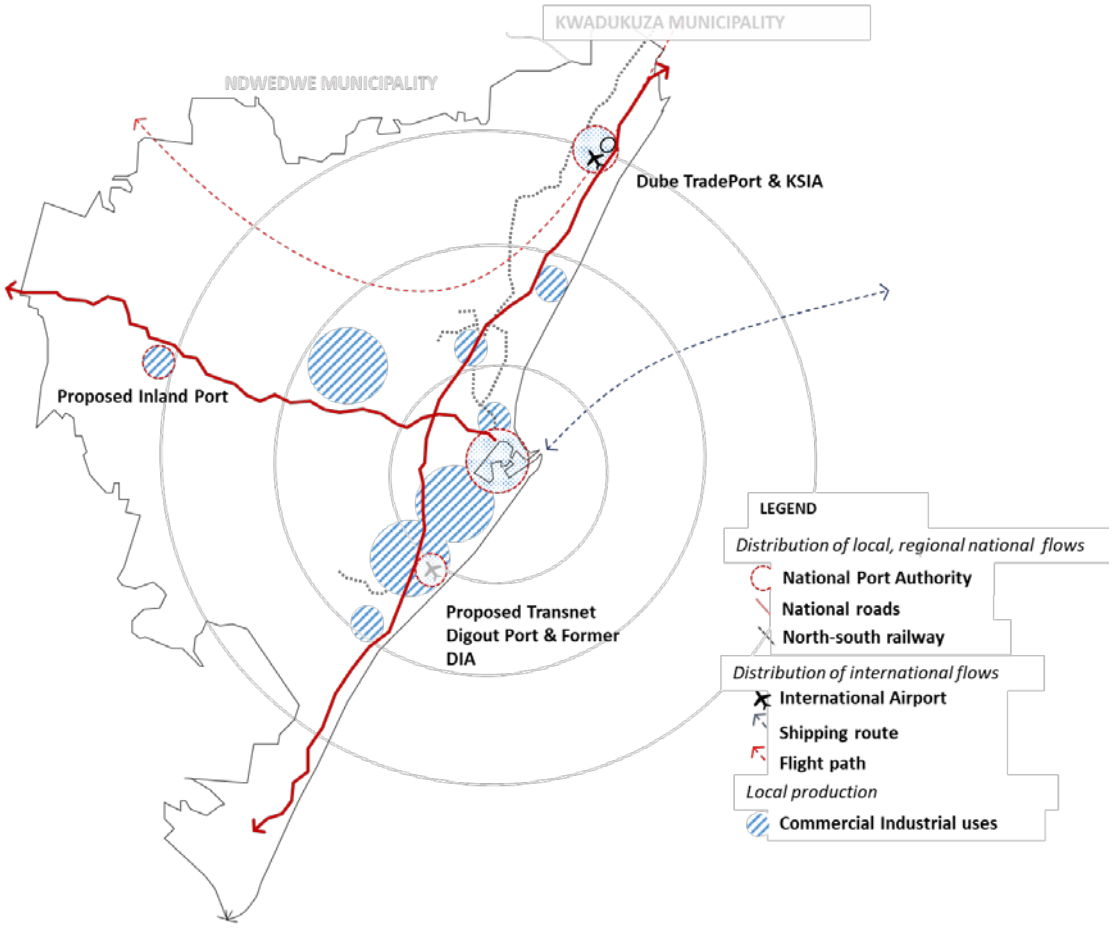
Source: Devised by the researcher

As a theoretical construct, in Figure 3.5, the engagement between existing flow of materials, capital and goods with the city structure, is taken as the entry point to understanding airport related logistics. Assumptions that airports generate the flow of goods is questioned in this research from the perspective that airports may attract or repel development, yet the volumes of flows are generated outside the influence of airports. In other words, to understand how airports add value to the movement of goods, the broader distribution of flows across networks needs to be understood. At a broad level, airport logistics really come into play when the movement of goods is of a time critical, rather than time dependent nature.

Transportation infrastructure, underpinned by capital and information flows, supports the flows of materials and the distribution of goods as a value-added activity of logistics within the supply chain. Related to the distribution function of logistics, and the role that airports play relative to road, rail and sea based modalities, is how flows relates to the production function of logistics. As argued in section 2.3.7, the increased distribution of goods is fundamental to the current economic systems operating across multiple scales within and across continents, nationally and more locally. The growth in the circulation of freight is not only an operational issue but fundamental to how

production systems are organised and integrated within supply chains (Hesse and Rodrigue 2004: 171). The function of logistic itself has become outsourced to ensure productivity gains related to time. As supply chains are predominantly managed on the demand side, the logistics services are becoming more time sense and complex, such that elements of supply chain management are outsourced to third party logistics providers benefiting from economies of scale (Hesse and Rodrigue 2004: 175). The argument made in section 2.3.7. is that new modes of production are inextricably linked with new modes of distribution, informs the definition of logistics as the activities related to both the physical distribution of goods (from raw materials to completed goods) and to the management of materials in the production process through to reuse and disposal (Hesse and Rodrigue 2004: 173).

Figure 3.6: Conceptual framework for understanding airport related logistics



Source: Devised by the researcher with data from eThekwini (2018:6)

Airfreight logistics, given the ability to distribute goods over extensive distance within time definite margins, has supported this not only a distribution role but part of new production systems. Figure 3.6 below provides a conceptual framework for understanding airport related logistics. The distribution of multi-scalar flows is separated from spaces of production in Durban.

Related to the case study, in order to understand airport related flows, the following points need to be considered:

1. The airport should be understood as part of the broader city structure and not as central to the city structure. The existing set of material relations are in flux, however over port has retained a dominated position in the handling of goods, over time, in volume, and at scale. The question of whether the airport will shift the set of material relations, would need to be considered over the long term period. Globally, airport cargo growth relates to the value of goods moved and not the volume of goods distributed.
2. The approach taken questions spatial variable such as distance to understand locational decisions or spatial distributions. Assumptions that firms will relocate to the airport where spatial proximity underpin agglomeration processes is not necessarily true. Factors such as land values, industrial incentives, accessibility to port, road and rail infrastructure may play a relatively more critical role in locational decisions than airport proximity.
3. The integration between the port and the airport, as two key infrastructures dealing with trade, are not considered as linear connections. In other words, goods do not necessarily move between the port and airport through road or rail. Rather, that firms in specific supply chains may require flexible access to multiple transportation.
4. Integration between the distribution and production of logistics have substantial land use and therefor spatial implications. The ability to embed production processes in the local economy is a complex investment decision that may require industrial strategies to hold down global production networks,

or build local production networks. In order for an airport to add value in the production process, the productive capacity of the local economy needs be effective. The supply linkages with local industrial areas is a key consideration for airfreight logistics, but so too is the demand. Gauteng represents one of the key African markets and the flows between Durban and Johannesburg are structural considerations in the South African space economy.

3.4.1 Chapter summary

Air logistics plays an important part in the processes underpinning economic globalisation, specifically the movement of goods between national and local economies. However, the field of logistics is not simply about the physical movement of goods within the agreed price, quality and time parameters. Logistics, supported by shifts in information, communication and technology, encompasses a wide range of activities, whereby transport is integrated in supply management and just-in-time production systems (Pedersen 2001: 87). This framework, through a relational perspective, recognises the flow of information and technology supporting the physical movement of goods across space within a context of differential relations between places of production, distribution and consumption, and includes reuse and disposal of goods. Thinking relationally allows one to explore these flows in cities as places with diverse networks of social, economic and culture relations as well as expressing these flows in concentrated or dispersed geographies within the structure of the city.

CHAPTER FOUR

SOUTH AFRICAN CONTEXTUAL CASE

4.1 Introduction

This chapter draws from the theoretical framework of Chapter Three to conceptualise and provide empirical background for planning of airport logistics related development in South Africa. The South African context as it relates to airport logistics is entangled with the African and global context as it relates to trade and connectivity, hence it forms part of the analysis in Chapter Four. The conceptual framework suggests that drawing on the relational understanding of space and flows across various geographic scales (local, regional, provincial, national, continental, global) may assist in understanding the dominant policy theme of promoting regional trade flows through place-based infrastructure investments. The context assesses how the contemporary economic processes underpinning the air transportation of goods are reflected in both policy and planning reports. Furthermore, this chapter reflects on the alignment between multi-scalar trade and locally derived benefits in terms of investment and employment within city regions.

The following arguments are made in Chapter Four.

1. Internationally, uneven geographic and economic distribution of trade flows reflects the deep structural and one-sided relationships between the global north and the rest of the world (Freund, 2019:1). These uneven distributions are acutely reflected in terms of air-cargo related flows. Despite the uneven distribution of trade and investment opportunities and the reported slowdown in globalisation (McKinsey Global Institute 2019), Dube TradePort has chosen a long-term strategy to engage with opportunities related to multi-scalar air cargo flows.
2. Policy and practice-based research converge with arguments that by broadening African air connectivity supports intra-African trade despite Africa's dominant trading partners being externally located to the African

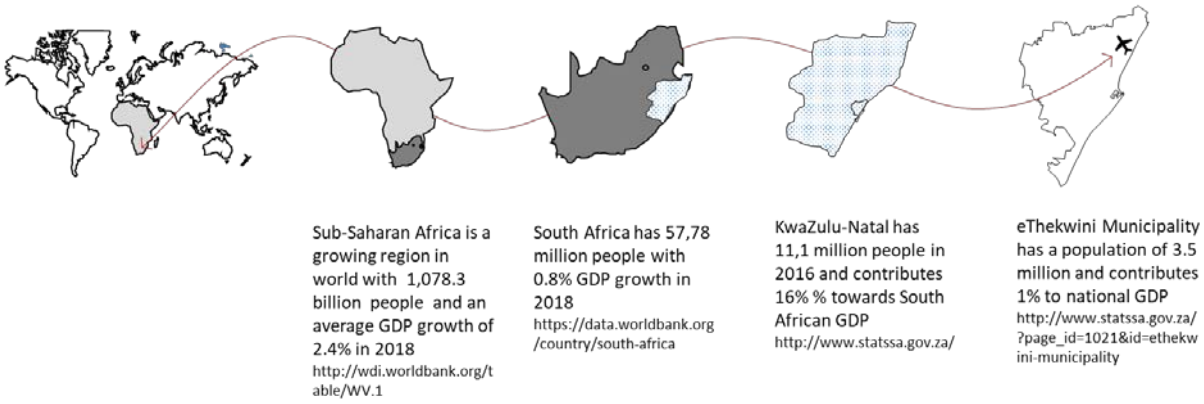
geographic territory. International funding organisations and African regional inter-governmental organisations' policies support a liberalisation agenda to promote intra-African trade. Despite these new African free trade agreements, there are still obstacles impacting on increased air trade within Africa.

3. The infrastructure led development trajectory in South Africa is a response to reconstruction and development following political settlement and democratic elections in 1994. The South African government is pursuing an export orientated development path with the intention of achieving the necessary growth to alleviate widespread poverty within a largely normative framework. Normative frameworks are based on principles of economic growth with redistribution, within the existing capitalist economic system. Provincially, Dube TradePort objectives are aligned with infrastructural led development strategy to promote trade and investment based on the value-added services of air-cargo in the supply chains.

4.1.1 Structure of the chapter

The purpose of this chapter is to provide the contextual settings for understanding the multi-scalar role of planning for airport and logistics. The chapter is structured across scales as shown in Figure 4.1 below.

Figure 4.1: Diagram summarising the multi-scalar context for airport



Source: Devised by the researcher

The first section provides the introduction and this is followed outlining the design of the contextual case and the methods used to collect the relevant data. Section three located the case within the global air cargo logistics context, section four deals with the African air cargo context and section five the South African context, before concluding.

4.2 Contextual case design

The Dube TradePort case is set within a multi-scalar context related to the flows of people, goods, services, information and capital at different scales albeit local, regional[xiv], provincial, national, continental or global. Since the land use activities within the case study is embedded in the physical world, the case can only be fully understood within a specific context. The chosen research method utilised to enhance the understanding of relations between the wider context and the particular case is explored in order to answer the following questions:

1. What are the multi-scalar (local, regional, provincial, national, continental, global) roles of the airport in terms of the flow of goods in practice?
2. How do airports land use integrate with other transport land use infrastructure (such as ports, rail and road) in the context of the Dube TradePort case?
3. How do airports integrate with spaces of production and distribution of goods in the context of the Dube TradePort case?

4.2.1 Data collection

Document analysis is the main method of data collection designed to answer the research questions in this chapter, supplemented with interviews and observations. The air-cargo logistics context requires a review of practice-based documentation and empirical studies related to trade, logistics, air-cargo and air-connectivity in Africa. A key issue in the global context review is to firstly collect data from practice-based literature that explicitly deals with air cargo as distinct from air passengers. Secondly

to collect information on air cargo flows as related to other modes of transportation (such as land and water) as used to conduct international trade. The data collection is hampered by the lack of separation of air cargo from air passengers as well as the lack of separation of air cargo from other modes of transportation. This requires a broadening of the document analysis to include a much broader scope of literature to include Africa policy environment. Similar concerns are encountered in the African context, namely focusing on air cargo and relations to other modalities, however, the African policy context also has relevance for the case. In the period of the study, international funding agencies and the African Union have introduced policies and agreements to promote intra-continental trade and investment. In Africa, implicit to both policy and empirical research on air connectivity is the assumption that a prerequisite to development is an investment in air infrastructure and free trade agreements are a precondition for economic growth. The South African policy context focused on policies informing infrastructure investment and spatial development plans. The literature review reveals how planners conceptualise Dube TradePort and KSIA in terms of flows and integration in local plans.

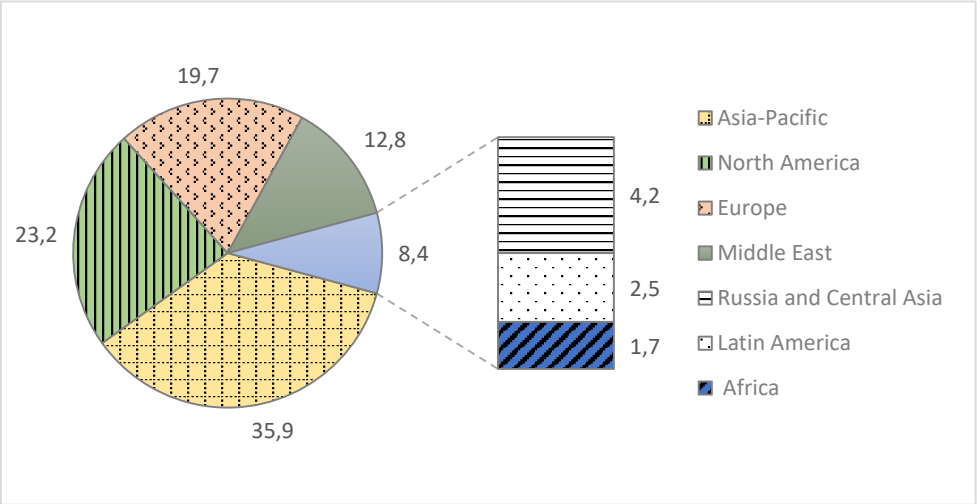
The document analysis includes a review of all annual reports between 2010 and 2018 for DTP, Tongaat Hulett, ACSA, SAA, Transnet as well as the current Integrated Development Plans and Spatial Development Frameworks for municipalities within iLembe and eThekwini Municipality. Documents were coded through Atlas.ti, a qualitative data analysis software programme. Codes were manually linked to data in the text through an inductive process of open coding. Thereafter codes were imported to the code manager component of the programme and deductions made from the content. The analytical instrument of Atlas.ti established how concepts are grounded within the annual and official reporting practices of contextual actors. Refer to Appendix D. The codes were linked into network codes in Atlas.ti and related back to the themes. Keys themes emerged about how airports integrate with ports, rail and road infrastructure and secondly how airports integrate with spaces of production and distribution of goods within the local context.

4.3 Air cargo logistics context

4.3.1 Global air logistics

Air transportation plays an integral part in production and distribution networks supporting the movement of goods between local and global economies. In Chapter Two, the importance of air transportation underpinning global production networks is established. It is estimated that globally some 80 percent of international trade is organised through global production networks, where lead firms coordinate investment and traded inputs and outputs between partners, suppliers, and customers internationally (Yeung and Coe 2015: 30). However, empirical work on trade and production across 23 industry value chains spanning 43 countries between 1995 to 2017 by McKinsey Global Institute (2019) suggest globalization is in transition since the mid-2000s. The reorganisation of the global economy is underpinned by shifting geographies of global demand impacting on trade flows in the following ways. Firstly, globally the production of goods is increasing in absolute terms, but the production is less trade intensive, meaning that more goods are consumed within regions and fewer goods traded across borders. It is estimated that between 2007 and 2017, global exports declined from 28.1 to 22.5 percent of gross output in goods-producing value chains (McKinsey Global Institute 2019: 5). Secondly, the composition of global trade is changing. In 2017, gross trade in services totalled $5.1 trillion, while global trade in goods amounted to $17.3 trillion (McKinsey Global Institute 2019: 5). However, trade in cross-border services grew more than 60 percent faster than trade in goods (McKinsey Global Institute 2019: 5) reflecting the relative value of added services in traded goods.

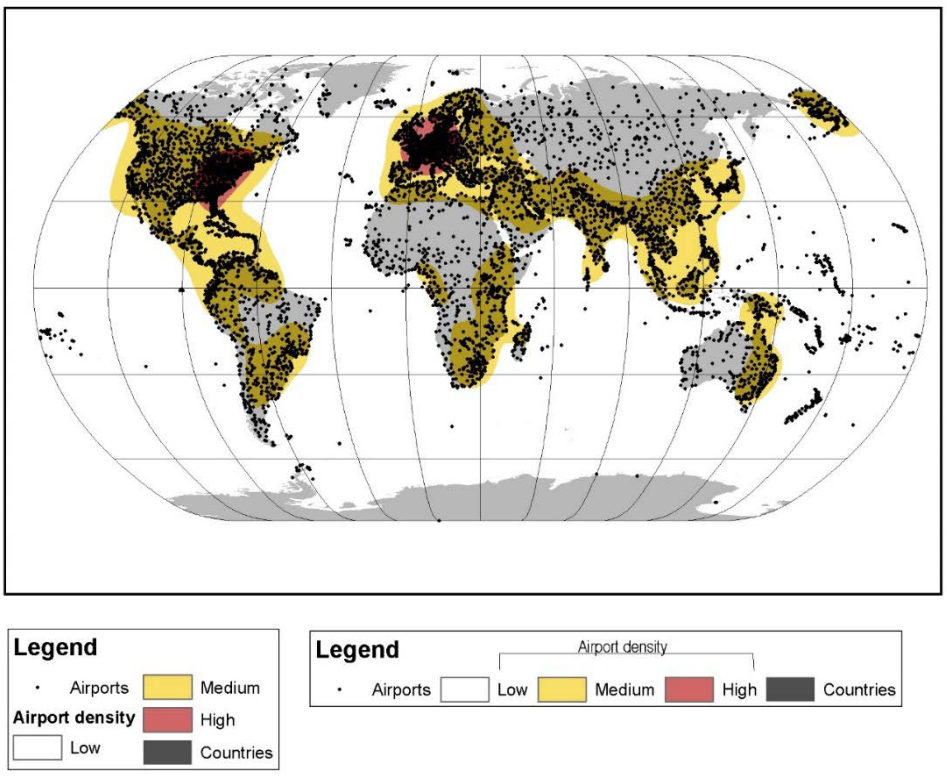
Figure 4.2: 2017 Air cargo market share by airline domicile



Source: Adapted from Boeing, 2018:21

Despite arguments that globalization is regionalising trade, the growth in air cargo tends to reflect economic growth in the long run. According to the World Air Cargo Forecast 2018 to 2037, global air cargo traffic grew 10.1 percent, more than double the long-term average growth rate of 4.2 percent (Boeing 2018: 4). The unusual growth was attributed to air cargo traffic exceeding capacity growth in the last two years and absorbing excess capacity in the market. Not all aspects of air cargo experience growth, while airmail grew less slowly, express freight responded to the doubling growth of ecommerce between 2012 and 2017 (Boeing 2017: 2). Airmail growth is attributed to the *last mile* role in e-commerce shipping. In 2017, global retail e-commerce sales were $2.3 trillion, more than double the $1.1 trillion spent in 2012 (Boeing 2018). Asia Pacific is the fastest growing e-commerce trading block, with China leading the e-commerce market. The dominance of the Asia-Pacific region in the air cargo market is shown in Figure 4.3.

Figure 4.3: Geographical concentration of airports



Source: DUT Department of Town and Regional Planning, GIS Unit

Air cargo accounts for less than one percent of the world trade tonnage (61.9 million tonnes) and 35 percent of world trade value, amounting to an estimated value of $6 trillion worth of goods in 2017 (Boeing 2018: 6). The geographic distribution of air-cargo market share is shown in Figure 4.3 above. More than half of air cargo is moved internationally in dedicated freighters as opposed to wide belly passenger planes (Boeing 2017: 6). However, reflecting uneven material flows, freighters tend to concentrate on the two main air trade routes of East Asia–North America and East Asia– Europe.

Outside of these dominant air freight routes and cargo hubs, air-cargo within Africa and South Africa make use of belly-hold capacity on passenger flights. Within South

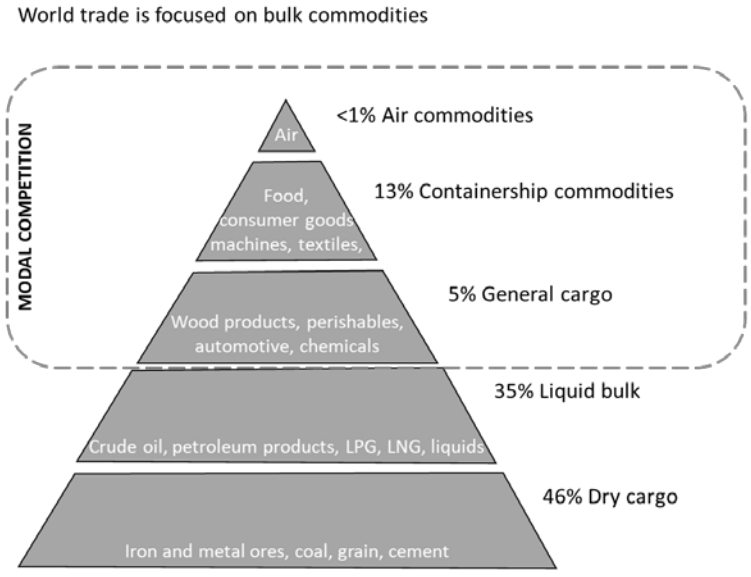
Africa, some 70 percent of the total cargo is carried in the belly-hold of passenger flights (Airports Company of South Africa 2015: 68).

4.3.2 Modal competition

As a general trend, materials, components and completed goods that are moving by air are high value, time sensitive and perishable, which require speed and reliability when transported (refer to section 1.5). Yet, some of the same commodities can move on either as waterborne or air cargo, depending on the requirements for price[xv] and timing. Refer to Figure 4.4 indicating how sea and air cargo interface with landside road and rail distribution systems.

Containerized cargo is the sector of waterborne trade that most closely corresponds to air cargo as both engage with international flows. Shifts in the types of commodity moving and modality chosen are inherent in the modal competition and provide flexibility and choice for users requiring such services.

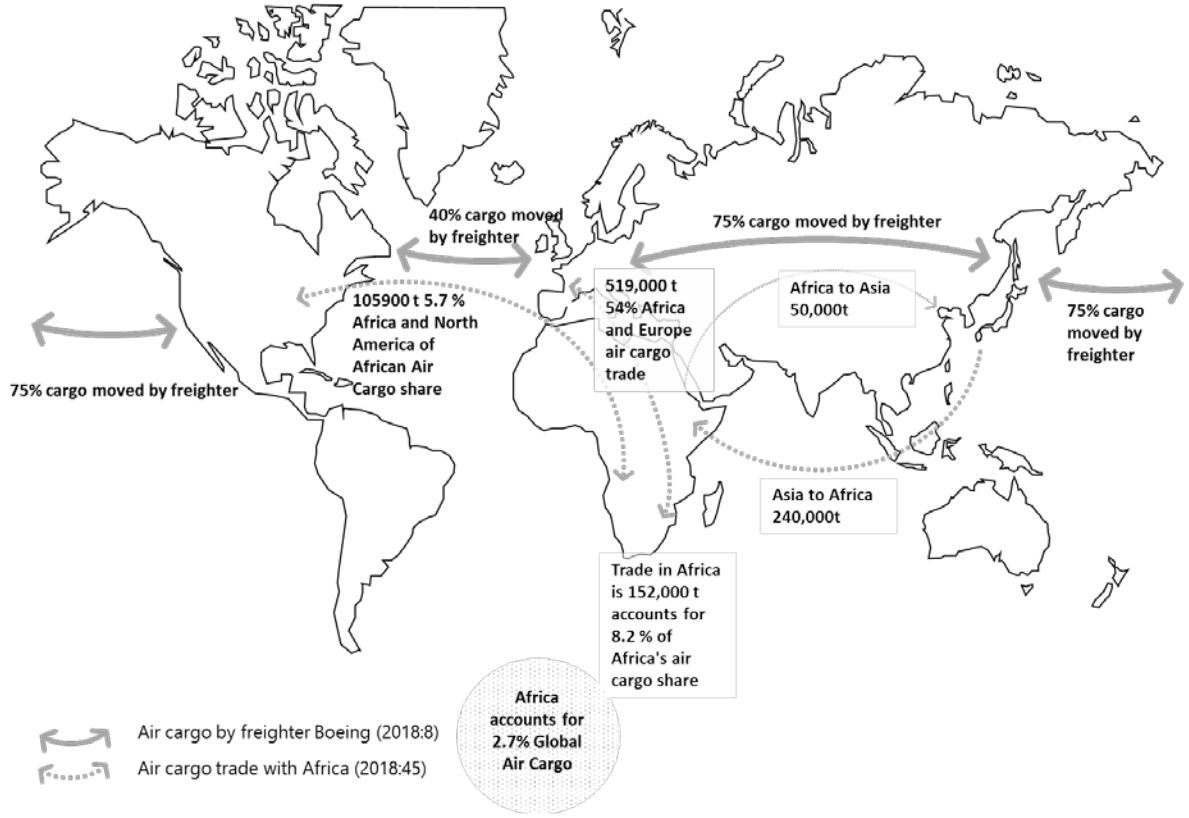
Figure 4.4: Correspondence between air and container international trade



Source: Adapted from Boeing, 2017:7

Consideration of the complexity of supply chains also impacts on modality competition. Simple value chains, such as those industries in basic metals, involve a sequence of production steps to process raw materials from businesses in different countries. In complex supply chains, such as automotive and electronics, inputs and subassembly of component parts, require greater coordination of these activities. Hence for complex supply chains there may be less flexibility on timing due to the complexity of the assemblage of intermediate inputs to final production making air cargo preferable. It is estimated that two-thirds of world trade is in intermediate inputs, not final goods and services, underscoring the timing and complexity of multi-scalar production networks (McKinsey Global Institute 2019: 6).

Figure 4.5: Air cargo flows with Africa, 2017



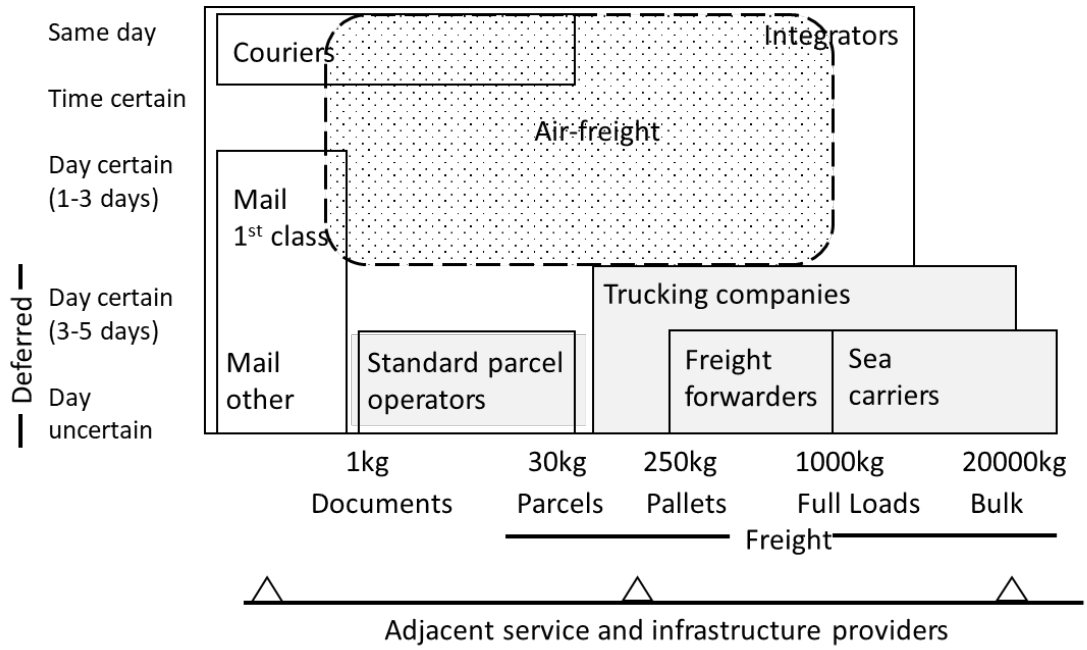
Source: Devised by researcher

Bidirectional trade[xvi] balance is a key concern in global air trade. Figure 4.5 indicates air cargo moved by freighter and air cargo trade with Africa. In African the sustainability of reciprocal cargo volumes is marginal. East Asia's share of Africa's international air trade has increased to 16.1 percent in 2017 (Boeing 2018: 45) and the commercial ties to Africa reflect positive trade. However, the nature of Chinese demand for raw materials, combined with African demand for consumer goods, has resulted in substantial directional imbalances. Air cargo flows indicate approximately four times as much East Asian air cargo entering as leaving Africa. Within the Chapter Five case study a similar dynamic within African countries is shown to impact on the sustainability of air connectivity, amongst other factors, on intra-regional trade.

4.3.3 Integrators

Integrators[xvii] hold an extensive segment of the transport sector, partly related to their logistics functions of door to door transport, with fast and reliable guaranteed delivery time. Refer to Figure 4.6 below indicates the role of air freight within the global transport sector. Although integrator services have national and regional operators, they are dominated by a few global integrator companies. The top global companies that dominate the integrated market are Federal Express (incorporated TNT in 2016), Deutsche Post DHL Group and UPS which are integrated with eBay, Amazon and Etsy. These integrated carriers operate multimodal networks, combining air services with extensive surface transport to meet customer demands. Barriers to entry in the global market are significant and require substantial investments in aircraft, vehicles, information technology systems and handling infrastructure in many different countries (Morrell 2012: 99). While some companies, such as airlines, may have some airline investments in place, they may lack landside infrastructure, such as road based distributors. According to the 2017 ITAT World Air Transport Statistics, the top five airlines ranked by total freight tonnes carried on scheduled services were FedEx Express (7.1 million), United Parcel Service (4.7 million), Emirates Airline (2.5 million), Qatar Airways (1,8 million) and Cathay Pacific Airways (1.6 million) (Bizcommunity 2017: 1). Appendix 1 indicates the overall ranking of airports by cargo volumes, with only Doha featuring in Africa.

Figure 4.6: Segmentation of global transportation sector



Source: Adapted from (TNT 2008: 11)

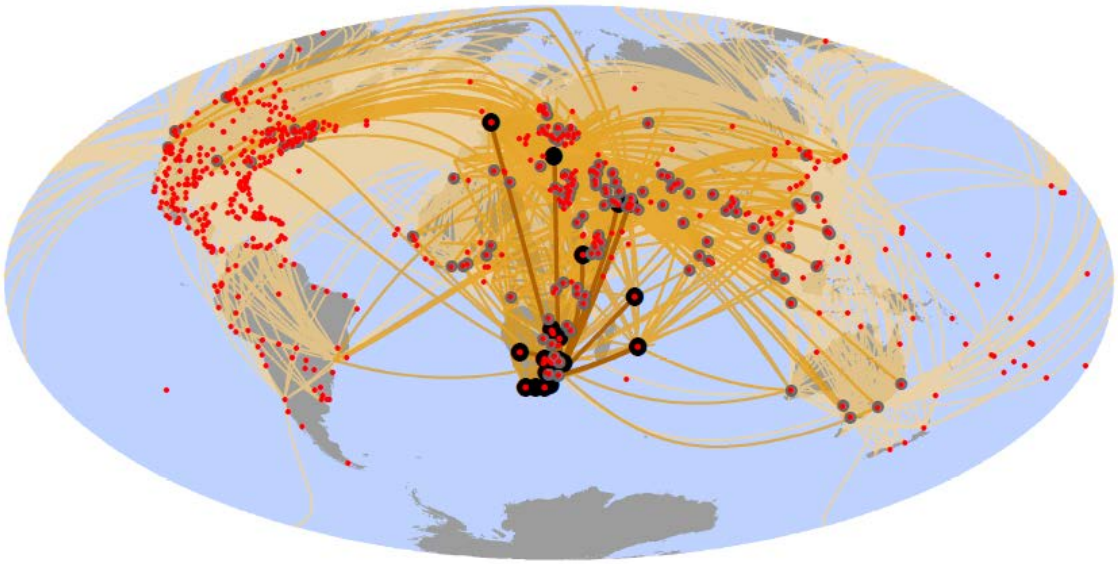
Mayer (2016: 54) argued that air cargo throughput is geographically concentrated globally, more so than passenger throughput, and attributes this to hub and spoke arrangements driven by integrators. In the development of a heterogeneus air cargo classification systems based on absolute (cargo tonnage) and relative measures (share of cargo work load units of freighter movements and of international cargo), Mayer (2016: 53) established the reliance of different airport types and groupings on air cargo. A distinction is drawn between three types of airfreight flows namely: 1) domestic consumption flows and those catering for export; 2) gateway flows where cargo is destined for maunufacturing concentrations in the hinterland; and 3) transhipment flows related to hub cargo. While cargo operators are able to use additional belly hold capacity in passeneger planes, Morrell (2012: 55) argued that integrators prefer secondary airports, with low passeneger numbers and less congestion, particularly if in close proximity to distribution centres. However, this only applies to major air-cargo routes.

Typically operators that are involved in airfreight transport, whether it is for the entire trip, such as integrators, or a portion of the trip, such as courier operators or freight forwarders, are associated with air cargo operations (Morrell 2012: 98). The value, weight and timing are key determinants in how goods move and how the transportation sector is differentiated by different operators. Morrell (2012: 98-99) outlines the operators as follows: 1) integrators (with a combination of air and road networks) who tend to operate time sensitive goods and use sea carriers for less expedited goods; 2) freight forwarders who operate virtual networks by selling space with other operators (such as on planes, ships and trucks) and also provide their own depots and sites in harbours and airports; 3) couriers who tend to focus on same day deliveries and intercontinental deliveries. All these private sector operators are supported through by state owned entities and public sector infrastructure providers (such as port authorities, airport operators, and transport authorities) as well as information and communications technology infrastructure.

4.3.4 DTP case study located in the global context

Durban, within eThekwini Municipality, is developing international connectivity through both direct long-haul flights as well as proximity to OR Tambo International Airport (ORTIA). Durban is globally connected to almost 700 cities through third order connectivity. Refer to Figure 4.7 to show international connectivity from Durban. KSIA offers a range of scheduled and unscheduled flights and low-cost operators to short and medium-haul destinations in the domestic market and growing regional market, as well as a small share of long-haul international market (via the direct international flights). There are 19 direct destinations from Durban, of which 11 are international destinations. These connect to 118 second stop international destinations and a further 694 third stop international destinations (Durban University of Technology GIS data, 2017).

Figure 4.7: Global connectivity from Durban, 2019



Source: DUT Department of Town and Regional Planning, GIS Unit

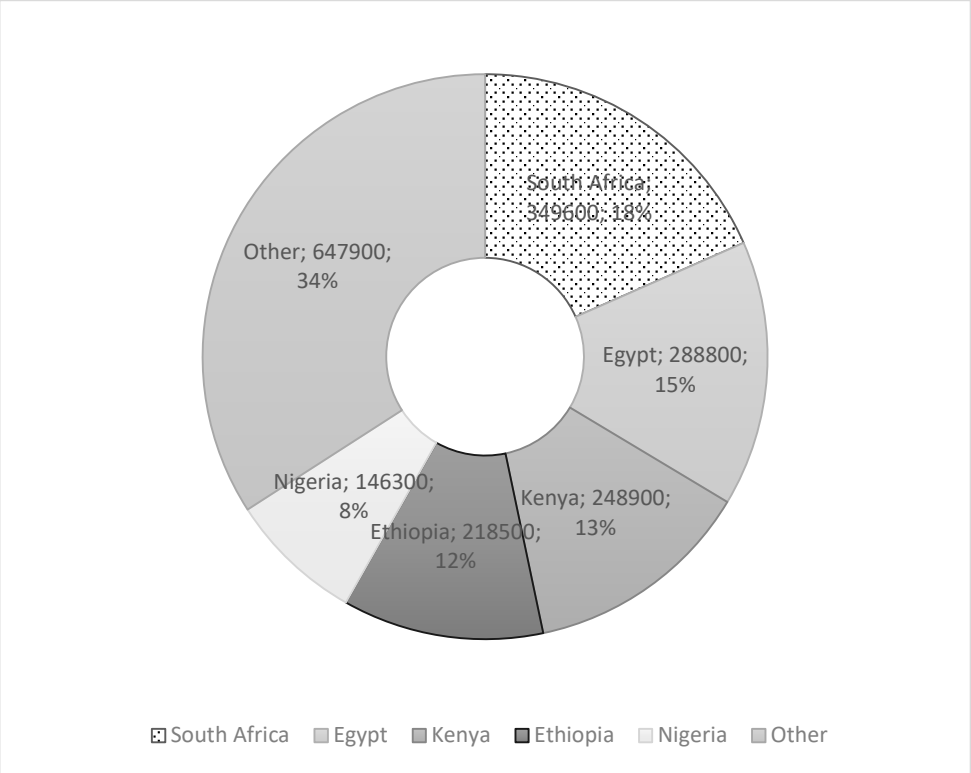
Durban is directly connected to international hubs of London, Istanbul, Doha and Dubai, and to African destinations of Mauritius, Maputo, Harare, Windhoek and Gaborone through eleven international airlines to some seven hundred airports. Not all of the international airlines have cargo operations at KSIA, and these are limited to Africa Charter Airline, Air Namibia, BidAir Cargo, Emirates Sky Cargo, Ethiopian Airlines, Qatar Airways, SAA Cargo, SA Airlink, and Turkish Airlines. While there is some overlap between passenger and cargo related connectivity, particularly with belly hold cargo, there is also divergence. The direct air connectivity with Durban is shown in Appendix 2.

4.4 Africa air logistics context

4.4.1 Air-cargo trade in Africa

Air cargo trade in Africa was 1.9 billion tonnes in 2017 and the Africa market accounted for approximately 2.7 percent of global air cargo tonnage (Boeing 2018: 45). Historically Africa played a marginal role in established air cargo markets, with Africa-Europe air cargo volumes estimated at 519000 tonnes in 2017 (Boeing 2018: 45).

Figure 4.8: Air cargo market share in Africa, 2017



Source: Adapted from Boeing (2018: 46)

The trade relationships with former colonial countries in Europe is significant with these relations handling more than half (54 percent in 2017) of the African air cargo share (Boeing 2018: 45). Despite Africa's marginal air-cargo role, access to international markets is an important opportunity for trade, especially for South Africa with its locational position as a gateway into neighbouring (southern) African

countries. Furthermore, the relatively open economy with free trade agreements in place has also created new opportunities for South Africa trading with Africa (Bouët, Cosnard and Laborde 2017; African Union 2019: 934). Figure 4.8 indicates the air-cargo distribution between the main economies in Africa

Chapter One, section 1.6 argued the case for improved logistics and infrastructural integration to support trade. However, the mechanisms to support regional trade lie beyond the physical infrastructure. Air connectivity, supported by trade agreements, have seen a shift in the African share of air cargo, and yet air connectivity between Africa and its trading regions is still stronger than trade within Africa. Europe is Africa's primary air cargo trading partner, but more recently intra-Africa and Asia air trades have rapidly expanded their share (Boeing 2017: 36). Weak economic integration within Africa represents lost opportunities for developing larger trading markets and economies of scale associated with regional trading blocks. This is not suggesting the corollary that air connectivity holds the key to improved trade in Africa, but rather an argument that air connectivity is part of a broader strategy supporting regional integration.

There is recognition in the practice-based literature that although Africa holds a relatively marginal share in aviation services, the potential for growth is significant. According to the International Air Transport Association (IATA), air freight grew more than twice as fast as global trade volumes during 2017, with the most significant margins emerging post-global financial crisis from 2010 (International Air Transport Association 2018b: 12). Strong growth internationally was attributed in part to the global inventory restocking cycle, as well demand for manufactured exports (International Air Transport Association, 2018a). However, notable growth in Africa with related changing air trade patterns are attributed to trade and investment opportunities from increased participation in global markets, population growth and increased foreign investment from Asia (International Air Transport Association 2018a: 4). Currently the intra-regional African share of airfreight is 12.9 percent of

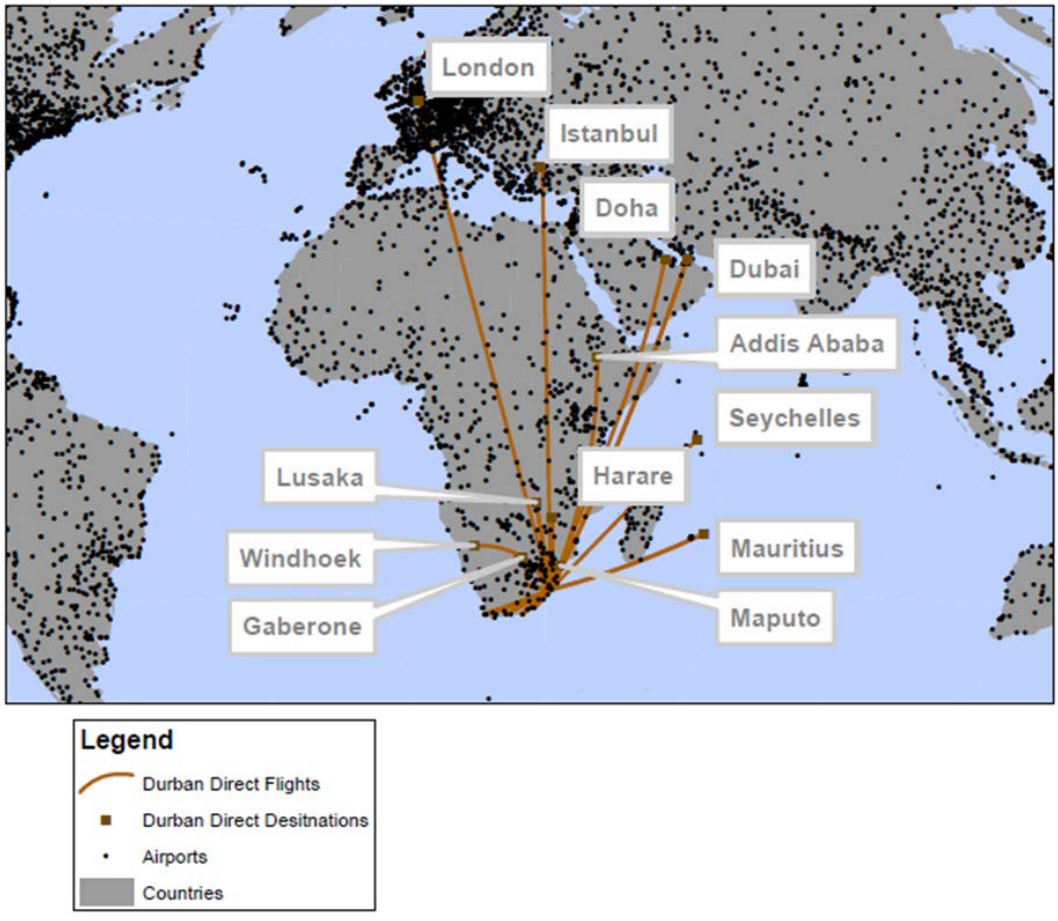
African trade, with some 60 percent of trade with Europe. However this intra-regional share has grown by more than 35 percent in the past two years, reflecting a significant change in patterns of African trade (Boeing 2017: 36). The recent implementation of agreement on the African Union Free Trade Deal (African Union 2019) supports the removal of trade tariffs between African countries, and reinforces the establishment of a single African aviation market (African Union 2017). Njoya (2016: 10) identified uneven implementation of liberalization agreements as an impediment to the growth in air traffic, specifically slow implementation of five amendment aviation rights allowing a country's airlines landing rights in another country's airspace.

Notable air related growth in Africa is attributed by Button et al. (2015: 88) to the direct link between the provisions of airline capacity and international trade within Sub-Saharan Africa. The relationship is linked to the economic performance of urban areas in the region. Added to this, the study suggested complementarity between the scale of the domestic air transport system and trade, suggesting an important role for synergistic domestic feeder networks to support internal trunk services. Arguments based on the implementation of liberalisation policies as set out in the Yamoussoukro Decision[xviii] feature in policy and are taken as common departure points (Adler, Njoya and Volta 2018: 188).

Ssamula (2012) and Ssamula and Venter (2013) investigate hub and spoke networks in the African context by applying a cluster model in order to search for optimal hubs. Developing the hub network design further Adler, Njoya and Volta (2018: 187) forecasted future demand in the African aviation market, taking intra-continental and international flows into account. In addition to the hubs of Cairo (Egypt), Addis Ababa (Ethiopia) and Johannesburg (South Africa), Adler, Njoya and Volta (2018: 187) predict by 2030, there will be sufficient demand for air travel to justify an additional hub in central Sub-Saharan Africa, such as Lusaka (Zambia). In summary, Bouët, Cosnard and Laborde (2017) confirmed the argument that Africa is characterised by weak trade integration, particularly with the rest of the world.

Traditionally this is explained by high trading costs, evaluated by tariffs, non-tariff measures and other trade costs, such as those related to border and documentary compliance. The African region's small number of trading partners and low product diversification are also reflective thereof. Bouët, Cosnard and Laborde (2017) put forward an argument that the use of more refined indicators shows that intra-African trade is relatively high when compared with trade with other continents. They however acknowledge the low share of regional trade appears to reflect other determinants of trade, particularly the low level of economic activity within the region (Bouët, Cosnard and Laborde 2017: 972).

Figure 4.9: Durban Direct Destinations, 2019



Source: DUT Department of Town and Regional Planning, GIS Unit 2019

In summary, as far as KSIA/DTP and ORTIA are concerned in Africa, the context supports the argument that there is evidence of the Africa region's weak trade integration at a global level. Africa, and by extension KSIA/DTP and ORTIA, occupy marginal positions in the world trade network and are poorly connected to the rest of the world. Refer to Figure 4.9 to reflect on the limited direct connections. While the bulk of African trade relates to primary commodities, there are opportunities for value-added products and product diversification in commodities. It is suggested that the challenge is to shift the level of economic activity within the region.

4.4.2 African policy context

Assumptions that trade causes growth are implicit in the World Bank's policy agendas to promote open trade. In the context of Sub-Saharan intra-regional trade, Button *et al.* (2015: 88) claim that the World Bank, rather than fund equipment and air infrastructure, have reoriented trade creation policy towards regulatory support functions. According to the World Bank investigations, the African markets are highly fragmented and while some countries have removed import duties within regional blocks, obstacles such as non-tariff and regulatory barriers limit the movement of goods across borders and raise the transactional costs (World Bank 2012: xvii). The implied agenda is to promote regional trade liberalization within Africa and to strengthen the internal integration within Africa, the implication being that Africa is more integrated with the rest of the world than itself, specifically through air connectivity.

The discourse on liberalization and free trade as mechanisms to open African markets to export and investments remains contested. Promotion of free trade is evident in the policy agendas of international lending agencies (IMF and World Bank) and reflected in the dominant research agenda on air services in Africa. Research on airport led development in Africa, particularly at the national level, is based largely on econometric models forecasting future demand, and argued that greater liberalization in air trade promotes growth (Njoh 2008; Ssamula 2012; Ssamula and Venter 2013;

Button *et al.* 2015; Abate 2016; Njoya 2016; Adler, Njoya and Volta 2018). Njoya (2016: 1) assessed some of the impediments to liberalization of African air services and found Southern African countries are particularly reluctant to enter into agreements to open up the competition and by implication place subsequent pressure on costs. Njoya (2016: 1) argued for the creation of a single African aviation market through implementation of the Yamoussoukro Decision, aimed at airline cooperation and integration through liberalization. However, a generic liberalization strategy in pursuit of trade and growth is arguably questionable. Regionally appropriate and contextually derived development paths may hold possibility for local and regional development (Pike, Rodríguez-Pose and Tomaney 2007). In other words, variations in local and regional dynamics prompt differential responses to increased air connectivity and connectivity is tied into place-based production.

Trade liberalization is suggestive of a wider neoliberal agenda to enhance economic competitiveness. It is also arguably one of the neoliberal policy packages by which free market principles are privileged over state protectionism to ensure adherence to laissez-faire multilateral free trade. The main concern is that neoliberal policies tend to constrain public intervention in the market, potentially constraining the planning instruments. Planning as a public interest activity, based on normative principles of inclusive growth, can be at odds with regional and national economic growth juxtaposed with local environmental intrusion (Freestone 2011: 129). It is at the local scale where choices over national economic development paths are negotiated by more localized environmental interests.

The thread of infrastructure-led development to strengthen intra-African trade and integration is consistently found in policy documents. Africa's Agenda 2063 anticipates the development of 'world-class integrative infrastructure' (African Union Commission 2015: 4-5). This focus echoes goal 9 of the Sustainable Development Goals (SDG) adopted by the United National and calls for building 'resilient infrastructure, promote sustainable industrialization and foster innovation' (United

Nations 2018). The African Union Commission (AUC) vision and strategy also include infrastructure provision in support of trade and inclusive growth (African Union Commission 2013: 3; 2015: 5). The New Partnership for Africa's Development (NEPAD) as the development agency for the AUC, has regional integration, infrastructure, and trade as a focus. The NEPAD programmes to '*Move Africa*' and the '*Programme for Infrastructural Development in Africa*' (PIDA) implement the AUC vision to promote development and poverty reduction through improved access to integrated regional and continental infrastructure networks and services. The argument for regional integration by the African Development Bank Group funding these programmes, is to add value to African products, create larger markets, attract investment and trade for sustained and inclusive growth and development and improve Africa's competitiveness (African Development Bank Group 2015: 15). It is noted that coastal cities are critical for transit and that airports, along with seaports, feature as Africa's logistics and infrastructure hubs (African Development Bank Group 2015: 24).

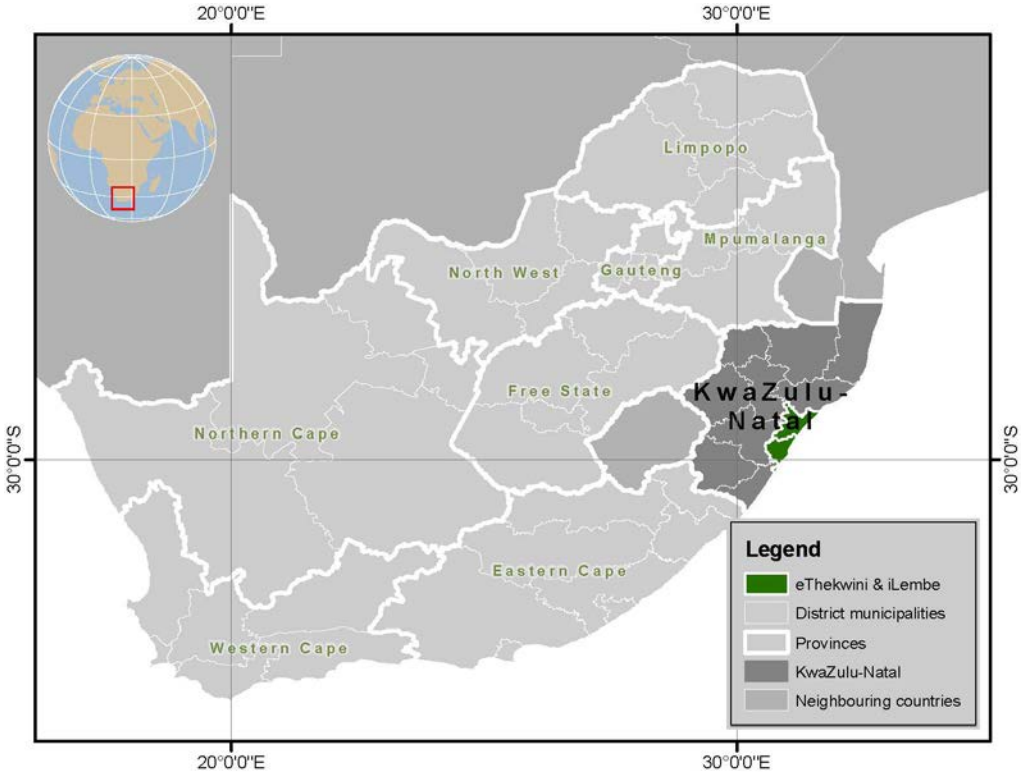
Industrialization is at the centre of Africa's structural transformation with infrastructure identified as the catalyst for New Partnership for Africa's Development (NEPAD) implementation (New Partnership for Africa's Development 2016: 8). Transportation costs in Africa are relatively high and raise a concern for trade competitiveness. It is estimated that freight costs, as a percentage of import value, are 13 percent for Africa, compared to 8.8 percent for other developing countries, and 5.2 percent for industrial countries (New Partnership for Africa's Development 2016: xii). The importance of transport infrastructure, alongside power and ICT, are identified as contributors to economic development and poverty reduction in Africa. Within this context, aviation receives particular attention. NEPAD identified the creation of a single African Aviation Market as a flagship project, including renewed commitments to the liberalization of air-trade in Africa (New Partnership for Africa's Development 2017). Commitment to regional integration and sustained growth through the SADC member states is demonstrated in SADC 2015 Consolidated Treaty on matters related to infrastructure and trade (Southern African Development Community 2015: 2).

4.5 South African context

4.5.1 Governance context

The 1994 national election of democratic governance set in play changes to the structure, function and jurisdiction of governance to include local, metropolitan, district, provincial and national government across the country. Nationally, there are nine provinces, namely the Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West and Western Cape. The local sphere of government comprises of three types of municipalities, namely metropolitan, district and local municipalities. Within the Province of KwaZulu-Natal, there is one metropolitan municipality, eThekwini Municipality. The rest of the province is under the jurisdiction of eleven district municipalities, each with approximately five smaller local municipalities. Figure 10 indicates the provincial jurisdiction of KwaZulu-Natal within South Africa with the municipal areas of eThekwini and iLembe.

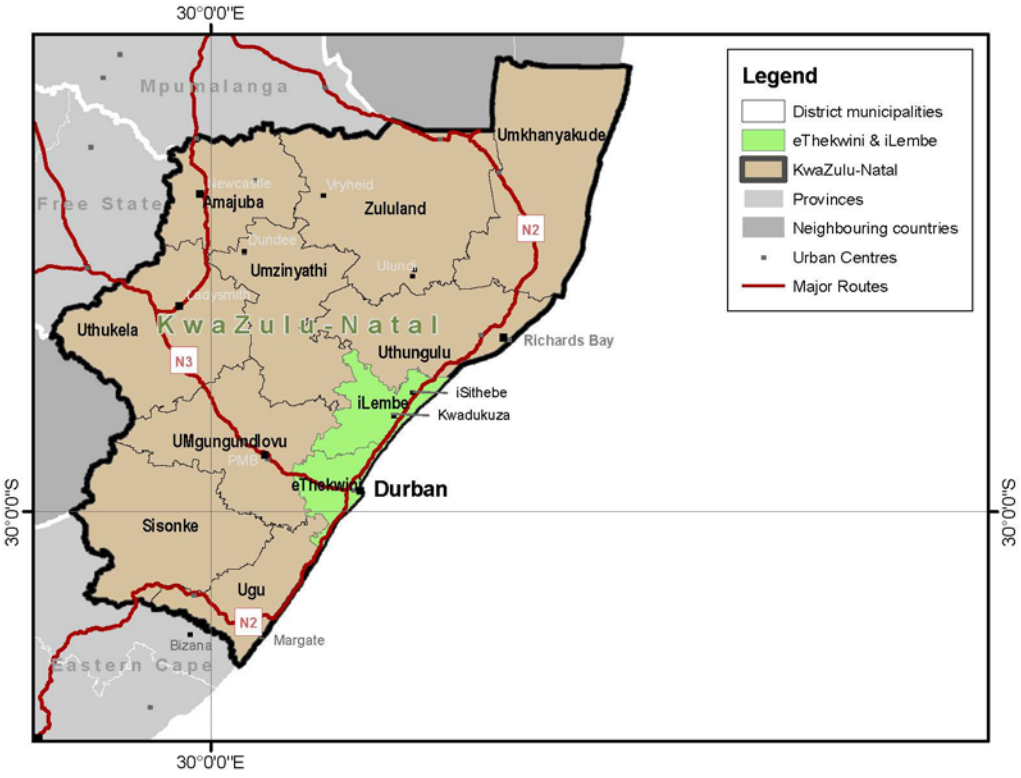
Figure 4.10: Governance jurisdictions for provinces, South African 2018.



Source: DUT Department of Town and Regional Planning, GIS Unit.

While the content of municipal plans is informed by legislation, the conceptual intentions behind local government restructuring are within the green paper on local government restructuring. Conceptually the hierarchical system of government levels, as a function of higher levels, was replaced with spheres of governance, being "*distinct, interdependent, interrelated, yet separate"'* (South Africa 1996). Implicit in this notion of cooperative governance, is the assumption that the coordination of government investment decisions is through local government. The mechanism for coordination and cooperation within governance is intended through the integrated development planning process. In this study, a key challenge for the planning of provincially owned Dube TradePort, was the alignment and incorporation of the project within local government planning processes.

Figure 4.11: Governance jurisdiction for municipalities within the Province of KwaZulu-Natal, South Africa, 2018



Source: DUT Department of Town and Regional Planning, GIS Unit.

Figure 4.11 shows the ten district municipalities and the metropolitan eThekwini Municipality jurisdictions within the Province of KwaZulu-Natal. Although DTP is located within eThekwini, the project was intended for provincial gain and *"sought to reposition KwaZulu-Natal in global supply chains through improved air connectivity"* (Dube TradePort Corporation 2014: 2).

DTP, including the KSIA, fall within the metropolitan jurisdiction of eThekwini Municipality, within the Province of KwaZulu-Natal. Ndwedwe Municipality is located to the west of the airport and KwaDukuza Municipality to the north of the airport. Both municipalities fall within iLembe Municipality.

The complexity lies in the competency and functions assigned to respective spheres of governance. The functional competencies assigned to planning are listed in Schedules 4 and 5 of the Constitution, as *'regional planning and development', 'urban and rural development*', *'provincial planning*' and *'municipal planning*' (van Wyk 2012: 288). The constitution permits the national sphere to intervene in provincial affairs and the province to intervene where a municipality fails to fulfil an executive obligation. Provincial government has the power to monitor and support local government. The constitutional hierarchical distribution of powers is at odds with the cooperative principles of local government restructuring (van Wyk 2012: 288). Approvals over the establishment of the KSIA tested the powers associated with jurisdictional responsibilities, particularly with airports falling under national competencies, environmental approvals under provincial approvals and land use at a municipal sphere. The opposition from the Municipality and the attempts to appeal the approval through the Provincial environmental processes, were withdrawn at '*the eleventh hour*' (Respondent 11:6).

4.5.2 South African air cargo context

In Chapter Two, Section 2.4.2.3 the review questioned whether transport infrastructure investments holds potential for economic growth and development. South African supply side expenditure on infrastructural investment has assumed this relationship. The review supported contextually based arguments that investment in transportation infrastructure is an insufficient precondition for growth and development but requires other factors to be in place. Banister and Berechman (2001: 210) identified factors such as positive economic externalities to benefit from agglomeration and labour market economics (including skilled labour) with a positive underlying local economy to support growth, as well as investment and political factors in the argument. Banister and Berechman (2000: 12) also conclude that if transport capacity investments secure accessibility benefits impacting on market externalities, then it can be argued that transport development can potentially generate economic development.

This review also argued that a more nuanced approach, relating airport development to connectivity, may offer useful insights on the nature of urban development. Firstly, there are differential logics behind the geography of passenger and air cargo flows and the implied air connectivity. In terms of global flows, Bowen (2014: 44) argued that air cargo flows are more strongly localised than air passenger flows, reflecting traditional concentrations of global production output. Air passenger traffic tends to reflect patterns of consumption, specifically the volumes and growth in the middle class. Wandelt and Sun (2015: 55) in their study on international air transportation networks from 2002 to 2013, demonstrate a strong correlation between the Gross Domestics Product (GDP) of a country and topological and functional criticality of air passenger networks. Both geographies reflect spatially differentiated services, where Africa has a relatively marginal role on both low passenger and cargo numbers. However, despite the relatively low passenger numbers at a country level in Africa, South Africa has a high level of air connectivity, attributed to its important role in air traffic connections within Africa (Wandelt and Sun 2015: 63).

Figure 4.12: South African International Airport Cargo and Passenger Volumes

International Airports	**2012/ 2013**	**2013/ 2014**	**2014/ 2015**	**2015/ 2016**	**2016/ 2017**	**2017/ 2018**	**2018/ 2019**
Passengers							
ORTIA Total Passengers	18621259	18820988	19135093	20374998	20692780	21231519	21313943
KSIA Total Passengers	4668467	4465088	4524894	4930155	5220002	5252154	5993161
CTIA Total Passengers	8434799	8392989	8755872	9659589	10211390	10752246	10823737
TOTAL	31724525	31679065	32415859	34964742	36124172	37235919	38130841
Cargo							
ORTIA Total Cargo						394430	399781
KSIA Total Cargo						19498	19320
CTIA Total Cargo						49554	84921
TOTAL						463482	504022

Source: Extracted from Airports Company of South Africa (2017)

Air connectivity in South African is based on a hub and spoke model where OR Tambo International Airport is the main hub, supported by Cape Town International Airport and King Shaka International Airport and a number of regional centrals. However, air cargo and air passenger connectivity differ in the trip purpose, destinations and trip length. Air cargo and air passenger connectivity produce differential geographies and dynamics nationally, across Sub-Saharan Africa and Internationally.

The missing reporting data on air-cargo in Figure 4.12 was not available in the ACSA annual reports reviewed. According to Respondent (12:1), ACSA did not focus on air cargo until recently. Air cargo and the related revenue is currently part of the strategic focus for the company.

4.5.3 Infrastructure-led policy in South Africa

South Africa is strongly committed to infrastructure-led development and this is reflected in the National Development Plan (NDP) (2012) to eradicate poverty and reduce inequality in South Africa by 2030 (South Africa 2012b: 14) The NDP focused on spatial transformation across geographic scales to reduce inequalities in the South African space economy (South Africa 2012b: 37). Part of the strategy targets the expenditure of 10 percentage of Gross Domestic Product (GDP) on public infrastructure investment. The income to support expenditure on transport, energy and water infrastructure will be financed through tariffs, public-private partnerships, taxes and loans (South Africa 2012b: 24). The focus on public infrastructure investment to support efficient movement of goods suggests a reduction in the cost of trade and this in turn impacts on economic efficiencies and growth and, ultimately, poverty alleviation.

The Integrated Urban Development Framework (IUDF) (2016) extended Chapter Eight '*Transforming human settlements and the national space economy'*, of the NDP. The IUDF recognises the dysfunctional land and infrastructure networks undermining scares resources in South Africa. The IUDF vision is for "*liveable, safe, resource-efficient cities and towns that are socially integrated, economically inclusive and globally competitive, where residents actively participate in urban life"*(South Africa 2016a: 10). Underpinning the IUDF is policy lever 4 of 8, namely '*integrated urban infrastructure*', which aims through infrastructure investment to achieve inclusive economic growth to broaden social and economic opportunities (South Africa 2016a: 11).

The Draft National Spatial Development Framework (2019) is consistent with earlier national plans to reinforce investment on the Durban-Gauteng Logistics corridor. One of the four main strategies are directed towards the `national spatial development corridors as incubators and drivers of new economies and quality human settlements' (South Africa 2019a: 93). The national outcomes depicted in the plan support inclusive development related to trade and is conceptually underpined by a national transport, trade and communication network (South Africa 2019a: 100). The National Infrastructure Plan (2012) identified a number of Strategic Integrated Projects (SIP), largely socio-economic infrastructure investments to support freight growth (South Africa 2012d: 17) and this included the Durban-Free State-Gauteng logistics and industrial corridor SIP 2, which intends to strengthen the logistics and transport corridor between South Africa's main industrial hubs and to improve access to Durban's export and import facilities (South Africa 2012d: 18).

Within South Africa, there is again strong policy alignment from national, provincial to local, supporting an infrastructure-led growth path. The National Development Plan (NDP) argued the case for greater integration in the global economy to engage with new opportunities based on a leap in trade that promotes sustainable and inclusive growth by 2030 (South Africa 2012c: 49). Transport infrastructure featured in the NDP where the movement of goods from points of production to where they are consumed, facilitate regional and international trade (South Africa 2012c: 187). The NDP spatially targets the development of the Durban-Gauteng freight corridor in terms of the role of moving the country's high value freight (South Africa 2012c: 166). The National Medium Term Strategic Framework 2014-2019 in support of the NDP, reiterates the development of efficient competitive and responsive economic infrastructure, supported by Strategic Integrated Projects (SIPS) (South Africa 2017e: 23-24). The Durban-Gauteng corridor or SIP2 corridor aligns with the NDP to ensure that infrastructure is adequately planned and coordinated to promote the efficient movements of goods (South Africa 2012d). At a provincial level, DTP and the emerging '*Aerotropolis*' plays a central role in KwaZulu-Natal's Provincial Growth and Development plan, 2011-2030 (South Africa 2011b: 118) and is located on the

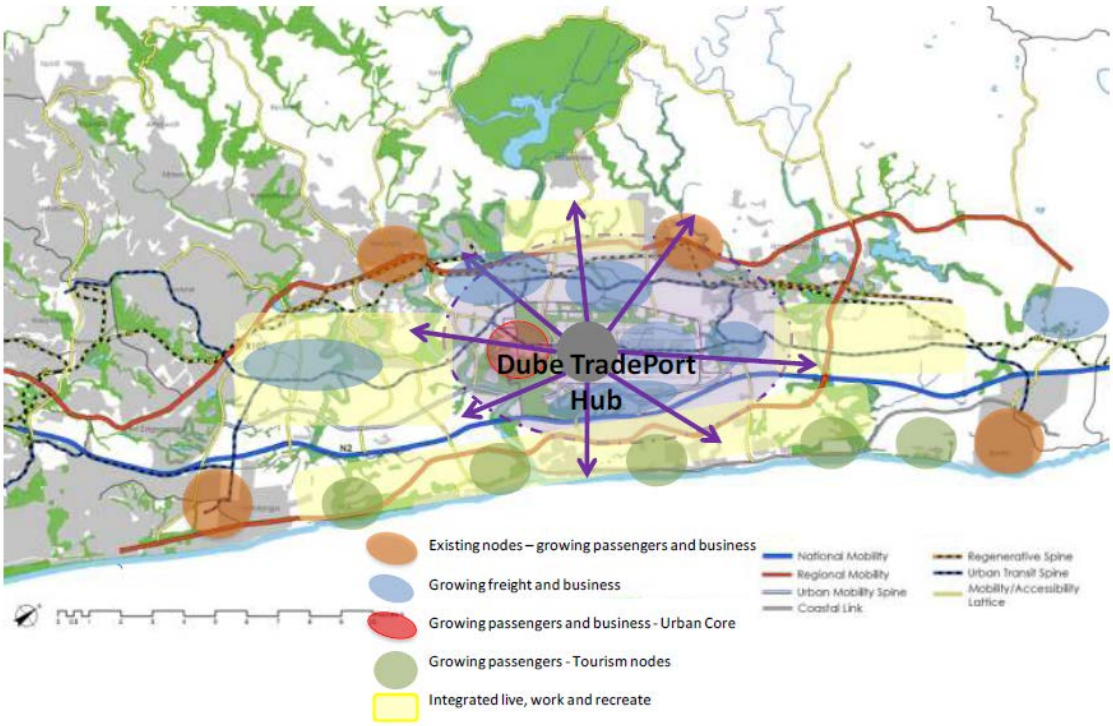
provincial northern corridor. Refer to Appendix 3 for the Province of KwaZulu-Natal hierarchy of nodes and corridor plan. The Spatial Land Use Management Act (SPLUMA) informs spatial planning nationally across all spheres of governance, especially local municipal land use management schemes (LUMS) supports infrastructure led development and ensures that '*spatial planning is insufficiently underpinned and supported by infrastructural investment*' (South Africa 2013b: 1).

4.5.3.1 Aerotropolis Plan

The Aerotroplis Plan is a variation on infrastructure led development underpinned by regional economic development strategies (Luthuli and Houghton 2019: 197). The Aerotropolis is an airport centred development model that offers air transport related and dependent firms the infrastructure and connectivity for people and goods.

The concept of the Aerotropolis was first introduced in KwaZulu-Natal in 2008 to communicate the regional impact of airport led development (Respondent 1). The term '*Aerotropolis*' was popularized by John Kasarda (Kasarda and Lindsay 2011), but is essentially a business model for air cargo and air passenger related development. However, due to the spatial representations of land uses related to airports, particularly air cargo operations, the aerotropolis terminology is used to brand airports aspiring to global recognition. The aerotropolis model as a direct translation into a planning model is arguably problematic in terms of scale of infrastructure, potential for sprawl and carbon implications to the form of development envisaged.

Figure 4.13: Aerotropolis Joint Initiative Phase 1 Spatial Concept Plan



Source: Dube TradePort and Tongaat Hulett Development (2011: 24)

The KwaZulu-Natal Aerotropolis planning processes have been developed and championed by various actors over the past decade. The Aerotropolis Joint Initiative (AJI) between Tongaat Hulett and Dube TradePort, 2008-2011, resulted in a plan that formed the basis of engagement with municipal officials and influenced subsequent planning to the north (Respondent 1:1). Refer to Figure 4.13 above for an early iteration of the KwaZulu-Natal Aerotropolis.

In terms of the plan, the KwaZulu-Natal TradePort Regional Framework, is a thirty-year framework intended to catalyse economic growth for the sustainable development of the Kwazulu-Natal TradePort Region. Key strategies included 1) grow freight and improved logistics and multimodal port functions; 2) grow passengers with international and domestic business and tourist functions; 3) grow connectivity and integration; 4) develop integrated living, working and recreating environments; and 5) promote sustainable development. The strategies supporting the plan were relatively

uncontested at the time, however undertaking a major planning process without collaborating with the municipality fed into the existing tensions with the planners (Respondent 1). According to Respondent 1, a strength in the AJI Regional TradePort planning process was the integration of infrastructure and transport capacity planning with strategic land use planning.

In 2012, the KwaZulu-Natal Department of Economic Development and Tourism, commenced with the development of the KZN Integrated Aerotropolis Strategy (IAS) (South Africa 2012a), in alignment with the provincial growth and development strategy (PGDS). The KZN Integrated Aerotropolis Strategy was adopted by the KwaZulu-Natal Executive Council in October 2014, and approved by KZN Provincial Cabinet in October 2015, with the recommendation to prepare the Durban Aerotropolis Master Plan (South Africa 2019c: 546-547). The IAS (2014) strategy was based on 1) growing air services and connectivity, 2) Integrated and Coordinated Spatial Planning, specifically aligning SDFs with the proposed designated aerotropolis area and 3) delivering equitable and inclusive growth (Republic of South Africa 2014: x-2). The process led to the formation of the Aerotropolis Institute with the launch of the new Durban Aerotropolis plan. Refer to Figure 4.15 for the KZN Integrated Aerotropolis Strategy.

The process for the development of the IAS was driven by provincial governance, with `*input*' from municipal spheres of governance. The KwaZulu-Natal Integrated Aerotropolis Strategy is described as a `*comprehensive*' plan (South Africa 2019c: 546). Rational comprehensive approaches to planning are associated comprehensive, master plans, and are associated with expert drive, top down approaches (Hall 2005: 528). Of concern is the potential shortcoming with provincial-led implementation plan to align municipal spatial frameworks and influence local budgeting processes.

The dominant narrative surrounding the '*aerotropolis*' is '*an urban form centered around an airport*' that attracts investment and drives economic growth and development. According to the KwaZulu-Natal Department of Economic Development and Tourism Affairs departmental webpage, the

> ''*aerotropolis' may be described as an urban form placing an airport at its centre with a city developing around it, linking workers, suppliers, business decision-makers and goods to the global marketplace. Air cargo today is a major force in the global context, connecting the world, driving business location and promoting competitiveness. The world's major airports are becoming significant points for production, affording businesses three vital attributes: speed, agility and connectivity. Regions meeting these attributes will attract inward investment and major airports have, therefore, emerged as potent drivers of economic growth and development*" (South Africa 2019d).

Of concern is that the `*global*' element is given prominance, where as the opportunities for economic development are related to `*localising*' development towards inclusive and transformational outcomes.

Figure 4.14: KwaZulu-Natal Aerotropolis, 2014.

Source: Republic of South Africa (2014: 37)

The Durban Aerotropolis Master Plan (DURAMP) was adopted by the KwaZulu-Natal Provinical Cabinet in November 2017. The study area for DURAMP relates to a flexible one-hour travel time from KSIA and is centered on the Aerotropolis City. The Aerotropolis City spans the M41 to the south (including Cornubia), to Compensation, Ballito in the north and the P521 and P715 in Ndwedwe to the west.

Figure 4.15: Aerotropolis City within the Durban Aerotropolis Plan, 2018

Source: https://www.dubetradeport.co.za/Pages/Programmes/Aerotropolis

The Durban Aerotropolis Plan, indicated in Figure 4.15, has a number of key airport-related features consistent with previous plans. The plan appears more resolved and updated as detailed planning to the west of Dube TradePort on Tongaat Hulett land is included in the plan. Dube TradePort's success is pinned to the Special Economic Zone as "*the heart of the first purpose-planned aerotropolis in Africa*" (Dube TradePort Corporation 2019e). A key advantage to the Durban Aerotropolis Master Plan is the government engagement process that managed to unlock further infrastructural investment for the project, such as a public transport link to KSIA and

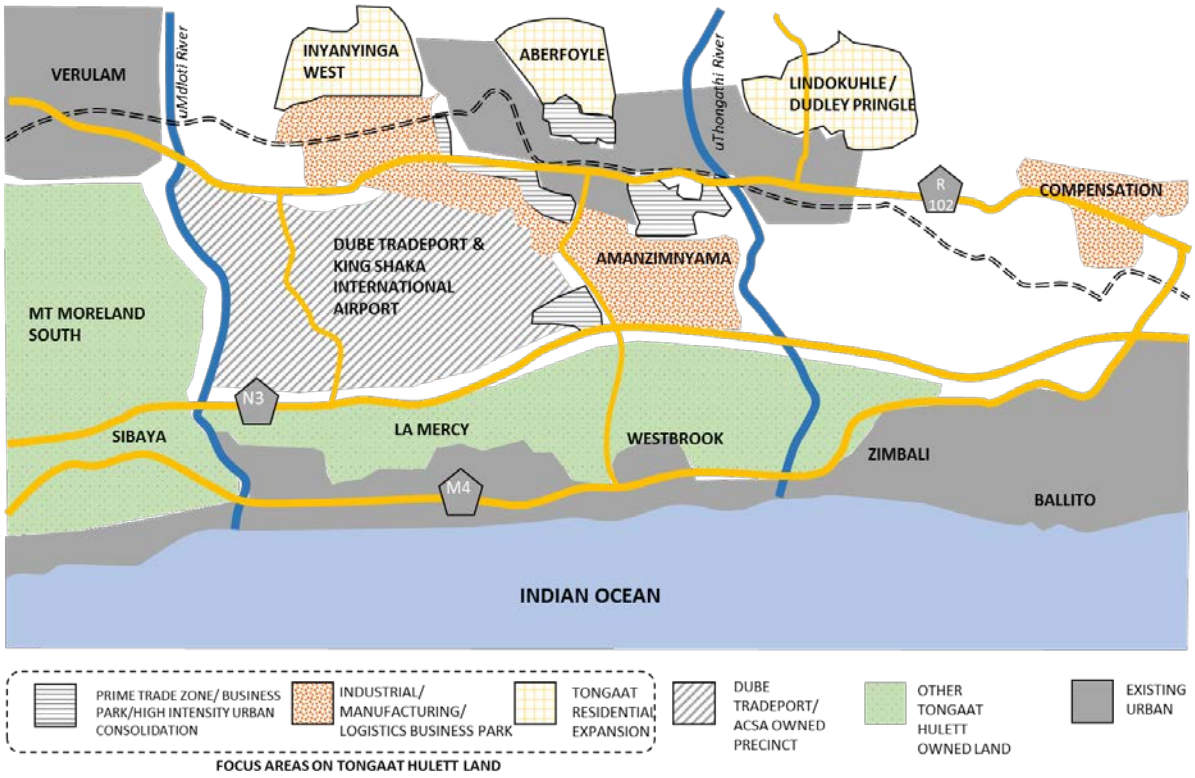
the Umdloti Regional waste-water treatment works as PPPs through National Treasury (Dube TradePort Corporation 2019e: 17). Dube TradePort has an extended role as a result of the Durban Aerotropolis Master Plan that included the development of the Automotive Supply Park in Illovo, South Coast.

The Durban Aerotropolis Master Plan is championed by provincial government of KwaZulu-Natal, in collaboration with the private sector, municipalities and state entities. The role of DTPC in the process is the "*formulation of the integrated regional spatial planning and development of the Durban Aerotropolis*". (Dube TradePort Corporation 2019e). Two issues appear unresolved. Firstly, the scale of the Aerotropolis City within the Durban Aerotropolis is not regional but relates to a portion of a metropolitan area. Adjusting the plan to a jurisdictional boundary is arbitrary given that the relationship with Dube TradePort are not necessarily functional or related to proximity within Durban. The process of embedding the Aerotropolis City within the municipalities, may require that some provincial `*control*' be relinquished. Secondly, the term Durban Aerotropolis '*Master Plan*' has been used in conjunction with a '*development framework*'. Terminology of a master plan is associated with '*blueprint*' planning from a rational comprehensive history and is at odds with more normative notions of flexible investment frameworks.

4.5.3.2 Private sector planning by Tongaat Hulett

Tongaat Hulett is an agri-processing company with starch and sugar operations in six countries in the Southern African Development Community. It was also a well-established company, with 8,091 developable hectares of land in KwaZulu-Natal, near Durban and Ballito identified for land conversion from sugar production to urban development (Tongaat Hulett 2018: 25). The land conversion component of the business is particularly relevant to the study, given the extent of the land holdings around Dube TradePort and KSIA. Planned, future land uses for the northern corridor are therefore relevant to understanding the broader contextual relations of the Dube TradePort case, and how land use changes relate to public investment spending.

Figure 4.16: Tongaat Hulett Land Handlings



Adapted from Tongaat Hulett (2016:35)

The extent of privately owned land illustrated inFigure 4.16. The bulk of this isheld by a single land owner, surrounding the state owned Dube TradePort site, and this contributes to exceptional circumstances for thinking about Dube TradePort as an outlier case (Rule and John 2011: 41). Tongaat Hulett owned approximately 5,374 hectares of land on the northern corridor when the airport opened in 2010 (Tongaat Hulett 2010: 4). By 2014, the company through their land conversion process identified some 1,725 Ha of developable land in the airport region, which were anticipated to sell by 2019. However, broader developments in the group have subsequently impacted on land development operations.

In the period under review the Tongaat Hulett share price dropped from 15,026c in 2 March 2015 to 2,950c on 25 Feb 2019 with the voluntary suspension of the listing of

Tongaat Hulett shares on the Johannesburg Stock Exchange (Tongaat Hulett 2019). The fall in value of the company assets occurred after 2018, but is relevant as the events impacted on real and perceived land values in proximity to the airport.

As a single, private landowner, Tongaat Hulett, exerted influence on the planning processes related to their land and the wider development corridors of eThekwini and KwaDukuza Municipalities (Todes 2014: 255). Refer to Figure 4.16 above to indicate the extent of the Tongaat Hulett landholding with the focus on converting land to new commercial, industrial and residential opportunities. In support of the influencing planning on the Northern Corridor, Tongaat Hulett and Dube TradePort entered into a joint planning process from 2008 to prepare the Joint Regional Aerotropolis Plan, in anticipation of the airport opening. The collaborative planning processes between Tongaat Hulett and Dube TradePort were was not only directed at the airport and adjacent land, but focused on corridors where substantial land is owned. Todes (2014: 245) previously found that Tongaat Hulett as a major landowner shaped growth and development in the north, through participation in multiple planning and engagement processes and ultimately influencing land values. The review of Tongaat Hulett Integrated Annual Reports between 2010 and 2018 supported the dominant discourse that land conversions can be profitable. A key strategy, consistent across the reporting period, is that the group unlocked land value and related profits through their land conversion programme. Planning approvals and phased infrastructural investments are supply side tools influencing the production of space. Land conversions follow strategic planning processes that influence future land use along with subsidised bulk infrastructure investments. In terms of regulatory approvals, the acquisition of development rights typically requires land use approvals (South Africa 2013b), environmental impact assessments approvals (South Africa 1998) and agriculture approvals (South Africa 1970).

Tongaat Hulett shaped the production of space on the northern corridor through the strategy of capturing land value through infrastructure development, converting sugar

cane to developable land and the related income of land sales for development purposes. The importance of influencing the supply side factors in land value were found in in 2015 Annual Report statement that

> "*the value achieved per hectare of land sold is increasingly reflecting the steadily improving land conversion platform and varies based on usage and location. A progressively larger area is benefitting from planning activities and infrastructural investment at key points*' (Tongaat Hulett 2015: 33).

Tongaat Hulett were reported to overstate their 2018 financial results by an estimated R3.5 to R4.5 billion and this was attributed to impact of cheap sugar imports, sugar tax and lack lustre property market (de Villiers 2019). According to the Tongaat Hulett (2018: 5) the company "*invested R979 million into land earmarked for future sales, to create a sound planning and infrastructure platform*", of which R489 million was located in Cornubia. However, speculative land investment based on anticipated airport led development fell short in the demand for industrial land sales (Respondent 8:3). It was reported that in the period 2016-2018, 171 hectares were sold while a further 185 hectares were made available through land investments and not sold (Tongaat Hulett 2018: 5). The issue of whether the alleged overstated financial results are linked to the starch, sugar or land development operations is unclear. The related operating profit the period 2010-2018 across the three operations is estimated from

Figure 4.17 as R 4,138 billion for starch operations, R 7,858 billion for sugar across four countries and R 5,244 billion on the northern KwaZulu-Natal corridor.

Figure 4.17: Tongaat Hulett Profits over 2010-2018

Operating Profit	**Starch Operation**	**Sugar Operation**	**Land conversion and development**	**Land conversion profit per m^2**
	2018: Operating profit related to lower maize prices and record crop	2018: Operating profit related to increased production, yet global price of raw	2018: Investments underpinned future land sales in areas related to negotiations and	

	production of maize	sugar low. Sugar operations are in Zimbabwe, South Africa, Swaziland and Mozambique.	market enquiries. Land operations in KwaZulu-Natal	
Operating profit 2018/17	R572 million	R837 million	R661 million (sale of 96 hectares)	R689
Operating profit 2017/16	R510 million	R1,271 billion Note: Tongaat Hulett (2017:3) IAR reported on 2016 loss of R15 million and this contradicted 2016 Tongaat Hulett (2016:3) IAR reported profit of R124 million	R641 million (sale of 75 developable hectares)	R855
Operating profit 2016/15	R658 million	R124 million	R1,115 billion (sale of 121 developable hectares	R921
Operating profit 2015/14	R561 million	R806 million	R829 million from sales of 108 developable hectares	R768
Operating profit 2014/13	R482 million	R908 million	(2014: profit of R1 080 million from sales of 259 developable hectares	R417
Operating profit 2013/12	R388 million	R1,435 billion	R350 million from sale of 65 developable hectares	R538
Operating profit 2012/11	R363 million	R1,428 billion	R215 million (sale of 42 hectares	R512
Operating profit 2011/10	R303 million	R 840 million	R166 million (sale of 144 developable hectares)	R115
Operating profit 2010/09	R301 million	R1,046 billion	R187 million (sale of 169 developable hectares)	R111
TOTAL	R 4,138 billion	R 7,858 billion	R 5,244 billion	R547 Average

Source: Extracted from Tongaat Hulett Integrated Annual Reports from 2010-2018

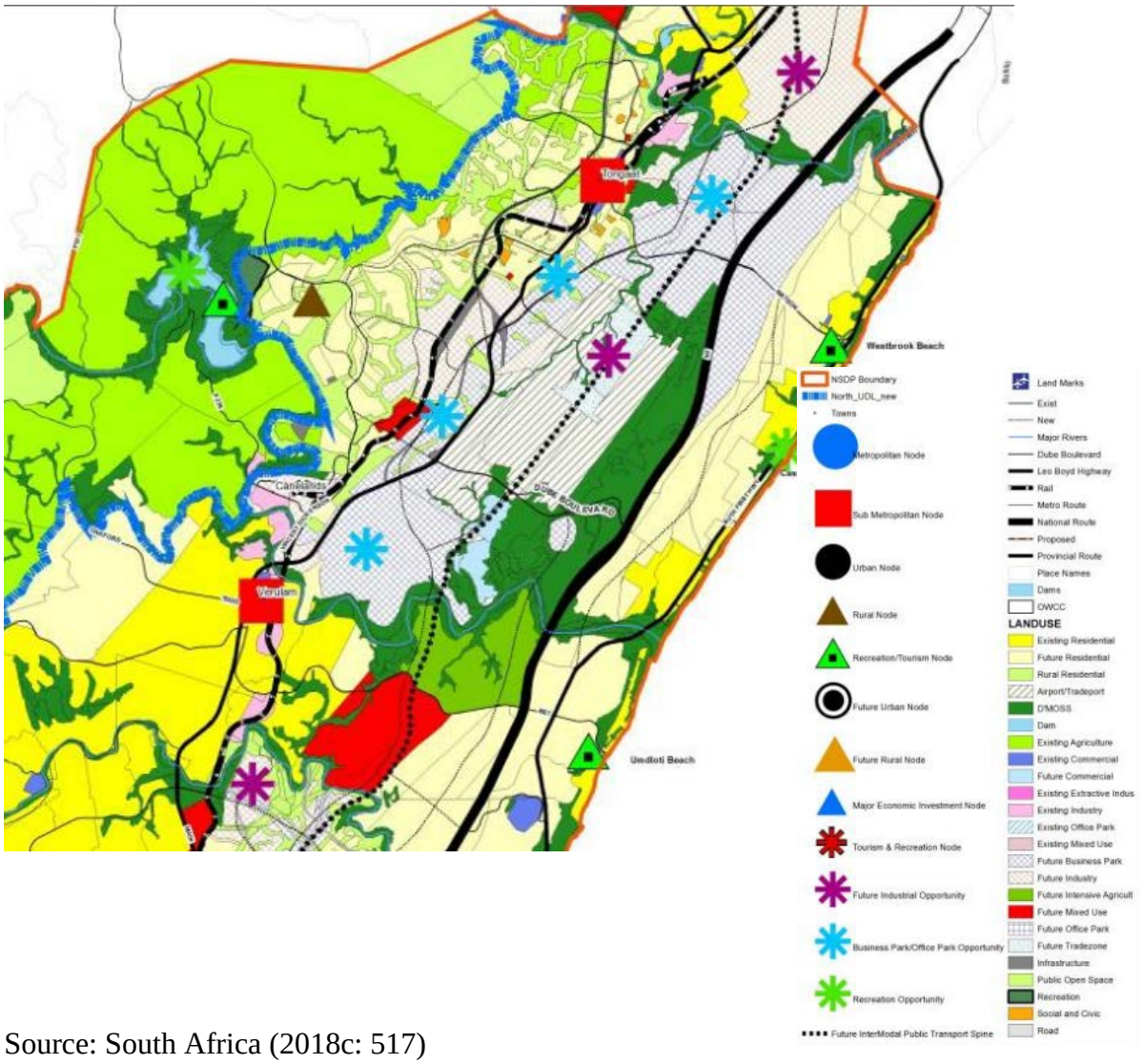
Of significance in Figure 4.17 is the increase in the profitability of land conversions after the opening of the airport from R115 a square meter in the financial year 2011, to an average of R670 per meter squared for the financial years 2011-2018 after KSIA opening.

The land conversion programme of Tongaat Hulett managed to generate private value of some R5,244 billion operating profit between 2010-2018 with a reported investment in infrastructure and planning of R979 million in 2016-2018. These findings on land indicated that the Tongaat Hulett land value responded to the opening of the airport on the Northern Corridor based on the reported profits from sale conversions and land sales. Recently developments within the group have questioned the absolute values published although relatively values do indicate shifts after KSIA opening. Tongaat Hulett land profits were overstated due to problematic accounting practices, where land expenses were not reflected against profits in the actual year of reporting. The practices of both deferring costs and attributing costs as assets were identified in the recent PwC investigation into the Tongaat Hulett accounting scandal (Gernetzky 2019). And yet despite the supply side support of the state in planning approvals and significant investment in the north, the take up and demand for land fell short.

4.5.3.3 eThekwini Municipality Support

Initially, the municipality support, and at the level of officials, was missing (Respondent 11:7) and politically reflected in locally disconnected practices, such housing projects being approved at Waterloo with potential noise impacts. Lack of municipal support was attributed to lack of municipal investment in the project with no ownership or board level representation in the provincial entity (Farole and Sharp 2017: 25). However, interviews indicated deeper national political and personality issues at play (Respondent 11:7,11:9; Respondent 14:4).

Figure 4.18: Extract from the Northern Spatial Development Plan 2013/204 contained in eThekwini Spatial Development Framework 2017



Source: South Africa (2018c: 517)

However, by the time the Special Economic Zone (SEZ) was established, coordinated investment and shared planning through the Aerotropolis Initiative emerged, including municipal support. Municipal concerns that DTP were on the edge of the Durban city shifted with municipal plans indicating DTP is on the Provincial corridor and in close proximity to historically disadvantaged towns and townships. The notion that Durban has a single centre around the Port was challenged through the polycentric spatial concept guiding the future development of eThekwini Municipality. Dube TradePort is included on the '*Prime Investment Corridor*' as part of the `*SDF priority urban*

investment areas' (South Africa 2018a: 10). According to the Built Environment Performance Plan, it was anticipated that private sector investment will be in the order of some R13bn, and in turn generate annual rates of approximately R180m with an estimated 150,000 broader employment opportunities and 2,060 permanent jobs (South Africa 2018a: 50). In terms of the broad, municipal spatial development plan, some 175 hectares were identified for industrial purposes on northern corridor (South Africa 2018c: 373). The document implies that the demand for industrial land responded to airport related opportunities, and yet the Northern Spatial Development Plan prepared in 2013/2014 and annually revised, restricts the expansion of industry locating within TradeZone 3 and 4. Refer to Figure 4.17 for an extract from the Northern Spatial Development Plan. The adjacent land to the west and north of Dube TradePort is reflected as future business park and office opportunities on the Northern Spatial Development Plan, included in the eThekwini Spatial Development Plan. Planning at a land use scheme level is possibly the most significant contradiction with airport related development. The portions shown in yellow relate to areas with the scheme where land use changes can be considered by the municipality. Refer to Appendix 9 to view the scheme areas. Outside of these scheme area, including portions of the DTP site, requires elusive approval from the Department of Rural Development and Agriculture to release these areas from agriculture for development purposes.

While the political support for airport related development is evident in the municipal strategic planning documents, there are some contradictory planning obstacles curtailing expansion beyond the currently approved industrial neighbourhoods.

4.5.3.4 Public sector local planning

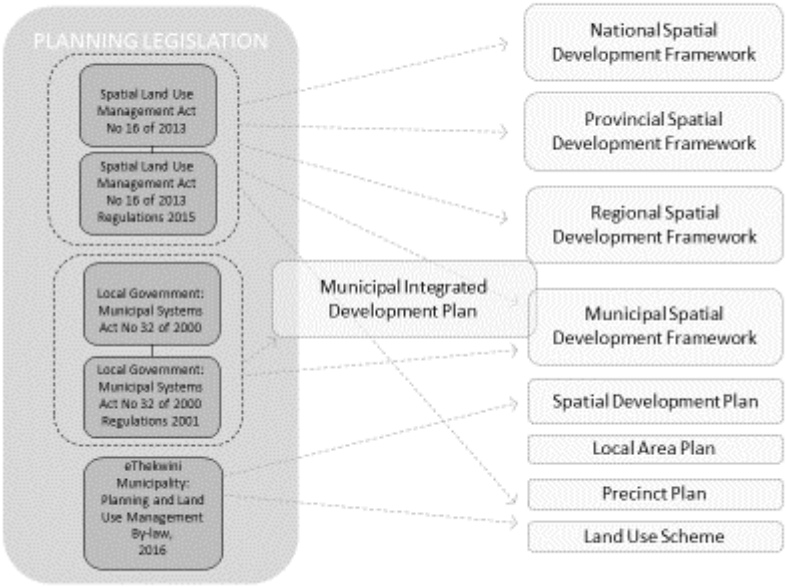
The opening preamble of national planning legislation, Spatial Land Use Management Act (SPLUMA) acknowledges that "*spatial planning is insufficiently underpinned and supported by infrastructural investment"* (South Africa 2013b: 1). The misalignment between spatial planning and infrastructure investment, is by extension an

implementation challenge, which relates to financial and/or human resources. The South African planning system is based on a strongly state interventionist and legislative approach. The complexity is represented in Figure 4.19. Overhaul of the planning system through the implementation of the SPLUMA extended a single planning system throughout the country. SPLUMA attributes the root of racial inequality, segregation and unsustainable settlement patterns to spatial planning, land use laws and practices (South Africa 2013b: 2). Intentions to overcome this legacy are contained in the SPLUMA preamble to

> "*achieve cooperative governance and the promotion of public interest*" and integrate "*informal and traditional land use development processes …into formal systems of spatial planning and land use management*" (South Africa 2013b: 2).

In effect the new planning system replaces a fragmented planning system with an overly complex, layered system based on normative Chapter Two principles underpinning inclusive, developmental, equitable and efficient planning. The legislation introduces national spatial development framework, provincial spatial development framework, regional spatial development framework, municipal spatial development frameworks and land use schemes. Currently the Draft National Spatial Development Framework is process of being approved.

Figure 4.19: Planning legislation impacting on the local sphere



Source:Self generated by the reseracher

Locally DTP is featured in the eThekwini Integrated Development Plans (IDP) despite earlier political contestations with the municipality (Todes 2017) to the inclusion the project within the development area of the City. Although the strong national policy alignment is evident, the coordination, sequencing and funding of infrastructure locally is a challenge. Key impacts emanating from freight movements in the Spatial Development Framework include the sub-optimal split of moving goods by road instead of rail from ports; associated GHG emissions of freight travel and challenges of growing exports within an economic slowdown and downgraded investment climate (South Africa 2018c). The SIP 2: Durban-Free State-Gauteng logistics and industrial corridor is included in the spatial framework eThekwini Municipality, and yet ironically the SIP 17: regional integration for African cooperation and development, is not included (South Africa 2018c: 35). The planning omission of the port and airport's role in regional trade, probably relates to the dominance of the road-based freight role between the port and the Gauteng hinterland. The SIP2 is spatially

and narrowly translated into the N3 western corridor, without linking this to the N2 related industrial and logistics uses (South Africa 2018c: 88).

DTP falls within the prime integration zone of the Built Environment Performance Plan (BEPP)[xix]. In effect this means that the focus on redevelopment and regeneration opportunities with increased density and intensity of development, and targeted public investment, including the DTP site. However, investment in public transport on the C8 link between the city and KSIA through the Integrated Public Transport Network (IPTN) is planned for 2026 (South Africa 2018c: 309).

In terms of the metropolitan strategic plans in Ilembe District and including the municipalities of Ndwedwe Municipality, KwaDukuza Municipality, as well as eThekweni Municipality, the plans are aligned to opportunities for growth related to agriculture exports, tourism potential and value added manufacturing and logistics. The extract from the municipal spatial development plans shows both infrastructural alignment and land use compatibility.

1. Appendix 4 indicates how within iLembe the N2, R102 and P100 link through `Priority Infrastructure Routing' to Dube TradePort. Numerous references to the strategic opportunities presented by DTP are made in the document (South Africa 2016b: 127).
2. Appendix 5 includes the 2017/2018 eThekwini SDF with opportunities for `business parks' and `densification corridors' linking the northern corridor through to Tongaat (South Africa 2018b: 325). The eThekwini Municipality SDF makes references to Dube TradePort, where the area is classified as an emerging sub-metropolitan node (South Africa 2018b: 325). . The site on the northern urban development corridor is identified for future intensified development led by infrastructural investment and indicates broad support for the northern growth of the city.

3. Appendix 6 related to the 2010/2011 eThekwini SDF that was revised in support of the opening of the site in May 2010. Appendix 7 includes the 2008/2009 eThekwini SDF that indicates where the then proposed DTP development fell outside of the urban edge but on a future growth corridor. The reference to the municipal compromised support for DTP is shown as a hatched arrow north (Respondent 11:7).
4. Appendix 8 contains the Northern Urban Development Corridor plan. The lack of alignment with the local area plan and the broader support is visible in the plan and in the document. The full development of the site is curtailed by the lack of infrastructure, restrictive land uses and further proposed planning processes.
5. Appendix 9 indicates the scheme areas where development is permitted subject to planning approvals within the municipality. Outside of the scheme areas, the approval of KwaZulu-Natal Department of Agriculture and Environmental Affairs (DAEA) is required to release land for development purposes. The departmental position is currently reluctant to release high potential agricultural land, specifically in the north, for development purposes (South Africa 2019b: 248). In effect, planning applications requiring Act 70 of 1970 release from agricultural purposes, are not successful, subject to time delays, with unclear appeal procedures (Respondent 10:2). In effect planning at the land use scheme level presents a significant challenges for the development of land in eThekwini, KwaDukuza and Ndwedwe Municipalities.
6. Appendix 10 includes the SDF for Ndwedwe Municipality indicating broad land-use and infrastructural alignment with the opportunities presented by Dube TradePort. The document supporting the SDF, prepared by the same consultants as the iLembe District, indicate strong support for DTP based on economic opportunities for the municipality (South Africa 2017d: 61).

In response to Figure 4.18, the municipal plans reviewed fulfil the various legislative requirements. In the review of municipal integrated development plans and spatial development frameworks, the following was found.

1. Integration: The new SPLUMA spatial planning system is intended to overcome the challenge that "spatial planning is insufficiently underpinned and supported by infrastructural investment: (South Africa 2013b: 2). In the Municipal planning documents reviewed, the local plans are shown to vertically integrate, and demonstrate consistency, with higher order plans and policies, in order to access and achieve alignment on infrastructure spending; Vertical integration down to the scale of land use schemes are included in the SDFs reviewed and this demonstrates land use compatibility. However, vertical integration tends to be compliance based, demonstrating spatial vertical and multi-scalar integration. Conceptually vertical integration in municipal plans are assumed to occur within the hierarchical package of plans. However, vertical integration is not simply consistency of land use plans, or even consistency of infrastructure. Vertical integration is about shifting relations between actors and places over time and is difficult to capture in an annual fixed spatial plan. The endpoint of vertical integration is not at the national scale, but thinking about multi-scalar activities occurring at a range of scales locally, regionally, provincially, nationally, continentally and international simultaneously, and embedded locally.
2. Horizontal integration is reflected in the SDF comments on adjacent land use and infrastructure aligned with the adjacent municipality through cross border committees. The municipal plans indicate physical compatibility and alignment, and acknowledge cross border processes, provincial government forums and aerotropolis forums to engage. Physical integration can be the outcome of an integrated process between land use planners, engineers and transportation

planners across municipal boundaries. Municipal plans do not indicate that alignment is informed by such integrated processesxx between planning, transport and engineering departments and therefore municipal integration is compliance based within rather substantive and joint infrastructure planning functions between municipalities.

3. In the context of planning processes in the airport region on the northern corridor, there appears to be broad alignment between spatial plans and infrastructure spending. Comparison of the variations of Aerotropolis Plans with the NUDC, Tongaat Dube Local Area Planxxi (LAP) (South Africa 2011a) show broad alignment on roads and land use. Tongaat Hulett and Dube TradePort, have been critiqued for undue influence over municipal planning processes, and yet interviews with planners from these organizations suggest contested relations.
4. The review identifies the prominence given to opportunities related to the Durban Port relative to Dube TradePort and King Shaka International Airportxxii, within municipal plans. Opportunities related to strategic logistics infrastructure are significantly developed for the port, but unclear in terms of the airport. Within the planning documents, the concept of cargo flows generally refers to sea cargo flows, and the interaction between ports and airports to support the logistics requirements of firms is weakly developed in the eThekwini planning documents. Dube TradePort related opportunities identified by eThekwini Municipality relate to opening up industrial land, whereas Ilembe focused on the potential for agricultural exports through the Dube TradePort development (South Africa 2016b: 45). KwaDukuza identified a range of opportunities that include strengthening tourism offerings, exporting perishables, establishing competitiveness in supply chains, supporting high value manufacturing and value-added logistics in the adjacent municipality (South Africa 2017b: 45).

4.6 Chapter summary

Chapter Four provides the context for understanding how the movement of goods through Dube TradePort is territorially embedded in multiple scales. At a broad scale, municipal, district, provincial and national planning frameworks are clearly aligned to the perceived economic opportunities of infrastructure-led development, particularly related to airport infrastructure. Some lack of alignment was identified at a scheme scale and is reflective of insufficient alignment between Provincial line function departments.

The decision to engage with international trade flows, from a weak position within structural and geographically inequalities, is contentious. However, the South African government has committed substantial resources to engage with these trade flows through infrastructure led development. This chapter demonstrates consistencies in infrastructure spending to support the chosen development path. However, there is a failing in how the local plans articulate the national development path. At the local planning scale where that understandings of how air cargo relates to land use and other modes of transport is weakly articulated in plans.

The air-cargo context demonstrates the relatively weak position that Africa holds in terms of global trade integration. Yet, despite this marginal position, Africa has demonstrated significant growth in air cargo, off a low base with subdued levels of economic activity. Chapter Five will look more closely at the case of Dube TradePort on site in order to understand what these flows mean for a greenfields airport with air cargo capacity, outside of the main ORTIA hub in Africa.

CHAPTER FIVE

RESEARCH SETTING AND DUBE TRADEPORT CASE STUDY

5.1 Introduction

The purpose of this Chapter is to outline the case study research by drawing from the contextual setting from the previous Chapter Four. The case is nested within the multi-scalar global and African contexts outlined in Chapter Four. The first section of this Chapter introduces the case study research design, rationale for the case, and research methods. The second section outlines the context and the case study research findings.

The case study raises the following thematic issues for the study:

1. The development of Dube TradePort (DTP), including King Shaka International Airport (KSIA), was based on the rationale that airports support trade and the movement of goods between global and regional economies, through improved logistics at the local scale. The case study interrogates the assumption that long-term investment in airport infrastructure and related industrial uses support multi-scalar connectivity for flow of goods. Does the case of DTP have sufficient preconditions to support international trade with the expanding Sub-Saharan markets? Are the flows of goods focused internationally, intraregional or subnational?
2. This case study focuses on how a purpose-built airport with precincts containing specialized infrastructure and related uses, interacts with the local flow of goods as distinct from passenger flows. How do these material flows through DTP related to territorial embeddedness? Reflecting on dimensions to territorial embeddedness the following sub themes are raised:

a. Does the planning of DTP play a role in attracting foreign and local investment and related trade? Do relations between firms and DTP secure foreign and local investment?
b. How do flows through DTP relate to land uses in the northern corridor. Do flows relate to places of production and distribution? Is value-added locally?
c. How do flows relate to other modes of transport locally or landside?

5.2 Research setting

5.2.1 Rationale for the case study

The introduction chapter in section 1.9.1 justified the qualitative research design by relating the case design to the type evident required to answer the research question. The main research questions are exploratory and aim to understand the relationship between airports and logistics, and how these relate across scales, with other modes of transport and other land uses interacting with goods. The emerging airfreight logistics phenomena is explored within the context of a case. It is argued in the case selection that DTP, including King Shaka International Airport, differs from other South African airport related development. The nature of the socio-economic context in which the development is grounded raises some pertinent issues for the field of urban planning.

The case of DTP is considered as an object of study that is '*bound*' in terms of air-cargo related activity and research time frame from first opening in 2010 to 2018. From a relational perspective, it is assumed that the activities of DTP relate to KSIA, the Cargo Terminal and the surrounding DTP site, however some relations may extend beyond geographic proximity as the '*Aerotropolis*' plan suggests (Republic of South Africa 2014: 1). In this sense the requirement for cases to be '*bounded*' as in defined, is not necessarily geographically or cadastral related.

5.2.2 Case study selection

The criteria for selecting the case study is based on trying to understand and gain insights into the dynamics of planned airfreight logistics. In other words the selection of the case is secondary to the research object. Stake (1994: 237) referred to this heuristic as an '*instrumental case study*', which differs from an '*intrinsic case study*', as the case is supportive and almost of secondary interest to airfreight logistics. The selection criteria that separate the case from other South African air-cargo related phenomena, are as follows: The criteria used to select the case study were 1) proximity of a sea and air port, 2) existence of intra-regional air cargo flows, 3) a greenfield development, 4) purpose-built air-cargo infrastructure and 5) application of Special Economic Zone (SEZ) industrial policy.

1. Contextually, the Durban Sea Port Container Terminal (DCT) has a significant impact on trade and logistics in Africa. The DCT is Africa's busiest sea container terminal, and increased capacity from 3.6 million to 4 million TEU with berth expansions. In effect Pier 1 and Pier 2 of DCT handled approximately 65 percentage of South Africa's 4,8 million TEU container traffic[xxiii] (Ports Regulator of South Africa, 2015:7). The location of the airport some 35 kilometers north of the port, where both infrastructure handle international, sub-Saharan, regional and local freight, generates a logistics role for the city. Comparatively CTIA is located some 20 kilometers west of the Cape Town Container Port (the second biggest sea port container terminal), handling some 0,9 million TEUs relative to the 2,8 million TEUs in Durban (Transnet 2019). Refer to Figure 5.1. The bulk and break-bulk ports on Figure 5.1, includes Port of Richards Bay adjacent to the Richards Bay Industrial Development Zone and contains the largest coal export facility in Africa, the Richards Bay Coal Terminal (RBCT). The Port of East London on the Buffalo River, and handles bulk, break bulk and containers. The Coega Industrial Development Zone adjacent to the Port of Ngqura, is a deep water bulk port designed to handle transhipment cargo. The Port of Saldanha Bay is a natural deep water

port and the terminal contains Africa's largest iron ore export facility. These bulk ports are not linked into international airport facilities. Thus the selection of international airports handling freight in the same city as ports with container handling capacity, are narrowed to CTIA and KSIA in South Africa.

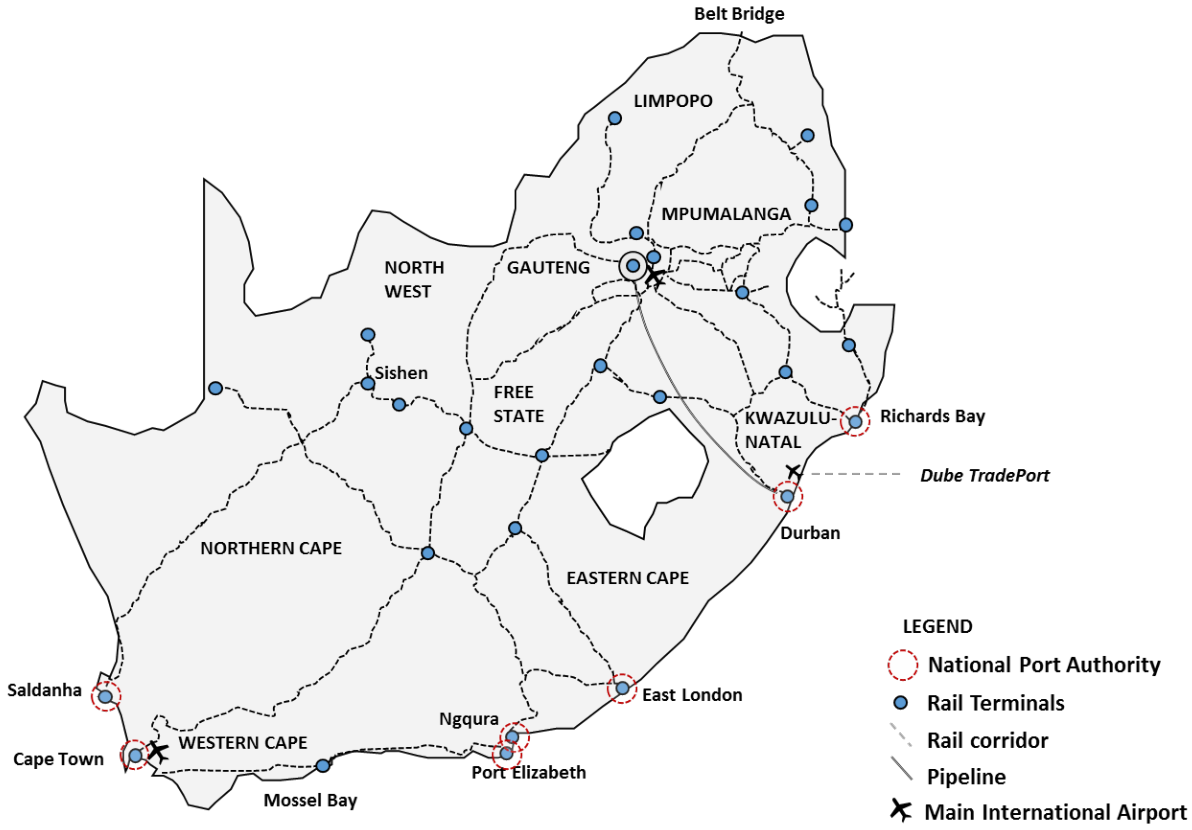
2. The intra-regional African air cargo market has grown to an estimated 152 000 tonnes for 2017, which amounts to 8.2 percent of the total Africa cargo market and a 12 percent increase from 2015 (Boeing 2018: 45). Within Africa, free trade agreements and policy support for the development of air cargo connectivity, has seen a number of airport development proposals to increase air infrastructure capacity. As a contributing factor in air cargo demand, Boeing (2018:45) identified the failure of integrated ground infrastructure in creating a special need for air cargo. The funding of either ground or air infrastructure requires substantial resources. Due to these constraints, the bulk of airport construction projects, are either redevelopment projects or increased capacity on existing projects. Refer to the review of current airport construction projects in Africa in Appendix 12. Greenfields projects in North Africa include Marsa Alam International Airport, Egypt, amongst another two proposed greenfields airports (Tomová 2009: 14). Western Africa greenfields projects include Aéroport International de Blaise Diagne, Dakar, Senegal, and although sometimes classified as greenfields, the Murtala Muhammed International Airport, Nigeria, is built adjacent to the domestic terminal. The New Luanda International Airport, Angola, is a 1,324 hectare greenfields project under construction until 2022. The facility has planned capacity of handling 15 million annual passengers and some 600,000 tons of cargo by positioning Luanda as new western sub-Saharan aviation hub (Centre for Aviation 2019). In Southern Africa, Dube TradePort, including KSIA, is the only operational airport developed on a Greenfields site in the past fifty years[xxiv]. All other air infrastructure proposals in that time period have involved expansions to existing airports. The concept

of Greenfields is important to the research, as it allows for the planning of onsite and adjacent land uses, particularly for purpose-built link to manufacturing.

3. Dube TradePort was not simply an airport relocation but included purpose-built air-cargo capabilities linked to local manufacturing. The motivation in the environmental impact assessment identified 'the cost and efficiency of transporting people and freight as a key constraint on the expansion of the South African economy' (Institute of Natural Resources 2006: iii). The project was designed as a 'catalyst for economic growth through improved air transport infrastructure with both passenger and air-cargo terminal facilities. In addition to the King Shaka International Airport, the project included that Trade Zone some one kilometre north between terminals. The Trade Zone includes a cargo terminal and associated dry and perishable cargo processing, and facilities supporting export and import of time sensitive products by air. The TradeZone Cargo Terminal was designed to handle 100 000 to 150 000 tonnes of cargo per annum (Institute of Natural Resources 2006: iii). The New Luanda Angola International Airport, some fifty kilometers west of Luanda, is the only other African airport that includes a purpose-built air-cargo facility. The new airport, together with the new gated satellite development of 'Villa Chinesa' are forms of urban development disconnected from local communities (Gastrow 2017: 377).
4. SEZs are South Africa's most prominent industrial policy instrument for attracting spatially targeted investment. SEZs are based on the assumption that place based investment can support agglomeration and associated job creation. The potential to align spatial and sectoral industrial policies at airports, mitigates against some of the pitfalls of more general industrial policies. Airports attract sectors related to pharmaceutical, perishables, and electronics and the development of a SEZ can potentially target preformed firms. Although SEZs are a national initiative, the combination of SEZs with national

infrastructure, such as airports presents an opportunity to access funding for local and regional investment. Within South Africa, a number of IDZs near ports were proclaimed, including COEGA, East London IDZ (ELIDZ), Saldhana Bay IDZ and Richards Bay IDZ. The Gauteng IDZ (at OR Tambo International) and the DTP IDZ were both established at airports. The SEZ regulations allow for the locations established as IDZs to transition into SEZs over a three-year period. Currently Dube TradePort is the only South African airport that has taken advantage of these incentives.

Figure 5.1: Dube TradePort as a greenfield airport linked to Transnet rail and port infrastructure



Source: Devised and adapted from Transnet (2018:15).

The selection of the Dube TradePort, in terms of a greenfields, purpose-built facility interacting with cargo flows, supports a single case study approach, in terms of the points above.

5.2.3 Research methods

Chapter One outlines the research methods as they relate to the study design. The case study allows the phenomena of air-cargo logistics to be studied in depth within a context of existing flows in a purpose-built facility in South Africa. Data was collected through multiple qualitative methods, primarily through interviews, land use survey and observations. Secondary methods included extensive document analysis. Data collected was triangulated to verify descriptive accounts of how goods move and how goods, actors and land use relate. Although this chapter encompasses the collection of data related to the case, some temporal analysis was employed in the timelines to make sense of organisational milestones. Similarly, initial coding for content through Atlas.ti was employed. This coding assisted with gathering data on specific inquiries related to how air cargo was included in the annual reports.

5.2.3.1 Primary data

5.2.3.1.1 *Qualitative semi structured interviews*

The purpose of the interviews was to understand how knowledgeable individuals within organisations understood the airfreight logistics dynamics within the context of Dube TradePort. Interviews were arranged, undertaken and transcribed by the researcher with informants' consent. Gatekeep letters and letters of consent are included in the Appendices 1 and 2. Interviews were not taken to represent organisations but to reflect on the participants' experience and knowledge on the topic. Interviews with the executives within Dube TradePort were not recorded at the request of participants and subsequent notes were taken with follow-up interviews to confirm shared understandings of the issues discussed. It was initially assumed that participants wished to remain anonymous and yet some requested acknowledgement of statements made. Recorded interviews were transcribed using temi.com into

document outputs and non-recorded interviews were subsequently recorded as interview notes. Prior to the interview, permission to conduct the interview was arranged through gatekeeper letters and individual letters of consent. Possible semi structured questions were sent with the request. The questions in the interviews, and the follow up questions varied in response to the conversations, although the interview topic prompts were consistent. The interview strategy was similar to a conversation where the researcher follows the participants' information and prompts the participant when the topic ran its course. The interviews were conducted between 2016 and 2019 and summarised in Appendix B. Refer to the summary of semi-structured interviews in Figure 5.2 below.

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Figure 5.2: Summary of semi-structured interviews

Respondent No	Date	Role	Thematic contribution
Respondent 1	14.04.2016	International logistics consultant	Multi-scalar role, and specifically the importance of rail in planning for logistics
Respondent 2	22.04.2016	Local planning consultant with ongoing planning involvement with DTP and ACSA	Planning intentions and challenges for planning airport region
Respondent 3	14.06.2016	Employed by DTP since the project inception	Multimodal logistics concept and connectivity informing the development
Respondent 4	27.06.2016	Employed by eThekwini Municipality	Understanding logistics from the City perspective
Respondent 5	11.08.2016	Employed by DTP	Understanding planning processes
Respondent 6	05.11.2016	Consultant employed by DTP and ACSA	Intention and limitations of DTP project
Respondent 7	14.08.2016	Employed by DTP	Challenges for Dube TradePort
Respondent 8	08.08.2018	Employed by Tongaat Hulett	Logistics and multi-scalar role and impact on land development

Respondent 9	27.08.2018	Employed by DTP	Performance of the CargoTerminal
Respondent 10	30.08.2019	Employed by DTP	Verifying DubeTradePort data and importance of freight forwarders
Respondent 11	3.09.2019	Employed by eThekwini Municipality	Changes for planning for airports and logistics
Respondent 12	9.09.2019	Employed by ACSA	Challenges of airports for planning
Respondent 13	1319.09.2019	International logistics consultant	Logistics and planning intentions of DTP
Respondent 14	19.09.2019	Former employee of DTP	Outlined project intentions and shortfalls

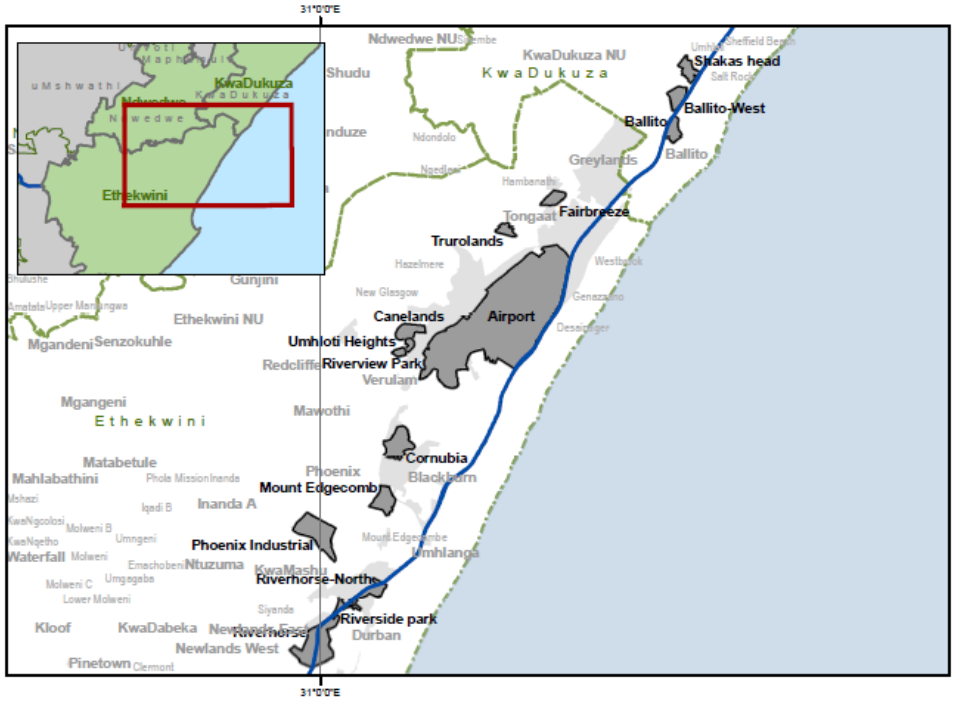
Source: Devised by the researcher

5.2.3.1.2 *Land use survey*

The land use survey was initially conducted in October 2016, March 2017, May 2018 and October 2019. It focused on industrial areas on the 50 kilometers northern corridor between Mhlali and Umgeni Rivers. Figure 5.3 indicates the industrial areas surveyed in geographic proximity to the airport. The survey was undertaken by the researcher, and captured and coded in GIS, with the assistance of the DUT GIS technician. The analysis of the land use survey forms part of Chapter Six.

Spatially reference data in the survey is reflected in the GIS maps, and these were subsequently referenced against photographs from the field trips and street view google maps. Observations were recorded as iPhone photographs and stored as place-based data on Google Photos in monthly observations. Photographic observations were used as prompts in interviews, tracking changes over time and verifying the data.

Figure 5.3: Industrial areas surveyed in geographic proximity to the airport



Source: DUT Department of Town and Regional Planning, GIS Unit (2018)

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Sites selected for the inclusion in the survey were based on the premise that firms in industrial areas, in geographic proximity to the airport, may display linkages with the airport in one of two ways:

1. Firms and facilities either specialising in logistics, with a relationship to airfreight, and could include logistics, forwarding, warehouse and distribution facilities,
2. Firms active in the sectors targeted for air connectivity related growth. These existing sectors in manufacturing are related to automotive components, electronics, pharmaceuticals, clothing and textiles (Republic of South Africa 2014).

The first stage of the survey was to identify sites selected on the following criteria:

1. Less than thirty minutes travel time or twenty five kilometre distance from the the Dube TradePort cargo terminal based on assumed proximity to the site;
2. Sites on the northern development corridor in either eThekwini Municipality or KwaDukuza Municipality that are classified as industrial suburbs related to the town planning schemes land use classifications or spatial development frameworks land use classification as industry or future industry.

Refer to the definitions Annexure 13 for the land use survey metadata applied to the site selection. The following industrial areas on the northern development corridor were selected for inclusion in the survey related to airport proximity and industrial uses and zoning criteria:

- Shakashead
- Ballito West
- Ballito
- Fairbreeze
- Trurolands
- Airport
- Canelands
- Umhloti Heights
- Riverview Park
- Cornubia
- Mount Edgecombe
- Phoenix
- Riverside Park
- Riverhorse North
- Riverhorse Main

Within the selected industrial suburbs above, a distinction was made between subdivisions intended for industrial purposes, and non-industrial subdivisions relates to parks, vacant uses, roads and reserves. Refer to Figure 5.4 where the distinction between industrial and non-industrial sites are made, and the observation that KwaDukuza has significant capacity for industrial development within established areas.

Figure 5.4: Northern corridor land use survey of industry and non-industry uses, 2016-2018

Land Use Category	eThekwini	KwaDukuza	TOTAL
Industry	2562	40	2602
Non-industry	1045	751	1796

Source: Devised for the research.

A site may be vacant or include a single building or multiple buildings. The distinction between buildings and sites are indicated in Table 5.3 where the bulk of industrial buildings (1106) are within eThekwini Municipality, as opposed to 177 in KwaDukuza Municipality.

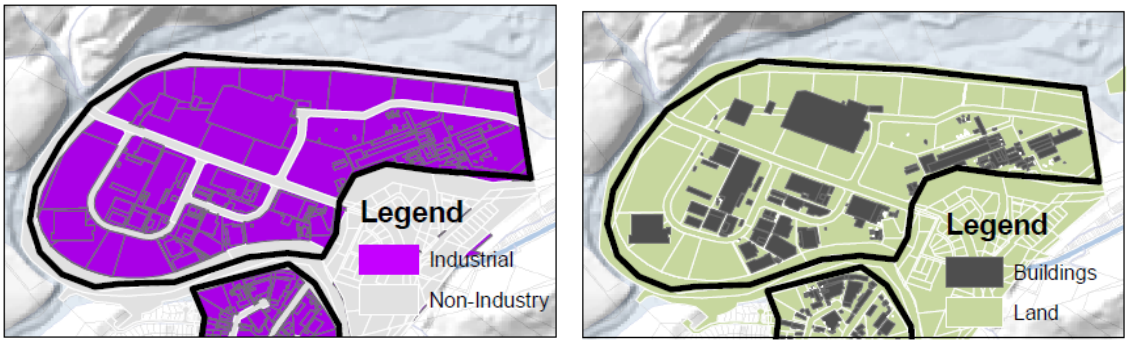
Figure 5.5: Northern corridor number of sites and buildings 2016-2018

Land Use Category	eThekwini	KwaDukuza	TOTAL
Buildings	1106	177	1283
Sites	2501	614	3115

Source: Devised for the research.

Figure 5.6 is an example data collected and indicates the distinction within the industrial townships between the industrial and non-industrial sites, and buildings and land.

Figure 5.6: Examples of data collected in the industrial land use survey, 2016-2017.



Source: Devised for the research.

The definition of logistics for the purposes of the survey, related to a description of land use and activity within a building or site related to the movement of materials, goods, components, parcels between distribution uses and production uses. 'Logistics related' include the storage and distribution functions. Appendix C indicates that in the land use survey some 87 logistics uses and 70 logistics related uses were identified. Within eThekwini there are 717 non-industrial land uses within the industrial suburbs, and 737 within KwaDukuza. These non-industrial uses include residential and informal residential uses.

Figure 5.7: Northern corridor land use survey classification, 2016-2018

Land Use Category	eThekwini	KwaDukuza	TOTAL
Other	1296		1296
Logistics	87		87
Logistics Related	68	2	70
Non-Industrial	717	737	1454
Industry	1208	7	1215
To be confirmed	41		41
Under Construction	20		20
Undeveloped Open Space	35		35
Vacant	135	45	180
Total	3607	791	4398

Source: Devised for the research.

Summary of land use observations related to Appendix C are listed below.

1. In Shakashead logistics uses are road-based logistics and the land uses responded to the internal residential demand of KwaDukuza.
2. Ballito West had no logistics or related uses and was largely undeveloped.
3. Ballito had no logistics uses, other than logistics related storage, in the commercial node.
4. Fairbreeze had no logistics uses in the surveyed area, other than Schenker International warehouse.
5. Trurolands had no logistics or related uses.
6. On the TradeZone logistics uses were found in value-added manufacturing, assembly and distribution function, whereas logistics related uses included storage services and occured outside the production process. Freight forwarders were concentrated in the TradeHouse.
7. Logistics uses were absent and logistics related uses were linked to road based distribution of local businesses in Umhloti Heights.
8. In Canelands, logistics uses focused on the domestic road based distribution to the point of consumption rather than linked to the production processes.
9. There are no logistics uses in Riverview, other than related uses such as local food manufacturers that would require local distribution.
10. Logistics uses emerged in the Ottawa South in Cornubia; The Cornubia Logistics Park was largely underdeveloped
11. The Spar Perishables Distribution Centre in Mount Edgecombe Park generates cold storage, road based logistics. A number of road based logistics carriers operate in the area.
12. Phoenix industrial park was initially designed with direct rail access to large industrial sites but has subsequently redeveloped. The FMCG distribution functions of Spar and Checkout generated substantial road-based logistics;

13. Logistics companies in Riverside Park, featured in the accessible location at the N2 and R102 intersection.
14. Logistics related uses responded to the concentration of logistics in Riverside and Riverhorse Valley.

The northern corridor industrial land use survey shows evidence of a subdued land market, with observed vacancies and limited public realm investment within brownfields industrial estates. In contrast, the greenfield areas developed by Tongaat Hulett, Dube TradePort and private property developers, marketed on airport related growth. Despite the scale of public infrastructure-related investment on the northern corridor and assumed locational value, the take-up of new opportunities are concentrated in recent Cornubia and the Dube TradeZone developments. Take-up of new or redevelopment industrial opportunities outside of Tongaat Hulett and Dube TradePort areas is limited. This observation confirmed interviews suggesting that industrial demand falls significantly beyond a 20-minute drive from the Port, or north of Riverhorse Valley on the northern corridor. To the north of the airport, industrial areas responded to the internal growth demands of residential expansion in KwaDukuza rather than opportunities presented by Dube TradePort. Across the land-use study area, despite proximity to rail and air cargo capacity, the bulk of industrial uses show evidence of road-based logistics services. The location of logistics firms tends to cluster on the southern portion of the northern corridor.

The land-use study tested the premise that logistics companies would respond to new air logistics capacity at Dube TradePort. It was noted that although courier and logistics companies were observed at the airport, the location of these land uses concentrated to the south of the airport near Riverside and Riverhorse Valley. There appeared to be a relationship between road-based accessibility to the national freeways of N2 towards N3 and the locational requirement of integrators, couriers, and logistics uses. Relocation of logistics-related uses from the central area to Dube TradePort seemed unlikely except those logistics and freight forwarding firms dependent on air cargo. The combination of road accessibility, combined with the existing established

industrial areas south of the airport on the northern corridor, outweighed airport accessibility considerations.

5.2.3.2 Limitation to land use survey

Land use survey rely on methods of observation triangulated against google street view after the survey. Some of the activities, such as production processes, are not necessarily visible, and therefore observation of final goods and visible flows are favoured in the survey. In some cases, evidence of pallets, containers, trucks, infer sea and road based logistics intensity and volumes but not necessarily added value.

5.2.4 Secondary research

5.2.4.1 Document review

Review of secondary data sources formed part of the initial case study design and these included the following:

- Review of DTP integrated annual reports 2009-2018
- Review of ACSA integrated annual reports 2009-2018
- Review of SAA integrated annual reports 2010-2018
- Tongaat Hulett integrated annual reports 2010-2018
- Transnet integrated annual reports 2009-2018
- Government integrated development plan and spatial development framework reviews in eThekwini Municipality and municipalities within Ilembe Municipality

The review of annual reports was focused on the reporting of public information related to organisations'' strategic intent, reporting of financial information and key performance indicators. In the case of government policy documents, documents were thematically reviewed for directives related to infrastructure led development paths, underpinning economic strategy, and consideration of airports and logistics therein.

Planning documents, IDPs and SDFs, were reviewed in terms of the relational conceptions underpinning socio-spatial planning making processes raised in Chapter Three. These include the following considerations:

1. Integration: Integration in planning: What are the assumptions about economic shifts to address inequality? What are the strategies for integrating local and foreign investment into local places?
2. Flows: How are the movement of goods, people, services and information treated in plan? Are flows represented as multi-scalar, with vertical integration articulation and horizontal embeddedness in the local economy?
3. Space: How is space considered in the plan, contained or dynamics; homogenous or heterogeneous?
4. Connectivity: What are the assumptions about airports and logistics underpinning growth?

The document analysis data performed two functions, firstly documents were reviewed for content, patterns of airport and logistics communication and analytical constructs for plans. The first stage of the content analysis analysed the data within the specific context of formal organisational communication (Krippendorff 1989: 403). Depending on the relevance of organisations in the case study, documents were then analysed temporally into timelines to make sense of organizational decisions impacting on the flow of goods through airports. The relative importance of Dube TradePort, ACSA and Tongaat Hulett Integrated Annual Reports 2010-2018 were analysed temporally and related to a themes. Refer to section 6.2.2.

5.2.4.2 Ethical considerations

A key ethical consideration was the researcher's previous involvement in with projects related to Dube TradePort 2007-2011. These included statutory planning applications, employment as a planner in the initial approval of the airport and subsequent work on the first and second phase of the KwaZulu-Natal Aerotropolis Regional Plan. The experience on the project as an '*insider'* allowed the researcher to be immersed in the

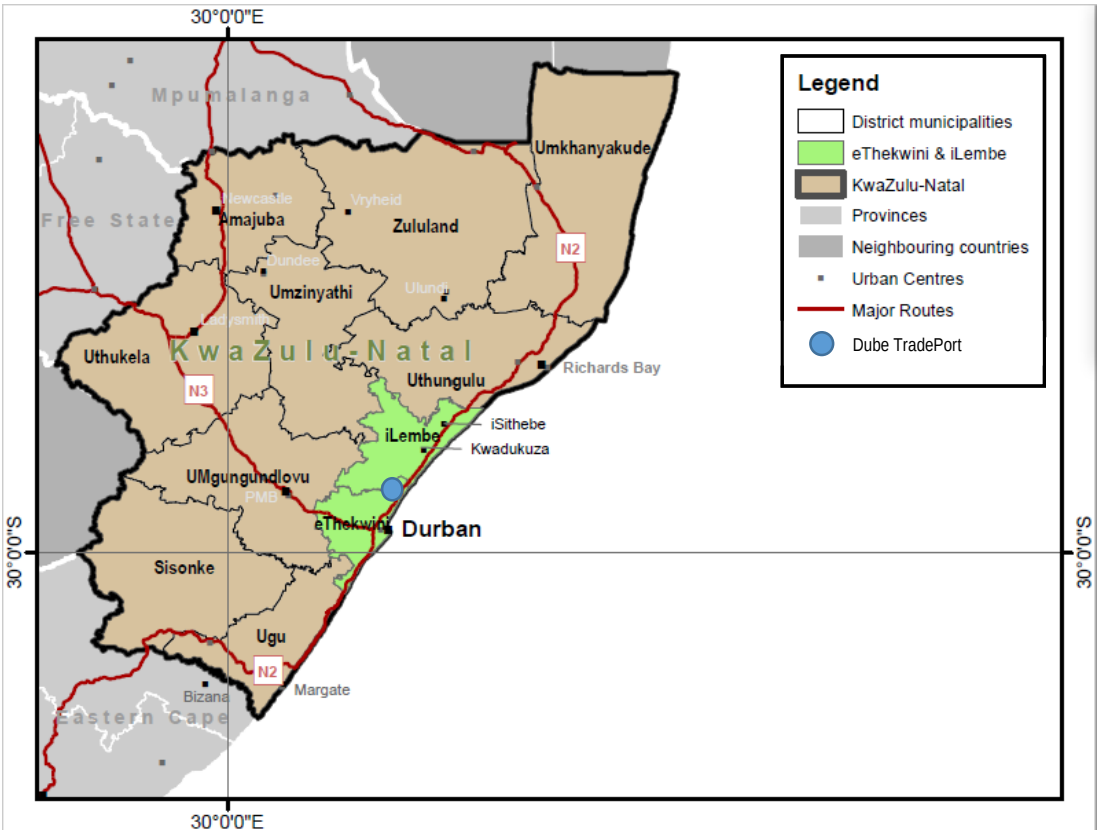
development of the project. Subsequent to this, no consultancy, advisory, research or any contractual relationship exists between the researcher and Dube TradePort or with any organization contracted to DTP, ACSA, Tongaat Hulett or government departments. There is no conflict of interest for the research period, and nor was any funding received for the research other than through the National Research Fund.

5.3 Dube TradePort case study

5.3.1 Introduction to the case

The Dube TradePort site, incorporating King Shaka International Airport and Dube Cargo Terminal, and surrounded by development zones, operates as an air logistics platform, and is currently being developed as the largest infrastructural project in the Province of KwaZulu-Natal and forms part of the National Development Plan for the country (Dube TradePort 2015: 1). Refer to the location of Dube TradePort on the east coast of the Province of Kwa-Zulu-Natal in Figure 5.8.

Figure 5.8: Location of Dube TradePort within KwaZulu-Natal



Source: DUT Department of Town and Regional Planning, GIS Unit (2018)

Furthermore the Dube TradePort development is planned and purpose-built to move freight efficiently as part of the strategic infrastructure required to support the Provincial Growth and Development Strategy (South Africa 2013a: 33). However, despite South African policy and expenditure support for the efficient movement of goods, the optimal integration between the airport, within the Dube TradePort site, with other modes of transport (roads, rail, and ports) is unclear (South Africa 2013a: 97).

5.3.2 Nature of the development

DTP site includes KSIA, a dedicated cargo terminal, with a range of supporting precincts focused on, warehousing, offices, retail, hotels and agriculture. The site

shown on Figure 5.9 is divided into a number of precincts, with complex ownership arrangements related to the institutional arrangements negotiated between DTPC and Airports Company of South Africa (ACSA) in the lead-up to the site opening in 2010, and more recently including Tongaat Hulett in TradeZone 3. The Cargo Terminal Precinct and TradeZone Precinct are owned by DTP and leased to tenants, while the Airport Precinct is owned by ACSA. ACSA own and operate OR Tambo International Airport (ORTIA), Cape Town International Airport (CTIA), KSIA and the balance of regional airports in the country. Dube TradePort Corporation (DTPC), is a provincial state-owned entity (SoE), which own and operate Dube CargoTerminal, TradeZone, AgriZone and Dube City.

The DTP site is centred on the Airport Precinct including KSIA passenger terminal with a 3.7 kilometers runway. Dube CargoTerminal located at mid runway is a cargo handling facility, including cold storage, with direct, secure airside access. The TradeZone Precinct is designed for airport related industrial activities with warehousing and logistics type uses. Integral to the design is the TradeHouse, comprising of warehousing space, and forwarders and shippers offices above. An elevated conveyor transfer system links the TradeHouse with the TradeZone, to the adjacent Cargo Terminal. The AgriZone precinct comprises greenhouses, packing and sorting facilities, and related uses. Dube City Precinct is for business and hospitality purposes.

Figure 5.9: Dube TradePort Master Plan indicating the precincts

Source: Dube TradePort Corporation (2019c)

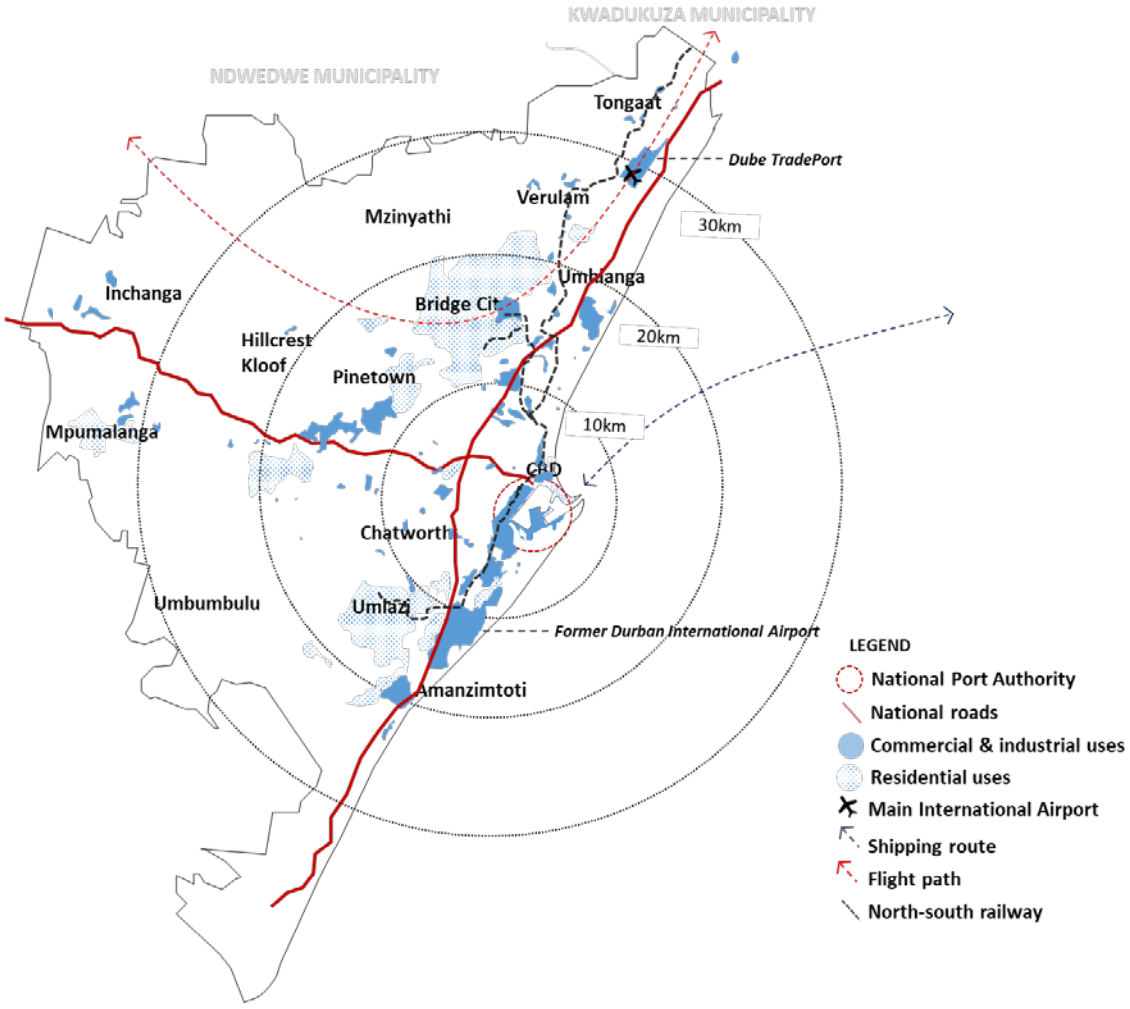
The Dube TradePort Master Plan was a long-term master-planned freight and passenger logistics development to inform future expansion over a 60 years period (Dube TradePort Corporation 2012: 46). The airport was initially planned, built and operated in terms of the 60 year master plan underpinned with a Development Framework Plan and precinct plans approved by the Municipality. In alignment with the first phase of development for 2010-2015, and as a separate process to the Master Plan, the Development Framework Plan was prepared for whole site. Refer to Annexure 11 to indicate the first phase of the master plan, developed for opening at the site, and the ultimate development of the site.

5.3.3 Geographical context

The Dube TradePort site is located some 30 kilometers north of the central city of Durban, within the eThekwini Municipality in KwaZulu-Natal, on South Africa's eastern seaboard. The location of the site in relation to modes of transports within eThekweni Municipality is shown in Figure 5.10. The site is strategically located in relation to infrastructure supporting trade and is some 35km north of the container sea

port of Durban and some 150km south of the bulk sea port of Richard's Bay on the main provincial north-south N2 corridor. As part of the strategic infrastructure project (SIP) for the Durban- Free State Gauteng Logistics and Industrial Corridor, DTP is 40km north of the western N3 corridor connecting the Durban container sea port with Johannesburg. The established road-based freight corridor is strongly tied to the Africa's busiest port and the nature of sea freight varies substantially in volume and value to air freight. Arguably access to both sea and air infrastructure provides flexibility in how goods move.

Figure 5.10: Location of Dube TradePort within eThekwini Municipality



Source: Devised by the researcher and adapted from eThekwini Municipality (2018:6)

Given the active role of DTP in the local property market, the initial 2,060 hectare development was expanded to 2,940 in 2017 to include new land holdings north and south of the site. Land adjacent to the site is largely held in private ownership, where a substantial portion is owned by Tongaat Hulett. On the cargo side of the business, the Cargo Terminal is supported by Dube TradeZone 1 and 2 on the site, as serviced industrial land for the development of

> "*warehousing, logistics and distribution, manufacturing, assembling, air-related cargo distribution, high-tech aerospace services, pharmaceuticals, electronic manufacturing, automotive industries, clothing, textiles, and cold storage'* (Dube TradePort 2016a).

The cargo terminal is also supported by Dube AiRoad, a road-based logistics fleet, intended to move time sensitive goods between the terminal and other centres.

In 2016, Dube TradePort was proclaimed as the only Special Economic Zone (SEZ) in the KwaZulu-Natal Province (Dube TradePort 2016b). While the take-up under the SEZ provides incentives from the South African Revenue Services, development in the zone is not exempt from labour, environmental and related legislation. The incentives are outlined in 5.3.6.2. The location of the SEZ at the airport, supported by significant infrastructure, incentives and government support, specifically targets the sectors of *"aerospace and aviation-linked manufacturing and related services; agriculture and agro-processing, including horticulture, aquaculture, and floriculture; electronics manufacturing and assembly; medical and pharmaceutical production and distribution; and clothing and textiles'* (Dube TradePort 2016b).

5.3.4 Historical context

The early development of Dube TradePort as a unit within the KwaZulu-Natal Department of Economic Development and Tourism was important in establishing strong provincial support. Jacob Zuma was appointed as the Member of the Executive

Committee (MEC) of Economic Development and Tourism in KZN, after 1994 until 1999, when he was appointed as the Deputy President. Mike Mabuyukulu was appointed in his place as MEC of Economic Development and Tourism, and oversaw the established of Dube TradePort in 2003, under a single CEO until 2012. The representation of provincial heads on the DTP board, political support of former MECs, Premiers and the Presidency, enabled the formation of a well-resourced, provincially owned entity.

In the lead up to the opening of the KSIA in May 2010, DTP embarked upon a process of engagement with local role-players most notably Tongaat Hulett from 2008. Relations with eThekwini Municipal officials was conflictual in the lead up to the KSIA opening as a result of the initial opposition to the airport (Respondent 11:11, and Respondent 14:4).

The formation of Dube TradePort as a section 21 company in 2009 and the subsequent listing as a Schedule 3C public entity changed the nature of DTPC. The ability to acquire and profit from the purchase of property gave DTPC flexibility as an active participant in the property market, specifically the extension of the DTP site boundary to include TradeZone 3 and 4.

Prior to the construction, relocation and opening of the KSIA within DTP site on 1 May 2010, the previous Durban Airport operated as a regional airport, some 20km south of the Durban Port. The airport relocation was motivated firstly as the stimulus to the regional economy through direct international long haul flights, secondly the growth in high value manufactured and perishable goods and thirdly investment opportunities created through connectivity (Institute of Natural Resources 2006: 24).

The relocation of the Durban Airport to La Mercy on the north coast was planned from the 1970s, however the proposed cargo role as a TradePort emerged at the turn of the century as a unit within the Department for Economic Affairs.

The site described as Farm La Mercy Airport No. 15124 (initially some 2,060 hectares in extent), was acquired by the South African Transport Services in 1972 for the purposes of relocating the existing Durban International Airport from Durban South Basin. The property was tied cadastral in terms of 74 properties and the related 60 Title Deeds, before consolidated and transferred to ACSA from the South African Transport Services (Institute of Natural Resources 2006: iv). The site was levelled and drained between 1972 and 1975, to accommodate the KSIA runway and adjacent terminal. The site was kept largely clear until the mid to late 1980s while it was used as a military air force training establishment (Institute of Natural Resources 2006: ix). According to Todes (2014: 257) the 1970s oil crisis delayed the development of the airport relocation. The project gained traction in the context of initiatives to promote KwaZulu-Natal as a tourism destination by the mid-1990s. The feasibility as a passenger airport was questioned, and Dube TradePort project emerged as a logistics and cargo focused airport (Respondent 10, interview dated 9 September 2019).

The site was rezoned to Special Zone 10 for Airport Purposes as part of the Umhlanga Town Planning Scheme by the former North Local Council. The decision was appealed by the residential settlement of Mount Moreland who fell within the 55dBA L_{Rdn} noise contour. The appeal was dismissed by the Town and Regional Planning Commission, and subsequently the Commission invoked a Section 48 Order in terms of the Town Planning Ordinance No. 27 of 1949 as amended instructing the Municipality to zone the adjacent Mount Moreland as "*Airport Warehousing*" (Institute of Natural Resources 2006: 108). By February 1999 the Municipality appealed against this order to the Premier. Mount Moreland was proposed for rezoning more than a decade later, although the process was not finalized.

The politics of the airport relocation was contested. Informal and issue based alliances between Tongaat Hulett and the North Local Council and Provincial Government supported the airport relocation. The newly established eThekwini Municipality in 2000, Airports Company of South Africa and ironically Tongaat Hulett all opposed the airport relocation at various times leading to the final relocation decision. In the 2003 State of the Nation address Thabo Mbeki, the newly established Dube TradePort (Pty) Ltd was tasked with establishment of Dube TradePort at La Mercy, north of Durban as a PPP (KwaZulu-Natal Minister of Economic Development and Tourism 2003). The development of air cargo was an important aspect in the initial DTP concept. The elements included the following,1) Build an airport in a strategic location to create air cargo flows, including a regional air cargo feed to portions of sub-Saharan Africa, 2) Link the airport to existing transportation nodes (Port of Durban, Port Richard, JIA) creating a multimodal logistics platform, and 3) Use IDZ and FTZ concepts to attract global manufacturers and distributors to locate at the TradePort (Dube TradePort 2003: 26).

In 2005 the Integrated Master Plan for the site was developed. The design formed the proposal for approvals and the bids to build, operate and transfer the initial phase. Following the initial scoping and environmental impact assessment between 2006 and 2008, a positive record of decision was reached for the first phase of airport construction with significant mitigation measures (Dube TradePort Corporation 2010: 15). Airport construction commenced in August 2008 and was completed in time for the opening on 1 May 2010.

5.3.4.1 Historical planning processes

The review of planning processes as recorded in the Dube TradePort Annual Integrated Reports identified the following planning processes impacting on the development of the site.

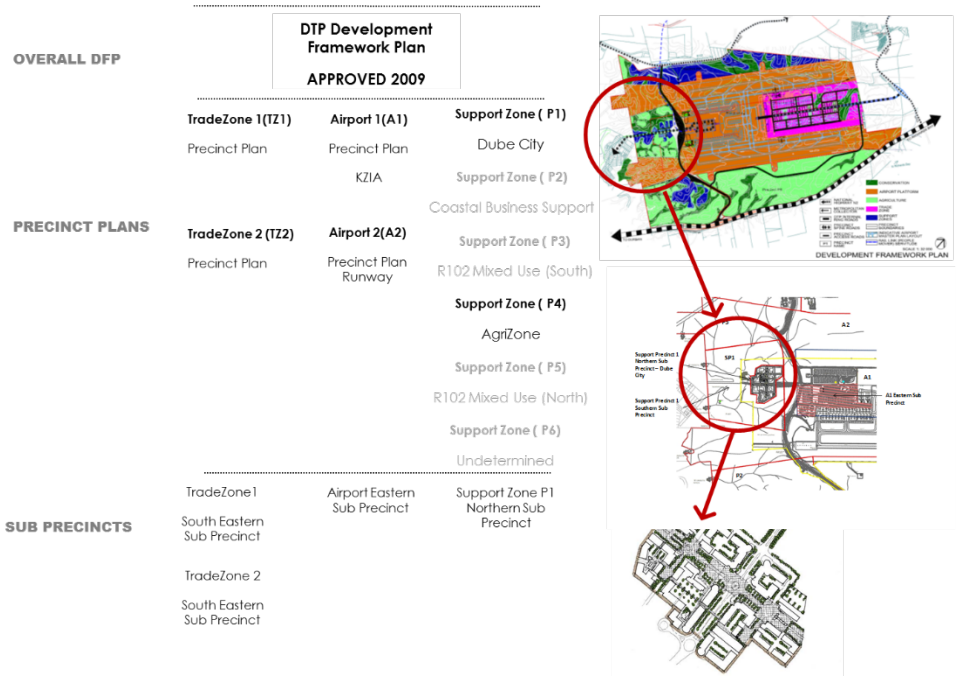
On the planning side the following processes were significant:-

- Review of the Dube TradePort Master Plan 2010 – 2015 through the Joint Venture Company (Dube TradePort Corporation 2010: 23), as an airport engineering project; DTP reported lack of co-operation with ACSA negatively impacted on progress in the Master Planning review process. Delays experienced in 2011 in the development of the Master Plan due to a breakdown in relations with ACSA (Dube TradePort Corporation 2011: 23).
- Thereafter the AgriZone Precinct Plan and Development Manuals were prepared and Support Precinct 1A i.e. Dube City plan was revised and approved.
- Preparation of the Development Framework Plan (DFP), as a separate process and yet based on the Dube TradePort Master Plan 2010-2015, was approved by the Municipality in February 2009. The DFP and the Master Plan, informed the development of the JV Company (La-Mercy JV Property Investments (Pty) Ltd.) property (Dube TradePort Corporation 2010: 41), as well as any development on the site. Currently the Master Plan is being reviewed for the entire site and this process includes the precinct plans and development manuals for several precincts. Within the approved DFP, a number of precinct plans were required to be approved as well as any sub-precincts plans (Dube TradePort Corporation 2018a).
- Acquisition of further development rights and/or rezoning, including the minor and inconsequential amendment to the existing Special Zone 10 (Dube TradePort Corporation 2010: 25); Prior to formal planning submissions to the local government, all planning applications are scrutinised by the Development and Review Panel. The Panel manages the draw-down of development rights related to the Special Zone 10. Refer to Figure 5.11 for the complexity of plans for managing Dube TradePort land rights. Appendix 15 provides a summary of the development rights pertaining to the site and the current drawn down of those rights.
- By 2018 eThekwini Municipality's approved the amended Special Zone 10 Airport Scheme, resulting in increased mixed land use for both King Shaka

International Airport and Dube TradePort Corporation (Dube TradePort Corporation 2018b: 17).

- Facilitation of the re-zoning of Mount Moreland (Dube TradePort Corporation 2010: 25);
- Development of a shared strategic vision, strategy and projects within a 15km radius of the Dube TradePort site through the Regional Development Initiative, including Tongaat Hulett (Dube TradePort Corporation 2010: 30). By 2011 the Municipal IDP included the Dube TradePort development (Dube TradePort Corporation 2011: 28).

Figure 5.11: DTP Development Framework Plan and the package of plan



Source: Devised by the researcher

- Preparation of the revised Precinct plans for P1 submitted to eThekwini, and the Layout for S2 and 1B (Dube TradePort Corporation 2011: 23). The precinct plan for P6 was subsequently excluded from planning and incorporated into the Durban Metropolitan Open Space System (DMOSS).

- In 2018 the Department of Agriculture, Forestry and Fisheries provided its consent for the release of Support Zone 2 from the Agricultural Land Act, No. 70 of 1970 (Dube TradePort Corporation 2018b: 17).
- Layout plan for Watson Highway (TradeZone 3) for industrial and business related uses (Dube TradePort Corporation 2010: 25). Environmental approvals were not granted for Dube AgriZone 2 and TradeZone 3 (uShukela) developments, and the basic assessments were relodged to align with new legislation (Dube TradePort Corporation 2018b: 17).
- Layout diagrams for Dube TradeZone 2 and a conceptual layout for Cottonlands were produced (Dube TradePort Corporation 2013: 31). The layout diagram for Dube TradeZone 2 was refined and finalised through the Environmental Impact Assessment process during the year (Dube TradePort Corporation 2014: 31). In 2018 Dube TradeZone 2's rezoning application was submitted to the Local Municipality, with approval outstanding for the additional 43 hectares of land for industrial site development (Dube TradePort Corporation 2018b: 17). The site will be developed in 2019 following approval, although the platform is constructed at risk.
- A funding agreement was signed between Dube TradePort Corporation and the Department of Trade and Industry in March 2014 in order to plan and prepare for the establishment of a Special Economic Zone at Dube TradePort (Dube TradePort Corporation 2014: 31).
- As part of the broader Regional Initiative, the Global Value Chain (GVC) Aerotropolis Strategic Report and a macro-economic analysis report were finalised (Dube TradePort Corporation 2014: 31).
- Participation in the quarterly Strategic Infrastructure Project 2 meetings (Dube TradePort Corporation 2015: 29).
- Participation in the ACSA KSIA Master Plan meetings (Dube TradePort Corporation 2015: 29).
- A Memorandum of Understanding was signed with Transnet to develop projects of mutual interest relating to sea and air cargo movements (Dube TradePort Corporation 2016: 17).

- An inception report and stakeholder workshop was conducted for the Aerotropolis Master Plan and submitted to the secretariat (EDTEA) (Dube TradePort Corporation 2016: 25). In 2016 the Durban Aerotropolis Master Plan was concluded for final approval by the KwaZulu-Natal Provincial Cabinet (Dube TradePort Corporation 2017c: 11).
- Constraints were identified by DTP on air-cargo growth in 2011. King Shaka International Airport were unable to handle a Code F freighter, resulting in freighters being turned away from the Cargo Terminal. The aprons are under construction in 2018 and due to be completed in 2019.

5.3.5 Socio-economic context

DTP falls within the eThekwini Metropolitan Municipality within the Province of KwaZulu-Natal, on the eastern seaboard of South Africa. The Province is home to some 11 065 million people (Statistics South Africa 2011) with a growth of 1,7 percentage since 2011. Refer to Figure 5.12 for KwaZulu-Natal population census data.

Figure 5.12 Population distribution by province, Census 2011 and Community Survey 2016

Province	Census 2011	Community Survey 2016	Growth rate
Western Cape	5 822 734	6 279 730	1,7
Eastern Cape	6 562 053	6 996 976	1,5
Northern Cape	1 145 861	1 193 780	0,9
Free State	2 745 590	2 834 714	0,7
KwaZulu-Natal	10 267 300	11 065 240	1,7
North West	3 509 953	3 748 435	1,5
Gauteng	12 272 263	13 399 724	2,0
Mpumalanga	4 039 939	4 335 964	1,6
Limpopo	5 404 868	5 799 090	1,6
South Africa	**51 770 561**	**55 653 653**	**1,6**

Source: Statistics South Africa (2018: 19)

Refer to Figure 5.13 that shows eThekwini Municipality, is home to some 3,44 million people with a 1,43 percentage population growth over the past five years. Unemployment rate within eThekwini is 30,2 percentage based on the last census data (Statistics South Africa 2011).

Figure 5.13: Population distribution by selected district and local municipality, Census 2011 and Community Survey 2016

District and local municipality	Census 2011	CS2016	%
DC29: iLembe	**606 809**	**657 612**	**1,83**
KZN291: Mandeni	138 078	147 808	1,55
KZN292: KwaDukuza	231 187	276 719	4,08
KZN293: Ndwedwe	140 820	143 117	0,37
KZN294: Maphumulo	96 724	89 969	-1,64
ETH: eThekwini	**3 476 686**	**3 702 231**	**1,43**
KwaZulu-Natal	**3 020 720**	**74,0**	**3 571 688**

Source: (Statistics South Africa 2018: 39-40)

Within eThekwini 30,2 percentage of the population are unemployed and the growth rate was estimated at 1,08 percentage between 2001 and 2011 (Statistics South Africa 2011). The adjacent municipality of Ndwedwe (within Ilembe district municipality), has a population of 143 117 people, with unemployment at 48,7 percentage and a -0,2 percentage growth rate between 2001 and 2011 (Statistics South Africa 2011). North of DTP, between the eThekwini border and the south of the Tugela River, is KwaDukuza Municipality (within Ilembe District Municipality), with a population of 276 719, unemployment at 25 percentage and growth at 2,3 percentage between 2001 and 2001 (Statistics South Africa 2011).

Figure 5.14: Distribution of unemployment, GDP and population growth by selected district and local municipality, Census 2011 and Community Survey 2016

District and local municipality	Unemployment 2011	GDP%2013	Population growth %
DC29: iLembe	**30,6%**		**1,83**
KZN291: Mandeni	28,6%	0,81	1,55
KZN292: KwaDukuza	25	2,3	4,08
KZN293: Ndwedwe	48,7	-0,27	0,37
KZN294: Maphumulo	49%	-2,21	-1,64
ETH: eThekwini	**30,2**	**3,1**	**1,43**
KwaZulu-Natal	**33%**		**3 571 688**

Source: Statistics South Africa (2011)

The growth dynamics of KwaDukuza and eThekwini on the northern corridor are arguably interrelated, however Todes (2014: 245) in the study on suburbanization processes found these areas displayed differential forms of growth related to land ownership. The dynamics of a dominant landowner, Tongaat Hulett, on the northern corridor surrounding the airport, was found to shape development in contrast to fragmented patterns displayed in KwaDukuza. Imperatives for DTP to create employment and contribute towards regional growth, particularly as a state entity tasked with promoting investment in KwaZulu-Natal, are high (Dube TradePort Corporation 2018b: 12). According to DTP, public and private capital expenditure into Dube TradeZone 1 and Dube AgriZone 1 created 46 367 employment opportunities in KwaZulu-Natal to date, including construction and operations, and contributed approximately R9.5 billion into the national GDP (Dube TradePort Corporation 2017c: 10). According to Robbins (2015: 3) the estimated construction costs covered by the state and related entities were in the order of R 8 billion rand (USD 1 Billion in 2010), with employment, cargo volumes and passengers numbers being below the estimates on opening. The limitations of reaching short-term conclusions on the case of DTP, after some three years in operation, are recognized given that airports plan for 10 and 30 year horizons.

5.3.5.1 Land Ownership

Land ownership on the Dube TradePort site is complex and the outcome of a decade of negotiations. On the whole, land is owned by the state through various ownership vehicles and leased to private investors for site development. Dube TradePort own the Agrizone and TradeZone, however a portion of TradeZone 3 was a joint venture with Tongaat Hulett. The initial support, now comprising Dube City, is owned by the La Mercy Joint Venture between Dube TradePort and the ACSA. Refer to Figure 5.15 for the local context to Dube TradePort. The airport precinct A1 and 2 are owned by the Airports Company and the remaining portions in a Joint Venture between DTP and ACSA.

Figure 5.15: Location of Airport Precinct, Dube City Precinct, Agrizone precict and TradeZone Precincts in relations to ownership of the Dube TradePort site

Source: DUT Department of Town and Regional Planning, GIS Unit.

Annexure 14 indicated the land sales undertaken by Dube TradePort between 2010 and 2018, amounting to more than R 1 294 489 540 across the decade at an average purchase price of 77m^2. While Tongaat Hulett benefited from land sales, and reported these as profitable sales (Tongaat Hulett 2014: 21), the was also some level of competition for end use tenants (Respondent 8:3). Land at Dube TradePort was initially leased at approximately R7,50 per m^2 in the TradeZone (Dube TradePort Corporation 2014: 26), the rental income from TradeZone (total rental/area rented) was reported in the DPTC Integrated Annual Reports as R57,72 m^2 in 2016, R59,70 m^2 in 2017 and 62,32 m^2 in 2018. The annual building rental price in the TradeZone indicates residual land value appreciation. DTPC own the TradeZone and AgriZone land that was initially purchased at a price of R142m^2 from ACSA in 2010 (Refer to Annexure 14).

5.3.6 Institutions operating on site

5.3.6.1 Dube TradePort Corporation

Dube TradePort Corporation (DTPC), is a provincial state-owned entity (SoE). DTPC is the operator of the Dube TradePort Special Economic Zone (SEZ), and is tasked by the KwaZulu-Natal (KZN) Provincial Government, to implement the largest infrastructure project in the province, including the international airport and logistics platform to the north of the City of Durban. DTP is described as *"a 3,800 hectare greenfield development, purpose-built to facilitate airport related businesses. A combination of cutting edge infrastructure, with an emphasis on local economic development, Dube TradePort is home to King Shaka International Airport (KSIA) and phase 1 of DTPC's 50-year Master Plan consists of 4 main development zones, aimed at driving the development of air logistics business and attracting investment to the province*' (Dube TradePort Corporation 2017b: 8).

5.3.6.2 Special Economic Zone

DTPC was established to implement the development of the international airport and logistics platform to the north of eThekwini Municipality, Durban. The specific

mandate for DTPC has shifted over the development phases of the project, initially conceived as a TriPort, multimodal logistics platform to a "*global manufacturing and air logistics platform*" responsible for development of the DTP site, including the designated Special Economic Zone (SEZ) to promote foreign and local investment (South Africa. eThekwini Municipality 2015; Dube TradePort Corporation 2017a; South Africa 2017a). The designation of DTPC in 2016, as a SEZ operator, broadened the vision to enhance manufacturing and export capacity, attract foreign direct investment through government incentives and investor-related infrastructure. The specific SEZ incentives include 15 percentage corporate tax for qualifying entities, 10 percentage per annum building allowance, employment incentives for low salary workers, import duty rebates for export-related production, value-added tax exemption under specific conditions for South African procedures supplies and tax incentives (Dube TradePort Corporation 2017d). In effect, the DTP mandate is strongly aligned with government industrialization policy to support trade by deriving agglomeration benefits of airport infrastructure as well as the spatially targeted investment through the SEZ instrument.

5.3.6.3 The Dube TradePort Design and Review Panel

The Dube TradePort Design and Review Panel was established to fulfil the statutory requirements of the zoning controls of Special Zone 10. The Panel comprises of representatives of DTP, ACSA, eThekwini Municipality including the Land Use Management Unit, eThekwini Transport Authority and Engineering Services Departments. The purpose of the Panel is to co-ordinate and oversee development implementation, comments on the submission of building plans, precinct plans in terms of how applications relate to the overall Development Framework Plan. Applications are also assessed to manage, guide and review the drawdown of overall development rights in terms of the suite of plans for Dube TradePort. The Panel does not replace any municipal approvals but provides a supportive role prior to municipal submission.

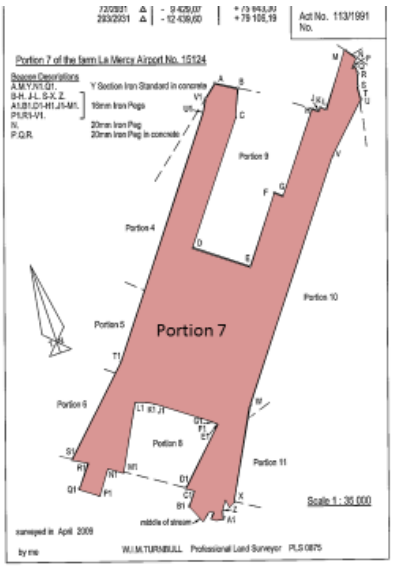
In effect the panel monitors the management of development rights occurs in terms of a suite of plans that include:- the Development Framework Plan, Precinct Plans and Development Manuals, Site Development Plans and Landscaping Plans and thereafter Building Plans.

5.3.6.4 Airports Company of South Africa

Airports Company South Africa SOC Ltd (ACSA) is a public company established under the Airports Company Act 44 of 1993 and owns and operates three international airports (O R Tambo International Airport, King Shaka International Airport, Cape Town International Airport), and six national airports including Port Elizabeth International Airport, Bram Fischer International Airport, Upington International Airport, East London Airport, George Airport and Kimberley Airport (Airports Company of South Africa 2018: 10).

ACSA is involved outside South Africa in the maintenance and operation facilities of Guarulhos International Airport (Brazil), performs technical advisory and consultancy services at Kotoka International Airport in Accra (Ghana), and equity investment in Chhatrapati Shivaji International Airport in Mumbai (India) (Airports Company of South Africa 2018: 10). Within the Dube TradePort site, ACSA own the airport precincts that fall within Portion 7 of the Farm LaMercy Airports No 16124. Refer to Figure 5.16 below for the extent of ACSA ownership within the DTP site.

Figure 5.16: Airports Company of South Africa Ownership



Source: Devised by the researcher

Prior to the establishment of ACSA as a state owned entity, all South African airports were managed through the National Department of Transport. ACSA is majority owned (74.6%) by the South African government through the Department of Transport. A further 20 percentage is owned through the Public Investment Corporation (PIC)[xxv]. The PIC shareholding is held through ADR International Airports SA (Pty) Ltd, a wholly owned subsidiary of PIC and the remaining (4.2%) through empowerment investments.

5.3.6.5 South African Airways

South Africa Airways (SAA) was founded in 1934 and forms part of the Star Alliance Group with four wholly owned subsidiaries including, SAA Technical for airport maintenance, Mango as a low cost carrier, Airchefs as the catering section of SAA and South African Travel Centre (SATC) (South African Airways 2010: 4). The core SAA business is the movement of people and goods by air (South African Airways 2011: 48).

SAA moved from a position of a leading airline in Africa to loss in value and facing charges of state capture in the Zondo Commission of Inquiry (Haffajee 2019). As a consequence the airline has lost its two most profitable routes, including the Johannesburg-Dubai route to Emirates and Johannesburg-London route to British Airways (Haffajee 2019). Locally the connection from Durban-Johannesburg-London and Durban-Johannesburg-Dubai also increased passenger and cargo operations.

It is estimated that SAA handled approximately 60 percent of all air cargo in South Africa (South African Airways 2012: 4), however this share has fallen since 2012 in Figure 5.17. Typically air cargo accounts for a significant portion of airline revenue, however, in the case of SAA they shipped 111,000 tonnes of cargo annually in 2017 and generated 5,8 percentage of the SAA group revenue (South African Airways 2017: 9).

Figure 5.17: Cargo handled at South African Airways

Financial Years	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	2015/ 2016	2016/ 2017
Cargo handled tonnes	119,000	129,000	142,000	133,000	132,000	131,000	114,000	111,000
Annual cargo growth		8%	10%	-6%	-1%	-1%	-13%	-3%

Source: South African Airways Integrated Annual Reports 2010-2017.

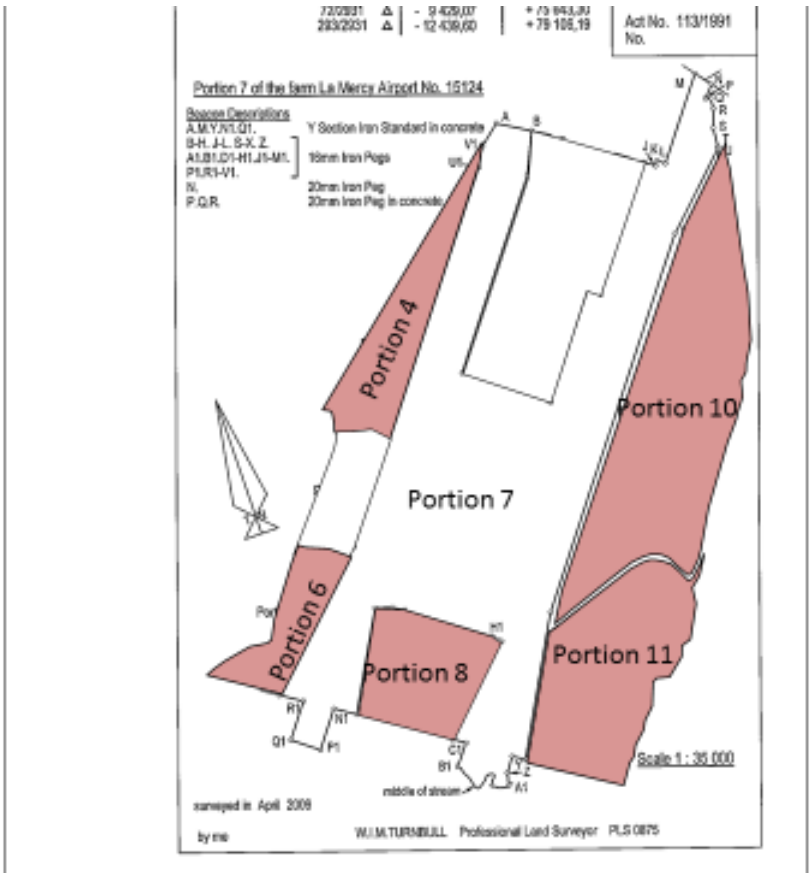
The review of SAA Integrated Annual Reports (2010-2017) indicate a number of factors related to shifts in air cargo flows in South Africa. In 2012 the increase in cargo was linked to the utilization of four freighters, subsequently reduced to two, and the development of new routes to four African countries and China. The relationship through BRICS was important in gaining permission from Chinese authorities for SAA air cargo movements between Johannesburg and China. In 2014, improved

ground handling agents in Lagos, Luanda, Lilongwe, Blantyre, Abidjan, Dar es Salaam, Brazzaville and Bujumbura, were linked to increased volumes handled. Load volumes[xxvi] and economic slow-down impacted on the decrease in volumes in 2013. In 2014, SAA cargo used prorate agreements with other airlines to carry belly freight and expand services. By 2015, SAA handled not only 40 percentage of all domestic passengers but more than 50 percentage of all cargo within and beyond the borders. The introduction of Middle East Airlines from 2015 impacted on the international cargo market and the postal strike on domestic cargo. By 2016, the Beijing and Mumbai routes were terminated thereby creating additional opportunities for cargo handling outside the national carrier.

5.3.6.6 La Mercy Joint Venture

La Mercy JV Property Investments Proprietary Limited (the JV Company) is a joint venture between Dube TradePort Corporation (DTPC) (60%) and Airports Company of South Africa (SOC) Limited (ACSA) (40%). The JV Company is registered as a private, limited liability company which was formed as per the Cooperation Agreement dated 12 December 2006 between ACSA and DTPC, and brought into effect on 8 April 2008.

Figure 5.18: La Mercy Joint Venture Ownership



Source: Devised by the researcher

The JV Company was established as a vehicle to lead the developments in portions of the site in keeping with the objectives of the major shareholder. The JV Company is responsible for the maintenance of common use areas in Dube City. This includes the running of the newly formed Management Association and the work on service level agreements. The JV Company is also responsible for the implementation and maintenance of the Environmental Rehabilitation and Restoration Plan (Dube TradePort Corporation 2017b: 99).

5.3.6.7 Private sector on site

5.3.6.7.1 *Tongaat Hulett*

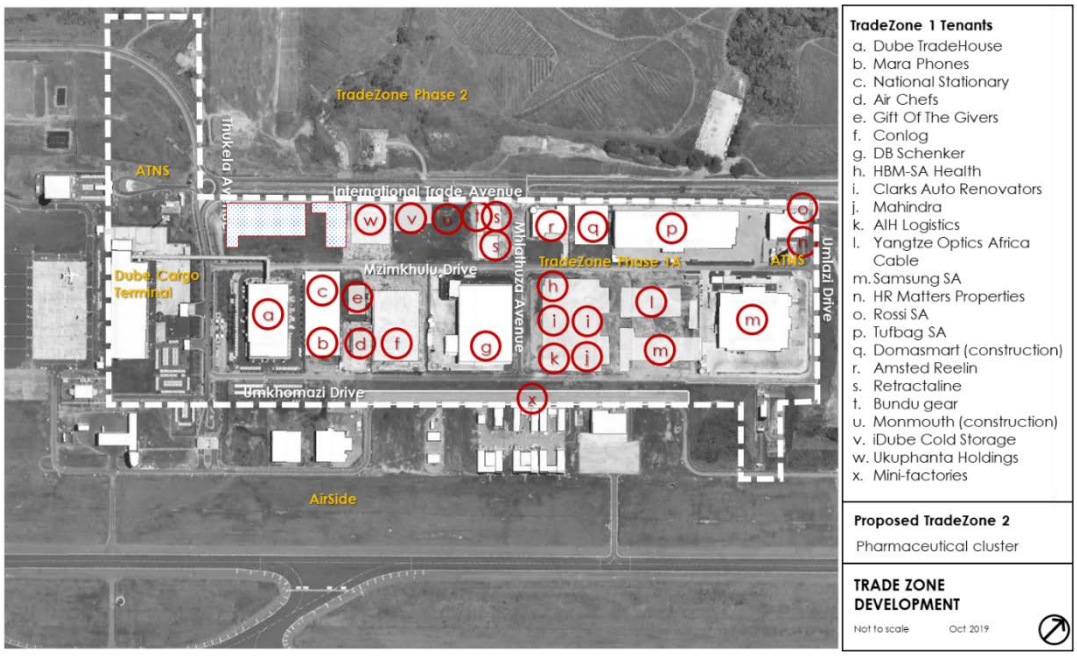
A portion of Chapter Four, discussed Tongaat Hulett due to the extent and location of their land holdings under single ownership within the aerotropolis context. A key issue raised in the Chapter Four is process to capture land value through the land conversion strategy from sugar cane to residential and related uses.

On site, Tongaat Hulett have sold land to Dube TradePort and partnered in TradeZone 3. The relationship between Tongaat Hulett and Dube TradePort is complex and shifts between adversaries, objectors, collaborators and competitors. Tongaat Hulett participate in the joint regional planning process with Dube TradePort (2010:27) to undertake shared consulting projects and level in resources for mutual gain.

5.3.6.7.2 *Firms*

The prevalence of firms participating in global production networks and linked to airfreight is evident in Annexure 16 and depicted in Figure 5.19 below. Subsidiary firms and local firms also indicate the number of B-BBEE contributors, reflecting government preferential procurement policies being implemented by DTPC.

Figure 5.19: TradeZone 1 firms



Source: Devised by the researcher

The following firms or subsidiary firms in the TradeHouse are publicly listed firms and part of networks that either operate, own or control production of goods and services in at least one other country than their home country: Air Menzies. Bidvest Facilities Management, Bidvest Panalpina Logistics (BPL), Bolloré Logistics, Millhouse International, Röhlig-Grindrod, Superclean (Tsebo), Swissport South Africa and Turners Shipping. Similarly, within the TradeZone, Mahindra, Brenco Reelin, DB Schenker, and Mara Phones Rossi SA Yangtze Optics Africa are part of global production networks. Air Chefs, Gift of the Givers Foundation, HBM-SA Health, iDube Cold Storage, Laser Junction, Retractaline Tufbag SA and Ukuphanta Holdings distribute nationally and internally but not part of global production networks.

5.3.6.7.3 *Airfreight Operations*

Internationlly major airports are primarly designed to service the needs of passenegers and the remaining capacity directed to air cargo operations (Mayer 2016: 53; Yuen *et al.* 2017: 15). South African airports are no different in this regard. Air connectivity in South African is based on a hub and spoke model where OR Tambo International Airport is the main hub, supported by Cape Town International Airport and King Shaka International Airport and a number of regional airports. However, air cargo and air passenger connectivity demand differs in the goods, destinations and trip length and produce differential geographies and dynamics nationally, across Sub-Saharan Africa and Internationally. The domestic airfreight market is relatively subdued in Durban. While some of the domestic freight demand met through a daily freighter, the relative strength of road based distributors out compete air cargo operation. Added to this are the inefficiencies of limited weight space in B737 on domestic routes.

In the case of Dube TradePort, integrators make use of the airport, but unlike CTIA and ORTIA, integrators have not moved operations to the airport. In Durban, Fedex are located in Red Hill, some 23km south on the N2, DHL in Riverhorse Valley some 26km south of KSIA. The land use survey confirmed the observation that in the context of this greenfields airport, spatial proximity to the airport is at odds with the main road based logistics distribution functions. For this reason logistics companies tend to choose road based accessibility between the port and Gauteng, on the N2 and N3 accessible routes.

5.3.6.8 Air connectivity

The project approvals were finalised in the period following the 2008 global economic crisis and despite the impact of the World Cup opening on the passenger side, the cargo side opened with limited air connectivity. Current passenger volumes of 5.6 million place KSIA as the third busiest airport in South Africa (Dube TradePort Corporation 2018b). Otiso *et al.* (2011: 619) in their study on African networks, as a proxy for Globalization, ranked Durban fourth in Africa and noted that along with

Johannesburg, Cairo, Cape Town, Nairobi, Casablanca, and Durban, are also relatively well integrated into the global urban airline network. Initially, the air cargo volumes between May 2010 to March 2012, were averaged at 337 tons for imports and 105 tons of exports per month (Dube TradePort Corporation 2012: 37). However, after some eight years of operation, cargo volumes have increased by 138 percentage to a total of 19,498 tons in 2017 (Dube TradePort Corporation 2018b: 14). DTP share of air cargo handling has shifted despite low levels of domestic economic growth. Changes in air connectivity at KSIA have impacted on supply side of air cargo handling volumes, with four additional routes flying from 2015 (Qatar Airways, Turkish Airlines, Ethiopian Airlines and Proflight Zambia), although only three related to the Cargo Terminal, a further three in 2016 (including Air Seychelles and Air Namibia) and although Ethiopian Airlines, Air Seychelles and SA Express withdrew in 2017, this was offset by the addition of Air Mauritius and more recently British Airways services in 2018. International air cargo growth from 2015-2018 has exceeded single digit GDP growth for KwaZulu-Natal and this is attributed in part to the opportunities created through increased connectivity with Durban and in part to modal competition for transporting specific goods (Respondent 9:1). The performance of Dube CargoTerminal is shown in Figure 5.20:in terms of international and domestic cargo revenue and tonnage between 2010 and 2018.

DTPC handles international cargo only and domestic operations are carried out by tenants in the Dube CargoTerminal. The international market is exclusively served through the existing wide-bodied aircraft, fixing the destination of exports through the related passenger hubs, rather than scheduled international freighter services. Charter freighters are arranged on an ad hoc basis, specifically where outsized cargo cannot be accommodated in the belly. Domestically the air cargo market is served through scheduled carriers, on a standard body (less than 45 tons) B 737. This aircraft has the capacity for approximately 7 tons, but on average carries, about 4.5 tons a year, and the Cargo Terminal handles approximately 11 percentage of the domestic cargo tonnage (Respondent 7:1; Respondent 9:2) Domestic cargo was constrained in 2017

by both the domestic economic climate and reduced cargo capacity on domestic routes (Dube TradePort Corporation 2018b: 40).

5.3.6.9 Cargo volumes

The Cargo terminal was purpose-built to support airfreight industry growth in KwaZulu-Natal, with sufficient capacity to support long-term development. The cargo handling has a capacity for 100 000 tonnes of cargo annually, although current volumes are a fifth of ultimate capacity.

Growth in exports and imports through the Dube TradePort terminal is estimated at 138 percentage since 2010 (Dube TradePort Corporation 2018b: 14), and the growth reflects trade relations with specific countries. Germany and China are where the majority of shipments originate to and from the Dube TradePort Cargo terminal, closely followed by the USA. Markets between India and China are bidirectional balanced with goods, which is not the case for total air cargo between Africa and China (Respondent 9:3). According to the DTP officials, exports are estimated at less than a quarter of international tonnage but are increasing in proportion and volume annually (Respondent 7:1).

The ability to move high value to weight and time-critical goods, including component parts and perishable goods, was part of the initial concept for developing an international air cargo strategy for the Province of KwaZulu-Natal. Although this requires dedicated and specialist air cargo facilities, warehousing and integrated network of intermodal logistics services, the bulk of air cargo is not transported in dedicated air freighters as initially planned. In other words, in the context of DTP, domestic airfreight capacity is more strongly tied to production capacity whereas international airfreight follows connectivity through passenger hubs.

Figure 5.20: Performance of Dube CargoTerminal 2010-2018

	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019
Revenue from cargo handling (imports and exports)						R9.4m	R10.2m	R14.3m	
Tonnage through Dube Cargo Terminal (international)	5023	5060	6123	7681	7150	8062	10075	11351	15 251
International tonnage growth %		1%	21%	25%	-7%	13%	25%	13%	34%
Tonnage through Dube Cargo Terminal (domestic)			3396	7335	6700	6427	7780	8147	8444
Domestic tonnage growth %				116%	-9%	-4%	21%	5%	4%
Value of international goods through Dube Cargo Terminal				R1,74b	R4.3b	R4.8b	R4.9b	R4,5b	R5.9b
TOTAL Tonnage	5023	5060	9519	15016	13850	14489	17855	19498	23695
% Growth		1%	88%	58%	-8%	5%	23%	9%	22%

Source: Data from Dube TradePort Corporation Annual Reports 2010-2018

Goods, either because they are able to absorb the higher cost of transport into pricing or due to time demands, are handled by the CargoTerminal and include electrical components and electronics, closely followed by engines, machines, equipment, and more recently clothing. Opportunities to establish linkages to well-established manufacturing and the automotive clusters in Durban are important in the context of

local economic stagnation and high unemployment figures. DTP have invested in the Dube Automotive Supply Park, located some 50 minutes to the south of the site. Mahindra opted to locate a production plant in the TradeZone for opening in 2018. Prior to the full operation of the Special Economic Zone, with incentives in the TradeZone directed towards export orientated manufacturing, the CargoTerminal handled more air imports than exports. Refer to Figure 5.21 below to note the performance between 2014 and 2016. Data for the period 2017 to 2018 is not available, and the available data is included in Annexure 19.

Figure 5.21: Imports and Export for the Dube CargoTerminal and Potential Market

	Volumes (tonnes)			Value (Rm)		
	2014	**2015**	**2016**	**2014**	**2015**	**2016**
Total KSIA exports	1787	2191	2804	1911	2085	2126
% growth KSIA exports		23%	28%		9%	2%
Total KZN-based ORTIA exports	4135	3952	3438	661	548	658
% growth KZN-based ORTIA exports		-4%	-13%		-17%	20%
Potential DTP air cargo export market	5922	6143	6242	2674	2633	3483
% growth potential DTP export market		4%	2%		-2%	32%
Total KSIA imports	5396	5617	6726	2085	2126	2169
% growth KSIA imports		4%	20%		2%	2%
Total KZN-based ORTIA imports	2992	2692	3010	1006	1026	1046
% growth KZN-based ORTIA imports		-10%	12%		2%	2%
Potential DTP air cargo import market	8388	8309	9286	3091	3152	3215
% growth DTP air cargo import market		-1%	12%		2%	2%
Total DTP potential air cargo market	**14310**	**14452**	**15528**	**5765**	**5785**	**6698**
% growth DTP potential air cargo market		1%	7%		0%	16%
Total existing air cargo market	**7183**	**7808**	**9530**	**3996**	**4211**	**4295**
% growth DTP potential air cargo market		9%	22%		5%	2%

Source: Adapted from Airport Strategy and Marketing (2016: 22).

Figure 5.21 Figure 5.21 is based on a study for Dube TradePort to establish the share of the KwaZulu-Natal air cargo market making use of KSIA relative to ORTIA. The potential market share is derived from South African Revenue Service import and export data using the postal code and port of entry in South Africa to indicate where exporter or importer is registered. The distinction is made between imports and exports using KSIA and those originating or destined for KwaZulu-Natal using ORTIA. Although the Figure 5.21 indicates that tonnage and value of imports at KSIA exceed exports, the actual air cargo market share using KSIA rather than ORTIA grew between 2014 and 2016. The share of air cargo exports using KSIA grew from 30% (1787 of 5922 tonnes) in 2014 to 45% (2804 of 6242tonnes) in 2016. Air cargo imports moving through KSIA grew from 64% (5396 of 8388 tonnes) in 2014 to 72% (6726 of 9286 tonnes) in 2016. Both in terms of absolute amounts and a growing proportion, air importers destined for KwaZulu-Natal favour KSIA over ORTIA. On the air export side, it appears that the routing decisions for air cargo are split between using KSIA and ORTIA. The connectivity from ORTIA, combined with flexibility and cost of road based freight operators, work to retail a share of the KwaZulu-Natal air cargo market, although the share is diminished annually between 2014 and 2016.

5.3.6.10 Special Economic Zone

The development of the SEZ at DTP has reinforced spatially targeted government industrialisation strategies, with the intention of developing specific clusters in the TradeZone adjacent to the CargoTerminal. The conversion of the previous Industrial Development Zone (IDZ) in 2014 to the SEZ is able to derive benefits for industrial development related to both proximity to transport infrastructure and fiscal incentives. The availability of serviced, zoned industrial land on the site, saw the 26 hectare first phase developed, the balance sold out and the second phase of 43 hectare due for release following planning approval (Dube TradePort Corporation 2018b). Enterprises requiring air connectivity are targeted in the SEZ, however, the first phase shows uneven air dependence. Further development of the SEZ is intended for manufacturing, assembling, air-related cargo distribution, high-tech aerospace services, electronics, and pharmaceuticals production, automotive, clothing, textiles,

cold-storage, warehousing, distribution and logistics (Dube TradePort Corporation 2018b: 6). Within the SEZ, the total investment value, by either black owned or empowered companies is approximately R1.629 billion (Dube TradePort Corporation 2018b: 41).

Figure 5.22: Employment and investment within the Special Economic Zone, 2016-2019

Year	Construction related jobs in SEZ	Permeant jobs in SEZ	Investment	BEE investment[xxvii]	Major Investments
2015/2016	229	334	R137.3 million	R15 million	The committed investments included lease was signed with GT Logistics, value of investment made by existing developers, such as iDube Cold Storage and through Hodari Properties
2016/2017	270	345	R80million	R74 million	Yangtze Optics Africa was approved to operate in Dube TradePort SEZ
2017/2018	317	427	R265 million	R1,472 billion to date	Lease was signed with Sabipharm Pty Ltd and investment made by Millhouse International, Monmouth Investments, Retractaline Manufacturing, Samsung, Yangtze Optics Africa and Teqal.
2018/2019		240	R1393 million		Mara Phones SA (Pty) Ltd, Monustep, Hodari Properties (Pty) Ltd, Conlog (Pty) Ltd.
TOTAL	816	1346	R1,8 billion	R1,561 billion	

Source: Extracted from Dube TradePort Corporation (2016); (Dube TradePort Corporation 2017c, 2018b).

The employment figures in the SEZ are shown in the Figure 5.22 and indicate approximately 1,346 people employed by investors located within Dube TradePort SEZ. The audited impact by KPMG indicated that capital expenditure by the private and public sector in Dube TradeZone 1 and Dube AgriZone 1 yielded some 46,367 employment opportunities in KwaZulu-Natal, including 18,447 indirect jobs in the KwaZulu-Natal economy. (Dube TradePort Corporation 2017c: 10). The impact of the SEZ on employment in KwaZulu-Natal was estimated at 21330 by March 2019 (Dube TradePort Corporation 2019b: 44). These figures include the impact of construction and operations, and amounting to approximately R9.5 billion into the national Gross Domestic Product (Dube TradePort Corporation 2017c: 10).

The real measure of the SEZ is not simply employment creation through on-site investment. The off-site and longer term measure relates to ensuring growth in air freight volumes development through broader, regional supply chains. Although the development of the TradeZone derives some internal demand for airfreight, the first phase failed to secure strong airfreight linkages in all the sub-tenants. In subsequent development phases of TradeZone, requirements for air connectivity are implemented through targeted investment strategies, most notably in the automotive and pharmaceutical sectors. However, even on completion of the TradeZone, the viability of the Cargo Terminal is not based on internal demand. Some twenty-freight forwarding, logistics, storage and distribution companies are located in the facility to support air related cargo distribution. Dube CargoTerminal also provides services directly to users of the facilities and it is estimated that some 100 role players in the logistics supply chain including shippers, agents, air cargo charter operators and logistics service providers interact with the Cargo Terminal (Respondent 7:4). While a minority of logistics operators have set up operation at the airport and Dube TradePort, and bulk of logistics companies operating in Durban have not relocated to the airport, due to the dominant role of the port and landside distribution on the N3 west (Respondent 8:1).

5.4 Case study findings

In consideration of the strategic spatial planning decisions at DTP and KSIA, this case study focused on DTPC's stated intention to improve foreign and local investment through airport related infrastructure. The performance of trade emanating from the local investment is considered in terms of contradictory dynamics impacting on connectivity in Africa.

5.4.1 Finding One: Promoting air connectivity between global and regional economies through improved logistics

Connectivity is implicit in airport development, where airports reflect fixed capital investment in buildings and infrastructure, interfaced with the flows of goods and people between international, regional and local economies. Dube TradePort is an outlier case, not only as a purpose-built greenfields development but given the project intends to intervene in the movement of air cargo.

The complexity of the connectivity dynamics established in the case study are outlined as the following:

1. The dynamics of passengers and cargo connectivity vary substantially in terms of the geographic range and thresholds, and yet cargo and passenger connectivity are tied to common ground infrastructure and hub routings. Established airports, specifically those in geographic proximity to established air routes and hubs, meet the demand for dedicated air cargo freighters. However, in the case of new secondary airports, outside of hubs, the demand for international air cargo freighter services take time to establish. In the short term, while the demand for dedicated freighters is low, the bulk of air cargo demand is met through the available belly hold capacity in international flights. The implication being that international air cargo routing is tied to passenger routes.

2. Nationally, the demand for air cargo distribution is limited. Not only is the capacity of the national fleet relatively small, but the demand was found to be met through road-based distribution logistics.
3. Despite some of the structural issues related to low national demand for air cargo logistics and limited international belly hold capacity for air cargo, there is surprising growth on both the passenger and cargo side of Dube TradePort. The growth in connectivity is attributed to securing new international airline services, including air cargo services, direct from Durban.
4. The role of Dube TradePort in regional trade integration with Sub-Saharan Africa is underdeveloped. While Durban has direct international air connectivity with Africa, the main connectivity is between Durban and the hubs of Dubai, Istanbul, and London.

An important consideration from the case is that international air connectivity, along with maritime connectivity, underpins international trade. Landside interface with international, with road and rail connectivity, is a consideration in planning for airport and logistics within the South African space economy. Logistics entails both the distribution function across modes of transport but also includes the management of materials as part of the production process. Planning for airports and logistics requires consideration of both distribution and material management elements in order to support the efficient movement of goods between local and global economies as part of the production processes.

The findings from the case study are as follows:

1. The development of international air capacity direct from Durban contributes towards an improvement in logistics capacity locally. However, given the limited volumes, although high value with substantial growth, moving though the Cargo Terminal the development has not intervened significantly or intended to solve the suboptimal movement of goods in the South African space economy.

2. There is evidence from the case that the planning processes at Dube TradePort supported the acquisition of development rights in the TradeZone for value-added manufacturing and logistics related uses. However, the initial development of the TradeZone was less targeted towards logistics and value-added manufacturing and in effect limited relationship to air connectivity. While there are more recent examples of firms that require air logistics to support production processes, for the most part, firms are not dependent on airport related logistics for both production and distribution.

5.4.2 Findings Two: Integrating airport led development in the local economy

In the context of this research, integration has been extended beyond the horizontal and vertical alignment of plans and infrastructure to include economic linkages in the production processes. On the land-use side, the case considered the multiple linkages between Dube TradePort with existing industrial development, new local investment, employment and broadened participation of firms such as suppliers and service providers as a layer to embedding territorial outcomes for local and regional benefit. In consideration of how Dube TradePort integrates with land uses on the site and within the northern corridor, the following finds are relevant.

1. Empirically the case study found that the fixed investment in the CargoTerminal infrastructure was followed by substantial growth in trade and investment. The Special Economic Zone attracted some R3,2 billion (Dube TradePort Corporation 2019:11), approximately half of the investment is related to broad-based black empowerment with approximately 2000 employment opportunities established since opening. Some of the investment in firms is related to global production networks in the SEZ at the airport. However, while more recent value-added manufacturing investment in the SEZ demonstrated that a limited number of firms participated in the production process, the use of air cargo capacity to support production processes was unclear in the bulk of firms' investment in SEZ.

2. The SEZ secured spatially targeted investment in firms related to global manufacturing. While a number of firms within the SEZ are part of global production networks, either in their role as partners to lead firms, subsidiaries or as suppliers, there are few linkages between firms in the SEZ and the anticipated agglomeration processes are not evident. There is some clustering of firms related to the airport, however, the firm linkages to the Cargo Terminal are weaker than expected given the proximity to the airport.

5.4.3 Finding Thee: Plan-making processes protecting land values

The case study found that multiple planning processes competed, reinforced and shaped the first decade since the opening of Dube TradePort incorporating the King Shaka Internal Airport. Dube TradePort, as a state-owned provincial entity, drove the initial statutory planning and environmental approval processes with opposition to the approving municipality. Following the opening, residual tensions played out in further applications for land use development rights. The initial opposition from the municipality, as reflected in the 2008 Spatial Development Framework, was reconsidered and multiple municipal planning processes including the Northern Urban Development Corridor, 2011 and the Northern Spatial Development Plan, 2013. While these municipal plans intended to direct future development opportunities, in effect development outside of the existing industrial areas is restricted by triggering detailed framework plans and statutory processes. Of concern is the weakly developed, vague economic strategies related to future economic development. Contradictory statements that opportunities would emerge related to the airport while restricting airport related development.

In parallel to municipal planning processes to curtail development, Tongaat Hulett pursued a number of strategic transport and land use planning processes on the northern corridor, either in collaboration with Dube TradePort or government or independently. In effect, the long term strategy of Tongaat Hulett to build value in the

northern city-building processes unfolded and accelerated with airport related investment. Planning processes were key to building value for the Tongaat Hulett group, and created the framework for their phased land conversion programme. Dube TradePort initiated multiple processes with Tongaat Hulett, ACSA, and the provincial government, and these processes dominated the regional planning agenda with overarching notions of Aerotropolis regional growth. In both Dube TradePort and Tongaat Hulett planning processes, the purpose of the regional scaled development agenda provided the broad context for site scaled statutory applications.

Abstracting from multiple planning processes shaping the production of space surrounding Dube TradePort the following observations were found:

1. The powerful collaboration between provincial funded planning processes and augmented by Tongaat Hulett resources, initiated regional planning processes that dominated the regional development agenda with Aerotropolis related plans. The municipality as the statutory approver, for the most part, planned outside of these resources processes. In effect differential, conceptual and substantive issues informed the parallel planning processes. The normative notions of achieving economic growth with developmental outcomes were a common thread across planning processes. Key departure points related to municipal plans to manage and control development and provincial collaborations to initiate and direct development. The outcomes of differential understandings of airport related growth meant that the complexity of economically informed planning actions was overlooked. Opportunities to develop more collaborative learning processes failed to emerge.
2. Tongaat Hulett benefited from the increased land values related to agricultural land conversions to commercial, logistics, business parks, and industrial uses. In addition to land use planning processes to increase land value, the company benefited from locational values of owning land in close proximity to road infrastructure upgrading and airport infrastructure spending. The concern in this research is not

related to the scale of profits implicit in land value conversions, but that the land values were overstated and not related to the actual market conditions. In effect, the subsequent crisis in the readjustment of market prices resulted in the delisting of the company from the stock exchange. Uncertainties in the local property market, related to Tongaat Hulett, combined with the crisis in state-owned entities, specifically the reduced electricity provision, local government leadership changes, have all converged in an economic downturn.

5.5 Chapter Summary

Dube TradePort development has secured primacy in provincial investment spending and regional economic strategies. In addition to localise impacts the project has managed to increase connectivity to international markets, build up local volumes (albeit in specific supply chains and relatively small), attract local and foreign investment, all within in a relatively short eight year span.

The literature and policy review support the case for improved logistics and infrastructural integration to support trade, particularly where air connectivity embedded in local industrialization, builds regional trade volumes. Weak economic integration within Africa represents lost opportunities for developing larger trading markets and economies of scale associated with regional trading blocks. However, the mechanisms to support this regional trade lies beyond the physical infrastructure. Air connectivity, supported by trade agreements, has seen a shift in the African share of air cargo, and yet air connectivity between Africa and its trading regions is still stronger than trade within Africa. The findings point to dynamics outside of infrastructure design impacting on the forms of trade and investment at DTP.

DTP increased trade, but not in the way that was intended. African connectivity from Durban has emerged though new passenger services, and yet route development is not been accompanied with significant trade in Africa. One conclusion may be a tenuous

link between liberalization strategies and trade, however the DTP case shows that air cargo is strongly tied to local production rather than passenger destinations.

The ultimate design of Dube CargoTerminal is based on the development of Sub-Saharan supply chains related to connectivity, with sufficient import and export air cargo volumes to support scheduled freighter services. However, the limited airfreight volumes from Africa for exports moving through DTP, place the viability of dedicated freighters in the balance. Despite the Sub-Saharan reach of the air cargo infrastructure, the current trade imbalance works against building up trade volumes on the return flight. Strategies to align passenger and air cargo connectivity through belly hold cargo are short term strategies to offset risks of unbalanced backhaul. Longer term strategies relate to increased trade export volumes with local embeddedness reflected in growing local employment, trade and investment.

CHAPTER SIX

CASE STUDY ANALYSIS

6.1 Introduction

The purpose of Chapter Six is to analyse the case study data presented in Chapter Five for emerging themes in order to understand how the airport infrastructure supported the movement of goods between the global and regional economies, through improved logistics at the local planning scale within Durban, South Africa. Planning for airports and logistics requires an understanding of how airfreight flows are expressed horizontally in socio-spatial processes related to transport and land uses locally and how these integrate vertically across spatial scales.

Dube TradePort is the largest contemporary infrastructural project in the province of KwaZulu-Natal. The development presents a challenge in how to plan for airports and logistics within a normative framework of spatial transformation. It was argued in Chapter Two that normative planning frameworks are related to actions based on shared knowledge of the principles underpinning the restructuring of the South African space economy. Although planning activities are initiated within and outside of the state, the role of government as both approver of development rights and provider of infrastructure investment spending, supports the dominant role of the state in planning.

Normative principles for spatial transformation are evident in the national planning frameworks of the National Development Plan (2012), Spatial Land Use Management Act (2013), Integrated Urban Development Framework (2016), and range of development plans across the provincial, district, local and metropolitan entities. Section 4.5.3.3 provided the policy context for infrastructure led development in support of spatial transformation to redress the inequalities of the South African space economy. In keeping with the transformation agenda, Dube TradePort Corporation as

a provincially owned state entity links normative ideas of achieving growth with broad-based developmental outcomes. The analysis section reflects on how planning for air cargo logistics integrates with the production of space to produce developmental outcomes. The key question here is, is planning for airports and logistics, as an infrastructure led development strategy, achieving spatial transformation outcomes?

The analysis is based on three emerging themes in the research:

1. The city structure, specifically the case of Durban, provided the contextual entry point to this research. A key consideration is the insertion of a greenfield airport into existing material flows that are strongly embedded in the local territory related to a pre-existing Port of Durban serving sub-Saharan Africa. Findings based on the documents analysis, land use survey and interviews suggest a tenuous relationships between the airport and existing material flows. Historically flows are connected to the port serving the national economy, and while the broader city spatial structure is untransformed, there is evidence of growth in value and tonnage though the Dube TradePort Cargo Terminal, investment flows at the TradeZone with limited employments. Spatial transformation according to the NDP and the IUDF attempts to restructure the South African space economy in order to achieve inclusive economic growth with access to economic and social opportunities. In effect infrastructure is intended to be planned to support the development of an efficient and equitable urban form reducing distances between production and consumption.
2. Evidence of government policy, spending and investment implies a strong commitment to an infrastructure-led development path to support trade and investment in South Africa. However, within the context of deindustrialization impacting on the South African economy and specifically the decline in the manufacturing sector in Durban,

disappointments in relation to expectations related to employment creation and spatial transformation are acute. Investment in airport infrastructure to support value-added services in the production and distribution of goods, assumed developmental returns on supply side interventions. The evidence suggests that land use has responded to airport infrastructure investment but not as intended. Increased land value may relate to supply side spending and subsequent market speculation rather than demand for air connectivity. In addition to this, spatially targeted industrial policy tools at Dube TradePort SEZ attracted significant investment on the site, where incentives rather proximity to airport infrastructure drove the demand.

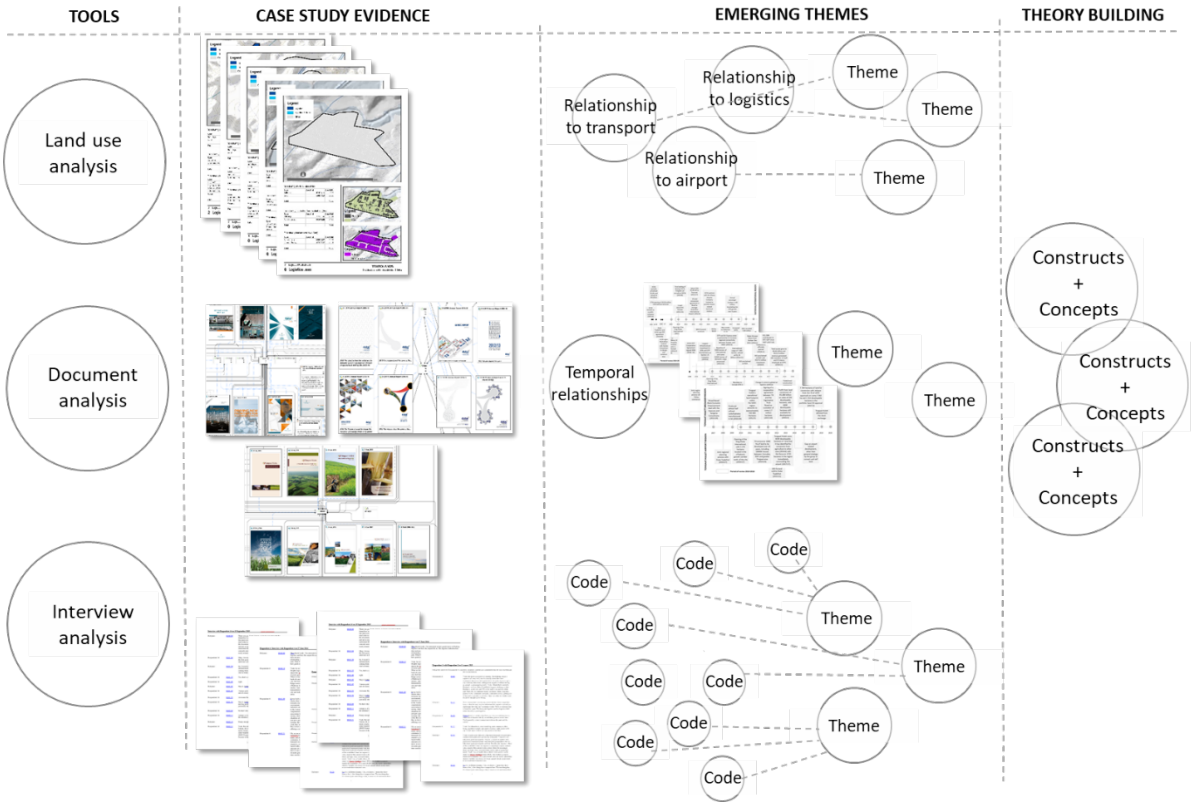
3. Planning as a public sector activity aims to protect the public interest within a normative framework. The development of an airport region requires planners to initiate, manage and regulate multi-scaled land use changes at a strategic regional and site scale. However, the issues related to airports and logistics require planners to think through issues not traditionally included in plan-making processes. Consideration of how airports related to other modes of transport in the distribution of goods and secondly how planning for airports relates to future industrial land for both localised production and participation in global value chains.

6.2 Methods to analyse the case study evidence

Data analysis in the context of the case study comprises of examining, categorising, tabulating and making sense of the case study evidence to produce empirically based findings (Yin 2014: 132). The methods used to collect and triangulate the case study evidence, select documents and interviewee are presented in Chapters Four and Five. The sources of data analysed includes the examination the land use survey of the industrial areas on the northern development corridor (refer to Appendix C); document reviews of planning, policy and annual reports (refer to Appendix D) and thirdly interviews (refer to Appendix E). A key analytic strategy applied in Chapter Six is the

juxtaposition of case study evidence from the different sources (land use surveys, document analysis, interviews) to each other to understand the emerging themes. The thematic analysis of data is then related back the original research questions to articulate emerging concepts and constructs (Braun and Clarke 2012: 58). Refer to Figure 6.1 that diagrammatically represents three strategies for the thematic analysis.

Figure 6.1: Strategy for Thematic Analysis



Source: Devised by the researcher

There was substantial data collected in the contextual case study (Chapter Four) and Dube TradePort case study (Chapter Five) in order to develop a case description. The rationale for the single-case design outlined in Section 5.2.2 emerged from a clear set of circumstances for a unique case. These relate to a case of planning a greenfield, purpose build-built air cargo facility with a Special Economic Zone (SEZ) in Durban. The emerging themes from the case study description are analysed with the case study evidence to reflect on extending an alternative theoretical proposition.

6.2.1 Land use analysis

Land use analysis of industrial areas on the northern development corridor attempted to establish the relative strength of relationships between the Dube TradePort (DTP) case study to the production and distribution of goods. The land use survey and analysis focused on the following research questions:

1. To explore the relationship of how the distribution of goods through airports integrate with ports, rail and road infrastructure relate to land use.
2. To understand how airports integrate with ports, rail and road infrastructure in the context of the case and how airports integrate with spaces of production and distribution of goods in the context of the case.

Land use analysis was produced as a GIS generated plans and there after annotated as in terms of the researcher's observations. The GIS plans were verified against updated Google map data on logistics. Each of the industrial neighbourhood plans were tabulated against the relationship between land uses and mode of transport, relationship to types of logistics and related uses and the relationship to the airport (refer to Appendix C). The themes emerging from the analytical strategy are discussed in section 6.3.1.

6.2.2 Documents analysis

The content analysis of the documents (annual reports) established the relative roles of organisations as they relate to airports and logistics and specifically to shaping the development of the case study across the period 2010-2018. Given that the study is bound to the time period 2010-2018, the annual reports were coded and analysed across the same time period. The focus is on how the relationships and key decisions made by organisations shape the nature of how goods move through (and around) the airport, how these flows are distributed and how they relate to local productive land

uses. Content analysis provides a research technique for making inferences from the data within context (Krippendorff 1989: 403), and made visible the economic and spatial interests underpinning these public decisions. The data drawn from the Atlas.ti document analysis is analysed temporally into timelines.

Coordination of regional investment through the `*Aerotropolis Initiative'* is an attempt to achieve integration between state owned entities, government and private entities. State owned entities (such as DTP, ACSA) played a significant role in shaping physical public and private investments on site and attempted to integrate actual on-site spending with off-site investment. Outside of the state, Tongaat Hulett as a major private land owner has benefited from a substantial land conversion programme related to state investment on the northern corridor. Although the decisions of other organizations impact on land use, the annual reports of Transnet, SAA and even the municipal integrated development plans, are relatively silent on the opportunities or challenges for planning for multimodal logistics at DTP. On this basis, ACSA, DTPC and Tongaat Hulett Integrated Annual reports are further analysed for milestones impacting on the unfolding planning processes on the northern corridor.

6.2.3 Interview analysis

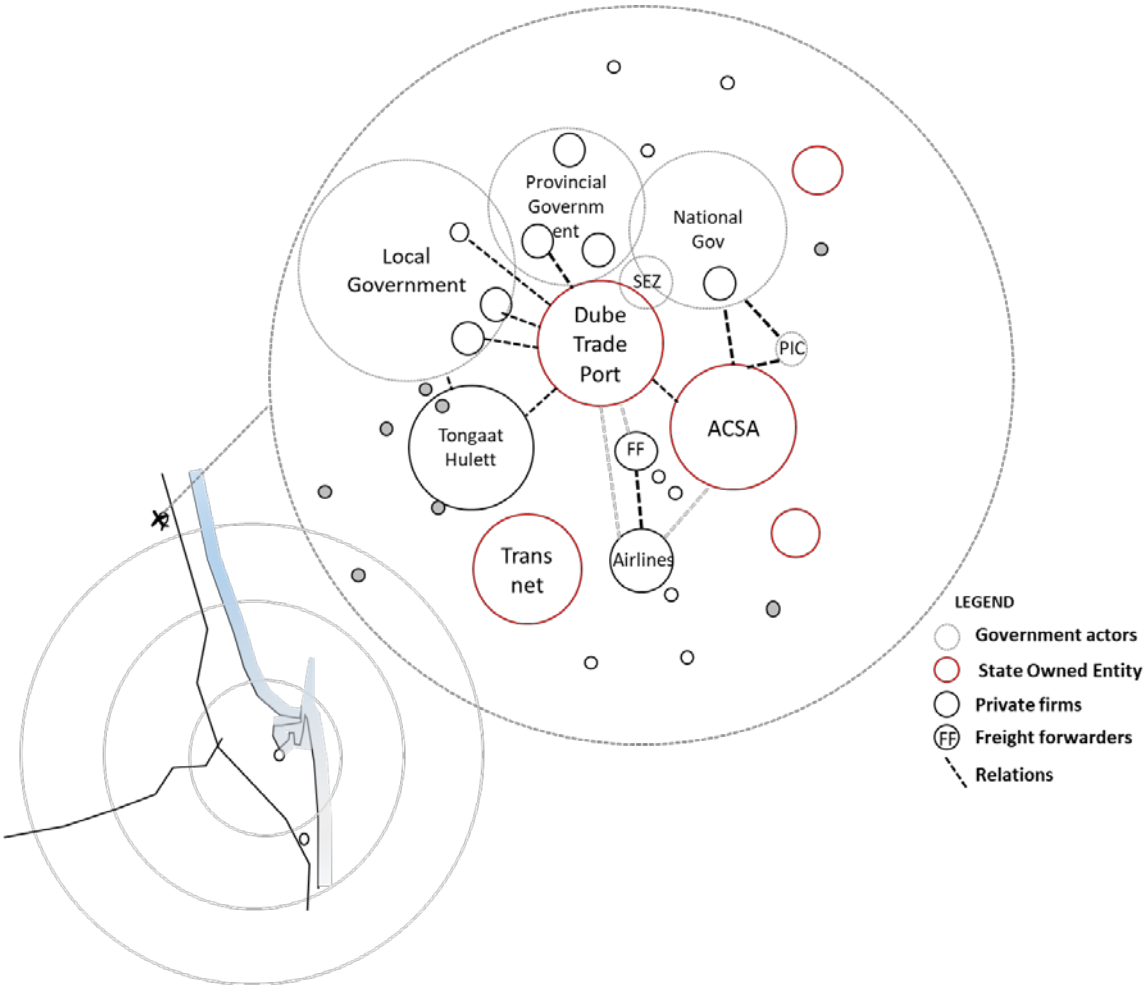
The interview transcripts are coded and clustered into emerging themes in order to triangulate interview data against case study evidence. A key question is whether interview data corroborated or contradicted other evidence.

Figure 6.2 below indicates the complexity of role players in shaping decisions and the production of space in proximity to KSIA. Arising from the interview analysis, the relative institutional emphasis on Dube TradePort was coded from the interview transcripts by the number of collective mentions of the institutions by respondents. It was found that Dube TradePort Corporation was mentioned 68 times as opposed to local government (147), national government departments (95), Transnet (80), ACSA (56), provincial government (27), Tongaat Hulett Developments (17) and SAA (6).

The strength of these relationships are inferred through both the interview and document analysis.

Some of the institutional complexity related to a provincially owned state entity of Dube TradePort Corporation established by KwaZulu-Natal EDTEA, with the SEZ funded through National DTI, to develop a project site that is operated by ACSA with weak linkages to Transnet and eThekwini Municipality. Contextually airports and SEZ incentives are national competencies located in a multi-scaled policy environment.

Figure 6.2: Relationships in the interview data



Source: Devised by researcher

6.3 Analysis of findings

6.3.1 Land use survey analysis

The land use survey analysis of industrial areas on the northern corridor was undertaken to observe the relationship between land use and transportation and to establish the relationships between the airports and logistics within spaces of production in relative close proximity to the KSIA. The underlying question is whether industrial land uses on the northern corridor display attributes, either in the nature of the value chain, land use activity or materials processed or produced, that relate to the proximity of the airport. The assumption that the investment in KSIA and DTP infrastructure investment is the main force shaping industrial land uses opportunities is questioned from the perspective of the DTP case. The analysis contributes to the long standing, unresolved debate around whether transport infrastructure investment promotes economic growth at the regional and local levels (Banister and Berechman 2001: 209). At a level of generality, Banister and Berechman (2001: 209) argued that a positive outcome of transport infrastructure led growth requires the following preconditions: 1) positive externalities such as agglomeration and appropriate labour market skills locally in place; 2) investment factors to ensure impact at spatial scale; and 3) a political environment that supports investment decisions and supportive policy alignment and incentives.

Dube TradePort arguably have many of these preconditions in place for agglomeration processes related to air infrastructure, investment at a regional scale and strong policy and political support. However, greenfield development means that positive externalities have to be established around shared infrastructure, labour and industrial activity within a longer-term period. This varies from the case of ORTIA and CTIA where industrial areas were established prior to the airports. In addition to the effectiveness of the SEZ incentives to attract new investment, public and Tongaat Hulett investment in the broader Aerotropolis region is aligned to site investment at Dube TradePort, despite initial concerns.

6.3.1.1 Conceptualising logistics and air logistics

Reflecting back on the two interrelated elements to logistics, the one aspect includes the physical distribution of goods in the supply chain from the point of production to consumption, including movement and handling related to transportation services, distribution and warehousing services, wholesale and retail. The second interrelated aspect to logistics is the material management function that includes activities related to production and manufacturing activities within the supply chain, and can include marketing, production planning, buying, inventory management, packing and recycling (Hesse and Rodrigue 2004: 172). In order to fulfil the distribution function and management of materials within the production supply chain, air-based logistics is a niche area, responding to high value, low weight and specialised demand.

Air logistics plays a specific role in the logistics chain. The demand for air logistics relates to whether the value chain requires time-critical or time-dependent services. Time-critical value chains are those firms that are dependent upon air transport for urgent requirements in the shortest possible time, such as medical, disaster management, critical components, or where the core business requires air services such as inflight catering or perishables. Time dependent value chains are those firms that choose air services as the trade-off and additional transportation cost warrants the time savings and require the services of logistics operators, freight forwarders and couriers, to meet deadlines. Other value chains making use of air services include those moving valuable cargo and requiring secure services.

The land use study was informed by the air connectivity distinction between air logistics interacting with the airport and general road based logistics, this understanding was applied to the land use survey, in order to understand the prevalence of activities and value-added activities related to the flow of materials, component and final goods. In the survey, logistics users and generators of logistics included warehouses for distribution, distribution centres, logistics companies, couriers, freight forwarders and trucking, cartage, and hauler companies. Logistics

related uses included large manufacturers, storage facilities, pallets and containers storage, and even recycling and storage of disposed goods. Related to logistics are downstream services such as packing, printing and product design; however, these downstream activities were excluded as they are possibly related to advertising and marketing services, not necessarily logistics related. The survey also differentiated logistics intensive activity within production uses, from air related logistics. Also, related to logistics, but excluded on primary use criteria, were activities related to the consumption and disposal of goods, such as shopping centres and recycling operations.

In effect the purpose of the survey was to observe land use relations between the Cargo Terminal and the production of space on the Northern Corridor. Whilst it has previously been argued in Chapter Two that air and cargo operators collaborate on routing, they also produce differential geographies, with cargo operators related to production activities in industrial areas. Assumptions that air cargo operations are strongly localised does not necessarily appear to be the case with air cargo greenfield development, as airports relate to the production and distribution of particular industries and goods under specific circumstances. As identified in section 4,3, typical airport related industrial sectors included automotive components, high value electronic manufacturing, pharmaceuticals, logistics, etc. The land uses survey needed to establish whether the established and new industrial areas on the northern corridor has existing or potential air connectivity. Did the Dube CargoTerminal offer opportunities to existing industrial firms on the northern corridor or did the Dube CargoTerminal create opportunities to attract airport related development either on the Northern Corridor or in KwaZulu-Natal more broadly?

6.3.1.2 On-site land use

Dube TradePort Corporation, through the SEZ incentives, accommodated tenants in TradeZone 1 related to logistics, electronics, warehousing, manufacturing and distribution, freight forwarding, and in TradeZone 1B will focus on pharmaceuticals,

and the like. TradeZone 2 is targeted at aerospace and aviation-linked manufacturing, agriculture and agro-processing, electronics manufacturing and assembly, pharmaceutical, textiles and automotive component in TradeZone 2 and in addition to the previous sectors include logistics and distribution in TradeZone 3 and 4 (Dube TradePort Corporation 2019f: 15-17).

Although the establishment of productivity gains for firms dependent on air infrastructure is a longer term outcome, the TradeZone 1 area of 26 Ha was sold out by 2017 and in 2018 a further 67 Ha was released in TradeZone 2 and 135 Ha planned for TradeZone 3 (Dube TradePort Corporation 2018c: 16). The on-site land use analysis shows how proximity and air connectivity are not necessarily connected within the context of the case study. Interview confirmed the observation within the TradeZone. The findings are summarised in Figure 6.3 below and also drew on Annexure 16 and Annexure 17 that outlined the nature of the industry, ownership (global, local, B-BBEE) and air connectivity of firms within the Cargo Terminal and TradeZone.

A central issue on the DTP site was to establish the scale of air connectivity with the airport infrastructure. Although tenants for the SEZ were screened for DTP board approval, the dependence and use of airport infrastructure cannot be guaranteed. The criteria used for establishing air connectivity and use of the Dube CargoTerminal was based on the nature of the SEZ operations and observations on site. The following criteria were applied to establish air connectivity:

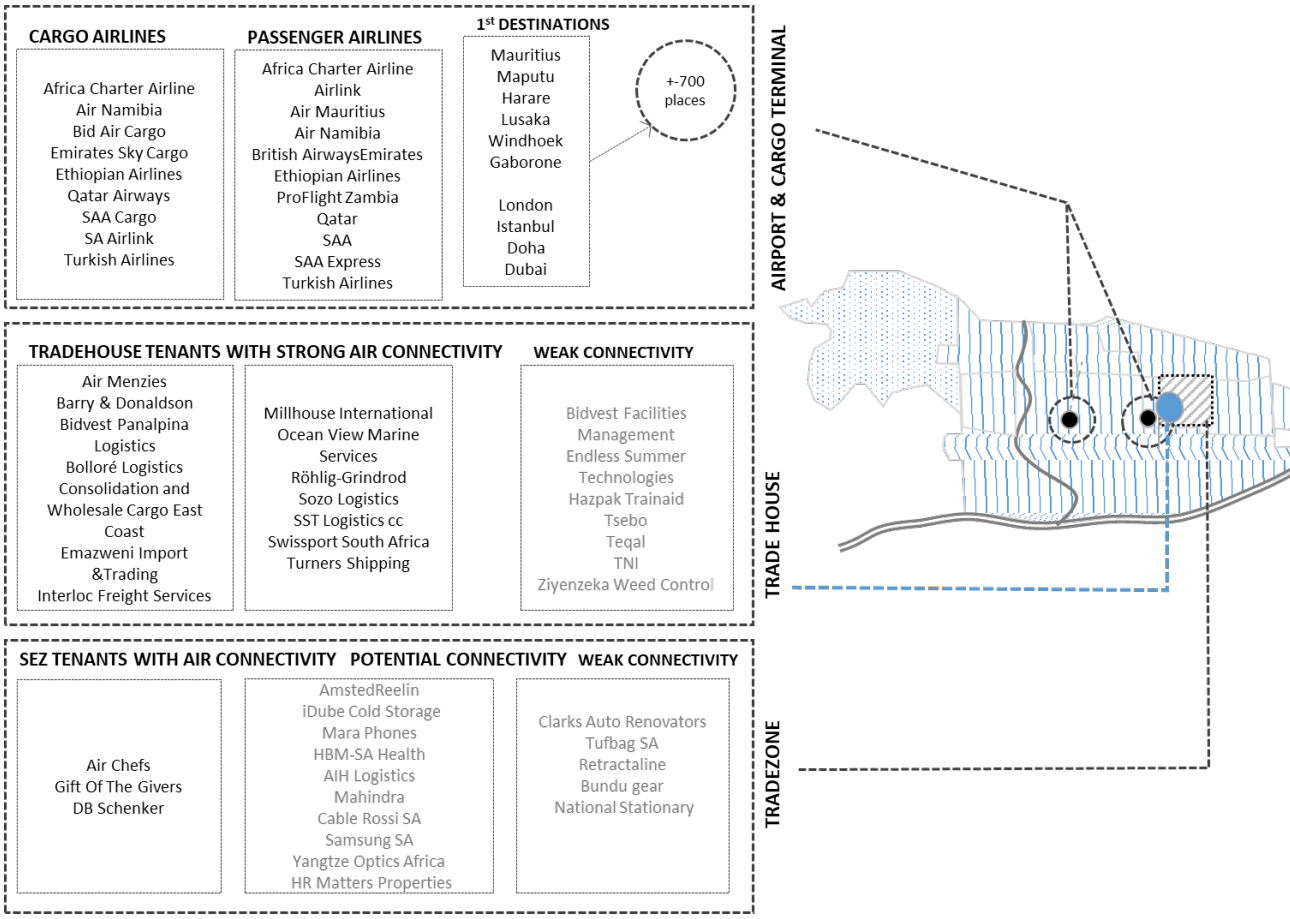
1. Is the nature of the core business time critical, such as an emergency or time dependent as in deliveries, perishable good?
2. Is the nature of the cargo low weight? The criteria is subjective volume and size may also be a factor. Essential there is a cost tradeoff between weight and value?
3. Is the cargo high value and able to absorb the cost of air transport in the pricing structure?

4. Is the cargo export orientated or imported for local domestic distribution? Domestic distribution is largely road based, even if located adjacent to the airport.

The air connectivity of tenants at the CargoTerminal and TradeZone were reflected in Figure 6.3 below. Air connectivity is intrinsic to air cargo and air line operators at KSIA and DTP, with airline connectivity to some ten cities and to a further 700 destinations. Air connectivity, as expected, within the Cargo Terminal is high, with a cluster of firms handling the movement of goods by air, such as airlines, air logistics operators, freight forwarders and shippers. Similarly, air connectivity with, within the Dube TradeHouse was designed with an overhead, direct and secure air bridge link to the Cargo Terminal and specifically intended to accommodate freight forwarders and shippers. While the facility has a significant number of operators (13) active with the Cargo Terminal, several tenants also have a tenuous link to the Cargo Terminal. Interestingly, the majority (100) of the freight forwarders interacting with Dube Cargo Terminal are not located in close proximity to the airport (Respondent 9:4), due to the multimodal nature of logistics.

TradeZone 1, forms part of the SEZ, and accommodates the Dube TradeHouse, on the land adjacent to the runway. Yet, despite the proximity to air related infrastructure, very few of the operators demonstrate strong air connectivity as part of their core business function. Tangentially, the nature of goods produced, or component inputs, could be distributed by air, and yet the relatively strength and flexibility of road-based distribution systems, have worked against these prospects. Operations with strong air connectivity would include in-service flight logistics (Air Chefs), disaster relief by air (Gift of the Givers), cold storage chains related to food (iDube Cold Storage) and logistics operators that could include an air cargo component (DB Schenker, AIH Logistics, Monmoth, Ukuphanta Holdings).

Figure 6.3: Air connectivity of firms and operators on DTP site in geographic related to proximity to KSIA and Dube CargoTerminal



Source: Devised by the researcher

The firms located within the TradeZone 1 are for the most part typical of clusters associated with air cargo and these include high value manufactures, electronics and logistics companies that would move component goods by air in the production process but not necessarily completed goods. Although firms such as MaraPhones, Samsung, HBM-SA Mahindra, Rossi SA, Amstead Reelin, iDube Cold Storage, Ukuphanta Holdings, Conlog, Monmoth all have potentially strong airport connectivity, there are companies with weak air connectivity. According to a DTPC official, some of the initial investment in TradeZone 1 displayed limited air connectivity (Respondent 5:7). The reasons behind this related the eagerness on the part of DTPC to secure early investments in the Dube TradeZone, through Shree

Property developers and Hondai Investments, to end user tenants. This also meant that some of the end tenants firms dealing with lower value goods such as Tufbags and Retractaline, were unlikely distribute through the CargoTerminal due to costs. The SEZ attracted substantial investment to the site, including global value chains (Respondent 5:7). Even in subsequent investments after the SEZ incentives, the air connectivity was questionable. Examples of goods unsuitable for belly cargo include goods that are not high value (such as National Stationers, Retractaline, Tuff Bags) or bulky (Rossi SA, Amstead Reenlin, Mahindra). However, components in the production process could be distributed by air and the potential for air connectivity exists. The reality is that domestic distributions at the TradeZone are currently largely road based. In part this relates to relative strength (cost and flexibility) of road based logistics that dominates modal choices for distribution but also reflects structural deficiencies in domestic air cargo. The limited services from the Cargo Terminal through freighters, limited belly hold capacity, specifically in domestic airlines, all combined with the costs impacts on the air cargo demand at Dube TradePort. Performance of the CargoTerminal in Figure 5.20, Figure 5.21 and Annexure 19 reflect the subdued domestic operations.

The land use analysis in the SEZ indicated some product differentiation occurring in particular value chains such as automotive and electronics. However, although these sectors along with pharmaceuticals are targeted for future investments in the TradeZone, there is a distinct lack of linkage between firms in the SEZ. In other words, the real measure of agglomeration economies with up and downstream linkages between firms has not yet emerged in the early phase of development. While there are linkages between AIH Logistics, Clarks Auto Renovators and Bundu Gear all with Mahindra, these were planned suppliers rather than an emerging automotive cluster.

Despite concerns around weak agglomeration and air connectivity with the Cargo Terminal, the early indicators of tonnage volumes and value indicate significant growth. Refer to Figure 5.20 and 5.21 on the performance of the Cargo Terminal.

Updated figure are included in Annexure 19 and concur with the statement of increased air cargo growth. Interviews with Dube TradePort confirmed that the Cargo Terminal volumes are drawn from KwaZulu-Natal rather than adjacent industries investing within the SEZ (Respondent 5:7, 9:2). Arising out of the on-site finds, a key question for the northern corridor land use survey is to establish how and if firms are related to the development of the airport.

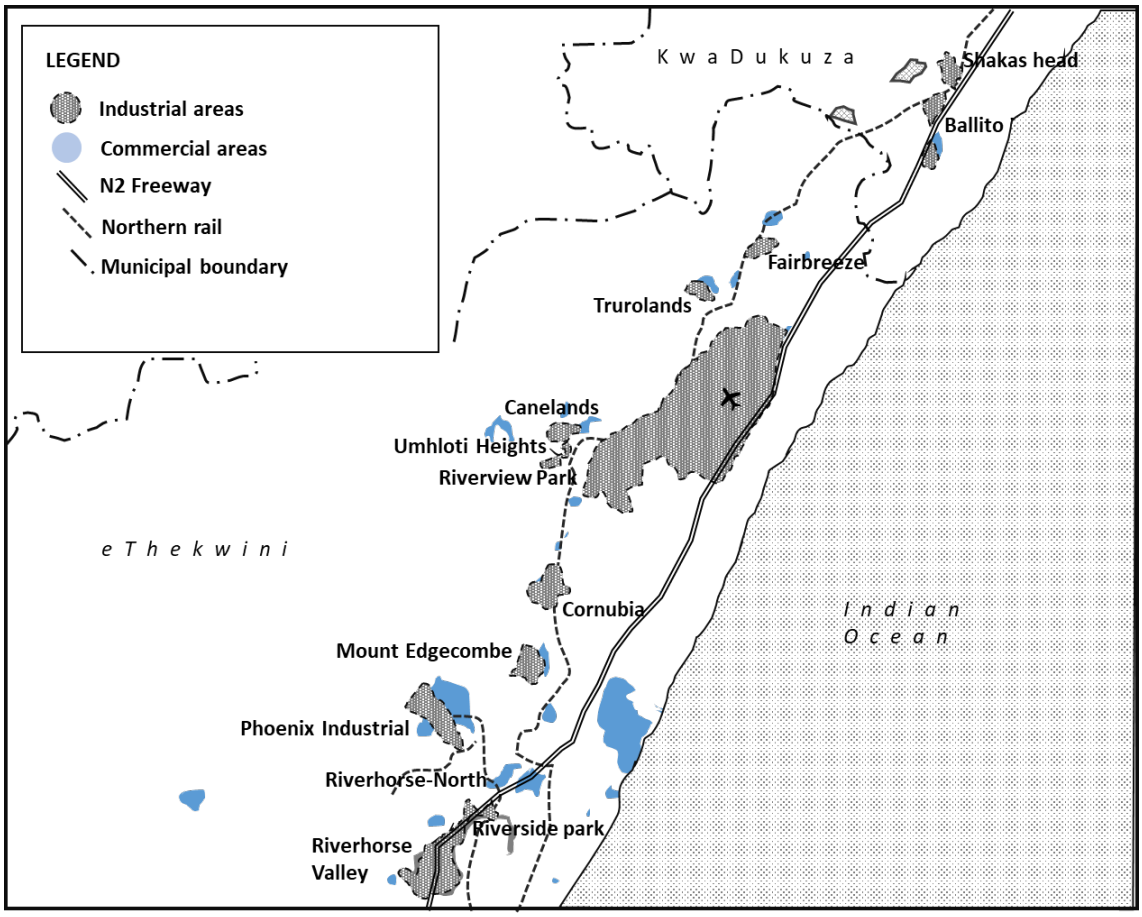
6.3.1.3 Off-site land use

Expectations related to the scale of the investments taking place at Dube TradePort influenced patterns of production, consumption and private investment in the roll out of the air logistics infrastructure project on the northern corridor. eThekwini Municipality in the Built Environment Performance Plan (2018) underpinning the Spatial Development Framework, attributed major growth on the northern corridor to investment related growth at Dube TradePort SDF (South Africa 2018a: 58). Although, in a seemingly contradictory statement the decline in Gross Value Add for manufacturing in the central area, is attributed to both displacement and `*exodus'* to the north (South Africa 2018a: 60-61), rather than new growth. Some of the document analysis suggested a disjuncture between off-site land values on the northern corridor and actual demand. The reported Tongaat Hulett land conversion profits averaged at R547m^2 with approximately 120 hectares sold annually from 2010-2018 (Refer to Figure 4.17). Tongaat Hulett marketed land development and manufacturing opportunities related to the airport in Bridge City, Cornubia, Inyaninga and Compensation (Tongaat Hulett Development 2018: 5), and have a slow take up of industrial land within Cornubia and failed to sell Inyaninga and Compensation to developers (Respondent 8). Reasons for limited demand were attributed to the distance from the Port (Respondent 8:1), the relative competition from DTP and the SEZ incentives (Respondent 8:3). Profits related to the sale of developable Tongaat Hulett land conversion were estimated at R5,244 billion from 2010-2018 (refer to Figure 4.17) with the perceived land value responding to the opening of the airport. In addition to the airport investment, some of land value was created through a relatively small contribution of R979 million infrastructure investment in 2016-2018

by Tongaat Hulett (Tongaat Hulett 2018: 5), as well as significant state investment in provincial and municipal road infrastructure and upgraded level change intersections on the N2 Freeway.

At a broader level, industrial land on the northern corridor is marketed in relation to the physical proximity to KSIA and DTP (Tongaat Hulett Development 2018: 4). Demand for industrial land has not responded to the airport proximity as anticipated by land developers, with factors such as accessibility to the port and N2/N3 accessibility outranking airport proximity and subdued in the property market (Respondent 8:3). While there is substantial investment in road and airport infrastructure on the northern corridor, the take up of land and the mix of land use is found to only partially respond to airport infrastructure led development. Reference by respondents was made to diminished interest in industrial land that is more than fifteen minutes driving time from the port (Respondent 8:1), and negatively affecting the demand for logistics and industrial land in Cornubia (50 minutes / 30 km), Inyaninga and Compensation (Respondent 8:3). In a similar argument, where the absolute time and distance vary, the importance of locating logistics related activity within the 30 km distance of the port (Respondent 14:16) is highlighted, or the `*holy distance*[xxviii]' from port and airport respectively 15-50 km (Respondent 11:1) was seen to underpin demand for industrial land. The underlying concept in most of these cases is that the fulfilment of multimodal routings suggests that access to transportation infrastructures is considered relationally, and avoids port- or airport- centric thinking. The focus on the land use study was not to identify multiple factors that influence the take up of industrial land, even after planning rights and bulk infrastructure are in place. Rather to look at the industrial neighbourhoods on the northern corridor and understand the prevalence of logistics and logistics intensive uses and their relationships to the Dube CargoTerminal. The field surveys identified logistics and logistics related uses in the industrial neighbourhoods, and verified these against google maps to update the survey.

Figure 6.4: Industrial sites in proximity to Dube TradePort on the northern corridor



Source: Devised by the researcher

The following observations emerged in the land use study included in Appendix C. Figure 5.3 represents an area of 4398 hectares was surveyed containing some 1215 hectares of building coverage. Land use distribution by site area related to industry (1215 hectares), logistics (87 hectares) and logistics related (70 hectares) with the balance for roads, open space and non-industrial uses.

1. Logistics related uses include activities dealing with the management of material in the production process as well as the distribution of goods. The location of logistics related firms, engaged with the distribution of goods, although it could related to multiple modalities

(sea, rail and air), road based logistics were most prevalent in the study area.

2. Related to land use there was a notable absence of airfreight related logistics, even at the airport. No airfreight integrators, such as DHL or Fedex, have set up warehouse or distribution operations at KSIA. Instead, the operators are located on the northern corridor near Riverhorse Valley, and undertake short trips for airfreight distributions at DTP/KSIA, using belly-hold capacity rather than dedicated freighters.
3. Related to road dominance, logistics companies make use of road-based transport for domestic distributions and sea-freight for international movements. Related to land use air cargo logistics are specialised and while large integrators are absent from the site, some of the freight forwarders engaged in this segment are clustered within the TradeHouse. Across the northern corridor study area, and specifically on the TradeZone, the lack of air connectivity land uses was noted. And yet, despite the airport attracting logistics and air dependent firm in close proximity to the airport, the volumes of air cargo through the cargo terminal are increasing. The connection between production related uses on the northern corridor and the airport is unclear.
4. Related to road dominance the strategy of infrastructure led development tends to focus on road based logistics (Patel 2017) and works against policy intentions to shift cargo off roads. While government spending is directed towards the SIP corridor, a key outcome was to improve road-based distribution between the port and main Gauteng hub. There is wide recognition that the current high road-based distribution of cargo is suboptimal, despite the availability of other modes of transport. The development of the northern corridor is historically and in recent planning terms structured around the northern rail line, with the majority of industrial suburbs having access to rail stations and sidings. In addition, recent purchases of additional

rolling stock and rail investments nationally (Patel 2017) are aimed at improved capacity. However: Government spending and private logistics operators reinforce the dominance of road-based logistics.

The broad relationship between transportation infrastructure and land use has been established in the literature review. However, in the case of greenfield, purpose-built airports the assumption that airports perform the role of attracting particularly land use activity is complex as locational decisions respond to numerous factors. The review of factors impacting on logistics and distribution centre locations were ranked as geographic locality, links to transport, market accessibility, market size and potential growth of region are key factors that multinational companies took into account when deciding on the location of logistics and distribution centres (Hong 2007; Carlucci et al. 2018: 597). Similar to the on-site land use analysis, the broader corridor proximity and air connectivity are not necessarily connected. A relational approach is helpful in thinking about logistics in conjunction with multi transportation modalities more broadly than just airports. In the case of logistics firms in Durban, geographic locality with accessibility to the sea port and inland markets through road based distribution does not necessarily dovetail with airport proximity. In Durban, location at the airport actually reduces accessibility to central Durban and the N3 highway to Gauteng markets, even though airport proximity increases international accessibility. The off-site land use finds that inserting an airport into well-established urban structure, does not significant shift road based supply chains between the port and Gauteng. However, within the KwaZulu-Natal air cargo market, whist a growing share of air cargo has shifted from road to air, the impact is relatively minor compared to the volumes on the N3 road corridor.

6.3.1.4 Implications for planning

Planners have limited land use policy tools to deal with the intended uses related to airport and logistics or in managing the negative externalities. Logistics uses are space extensive uses and are generally located on high value land where higher order road

accessibility is key. Although planners are concerned with the perceived low employment densities of these space extensive uses, the land use regulations create parameters for intended consent, excluded uses, minimum site size, height and parking standards.

The definition of logistics, contained in the new land use schemes for eThekwini, apply a relatively broad definition of logistics including all activities from the point of production through to consumption and defining logistics as '*the process of planning, implementing, and controlling the effective and efficient flow of goods and services from the point of origin to the point of consumption*' (eThekwini Municipality 2019: 88). However the range of permitted land use[xxix]s is relatively narrow including transport depot, warehouse and light industry and amongst the range of consent uses are airport, builders yard, general industry and motor related (eThekwini Municipality 2019: 88). Refer to Annexure 21 for the scheme extract. According to the Town Planning Scheme implemented on 31 October 2019 the scheme intention of logistics zone is '*meant to promote all activities related to the logistics sector and that includes opportunities for warehousing, the de-stuffing and 'breaking of bulk' and related industrial land-uses, all associated with the movement of goods and services*' (eThekwini Municipality 2019: 88). The zone is essentially conceptualised as road based and port orientated and not multimodal. The earlier version of the scheme included the "*purpose of this (logistics) zone is to introduce the Port of Durban as the gateway to Africa'* (eThekwini Municipality 2014: 75). Logistics is in the planning context associated with road and port distribution, implying a blindness towards multimodal logistics, and working against policy objectives to shift the sub-optimal distribution of goods. Planning at the level of land use management could broaden the focus of logistics to include both multimodal transportation uses derived from the physical distribution of goods and component goods as well as transport generated by spaces of production. Understanding the role of logistics within production processes, could also be extended to the value-added logistics services in relation to rail and airport infrastructure, not only ports and roads. A shift is the conceptual understanding

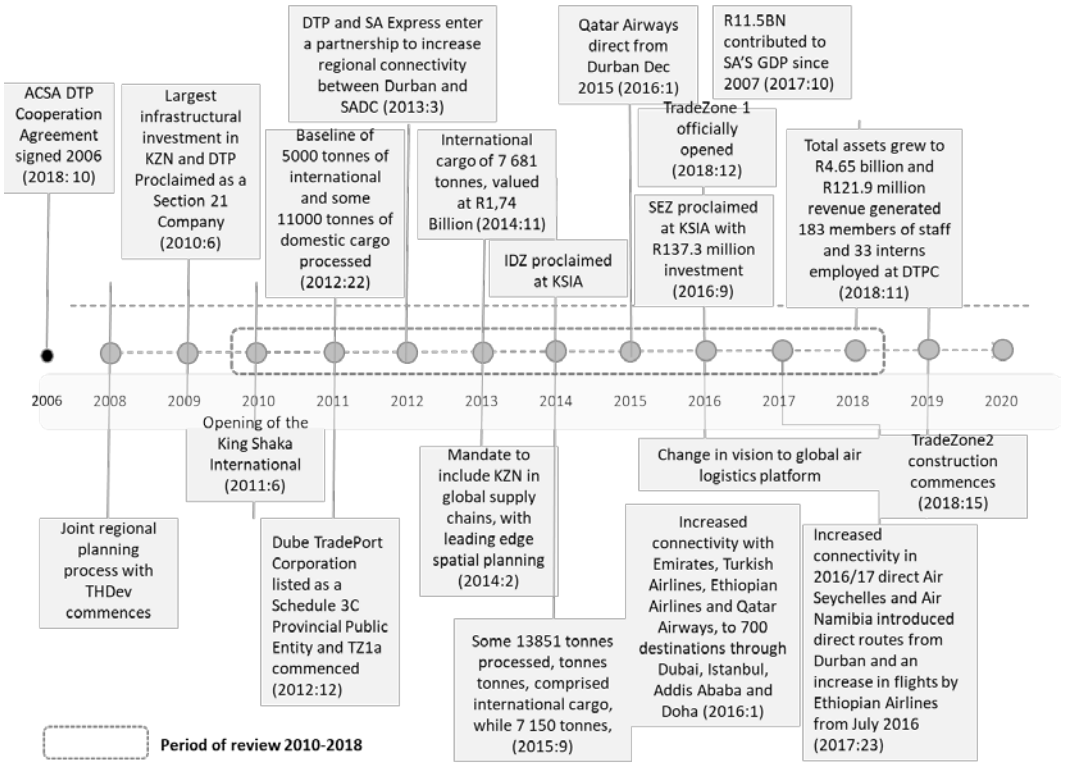
of logistics could also deepen understandings of those logistics services related to long haul distribution vary from city logistics.

6.3.2 Document analysis

6.3.2.1 Dube TradePort

Milestones impacting on the nature of Dube TradePort Corporation (DTPC) and the development of DTP were drawn from document reviews, verified in interviews and represented temporally following a content analysis. The timeline is represented in Figure 6.5 below.

Figure 6.5: Timeline of Dube TradePort development



Source: Devised by researcher

The agreement between DTPC and ACSA in 2006 was a key milestone that changed the nature of the development from a Public-Private Partnership (PPP) to a state led development charged with delivering on government policy objectives of broad-based

economic development. The La Mercy site was transferred to ACSA by the Department of Public Works after 1994 (Respondent 14:5). The DTPC and ACSA cooperation agreement in 2006 removed the possibility of a public private partnership or an independent operator at La Mercy Airport, in favour of the national state-owned entity `*monopoly'* (Respondent 14:6). The opening of the KSIA in May 2010 and the subsequent formal opening of the Dube CargoTerminal in 2012, initiated a shift in how goods in specific value chains move in KwaZulu-Natal. Although the former DIA had airfreight capacity, this was linked to domestic routings and not purpose-built with cold storage facilities, port of entry operators and international connectivity. The Industrial Development Zone was proclaimed at DTP in 2014 and transitioned to the proclamation of the Special Economic Zone by 2016, effectively enabling spatially targeted policy at the Dube TradeZone and AgriZone.

6.3.2.2 Dube TradePort decision to support the flow of goods

Based on the document analysis the following milestones impacted on the ability of Dube CargoTerminal to intervene and add value in the flow of goods: 1) establishment of a multimodal logistics platform to move goods; 2) air logistics infrastructure to promote trade; and 3) special economic zone to attract investment in export related firms.

DTPC was established for the purpose of intervening in the movement of goods through the development of a multimodal logistics platform with air logistics capabilities, within the framework of a developmental mandate. The overall, intended vision of DTPC has not shifted over the project, but the emphasis moved from underpinning economic strategies to infrastructure and planning interventions. Conceptually Dube TradePort was motivated by the drive to develop new airfreight capacity in the KwaZulu-Natal Province, in conjunction with the existing provincial strengths in transportation and logistics. The DTP vision between 2009-2013 as '*a globally competitive multimodal trade gateway in Southern Africa*' was supported by an economic development strategy to create an '*integrated trade and logistics*

platform' (Dube TradePort Corporation 2010: 3). This vision was refined with a change in leadership in 2013 as '*global integrated and sustainable air logistics platform in Southern Africa'* (Dube TradePort Corporation 2014: 4). Rather than supported by an economic development strategy the new vision sought to reposition KwaZulu-Natal in the global supply chain through new air services, infrastructure, IT platform with value-added services and spatial planning aimed at products in the export markets. By 2015-2016, following the appointment of current leadership, the vision re-established the multimodal function as a '*global air logistics platform in Southern Africa, seamlessly integrated with inter-modal road, rail and sea infrastructure*' (Dube TradePort Corporation 2016: 2). The underpinning mission then shifted after 2016 to focus on the aerotropolis related planning and infrastructure investment and SEZ investment in KwaZulu-Natal.

Performance in trade is represented in DTPC annual reports as cargo handled by the Cargo Terminal, with reported performance (refer to Figure 5.20) as growth of some 138% in imports and exports since opening. The SEZ incentives intended to attract approximately R1,561 billion BEE investment and 1,106 permanent employees between 2015 and 2018 (refer to Figure 5.20). Despite the reported performance of the SEZ and the intentions to build export orientated manufacturing, the Cargo Terminal plays a greater role in imports. The timeline in Figure 6.4 links increase air connectivity at both KSIA and the Cargo Terminal to increased tonnage with new international airline capacity after 2015. The year 2015 was a significant milestone for DTPC, not only because of improved international air-connectivity but also the conversion of the IDZ in 2014 to the establishment of the SEZ in 2015.

Integrated Annual Reports identify the performance indicators and successes of organisations. However, the Integrated Annual Report provides does not adequately report on these indicators. The initial construction costs of R8,2 billion are offset against successful incentives that attracted investment linked to transformation and employment creation and successfully built up air cargo volumes from 5023 tons on

opening to 23695 tons in 2018/2019 (Refer to Figure 5.20) with a reported impact of 21330 employment in KwaZulu-Natal in 2019 (Dube TradePort Corporation 2019b: 44). While the performance of DTPC does not necessarily reflect on the ability to lever in off-site investment at scale, shift trade and structural deficits[xxx] and intervene in the space economy, a key gap relates to the multimodal integration. Air connectivity in the first phase of development was found to be tenuous, rail connectivity, although planned, was not implemented, port connectivity is missing and road connectivity is in place.

6.3.2.3 Airports Company of South Africa and Dube TradePort

The nature of the agreement between ACSA and DTPC changed the development from a PPP as initially proposed, to a state driven development. In 2006 the compromise agreement between DTPC and ACSA was that ACSA would be the single operator of KSIA, closing out opportunities to break the monopoly of airport development (Respondent 14:6). Refer to Figure 6.5 for the timeline of DTP milestones impacting on the nature of the development.

In order to understand the context of why the relationship between ACSA and DTPC was so contested one needs to recognise some of the historical dynamics over the model to operate the airport, and secondly the dynamics of a hub and spoke model. Both of these dynamics are relevant today and impact on how goods move through the Dube CargoTerminal.

6.3.2.3.1 *Contestations between ACSA and DTPC*

The La Mercy site was owned by national government and transferred to ACSA as a state owned company in 1993, and then some 304 hectare portions[xxxi] effectively repurchased by provincial government. The early contestation over DTP and KSIA related to the appropriate model to build, own and operate the airport, and whether the new KSIA would involve the relocation of DIA. ACSA as the land owner of La Mercy created a challenge for the Provincial Government to partner on the development.

DTPC initially proposed a PPP and their strategy was to challenge the monopoly on airport operations through concessioned operations (Respondent 14:4-6). According to Respondent (14:6) the proposal was to

> '*build this airport as a public private partnership ... get a new operator for cargo, get a new operator for passengers and basically it means whatever the gap is in the feasibility, we will fill it as government, as province and whoever we can get to contribute'*.

ACSA were of the view that they would operate KSIA, even though "*it wasn't clear whose function it was because the ACSA* [inaudible] A*ct doesn't give them any jurisdiction over building greenfield airports. They only took over existing airports'* (Respondent 14:5). Following National Government intervention in 2006, an agreement was reached between ACSA and DTPC, that DTPC would be responsible for cargo and ACSA for passengers. They went into a joint venture agreement on the balance of land, DTPC bought the AgriZone and TradeZone (Portions 5 and 9 of the Farm LaMercy) and DTPC a contributed a third of the runway costs (Respondent 14:5). Refer to the Annexure 14 for a summary of the Dube TradePort land transactions between 2010 and 2018.

6.3.2.3.2 *Limited investment by ACSA outside of the hub*

The second element impacting on the investment in KSIA related to how ACSA implemented the hub and spoke approach to airline development in South Africa. Concentrating investment and capacity at ORTIA came after ACSA sold a share in the company to raise additional capital. Independent of the KSIA investment, ACSA had acquired a new partnership with Aeroporti di Roma. In 1998 Aeroporti di Roma acquired a 20 percent state in ACSA for some R800 million. As part of the shareholder's agreement Aeroporti di Roma had power and control over all capital expenditure decision making. At the time Aeroporti di Roma decided that all their capital expenditures would be made in ORTIA as it provided better revenue returns in

the shortest length of time. This was to the detriment of the KSIA as ACSA was no longer prepared to invest more than a nominal amount in KSIA (Respondent 14:1).

As a consequence of the land transfer to ACSA and agreement with ACSA, the development of KSIA secured a single state-owned airport operator in the context where most countries have multiple operators for airports. According to Respondent 14:9 *every other country in the world broke up the single operators because there is an inherent problem (of) no growth, if you do not have different operators that are competing against each other, basically like lowering the cost'*. Protecting investment in the ORTIA hub, combined with limited interest in the movement of cargo, inhibited an active role of ACSA in directing resources to KSIA, and in prioritising cargo and building point to point connectivity from KSIA. The Airports Company Act of 1993 established an independent statutory body, the Regulating Committee, to oversee the economic regulation of the airport authority including tariffs and taxes. The company derives taxes from landing fees, aircraft parking fees and passenger service changes, but not on cargo handling.

The 2013 Integrated Annual Report provided some insight to ACSA's planned infrastructural investment of R39 billion over the next decade (2.7 billion euros) over the next ten years, with an estimated 33 percent of expenditure in maintaining existing facilities and approximately 57 percent of R37 million on increasing airport capacity to handle growing volumes of passengers, cargo and aircraft (Airports Company of South Africa 2013: 20). ACSA spending was related to reinforcing the role of ORTIA as the hub, specifically related to cargo, rather than investment in KSIA. Part of the tensions on the development of KSIA related to redirecting limited resources outside of the hub and the cost of developing the airport.

6.3.2.3.3 *DTPC and ACSA Cooperation*

ACSA developed an interest in increasing cargo flows after 2016 (Respondent 12:1) with the announcement of the proposal for midfield cargo facilities at ORTIA (Airports Company of South Africa 2016: 66). In part this is reflected in the strategic

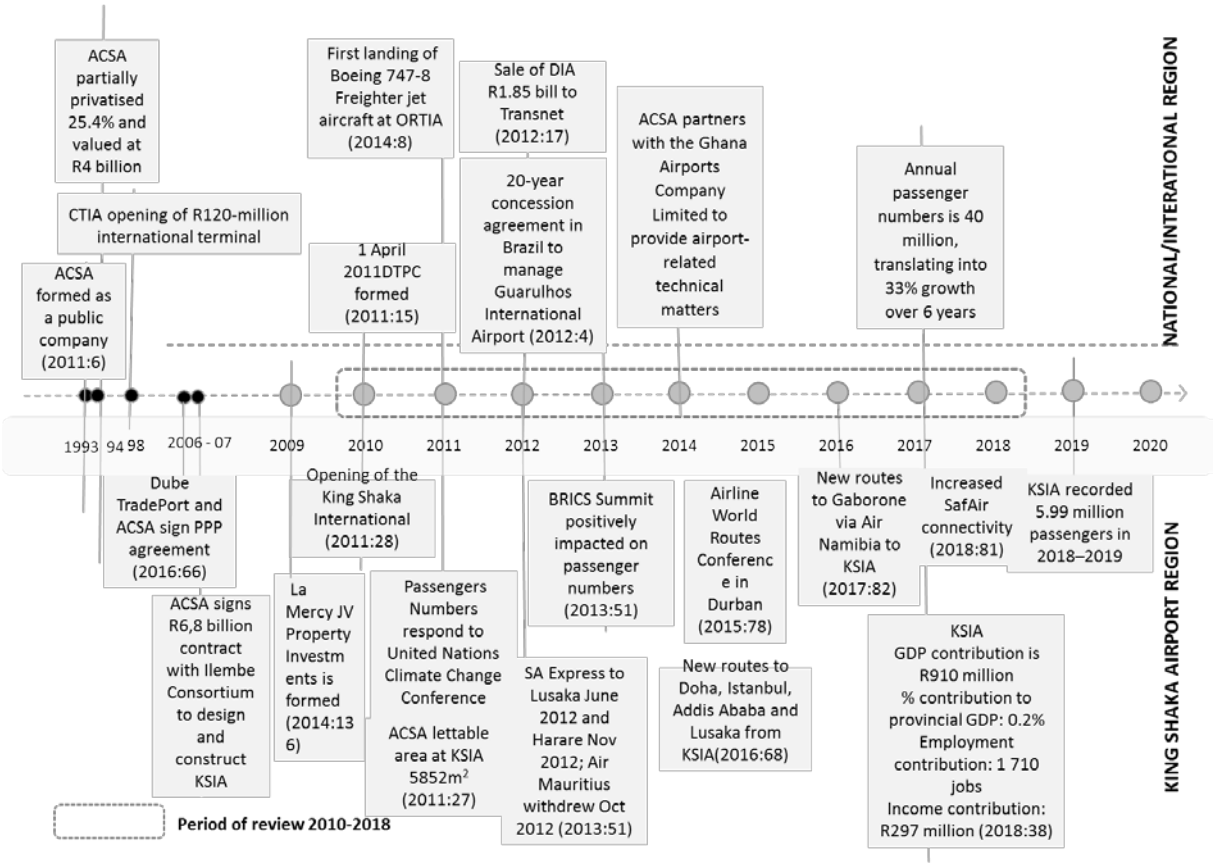
direction of the company, and the inclusion of cargo development in the DTPC and ACSA Master Plan, rather than as a direct financial interest in cargo related to tariffs from KSIA (Respondent 14:8).

Nationally ACSA is developing strategies around air cargo at ORTIA (Respondent 6:4), with planned investment in the cargo-handling facility including an additional midfield cargo complex with automated handling. It was estimated that capacity at ORTIA would increase to 450 000 tonnes per annum by 2020, based on spending over R30 billion on the new capacity (Council for Scientific and Industrial Research 2013: 37). Linking air cargo development at KSIA to cargo handling in the ORTIA hub would relate to international destined air cargo and not domestic routings. ORTIA is increasing cold storage and vulnerable cargo facilities while KSIA does not currently have these capacities in operation (Respondent 12:2)

Layered with the historic tensions, mutual interests exist between DTPC and ACSA in developing international passenger connectivity at KSIA as well as international airlines with cargo operation at the Cargo Terminal. Both parties participate in Durban Direct as a forum for route development, which aims to increase international connectivity to KSIA.

For Dube TradePort, the performance of the Cargo Terminal is related to growth in international passenger connectivity. It is estimated that for each passenger flight (such as B737) scheduled there is capacity for approximately 2,3-3,6 tonnes of cargo. Refer to Annexure 18. At this stage of development, the bulk of cargo is carried in passenger flights until demand is built up to support dedicated freighters or integrators. Figure 6.6 illustrates that the introduction of new airlines and world conferences, correspond to passenger and air cargo figures.

Figure 6.6: Timeline of ACSA milestones nationally and related to KSIA



Source: Devised by researcher

ACSA and DTPC also have vested interests through joint venture property arrangements and in joint planning processes to secure future development rights of the site. Before opening KSIA, Dube TradePort purchased sub-divisions 5 and 9 which is 303-hectares of the La Mercy Airport No. 15124 from Airports Company South Africa Ltd for R1 757 481 737 (Dube TradePort Corporation 2010: 66). Portion 5 relates to AgriZone, while Portion 9 is owned by Dube TradePort for the TradeZone. Refer to Annexure 14 of the Dube TradePort land sales.

The tension between ACSA and Dube TradePort are openly reported in the Dube TradePort annual reports as impacting on site development. In the decade following the initial memorandum of understanding between Dube TradePort and ACSA in

2006, the relationship was fraught with negotiations and compromises. These include comments such as: the "*lack of co-operation from ACSA on the Master-plan review*' (Dube TradePort, 2011:18); in terms of implementing the ROD " *this programme is on schedule, in spite of a lack of co-operation on the part of ACSA*' (Dube TradePort, 2011:24); the project has experienced delays due to a breakdown in co-operation with ACSA (Dube TradePort, 2011:26); and "*in addition to this, lease agreements at Dube City cannot be signed until negotiations with ACSA over the potential split of Dube City are concluded*' (Dube TradePort, 2014:21). From 2015, relations improved as several joint processes unfolded related to the La Mercy JV Property Investments, route development and Master Plan development.

The institutional dynamics between ACSA and DTPC are complex. Both organisations are aligned in their interests to grow international air connectivity and securing related future land values. Locally, ACSA and DTPC cooperate through joint venture planning processes on the Development Framework Plan (2009) Master Plan (2009, 2019) and ongoing Design and Review Panel while also undertaking separate planning processes. ACSA and DTPC collaborate through Durban Direct to promote direct connection to Durban, even though they do not necessarily align with ACSA's national interests to promote the ORTIA hub.

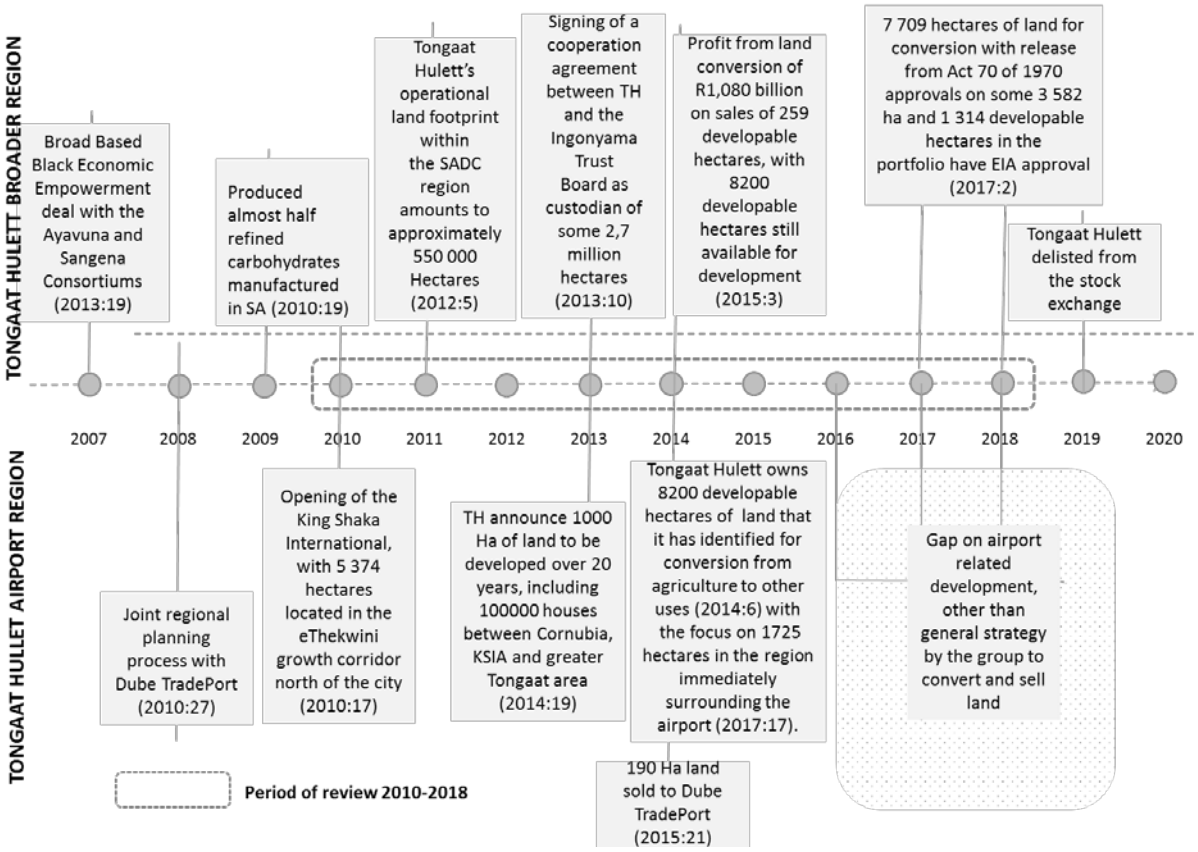
At times ACSA's interests, as a single state-owned entity operator with a monopoly on operations, is at odds with DTPC. The interest to grow cargo outside of the hub, where the bulk of the ACSA investment is based, does not necessarily promote the movement of goods through Durban.

6.3.2.4 Tongaat Hulett

Thematically the annual reports were coded to understand the relationships between land conversions and King Shaka International Airport. References tend to show the investment potential of their land holdings related to the opening of the airport.

Government infrastructure spending is seen as an opportunity related to the national and provincial investment in the airport and a constraint to bulk infrastructure provision by eThekwini Municipality (Tongaat Hulett 2010). Tongaat Hulett have a relatively narrow interest in the airport and these relate to land conversions for upmarket tourism, lifestyle and upmarket coastal developments and industrial and logistics related uses. There are no explicit references to air cargo in the documents, however the importance of the port and related logistics featured significantly in the documents reviewed. The economic role of the port in handling more than 60 percent of total container traffic to and from South Africa is arguably significant in the local market (Tongaat Hulett 2017: 25). Figure 6.7 summarises the broader milestones in the expansive phase of the Tongaat Hulett group until 2018 and the local milestones related to the airport region.

Figure 6.7: Tongaat Hulett Timeline 2010-2018



Source: Devised by the researcher.

The relationships between Dube TradePort and Tongaat Hulett improved substantially since the initial Environmental Impact Assessment objections to the relocation of the airport. DTP and Tongaat Hulett participated in several joint processes related to planning the airport region since 2009, leading to the development of the first Aerotropolis Plan in South Africa, and the proposed rezoning of Mount Moreland, south of the DTP site. In 2015 the climate resilience framework was jointly undertaken by Tongaat Hulett development, eThekwini Municipality, and Dube TradePort Corporation (Dube TradePort, 2015:10). Tongaat Hulett benefitted from substantial infrastructural spending in the region and the related confidence in the property market. More recently, Dube TradePort (2018:45) announced a funding solution on the wastewater treatment works developed in consultation with eThekwini Municipality, the Airports Company South Africa and Tongaat Hulett Developments.

In a similar finding to Todes (2014: 261), Tongaat Hulett through the working relationships with the municipality in Cornubia, joint planning processes with Dube TradePort and their internal planning on strategic parcels of land were able to produced and shape spaces of production and consumption on the northern corridor Extensive Tongaat Hulett land holdings surrounding the Airport, under single private land owner, presented a rather unique planning opportunity to coordinate private and government investment through a common plan-making process in order to achieve spatial transformation outcomes. In effect, while significant growth can be attributed to the role of Tongaat Hulett, the increased Tongaat Hulett land value related to infrastructure investment cannot be discounted. By the end of 2018, Tongaat Hulett managed to generate private value of some R5,244 billion operating profit between 2010-2018 (Refer to section 4.5.3.2) before the subsequent fall in share values and delisting of the company in 2019.

On the one hand, Tongaat Hulett benefited from the location of it land holdings and the confidence in anticipated airport related growth. These played a part in the speculative optimism driving growth on the northern corridor and were reinforced by

supply side support from government (infrastructure and planning approvals). Yet on the other hand the supply of government incentivised land near the airport, provided competition in a context of subdued economic growth rates. Despite the opportunities presented by increased land value responding to infrastructure investments, the development of land fell short of projected demand.

6.3.3 Themes from interviews analysis

6.3.3.1 Relative role of the port and airport integrating with local and international trade

The significance of the DTC in the port of Durban, both in terms of import and exports volumes, is well established in the literature, observed in Durban and reflected thematically in the interviews (Respondent 11:1, Respondent 8:1 and Respondent 2.1). The landside distribution of goods between DTC and Johannesburg, as the primary market on the N3/SIP2 corridor, is largely road based, and although policy and interviews problematise the dominance thereof, the reality persists.

The normative argument reported in the interviews is that the split between road and rail distribution is sub-optimal, with road-based transporters taking up the capacity of the N3 corridor while rail capacity should be more productively utilised. Respondents (4:6 and 8:1) corroborate the split with some 6,355,7 thousand tons (13%) of general freight in KwaZulu-Natal moving by rail as opposed to 42,463,0 thousand tons (87%) by road (Conningarth Economists 2016: 2). The distribution of freight is shown in Annexure 20 as 93% of the general freight traffic moved along the N3/NATCOR Corridor, with the remaining 7% along the N2/North Coast corridor (Conningarth Economists 2016: 2). The data and the interviews indicate limited modal integration between the port and northern rail corridor currently exists, although there is some variation on whether this can and should be strengthened. Considerations of the structural constraints associated with transporting break bulk over distances, and unsuitability for moving time-critical goods, would rule out strong port, rail and airport set of linkages (Respondents 4:3 and 8:1).

The additional distance associated with transporting containers to and from Inyaninga, a portion of Tongaat Hulett land to the west of DTP, and the Durban seaport, and with transporting break-bulk freight to and from Inyaninga and the N3 highway will add significant cost and time as compared to handling containers in the seaport and transporting break-bulk freight along the N3/NATCOR rail corridor.

In addition to the expected and relative dominance of the seaport engaged with flows of goods, road-based land-side distribution infrastructure and service providers dominate logistics space between Durban and Gauteng. Road transportation is generally considered the most efficient and flexible mode over shorter distance. The relative strength of road based logistics over rail or air is attributed to quality of national road networks and relative efficiency of the industry (Council for Scientific and Industrial Research 2013: 55).The strength of road infrastructure is also attributed to modal competition with domestic air cargo, and in part explains why international air cargo exceeded domestic air cargo, at KSIA. According to Respondent 6:6,

> *" there will never, ever, ever be major airfreight domestically within South Africa ... as long as we have good road infrastructure and rail, there is no reason for domestic air cargo. You are not going to fly stuff. Even if it's only a container, you cannot get a container onto a domestic flight. Because they are all belly cargo and individual pieces and that's very inefficient. In all likelihood one of the key things why there's no domestic freight, and why there will never be domestic freight, is the 737 aircraft does not take containers.*'

However, in terms of international air cargo, there appears to be a split between air cargo originating in KwaZulu-Natal and flying out of ORTIA due to the connectivity of the hub. As KSIA builds up air connectivity a greater share of air imports are flying directly to KSIA.

6.3.3.2 Complexity in the flow of goods related to the supply of infrastructure and demand factors of price and timing affect modal routing

The dynamics of how goods are distributed through the Port of Durban are reflected in the interviews as largely container based, followed by cars, break bulks and liquid bulks. In terms of the containers, it is understood that containers are *'stuffed and destuffed'* in Durban (Respondent 14:2), with the origin and destination of cargo predominantly outside of Durban. It is estimated while the bulk of cargo is destined for Gauteng that some seventy percent of containers moving through the Port stay in Durban after being destuffed, to avoid the surcharge for returning containers to the shipping lines. Short hauls between the port to distribution points combined with the long haul freighters at the Port, account for 10000 to 12000 truck movement a day as the dominant flows in Durban (Respondent 4:3).

The growth and distribution of goods moving informally in the city presents a key oversight in understanding cargo motilities in Durban. According to Respondent 14:1, informality as a means of the distribution of goods is fastest growing, unregulated, involving locally embedded actors. However there is the question of whether this informal distribution of goods, and other local sectors, is adding value in the production processes expected of a port manufacturing gateway.

The type of goods moving through ORTIA and KSIA, are typical of air freight, namely high value, low weight and perishables. Air cargo at ORTIA is related to pharmaceuticals, component parts, IT electronic goods and favouring imports over exports (Respondent 12:2). ORTIA is currently at able to handle valuable cargo for both places, while the DTP facility is not in operation. At DTP air cargo handled comprises of electronic components, automotive parts, engines, machinery and clothing through the terminal facility (Respondent 9:3). Potential shifts in the future trends would in all likelihood be perishables through the cold storage facility. The cold storage facility at DTP is due to be re-commissioned and the facility at ORTIA is being upgraded (Respondent 9:3).

6.3.3.3 Rail is considered as an important component in the overall multimodal logistics integration

The structural dysfunction in the overall logistics system is well understood. Normatively it is recognised that more goods need to shift from road to rail. Even the initial multimodal logistics concepts at Dube TradePort is based on intervening in road-based distribution by shifting high value, time critical low weight goods onto air freight. Refer to Figure 6.7 that indicates the Northern rail through Inyaninga rail siding. The vision of DTP is to develop a multimodal air logistics facility however without Transnet complementing the rail and port link, the development is road dependent in the start-up phase. A direct connection with the port is not as critical (Respondent 6:1), as both sea and airports interface with different aspects of international trade. The land side modalities warrant closer integration and DTP cannot claim to be a multimodal logistics platform without a secure rail connection (Respondent 1.1).

Generally the breakpoint where rail becomes most cost effective over road in moving goods is around 300 km, depending on the type of rail service provided (conventional or block train), efficiency of the service provider, infrastructure provided, topography and type of freight moved (Respondent 13:6). In a similar argument Respondent 8 supported the view that very little rail freight moves past the Inyaninga site, west and adjacent to the KSIA on the North Coast corridor. Furthermore, the nature of the commodities moved by rail north (including processed foods, beverages, manufactured commodities, chemical and timber related) are not directly related to the sectors targeted at the airport.

Dube TradePort has attempted through a Memorandum of Understanding (MOU) with Transnet to collaborate on projects of mutual interest. DTP recognise the importance of the sea and air integration, and reserved space for rail in the overall master plan and Aerotropolis Plan. The rail link was planned as part of the multimodal logistics at

DTP (Respondent 14:5) and yet Transnet's role to take up opportunities has not materialized. Respondent (4:12) attributes absence of rail connectivity in the north to Transnet competency to perform the necessary actions. Another Respondent (8:5) attributed this to structural issues related to the type of goods moving by rail and the position of an intermodal facility on the northern line as being too close to the port.

Planners' supports the normative argument that a more effective freight rail service should shift cargo off road infrastructure, with public interest benefits of improved road safety, reduced road maintenance etc. At the same time the private sector demand for the service is compromised by challenges related to the time delays for loading and unloading on rail (7-9 days between the Port and City Deep), security and related concerns, and inflexibility of routings (Respondent 4:7).

The ineffectual role of Transnet, as a state owned entity, to solve freight rail integration with the Port, improve service levels, raises serious concerns around not only a failed mandate but negatives impacts on the South African space economy through insufficient action.

6.3.3.4 History of the approval and understanding the opposition to the airport

The opposition to constructing the new international airport at La Mercy is complex. On the one hand the contestation played into politics, with different political objectives at a city-wide, provincial and national level. Opposition to the project was partly based on protecting the state-owned operator's interests, namely ACSA investments at ORTIA (Respondent 14:1). Initial support for the project in KwaZulu-Natal was based on the rise of Jacob Zuma whom originated from KwaZulu-Natal and his appointment as Deputy President in 1999. The national political opposition to the new airport was not simply about politicians supporting ACSA, but within ACSA, as an operator of multiple airports, there was internal opposition from its new shareholder Aeroporti di Roma. From the outset, ACSA was against the development of La Mercy airport by Dube TradePort as it would undermine the ACSA monopoly. Although, even after ACSA were appointed as the operator for KSIA, they are still firmly committed to

protecting their investment in ORTIA, as a hub airport, with the regional spokes feeding into the ORTIA volumes (Airports Company of South Africa 2018: 64). These regional spokes would include domestic passenger's volumes from KSIA.

At a local level in KwaZulu-Natal, without clear political support initially, support for the airport tended to relate to individual discourses along either national political lines or environmental sustainability arguments.

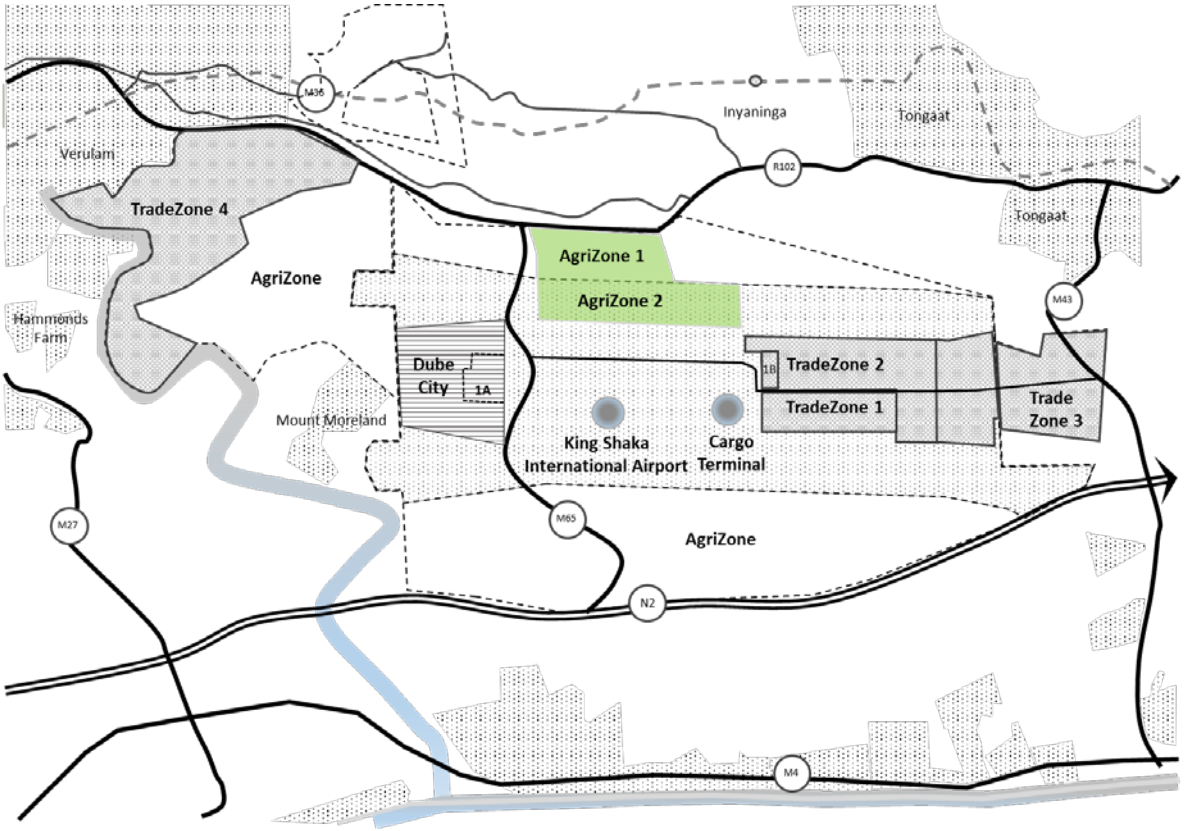
6.3.3.5 Divergence between initial concept and implementation

The initial airport function was designed as a multimodal logistics platform with the key objective to intervene in the movement of goods. The concept was broader than being a gateway, but adding value through logistics. The approval from cabinet was '*to build a multimodal logistics platform, at King Shaka with the Dube TradePort as a public private partnership. And they gave us the authority to form the Dube TradePort section 21 company'*. (Respondent 14:6).

The development of Dube TradePort as a public private partnership did not emerge and the initial section 21 company transitioned into the Dube TradePort Corporation, as a provincially owned state entity. The roles as developer of Dube TradePort and as operator of the Special Economic Zone are broadly aligned to fulfil the economic development mandates of government. The SEZ is focused on securing local and foreign investment with DTPC directing investment towards global manufacturing and air logistics. A concern arises that in order to develop longer term economic opportunities from the runway related to cargo, Dube TradePort is required to strengthen air cargo volumes through 1) negotiating favourable airline agreements with attractive rates and traffic rights 2) secure either additional freighters or integrators, 3) develop preferred routing through KSIA with freight forwarders and develop additional business with freight forwarders 4) increase the demand from shippers, logistics companies and logistics intensive companies. The overall objective

is not to divert existing KwaZulu-Natal volumes into air cargo routing but to develop new value chains. DTPC have managed to re-establish AgriZone services, operators and producers related to perishables, although the cold storage facilities at the CargoTerminal are underutilised for this purpose. There has also been some progress on establishing a new pharmaceutical cluster in TradeZone 1B and building on high value manufacturing investment related electronics and the automotive sector in TradeZone 2. The success of the CargoTerminal thus does not necessarily rest with on-site development but rather growth in new sectors with localised investment and production across the province of KwaZulu-Natal.

Figure 6.8: Dube TradePort Precincts



Source: Devised by researcher

The SEZ is not being developed for time-critical industries, questioning the assumption that CargoTerminal volumes are met by the on-site development. While there is investment growth in the SEZ, the nature of the investment is linked to incentives and not proximity to the runway, as argued in section 6.3.1.2.

For off-site the primary planning document is the Aerotropolis Plan (2019). A key critique of the Durban Aerotropolis related to the weaknesses around implementing the rail element of the multimodal logistics platform. While the Durban Aerotropolis Master Plan (2019) includes the rail alignment, approximately 3 km west of the airport boundary, as well the logistics platform centred on Inyaninga, the implementation is unclear. Firstly, the secure and bonded connection between Inyaninga and Dube TradeZone 4 is outside of the ACSA precinct and the SEZ, and direct air connectivity. Secondly, the implementation of the rail element is unclear, as the capacity of Transnet as a state-owned entity to operate, develop or concession a joint rail venture is unlikely (Respondent 1: and 8:1).

While there is a hiatus in the drive to deliver on all aspects of the initial vision of Dube TradePort, other international role players are continuing to advance and offer integrated logistics. For instance, the partnership between Ethiopian Airlines and DHL Global has been operational since May 2019 providing air freight forwarding services, ocean freight services, surface / trucking services and temperature controlled logistics in Africa. Other industry leader in the cargo side is Turkish Airlines (as cited by Respondent 6 as the strongest air-cargo operator in Africa). Off-setting the risk that SAA Cargo will be facing liquidation, Dube TradePort have managed to secure the main air freight airlines, with sustained growth in volumes and value. In 2019, the Cargo Terminal handled an estimated 15249 tonnes valued at more than R5,2 billion (Refer to Annexure 19).

6.3.3.6 Challenges for plan-making and planners

It was argued in Chapter Two that the planning practice on airports is largely concerned with managing the impacts on people and land use. In outlining the land use impacts through airport led development models, the related models tends to be descriptive of impacts rather than explanatory and informing practice. At the same time planning practices on how to integrate planning for airports and logistics with city planning through common plan-making processes is not reflected in planning theory. The practice and theory disjuncture is not specific to airports, the challenge for developing planning thought on airports and logistics is complex as it requires an integrated plan-making process.

First, there is a gap in the substantive knowledge on conceptualising how space is produced in relation to airports and logistics, drawn from empirical work and practice, the secondly how this knowledge informs the plan-making process. The review argued that planning theory has been critiqued for undue preoccupation with process at the expense of substance (Sager 2009: 3). The challenge is acute when dealing with strategic plan-making processes on airport infrastructure and searching for theoretical frames explaining the phenomena. The critique is in part that planning theory insufficiently informed the planning of airports, as with other forms of strategic transport assets as planning objects, but also more broadly that planning theory is weakly developed in relation to the plan-making process. A further concern is whether the plan-making process is conceptualised as layers to integrate horizontally into local economies and multi-scalar links to global economies in terms of investment flows and material flows. Multi scaled conceptualisation is important to overcome binary claims that the aerotropolis is a *regional economic engine of growth*' or `*global gateway*', and thereby avoiding airport centric claims to growth.

Drawing from global production network theory, the challenge for planning is to combine long-term investments in infrastructure with flexible investment incentives supporting local and regional income and employment links, while reflecting on

conditions in the global economy. Global production networks operate across different countries and places, the local plans need to reflect and respond to plans and strategies being made elsewhere. In addition to this, production networks can shift with new activities outsourced to new places. The tendency to overcome territorial embeddedness means places benefiting from previous rounds of investment need to respond and shift relatively quickly as global networks reorganise.

Dube TradePort, incorporating King Shaka International Airport, was planned as a state led infrastructure and development project and failed to full secure integrated and coordinated actions across government and state owned entities. Concerns were raised as to whether the DTP project could intervene in regional logistics infrastructure, support export led manufacturing opportunities and generate local employment in the process. Planning critiques applied the megaproject discourses to argue that there were overstated benefits with understated associated costs, and these claims were made prior to the full development of the project (Robbins 2015: 196). Yet, the main planning concerns with the development approval were subsumed within environmental issues (Respondent 11:6).

eThekwini originally did not support the development of an international airport (as with ACSA), but after political intervention there was a shift. Initially local planning attempted to prevent airport related development on environmental grounds and through the environmental processes. Concerns that the airport abetted sprawl on the northern corridor did not resonate with municipal and private planners interviewed. Integration with bulk services, and questions about whom would fund these services were articulated in the statement

> "*a city has to grow and there was acknowledgement that it should grow north, but it should grow with the necessary services and the necessary attention both to Dube TradePort, province and the city and private sector, which unfortunately all of those things never aligned*' (Respondent 11:7).

As a compromise in the 2008 eThekwini Spatial Framework, the political disjuncture between eThekwini and KwaDukuza was seen as arbitrary in terms of funding and planning infrastructure (Respondent 11:7). Planners amended the eThekwini SDF and IDP to include the provincial project as indicated by Respondent (11:7) "*even if you look at the IDP, even if it's just a line, we tried to accommodate it with the arrow going north but this wasn't aligned with services*". The challenges appear to be more directed at planners weak on integrating across sectors (Respondent 14:14), and how to overcome "*line functionary planning responses*" (Respondent 11:9, Respondent 8:11) rather than planning. Critiques of planners related lack of vision, and leadership to facilitate solutions and insufficiently independent planning thought and "*if the money goes in a particular direction, then they speak your language*" (Respondent 14:14). Challenges for planning were viewed by one private sector planner as less with the planning process and "*more with the bureaucratic process"* (Respondent 8:11), suggestive of a narrow land use approval role.

Planners have more experience with managing land uses related to logistics, particularly road-based logistics, the bulk and scale of logistics built form works against mixed use, fine grain uses that can be easily integrated in existing industrial areas (Respondent 11:4). Logistics is perceived as space extensive, perpetuating sprawl and sterilizing value well located land (Respondent 11:4). The relatively low employment densities are seen as problematic (Respondent 11:5, Respondent 8:8) and not a huge value-added sector (Respondent 8:8) with logistics largely supported by road based distribution systems (Respondent 11:5).

Related back to planning for airports and logistics, a commonly held view is planning should facilitate spatial interventions, directing land use activity when there is market failure, but essentially managing the land use flexibly (Respondent 8:10, Respondent 14:14). The narrow view of planning dealing with land use management is expressed in the specific challenges for planning, such as issues related to managing noise sensitive developments in the airport flightpath, such as hospitals, schools and

residential. These issues could be translated into Land Use Scheme so that at a minimum height restrictions in airspace are restricted, reflective building surfaces impacting on radar requirement avoided and that airport compatible land uses within land use schemes are promoted (Respondent 12:3, Respondent 8:10).

Even though the issues related to planning for compatible land use interfaces were relatively new at the time, the strategic issues to deal with the spatial dysfunction in the airport region were more of a challenge. Given high unemployment in the municipality, significant low income residential areas within 10 to 20 km to the airport and tracts of undeveloped land adjacent to airport, there are opportunities to align a range of housing opportunities with employment. In retrospect some of the local planning critiques of DTP, public transportation and rail connections, were misdirected critiques that were difficult to attribute entirely to DTP responsibilities. In terms of overcoming some of the transportation dysfunctions on the freight side, the multimodal logistics platform requires integration with rail and the port, both owned by Transnet. DTPC does not have significant sway over integration with other state-owned entities, other than MOUs and participation on cooperative forums.

6.4 Chapter summary

In this chapter the analysis of the research findings has been presented on the basis of the case study data collected from the land use survey and analysis, document analysis and interview themes. Both port and airport infrastructure perform roles supporting the movement of goods between local and international economies. Although the airport fulfils multiple functions including supporting domestic air cargo and passenger connectivity, the function of trade and investment related to the movement of goods provides opportunities for inclusive growth. The nub of the argument rests with how planning supports inclusive growth by considering integrating the distribution functions of airport logistics with productive land use functions. Conceptually, the notion of inclusive growth requires that international and local investments relating to the airport are locally embedded. Chapter Three outlined the

merits of thinking of local embeddedness as horizontal integration through managing material flows and distributions in the local supply chain. Promoting value-added manufacturing and investment opportunities within local industrial areas with access to airport and maritime port infrastructure is key to anchoring vertical integration in supply chains locally. Planning frameworks produced either by the municipality, Tongaat Hulett or the Aerotropolis Plan, broadly informed the supply of productive spaces related to the airport. Initially local municipal planning attempted to prevent airport related development on environmental grounds and then shifted towards an embrace of regional economic potential. The overstated potential economic gains were reflected in substantial industrial land being included in the northern corridor of the Spatial Development Frameworks, amounts well in excess of realistic take up rates. Similar dynamics were evident in Tongaat Hulett and Aerotropolis Plans. In effect planning failed to integrate city building infrastructure and planning for airports in an integrated plan-making process to achieve spatial transformation.

Dube TradePort Corporation have performed relatively well in the property market, both in terms of their own portfolio of adding value to the site and expanding their operation significantly after moving from a section 21 non-profit organisation to a Schedule 3 Public Entity[xxxii]. On site value has been created by retaining the underlying ownership of the TradeZone and AgriZone land, and renting out long term leases for ongoing revenue streams. Value has been created through proximity to air infrastructure, level of state investment in the infrastructure and industrial policy incentives. The analysis found that private site investment was particularly responsive to the Special Economic Zone incentives in the second round of development of TradeZone 1 after 2016, rather than proximity to the airport related infrastructure. In other words, investment in TradeZone 1 was not entirely air dependent in that proximity to the airport was not core to the main business of the firms.

Despite the scale of investment at Dube TradePort, combined with the reported private investment on the northern corridor, the productivity gains related to proximity to air

infrastructure, are relatively low. It is accepted that sustainability returns on air infrastructure investment are planned over the longer term. However, it is incongruous that the '*air returns'* on private investment within the TradeZone are neither air dependent nor air related. It is acknowledged that the early strategy of DTPC demonstrated confidence and attracted investment in the TradeZone, by leasing out primary investments to Shree Properties and Hondari developers. While this was effective in securing early investments, generating employment, ultimately the practice subsidised investments unrelated to airport infrastructure. The reinforcement of investment at the airport through spatially targeted industrial policy of the SEZ, managed to secured 39 operators worth R1.5 billion, with some 1 346 permanent employment opportunities related to the Special Economic Zone, and a further 21 330 in the broader KwaZulu-Natal economy (Dube TradePort, 2019:44). In a context where the demand for these subsidies are high, one would expect stronger screening mechanisms to ensure development in line with air related development. Dube TradePort has benefited from multiple rounds of government investment and successfully secured private investment, with a significant portion related to black economic empowerment. While trade and investment indicators show impressive growth trajectories, the performance of the SEZ falls short in the supply of products to export markets, relative to imports. Acknowledging that despite the absolute underperformance on exports, and global economic challenges related to deindustrialization, the CargoTerminal has still managed incrementally to grow the proportion of exports through localised production.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The purpose of Chapter Seven is to provide an overview of the findings related to the entire study. The overview is presented in the form of a synopsis on the extent to which the main research questions are answered. As part of Chapter Seven, the study's contribution to knowledge is also highlighted, followed by recommendations for further research arising from the study. The main recommendation relates to the preparation of a regional spatial development plan with the advancement of a conceptual framework developed by the researcher to guide planning for airports and logistics in the context of the case study.

7.2 Synopsis of the research

The location of Dube TradePort, incorporating KSIA, to the north of the Durban CBD in KwaZulu-Natal, reinforces the role of Durban as a logistics node in the South African space economy. The decision to develop new international air-cargo capabilities, north of Durban Container Terminal, required the commitment of national and provincial government resources to engage with trade flows through infrastructure-led development. The intended outcome for Dube TradePort, as a multimodal logistics platform, is to improve logistics performance for KwaZulu-Natal through improved air connectivity and supporting value-added manufacturing. Air connectivity is critical in supporting the transportation of specialised high value, low weight goods between points of origin to the final destination, and between global and regional economies. If combined with substantial economies of scale in production destined for national and international markets, then proximity to airports is assumed to reduce the '*first and last mile-transport costs'* of international trade (Appold 2015: 413). The rapid growth in specialized high value, low weight products with substantial economies of scale in production that are often shipped to national and international markets suggests that proximity to airports may help incentivise development. The

findings confirm some clustering of investment on the northern corridor, and in geographic proximity to the airport in greenfield developments, yet the drivers of development are more complex than airport related development. The study found that through the spatially targeted industrial incentives at the SEZ, substantial investment was attracted to the site. The effectiveness of the SEZ incentives relative to the dependence on government investment in airport infrastructure meant that opportunities for air-connectivity were missed. Firms using air logistics either in production or distribution processes, and able to access SEZ incentives, effectively benefit from two rounds of state incentives. However, those firms accessing the incentives without contributing towards the volumes in the cargo terminal and without supplying value-added manufacturing related to electronics, automotive components, and pharmaceutical are a missed opportunity for agglomeration in the TradeZone.

The yields through the Cargo Terminal are related to both the TradeZone and draw from a provincial threshold. Dube TradePort handled an estimated 24 000 tons of international air cargo in the financial year 2019/20 (Dube TradePort Corporation 2019d), of which some 15 000 tons of international cargo was previously not directly routed through Durban. Since the opening in May 2010, the 2 050 hectares Dube TradePort site (including the King Shaka International Airport) has expanded to an area in excess of 3 800 hectares with approximately 46 hectares of floor area developed on-site (Refer to Annexure 14). Within the Dube TradePort site, the 304 hectares SEZ has attracted R3.2 billion investment in the last financial year (2018/2019), securing 1 346 permanent employment opportunities in the SEZ alone and contributing a further 21 330 employment opportunities in the broader KwaZulu-Natal economy (Dube TradePort Corporation 2019b: 44). : From the initial investment in construction and operations in 2010 (ten years ago), it is estimated that Dube TradePort has contributed approximately R9.5 billion towards the national GDP (Dube TradePort Corporation 2017c: 10).

The returns on infrastructural investments for Dube TradePort is sixty years as outlined in the initial Master Plan (Annexure 17), which appears realistic given the slow economic growth in South Africa, and particularly within KwaZulu-Natal. The relevance for planning is not simply whether a return on the initial investment covered within a decade but whether the related rounds of investment have locally embedded outcomes in terms of employment, investment and multipliers in the short and medium-term. In other words, spatial transformation requires inclusive developmental outcomes are made explicit for infrastructural investment.

Although Dube TradePort development is starting to gain investment traction, the study found that integration should be specifically strengthened between firms in the TradeZone and the Cargo Terminal. Integration with multiple modes of transport at Dube TradePort is underdeveloped and largely road-based. While airport master plans reserved the possibility for future rail connections, only road-based distribution systems are in place. The role of Dube TradePort in the distribution of materials and goods on the Northern Corridor is also inconclusive. The survey of logistics-related uses in the corridor does not suggest a clustering logistics-related uses around the airport, outside of the TradeHouse. Tongaat Hulett benefitted from the proximity of their land holdings around Dube TradePort, specifically increased land values related to substantial infrastructural investments. Broader regional aerotropolis plans created the context that supported land use planning applications for the conversion of agricultural land to industry, logistics, business park, and commercial uses. The purported Tongaat Hulett land values are not only out of kilter with local demand but allegations of mismanagement emerged in 2019 resulting in the delisting of the company from the stock exchange. In terms of planning processes, a strong alignment was found linking Dube TradePort to the infrastructure-led development path contained in a range of policy documents. The disarticulation of plans is found at the sub-metropolitan scaled through to local plans. The impact of this finding is the need to strengthen local and regional integration with the airport and clarify some of the conceptual elements in the project. It is recommended that a regional planning process is initiated within a normative framework of spatial transformation. While the

outcome of the regional spatial plan may reinforce elements of the Aerotropolis Plans, the learning process needs to improve the articulation between plans towards inclusive outcomes.

7.2.1 Research Question One: What is the relationship between transportation and urban development?

7.2.1.1 Finding One: Theoretically and empirically transport and urban development are inextricably related

Chapter Two makes several arguments interrogating the relationship between transportation and urban development theoretically and practically. Traditional spatial models and locational theories are reviewed to establish the links between transport and urban development. Conceptually the interaction between cities and transport flows, as places of exchange related to flows, is described in traditional spatial models and is established theoretically in locational theory. However, it is found that the locational theory provided a narrow range of explanatory variables informing the interaction between transport and land use. This warranted consideration of restructured production systems over time and introduces contextual considerations of slowed globalization and deindustrialization impacting on city growth.

Conceptually the interactions between transport and urban development were explored using the terminology of flows, nodes, networks, and places. Although these geographic concepts are not specifically tied to airfreight, the relational notions of networks and flows are applied and further developed in the conceptual framework. The conceptual framework explores the dynamics between modes of transport infrastructures and urban development, particularly how the movement of goods and materials shape and are shaped by city growth. The conceptual frame for airports and logistics is focused on how the distribution movement of air-cargo interacts with cargo moving by road, rail, and sea and secondly how these air-cargo flows relate to production, distribution, and consumption uses in the city structure. The distribution

role of logistics emerged with, and enables the fragmentation of supply chains, by managing time and distance constraints related to dispersed production, consumption and storage activities. As a consequence, the complex flows of materials, components, and completed goods, supported by flows of information, people and capital through airports are understood in this thesis as being tied to a wider set of social relations within a local and global context.

The reciprocal relationship between transport and urban development is implicit in the South African policy frameworks of infrastructure-led development to promote social transformation through inclusive growth models. Dube TradePort is designed to promote the efficient flow of goods by the introduction of international airport cargo capacity. This study explored these multi-scalar flows in the context of a greenfield airport related to planned and unfolding urban development patterns on the northern corridor. The study found that urban development, in the form of new residential, commercial and industrial developments, emerged on the northern corridor after the opening of Dube TradePort development, incorporating King Shaka International Airport between 2010 and 2019. The combination of government infrastructure spending in the north, recognition as a provincial growth corridor, the scale of Tongaat Hulett commercial and residential developments, informal settlement growth and Cornubia state housing project, suggested that multiple processes are shaping the production of space and not simply responding to the airport. Indirectly the Dube TradePort development, and proposed infrastructure investments based on Aerotropolis Plans, influenced real and perceived land values and stimulated the local property market.

7.2.1.2 Finding Two: Emergence of air cargo logistics within global production networks

Notions of cities as places where people and goods concentrate and where interactions and exchanges of goods are derived from connectivity are fundamental to understanding the interaction between place and flows. In order to apply the concepts

to air-cargo flows across networks and places, the study draws on theory related to global production networks. Global production networks are a feature of contemporary capitalism with organisationally fragmented and geographically disbursed production systems. Logistics emerged as a function of organisational fragmentation and outsourcing but also as an integrator in the production process to overcome fragmentation. Air cargo logistics plays a specific role in the supply chain, not only the distribution of components and goods but managing the integration of the supply chain related to high value, perishable and low weight goods. Case study evidence confirmed both the narrow role that air-cargo logistic play in specific sectors and the presence of global value chains organising high value production at Dube TradePort. Dube TradePort is relatively successful in localising global value chains with a significant broad-based black economic empowerment investment on the site. Although more recent investment firms within the Special Economic Zone and TradeZone are dependent on the Cargo Terminal related to production and distribution processes, this is not the case for the majority of firms at Dube TradePort.

7.2.1.3 Finding Three: Relationship between air cargo flows and air cargo related urban development at Dube TradePort

Findings of the case study confirmed significant growth in air-cargo flows through the Dube CargoTerminal, with cargo volumes attributed to the production in KwaZulu-Natal rather than on-site demand for air cargo services. In response to the development of Dube TradePort and the SEZ, some 44 hectares of floor area was developed on-site between 2010 and 2018.

In the case of greenfield development, where the quantity of new development is clearly evident, it is difficult to isolate air connectivity as a clear factor in locational decisions. The findings on air connectivity were based on interviews, document analysis, and the land use surveys. Firms were, categorised by the likelihood that high value manufacturing firms related to electronic, automotive, perishables and

pharmaceutical sectors, as well as freighter forwarders, would display air connectivity traits.

Air connectivity was found to be strong consideration on sites where the core business related to moving goods and people by air such as in the case of air cargo logistics, freight forwarders, and airline businesses. Firms, where the potential existed to move goods by air as part of the production process, were identified for potential connectivity. While many sites within the SEZ and TradeZone had the potential for air connectivity, they are not necessarily dependent on the CargoTerminal. This finding raises some question whether TradeZone firms located in close proximity to the airport for time-critical rationale related to their core business or for time-dependent reasons related to supporting production networks, or whether the spatially targeted investment incentives attracted investment that would have otherwise invested elsewhere. It is found that while companies have the potential to engage more strongly with Dube CargoTerminal, for the most part, companies are largely dependent on road-based logistics. The relative strength of road-based distributions systems has created some modal competition for domestic air cargo distribution.

7.2.1.4 Finding Four: Influence of planning on the relationship between air cargo flows and air cargo related urban development on the northern corridor

Findings on how airport infrastructure influenced urban development on the northern corridor related to the efficacy of planning over investment decisions. The case of a greenfield airport surrounded by some 13 000 hectares of undeveloped land held in single ownership, displayed several preconditions favouring a strong connection between planning and the implementation of plans. In terms of the more strategic spatial development plans, including the municipal eThekwini spatial development plan, KwaDukuza spatial development plan, Aerotropolis Plan and the predecessor plans including the Tongaat Hulett variations, all show broad alignment on infrastructure development to support inclusive growth and spatial transformation. The combination of broadly aligned public and private sector plans on a growth

corridor, covering greenfields tracts of land linked to single and well-resourced land owners, centred on an airport, bode well for implementation. The combined anticipated scale of investment planned in the northern corridor, including mixed housing opportunities, mixed-use commercial development, industry, and logistics-related uses, reflected the relative confidence and value in the land market. Although infrastructure led development is a long-term project, the initial decade of planning is found to have deficits.

Tenants of modernist planning related to Land Use Schemes and Local Area Plans were found to conflict with the Aerotropolis Plan and Integrated Development Plan. Despite broad alignment to support airport related development, municipal planning strategic planning, municipal infrastructure support, and land use management curtail off-site development. Rather than planning directing growth, planning framework was amended initially in the SDF to accommodate airport related growth, land rezoned to accommodate new development trajectories and land use control amended on the airport site to accommodate the initial masterplan. And yet much of the planned development falls outside of the municipal schemes where development rights are curtailed.

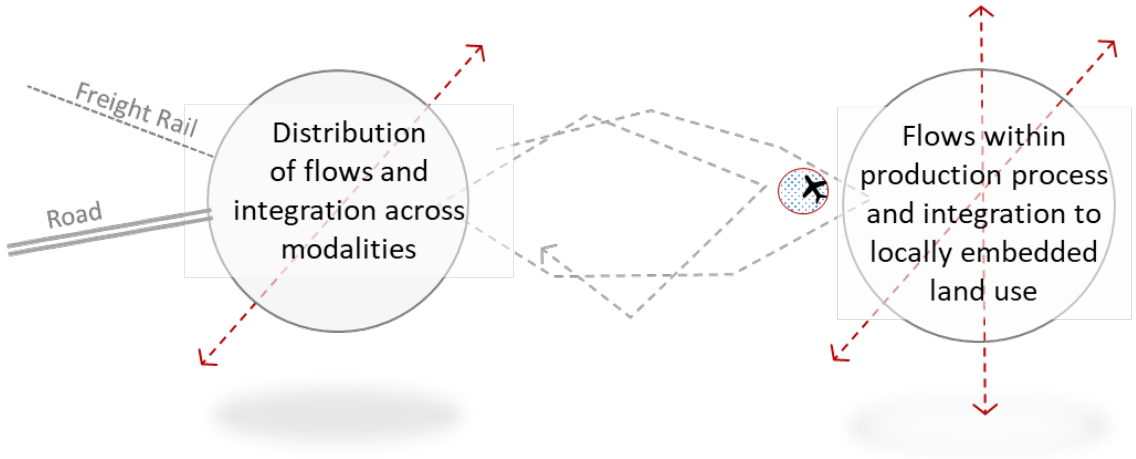
7.2.2 Research Question Two: What are the multi-scalar (local, regional, national, global) roles of the airport in terms of the flow of goods?

7.2.2.1 Finding Five: Multi-scalar role conceptualised

The research conceptualised and understood the emerging relationships between planning actions and the dynamics of place as they relate to airports and logistics through a relational conceptual framework. In order to frame and conceptualising the socio-spatial dynamics of airfreight related planning, a relational approach is taken to understand space as heterogeneous, dynamic, networked, multi-scalar and temporal.

It is argued in Chapter Three that a distinctive feature of contemporary capitalism is the ability to operate on multiple scales and organise the circulation of capital through global production networks. According to Coe and Hess (2012: 159), two features define global production networks, namely vertical disintegration which is the geographic and operational fragmentation of production along the value chain, and secondly the organisational processes of integration to overcome fragmentation dispersed trade-in component and intermediate goods. The emergence of air cargo logistics capacity, in the Dube TradePort case, provides the potential to integrate with the global production chain and overcome the dispersal in global production networks. The ability to move materials, components and completed goods in specific time scales across complex and geographically extensive production networks, with the required coordination of operations, collectively generates logistics related functions.

Figure 7.1: Distribution and production conceptual elements of airfreight logistics



Source: Devised by the researcher

The study contributed toward an understanding of the multi-scalar role of airports in relation to key features of global production networks. Firstly, the airports enable the distribution of goods between local international economics across multiple modes of transport and secondly airports support the flows within production processes and in

integrating production into locally embedded land uses. Global air cargo logistics capacity plays a role in supporting production processes, particularly those firms focused on high value, export-orientated manufacturing at an economic scale.

The study finds that while Dube TradePort specifically targeted freight forwarders, with their influence over cargo routings, to locate in TradeZone 1 and the TradeHouse, the limited international air connectivity curtails the volumes of freight. On the demand side, Dube TradePort managed to secure global production networks engaged with value-added manufacturing with their potential demand for air cargo capacity in the local production processes. While a stronger on-site connection to the Cargo Terminal may yet develop over time, current demand for air cargo capacity is drawn from the broader KwaZulu-Natal.

7.2.2.2 Finding Six: Challenge of trade imbalances

Air cargo exports and particularly imports, through the Dube CargoTerminal, grew steadily since opening in 2010, albeit these are relatively low volumes and off a low base. Bi-directionally balanced air-cargo routes are important for the Cargo Terminal, as it means both import and export capabilities are being utilised on the back of specialized infrastructure. Also, directional balance trips impacts on the viability of return trips, although the addition of hub connection can off-set the potential cargo space loss.

The imbalance of air cargo movements creates challenges for backhaul opportunities and creates unsustainable point to point dedicated air cargo operations. In order to offset this risk in the short term, air cargo routings are linked to passenger flows, until the volumes demand dedicated cargo operations. However, these decisions were driven from a passenger viability perspective as opposed to cargo routing logic.

7.2.2.3 Finding Seven: Dube TradePort and air-connectivity with OR Tambo International Airport hub

The development of cargo through Dube Cargo Terminal was motivated on the development of point to point international connectivity, outside of the ORTIA hub. It was anticipated that international wide-body passenger aircraft, could avoid time and cost delays of routing through a hub, creating opportunities for Durban and potentially act as a driver for increased volumes.

On the supply side, the strong hub and spoke arrangement for South African airports, creates some challenges for a secondary city attempting to move outside this dynamic. International passengers from Durban have seen significant growth in direct international flights specifically with Dubai, Doha, Istanbul routings and more recently with London via British Airways. The study found that despite the substantial capacity of DTP to processes air-cargo, more imports rather than exports are handled by the Cargo Terminal.

On the demand side, shifts in the market share of goods handled by DTP are evident since opening. A portion of cargo previously moving by road has moved to air cargo, before landside distribution. The relative share of air cargo from KZN based companies, previously trucked to ORTIA is reduced, as well as air cargo destined for KZN and previously trucked from ORTIA, has shifted in favour of DTP. In other words, a portion of the export bound air cargo from KwaZulu-Natal prefers ORTIA for exports, although the air cargo market share routing through ORTIA is diminishing annually.

It is estimated that the Dube TradePort Cargo Terminal processes almost half of all air exports for the KwaZulu-Natal Province and three-quarter of all air imports, where previously the majority of the air cargo were trucked between Durban and Johannesburg and flown out and in ORTIA. By implication, this means that in practice

DTP and ORTIA cooperate from a cargo routing perspective, whereby DTP is favoured for imports directly destined for KwaZulu-Natal and that ORTIA will continue to hold a share of KwaZulu-Natal based exports due to frequency and flexibility in routings. Given that the Dube TradePort Cargo Terminal is playing a greater role in terms of imports, this raises issues for managing landside logistics within eThekwini Municipality.

In the absence of the local volumes supporting freighters, the KSIA airport is tied to building air cargo volumes through passenger connectivity and working more closely with hubs. DTPC through its African route development strategy should continue to link passenger air services with trade strategies to develop air-cargo volumes on the backhaul. Structurally, passenger and cargo connectivity cannot be viably delinked in the short term, due to the dependence on belly cargo capacity.

7.2.2.4 Finding Eight: Dube TradePort and air-connectivity with African

Very little air cargo moves to and from the Dube TradePort Cargo Terminal into Africa and this is mostly due to the imbalance of cargo movements and reflects the overall structure of the trade. Certainly, in African markets, freight follows passenger routes as belly-hold cargo, and this is linked to limited air cargo volumes, historically limited air cargo specialists capacity from Durban (Respondent 14:2). Consideration of relatively good landside road distribution into the SADC region means that the flexibility and costs create modal competition, with road-based freighters dominating distribution.

KwaZulu-Natal exports significant amounts of freight to the SADC region but imports very little from the SADC region making it very difficult for air cargo operators to operate dedicated air cargo flights to points within the Africa region. KwaZulu-Natal province exports significant amounts of freight to the SADC region, specifically

Kenya and Angola, however, the relative imports from the SADC region are low (Respondent 10:1).

Future challenges for the Cargo Terminal will be to increase export air cargo volumes in line with the SEZ strategy of developing air logistics and export-orientated manufacturing so that local investment is promoted.

The local advantage of air cargo development cannot be equated with increased annual volumes of 12,7%, as reflecting the trend over the past seven years (Dube TradePort Corporation 2018: 12). Rather, questions of how the investment in firms are locally embedded, whether value-added manufacturing is occurring locally and linked to investment and employment gains in the process.

7.2.2.5 Finding Nine: Shift in cargo volumes due to air connectivity

Although it was previously noted that air cargo handling is concentrated at the ORTIA hub, the domestic and international volumes handled by DTP are increasing. The total air cargo handled between ORTIA, CTIA and KSIA is projected at 504 022 tons in 2018 and recorded as 463 482 tons in 2017, with a 9% growth (Airports Company of South Africa 2018). ORTIA handled some 394 430 tons relative to 19 498 tons through Durban in 2017, with Durban accounting for a 4% share of total air cargo by weight (Airports Company of South Africa 2018). However, in terms of domestic air cargo, it is estimated that the share is closer to 11%. (Respondent 9:1). Since opening, the DTP share of air cargo handling has now shifted despite low levels of domestic economic growth. Air cargo growth has exceeded the GDP growth for KwaZulu-Natal and this is attributed in part to the opportunities created through increased connectivity with Durban and in part to modal competition for specific goods to move within the specified time.

7.2.3 Research Question Three: How do airports integrate with ports, rail and road infrastructure and land use in the context of the Dube TradePort case?

7.2.3.1 Finding Ten: Partial integration between airports with other modes of transport in the context of the Dube TradePort case

Dube TradePort is conceptualised as a multimodal logistics platform to intervene in the movement of goods by inserting international air cargo routings through Durban for the benefit of the KwaZulu-Natal catchment. The study found that while both airports and seaports engage with international flows, they are not directly linked in the movement of goods. Goods suited to moving by air, as opposed to by sea, are generally time-sensitive, low weight and high value goods, or where it makes economic sense to absorb the cost of transport with the pricing structure. However, both airports and seaports are required to support a logistics framework that is engaged with international trade and access to both facilities creates flexibility in the way goods move. The more direct connection with airports and seaports is that both infrastructures require integration with road and rail infrastructure to support the landside distributions of goods. Ideally, firms require the flexibility to move goods in multiple ways, with direct connections to airport, seaport, road, and rail. Thematically the issue of a suboptimal split between road and rail distribution networks pointed towards structural issues that required Transnet intervention. Although policy intentions support long haul rail-based distribution networks, the failure on the supply side of rail has influenced both the case study and the broader South African space economy.

A key finding is that despite the planning intentions to reserve rail linkages in the Dube TradePort Development Framework Plan and Aerotropolis Plan the integration with rail has not materialised. Mechanisms to engage with Transnet and create capacity for freight rail including concession for freight operations and public-private partnerships at the Inyaninga rail siding were considered in the planning but not implemented. Despite attempts to shift the role of Transnet on the supply side through direct

agreements with Dube TradePort and inclusion on the Aerotropolis Plan process, the study found that the role of Transnet is missing in the implementation of a multimodal logistics platform.

7.2.4 Research Question Four: How do airports integrate with spaces of production and distribution of goods in the context of the Dube TradePort case?

7.2.4.1 Finding Eleven: Integration between Dube CargoTerminal and industrial uses

Dube TradePort is planned for the purpose of providing a global airfreight logistics platform to attract new high value manufacturing to KwaZulu-Natal and support existing production and distribution networks. Finding three attributed cargo flows through Dube CargoTerminal to production in the broader city and KwaZulu-Natal region, rather than being generated on-site.

However, in the vicinity of Dube TradePort, on the northern corridor, the purpose of integration with a supply of new productive, industrial land is curtailed by planning. Firstly, the initial municipal planning resistance to Dube TradePort development is reflected in the Northern Spatial Development Plan restrictions on-site and north for the business park and office purposes; and secondly, the land falling outside planning land use management schemes also curtailed the supply of new productive, industrial land. Furthermore, on the distribution side, Dube TradePort has been unable to intervene in the deeper structural issues that require state-owned entities such as Transnet to perform.

Finding three questioned the relative importance of air connectivity and industrial incentives in attracting productive uses to Dube TradeZone, adjacent to Dube CargoTerminal. For the most part transport infrastructure is funded through the public sector. There is considerable value and benefits derived from proximity to the road,

rail and airport infrastructure. Instead of capturing some of the investment value through a development levy, the national government provided further tax incentives (such as SEZ) to attract spatially targeted investment at the airport. Although returns on the initial construction costs are evident, return on the SEZ investment will require further studies into the local agglomeration benefits.

7.3 Recommendations

7.3.1 Proposed normative framework to respond to the challenges for urban planning related to airports and logistics within a regional spatial development framework

Planning rests on the normative idea of taking inclusive, developmental, equitable and efficient actions towards better outcomes (South Africa 2013: 1) as articulated in the Spatial Planning Land Use Management (SPLUMA) principles. SPLUMA as a legislative framework for normative planning in South Africa acknowledges that spatial planning is insufficiently underpinned and supported by infrastructural investment (South Africa 2013: 2). It is recommended that planning for airports and logistics is located within this normative framework for spatial transformation through the preparation of the regional spatial development framework. SPLUMA allows for the preparation of regional spatial development framework to guide spatial planning, land development, and land use management in any specific geographic area that gives effect to national land-use priorities (South Africa 2013: 13).

SPLUMA takes the transformation imperatives informed by the constitution into account, and articulates these as development principles within a legislative framework. At a policy level the Integrated Urban Development Framework (IUDF), 2016, articulates the integrated and coordination strategies required by the urban vision of the National Development Plan to deal with "*social exclusion, environmental threats, economic inefficiencies, logistical bottlenecks, urban insecurity, decaying infrastructure and the impacts of new technologies"* (South Africa 2016a: 4). The

IUDF policy framework for inclusive, resilient and liveable urban settlements rests gives effect to spatial transformation outcomes (South Africa 2016a: 4)

The legislative and policy context for planning firmly locates the plan-making process within the context of spatial transformation towards developmental outcomes. The argument made in Chapter Two is that planning theory is not a coherent body of knowledge nor can a dominant approach be claimed, and yet the South African planning system is predominantly rooted in a normative framework after the transition to democracy. The earlier normative framework initially applied to municipal planning frameworks and selected application under the Development Facilitation Act 67 of 1995, was extended under SPLUMA and applied to all national, provincial, district, local scaled spatial frameworks, development applications and managing land use schemes through by-laws (South Africa 2013: 3).

Although the implementation of normative principles requires value judgments that may prioritise one principle over another, the broad thrust of planning is still within a framework of spatial transformation towards development outcomes. These dynamics are acute in planning for airports and logistics, where claims for airport related regional economic growth are posited against local sustainability concerns. While it is understood that competing claims shaped the initial planning process these tensions should be reframed within developmental outcomes.

The recommendation to initiate a regional spatial development framework process that includes spatial planning, land development and land use management component in order to overcome the current lack of articulation between more localised plans and the normative framework for inclusive, developmental, equitable and efficient outcomes. Current KwaZulu-Natal Aerotropolis Plans may hold currency as a provincial economic plan, but the plan fails to align with the management of land at a local scale.

Initiating a planning framework outside of a municipal or provincial jurisdiction territory draws on some of the relational arguments for planning outside of a municipal 'container'. Such a proposal overcomes thinking that local economic activity is being directed or displaced from the municipal centre to the north, and bound to municipal boundaries. Rather consideration of cities as complex nodes and networks, places and flows with multiple relations, activities and values suggests a more nuanced approach to influencing socio-spatial relations towards spatial transformation objectives. For planning, this requires a better understanding of how global and local production processes shift and how these shifts may underpin growth. To engage and influence airport related development towards transformative outcomes requires an integrated approach.

The motivation for a regional spatial development framework is as follows:

1. The regional spatial development framework recognises that the benefits and costs for the implementation of airport related development are not bound to municipal jurisdictions require resourcing and implementation across a portion of eThekwini, Ndwedwe and KwaDukuza municipalities.
2. Furthermore, implicit in the principle of cooperative governance is that no one sphere of government takes precedence over another and that local government is placed at the centre of integrative actions. The preparation of a regional development framework allows for the municipalities of eThekwini, Ndwedwe, and KwaDukuza to take a lead in the preparation of a regional plan centred on airport related development.
3. The regional scale avoids the history of previous initiatives where stakeholders were overlooked and create an opportunity for a collaborative, learning process so that clear conceptual underpinning agreed and aligned to local plans.

4. In order to ensure that spatial planning is integrated with infrastructural investment planning, integration between planners, economists, engineers, and environmentalists needs to be designed in the normative values underpinning the processed integrated process. Furthermore, such an integrated approach towards spatial transformation requires inclusive developmental outcomes that are made explicit for both infrastructural and private investment.
5. SPLUMA makes provisions for the designation of regional spatial development framework with the inclusion of land development and land use management component. The latter ensures that the plan is aligned to implementation mechanisms.

7.3.2 Proposed plan-making process

Remnants of modernist thought, methods, and practices continue to coexist and conflict with normative planning approaches. Transport planning emerged in a modernist context, as a separate knowledge domain, but influenced planning theory and practice. The separated practice of land use planning from transport use planning is perpetuated through separated government institutions across spheres of governance. Within the planning field, normative strategic planning sits apart from land-use management, where tenants of modernist practices are embodied in land use schemes. The nature of airports and logistics spanning across the disciplines of transport, economic, environment and urban planning and requires integrated thinking across land uses that distribute, produce and consume goods. This research furthers the notion of integration in the context of planning for airports and logistics; Integration is extended from the alignment of infrastructures and land uses across municipal jurisdictions, across scales, shifting over time, and includes integration within the production process. The relevance of producing economic informed plan-making processes with spatial transformation outcomes is presented below.

This research seeks to reflect on the practice of planning for airports and logistics in order to strengthen the plan-making process towards spatial transformation outcomes. However, such an approach requires integrated thinking at the core of strategic spatial planning, transport planning, and land use planning (including environment). Approaches that test the infrastructural implications of a land-use plan as in the municipal approaches or the quantify land-use implication of a regional transportation plan, fall short in achieving integrated outcomes.

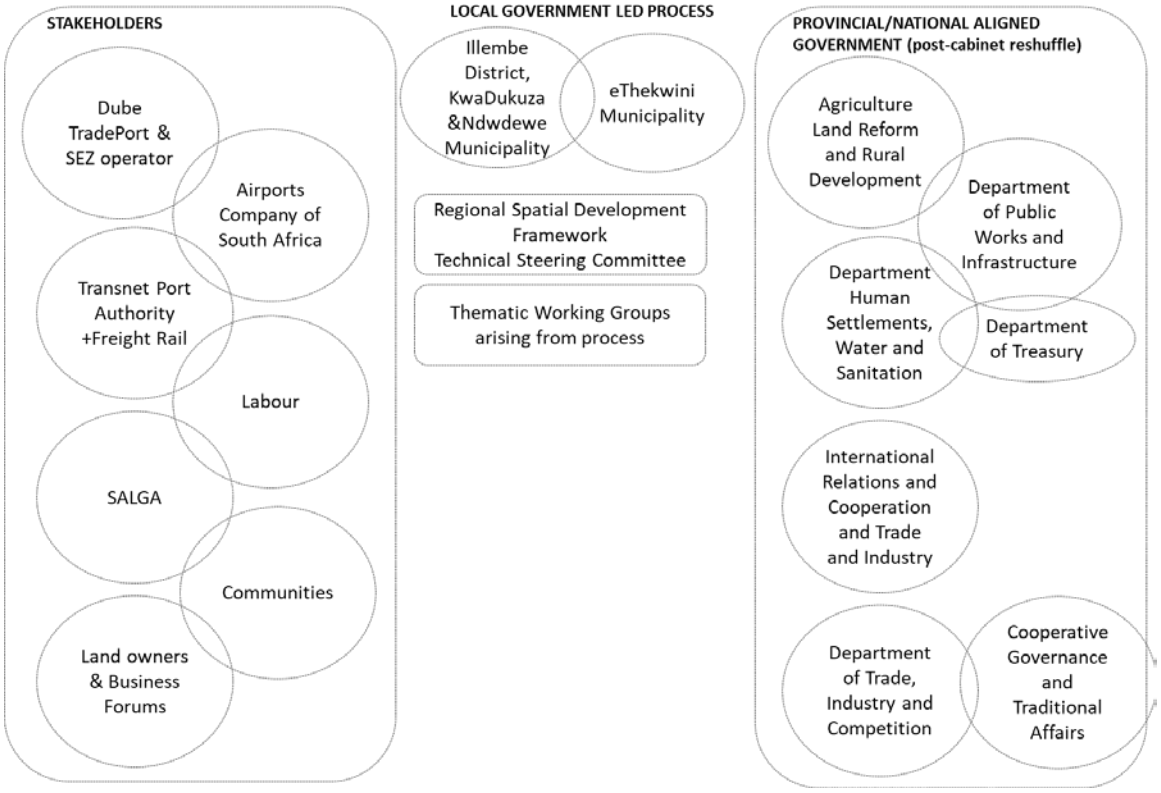
It is recommended that in order to achieve spatial integration in the plan-making process and "*forge new spatial forms in settlement, transport, social and economic areas*" (South Africa 2016a: 39) that an integrated approach is reflected in disciplines supporting the process. Key institutional actions for spatial integration could include the following interventions:

1. It is recommended that cross boundary discussions are initiated by the Department of Cooperative Governance and Traditional Affairs, as the responsible for local government. eThekwini Municipality, iLembe District Municipality including Ndwedwe Municipality and KwaDukuza Municipality would need agree on the brief, roles and functions of the Aerotropolis Regional Spatial Development Framework (ARSDF). Implicit in the proposal is for municipalities to lead the process of localising the ARSDF.
2. The proposed Aerotropolis Regional Spatial Development Framework is not about the plan but the planning process to achieved localised and integrated outcomes. At a political level the appropriate representation can be achieved between governments departments, state owned entities, representations of labour, local government, and business on steering committee. However, the process of working in integrated and themed working groups with municipal representations across line departments, specifically planning, transport, economic and

environment, is important to work through alignment issues across scale. Refer to Figure 7.2 for the proposed institutional framework.

3. Stakeholders and multi-disciplinary teams form the panel of experts and where required additional resources are co-opted into the process. It is recommended that an integrated plan-making process is adopted.

Figure 7.2: Proposed Institutional Guiding the Regional Spatial Development Framework towards inclusive growth



Source: Devised by the Researcher

7.3.3 Proposed conceptual framework for planning for airports and logistics

The proposed framework is developed though the research process by reflecting on the case study, specifically reflecting on planning for airports and logistics. The proposal seeks to make some of the conceptual ideas explicit in order to better understand how planning for the movement of goods through airports can localised.

The proposed framework comprises of the following conceptual elements related to air-connectivity, vertical integration and horizontal integration and can be applied to planning for airports and logistics.

A relational approach is taken to understand the airport in terms of its integration with other modes of transportation thereby adding value and distributing goods within the supply chain. The structural deficits in the space economy need to be considered within a sustainability framework for logistics. In addition to carbon emissions, the distance from Durban, as a key logistics hub connected through the 600-kilometre logistics corridor, to Gauteng has implications for moving goods in the national spatial economy. Air-cargo movements are conceptualised to support an overall logistics framework and promote the movement of goods between international and regional economies. Improvements in the overall logistics framework will require interventions outside of this study including localisation of goods and material flows combined with an improved rail long haul role Transnet. The contribution of this study, as outlined in Chapter Three, is that air cargo is conceptualised as a component of logistics distribution functions in two ways: 1) in supporting the movement of goods between land uses from point of origin, storage, distribution, consumption and disposal; and 2) to support the management of goods, parts, and materials required for value-added activities across supply chains in the production processes. In order words the logistics is both an outcome of economic performance and an enabler of economic performance of a region. Durban and the surrounding region, provides the interface between international sea and air trade, and plays an important role to support the landside distribution of goods by road and by rail. In support of an improved logistics role for the region, Dube TradePort fulfil a multimodal role by integrating air and road based logistics services with rail and sea-based logistics opportunities.

7.3.3.1 Air connectivity

Air connectivity is this study was developed as a qualitative assessment of the dependence of firms to air cargo logistics. When applied to the TradeZone firms it

was assumed that air cargo logistics would support two functions, firstly on the input side the movement of goods, materials and components in the production process and secondly, the distribution of goods as an output of value-added manufacturing.

The assumption that geographic proximity to the Cargo Terminal would strengthen air connectivity was questioned in the case study. Rather, firms at DTP demonstrated partial rather than actual air connectivity in the value-added manufacturing production processes. It is recommended that firms benefiting from Special Economic Zone (SEZ) subsidies are more closely screen to ensure that air connectivity is a locational requirement for future developments, lease renewals in the SEZ portion of the TradeZone,

7.3.3.2 Vertical integration

The contribution to planning entailed thinking about vertical integration to include global production processes. Planners tend to view integration as vertical alignment with higher-order land use plans, infrastructural alignment or even conceptual alignment such as corridors. The hierachical notion of vertical integration derived from planning discources is at odds with constitional imperitives for a spherical and cooperative governance institutional structure. The research extended the plan making process by thinking about integration as relational and layered framework for how infrastructure, can be designed to interact with the flow of goods across vertical and horisonal networks, and how this holds possibilities; and how these flows can integrate with broader land use processes.

This study explored how vertical integration in production processes is an important element when thinking about airport related manufacturing based on the following:

1. The organisation of production networks within a capitalist framework operating across multiple scales.

2. The circulation of goods and component parts, across multiple scales, supports the organisation of production networks in multiple places through logistics.
3. The role of air logistics in achieving vertical integration performs a narrow role in specific sectors, where production processes need to overcome time and distance, and where the cost of air transportation can be absorbed in the price structure of goods produced.

It is recommended that municipal planners broaden their understandings of airport related development, to include high value industrial manufacturing in sectors targeted for Dube TradeZone. This may require revaluating where the municipal proposals for business parks to uses better suited to can accommodate manufacturing and related services in electronic, pharmaceuticals, automotive and textiles.

7.3.3.3 Horizontal Integration

Horizontal integration in planning is typically considered as compatibility or alignment in adjacent land uses and infrastructures. This research has extended horizontal integration to consider local embeddedness as an element to consider in how capital circulates locally to employees, suppliers and expressed as localised land uses. In the context of airport related logistics, horizontal integration can be extended to how air logistics support horizontal integration and localising in the production process. Logistics entails a distributive function to coordinate the movement of material and goods within the fragmented supply chain, and requires horizontal integration between land uses and integrated between transport modalities. In order to benefit from the Special Economic Zone investments more locally, it is important that local and regional suppliers are linked into these new opportunities.

The purpose of the integration is derived from the normative planning framework of undertaking spatial transformation in order to achieve inclusive development through infrastructure led development. The imperatives for normative planning to be

inclusive are more critical given the limited resources of state to take the lead in infrastructure investments. Compounded by the deep economic crisis in the state leaving cities and their residents vulnerable. Pervasive allegations of financial irregularities and the impacts on state-owned entities such as Eskom, Transnet, SAA interacting with air cargo logistics foregrounds some of the structural difficulties to deliver on the South African infrastructure development path for inclusive growth and development.

7.4 Further research

The following areas of further research would enhance the theoretical framework for understanding of airport related development and accordingly improve its contribution to practice.

1. The development of a sustainability framework for logistics supporting the movement of goods including the opportunity costs of alternative modal choices within the supply chains.
2. Understand how the establishment of the global supply chains relates to the airport that is locally embedded with linkages to the automotive and manufacturing sectors in Durban.
3. Understand the locational dynamics of freighter forwarders and logistics companies in Durban of the port in relation to the airport.
4. Exploring the role of plans shaping public and private investment decisions towards developmental outcomes in the airport region.

7.4.1 Chapter summary

This study on planning for airports and logistics is specifically concerned with how airports, as precincts containing specialised infrastructure and related uses, interact with the flow of goods distributed across different transportation networks and land uses across local, regional, national and global scales. The spatial transformation returns of transport-led development paths are questioned in this study which looks at whether the achievements warranted the subsidisation of infrastructure investment

combined with spatially targeted SEZ industrial incentives. In effect, the study found that in a relatively short time the SEZ incentives delivered on the intended objectives of spatial targeted investment with inclusive outcomes meeting transformation and employment objectives, but not necessarily deepening agglomeration gains related to the CargoTerminal. Over the past three years (2016-2019) the productivity benefits of SEZ firms dependent on common airport infrastructures and services are yet to emerge. Businesses investing in the TradeZone as intended by the SEZ incentives, comprised predominantly of South African owned firms, which collaborate with global firms, dealing with high value manufacturing but not necessarily focused on export-orientated objectives. While progress has been made to develop locally embedded, value-added manufacturing at the SEZ, the challenge of how to continue to build up export-related volumes, strengthening new clusters at the airport and ensuring air connectivity linkages for firms benefiting from SEZ incentives.

Of concern is the tenuous relationship between the firms locating within Dube TradeZone, where time-critical air connectivity is neither a core requirement nor are they necessarily related to airport infrastructure. While firms fall within the targeted sectors suited to air connectivity (such as automotive, electronic related manufacturing, etc.), the logistics of firms are largely road-based operations but without any dependence on the CargoTerminal and specialized air infrastructure. The study took into account the strength of multipliers in the local economy developing beyond the northern corridor but observed limited productivity gains related to shared infrastructure, use of inputs between firms and related agglomeration benefits internal to the site.

Aligning existing firms with the opportunities for air cargo capacity, or attracting new firms and investment related to air logistics infrastructure, on the northern corridor is weakly evident in the study. Given that industrial investment cycles can exceed seven years from initial decisions to developing new lands, it is surprising that over the relatively short development period (2010-2019) more airport related industrial land

has not been developed (even combined with the slow economic growth). The study identified that both infrastructure provision on the northern corridor, combined with planning processes and plans, curtailed the supply of industrial land on the corridor.

The Aerotropolis Plan is based on airport led development to support growth. The municipal integrated development plans in eThekwini, KwaDukuza, Ndwedwe, and Ilembe are all broadly aligned to the Aerotropolis vision with anticipated growth. The Northern Spatial Development Plan 2013/2014 contained in eThekwini Spatial Development Framework 2017, however, limited the range of airport related '*industrial'* uses to '*business park*'. Compounded with this, being the restriction on development outside of scheme area on agricultural land and the unresolved extension to the municipal land use schemes, affecting the supply of industrial land on the northern corridor at a scheme level planning scale. A persistent challenge for planning is the contradiction between normative statements of inclusive growth at a broad scale and the obstacles to implementation at the local scheme scale.

On-site there is substantial growth in air cargo volumes through the CargoTerminal from 5 000 tons to 25 000 tons per annum over 2010-2019, which is impressive given the broader context of underperforming state-owned entities and the related economic slowdown. The study found that although the CargoTerminal gained shares in the regional air cargo market, and moved freight from the road into air cargo (freight previously lost by the KwaZulu-Natal economy to ORTIA), the CargoTerminal is still playing a greater role in air cargo imports. In part, this finding can be explained through deindustrialization impacting on the South African economy, but also due to direct connectivity out of the ORTIA hub. Findings that freight volumes can be attributed to the regional KwaZulu-Natal air cargo catchment area rather than local airport proximity have implications for the production of space on the northern corridor. The implication being that the broader northern corridor should be contributing towards inclusionary growth, containing urban sprawl and integrating airport related development with city-building processes.

Land values responded to infrastructure-led government spending and development approvals on the northern corridor. Land sales tended to reflect higher land values attributed to the Tongaat Hulett land conversions from agriculture to commercial, industrial and residential uses. More recently, the fall in company value is in part attributed to irregular accounting practices to arrive at overvalued land profits. Despite the investment by the company in the northern corridor and the downward adjustment in the company value, the influence of planning processes between DTP and Tongaat Hulett Development influenced the greenfields supply of logistics and industrial planned uses on the northern corridor. Within the existing industrial areas on the northern corridor, there is no significant realignment towards airport related opportunities. The land use survey identified logistics and logistics-related uses, however, these were for the most part road dominated. In cases where logistics companies included an air cargo component, the companies did not cluster in close proximity with the airport, they tended to retain their positionality in the city, with accessibility between the Port, Airport and N2/N3 road-based distributions.

As a key recommendation, the study points towards substantive issues for inclusion in plan-making processes related to how positionality in airfreight flows is important to understand the multimodal and multi-scalar connectivity between air transport, with road, rail and sea-based modalities and secondly to understand how planning for airports can be integrated with planning for productive land uses within the city structure. The implication being that the plan-making process requires a layered approach that considers horizontal integration in local economies and multi-scalar approach to integrating with global economies in terms of investment flows and material flows.

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9 ANNEXURES

Annexure 1: Airport ranks by Cargo Volume Loaded and unloaded freight and mail in metric tonnes, 2017

Rank	City (Airport)	Loaded and unloaded 2017	% Change
1	HONG KONG, HK (HKG)	5 049 898	9.4
2	MEMPHIS TN, US (MEM)	4 336 752	0.3
3	SHANGHAI, CN (PVG)	3 824 280	11.2
4	INCHEON, KR (ICN)	2 921 691	7.6
5	ANCHORAGE AK, US (ANC)	2 713 230	6.7
6	DUBAI, AE (DXB)	2 654 494	2.4
7	LOUISVILLE KY, US (SDF)	2 602 695	6.8
8	TOKYO, JP (NRT)	2 336 427	7.9
9	TAIPEI, TW (TPE)	2 269 585	8.2
10	PARIS, FR (CDG)	2 195 229	2.8
11	FRANKFURT, DE (FRA)	2 194 056	3.8
12	SINGAPORE, SG (SIN)	2 164 700	7.9
13	LOS ANGELES CA, US (LAX)	2 158 324	8.1
14	MIAMI FL, US (MIA)	2 071 722	2.9
15	BEIJING, CN (PEK)	2 029 584	4.5
16	DOHA, QA (DOH)	2 020 942	15.0
17	LONDON, GB (LHR)	1 794 276	9.4
18	GUANGZHOU, CN (CAN)	1 780 423	7.8
19	AMSTERDAM, NL (AMS)	1 778 382	4.9
20	CHICAGO IL, US (ORD)	1 721 807	12.6

Source: ACI, 2019. https://aci.aero/data-centre/annual-traffic-data/cargo/2017-

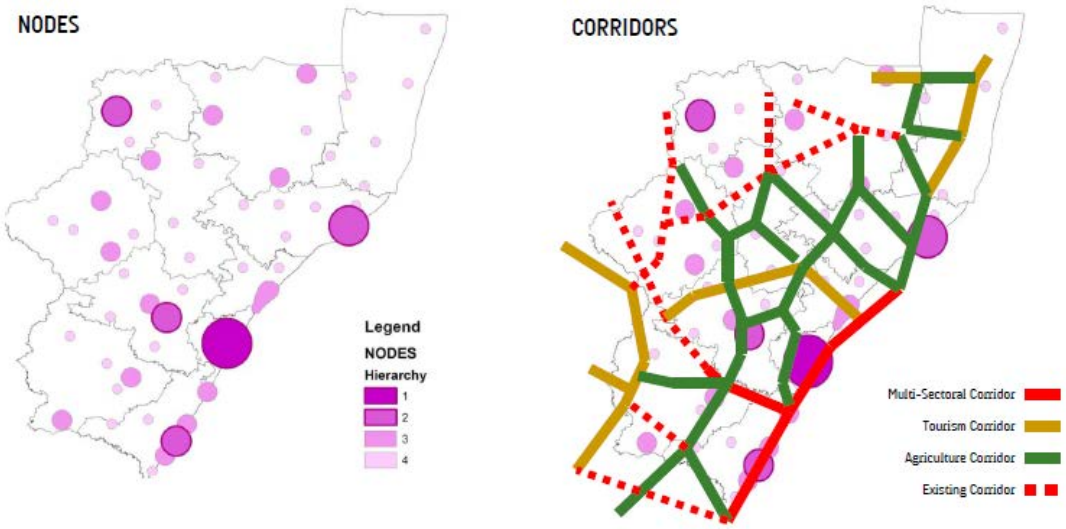
Annexure 2: Connectivity to Durban

Airline	Connectivity	Direct
Air France	Paris via ORTIA	
Air Mauritius	Mauritius	x
Air Namibia	Windhoek Via Windhoek Gaborone	x
Air Seychelles	Via ORTIA	
Airlink	Maputo	
British Airways	London	x
Egyptian Air	Cairo via ORTIA	
Emirates	Dubai	x
Ethiopian Airlines	Addis Abba via ORTIA	
Etihad Airway	Via ORTIA Abu Dhabi	
Kenya Airways	Nairobi via ORTIA	
KLM	Schiphol via ORTIA	
Lufthansa	Frankfurt via ORTIA	
ProFlight Zambia	Lusaka	
Qatar	Doha	x
SA Express	Harare	x
Swiss Air	Zurich via ORTIA	
Turkish Airlines	Istanbul	x

X means a connection

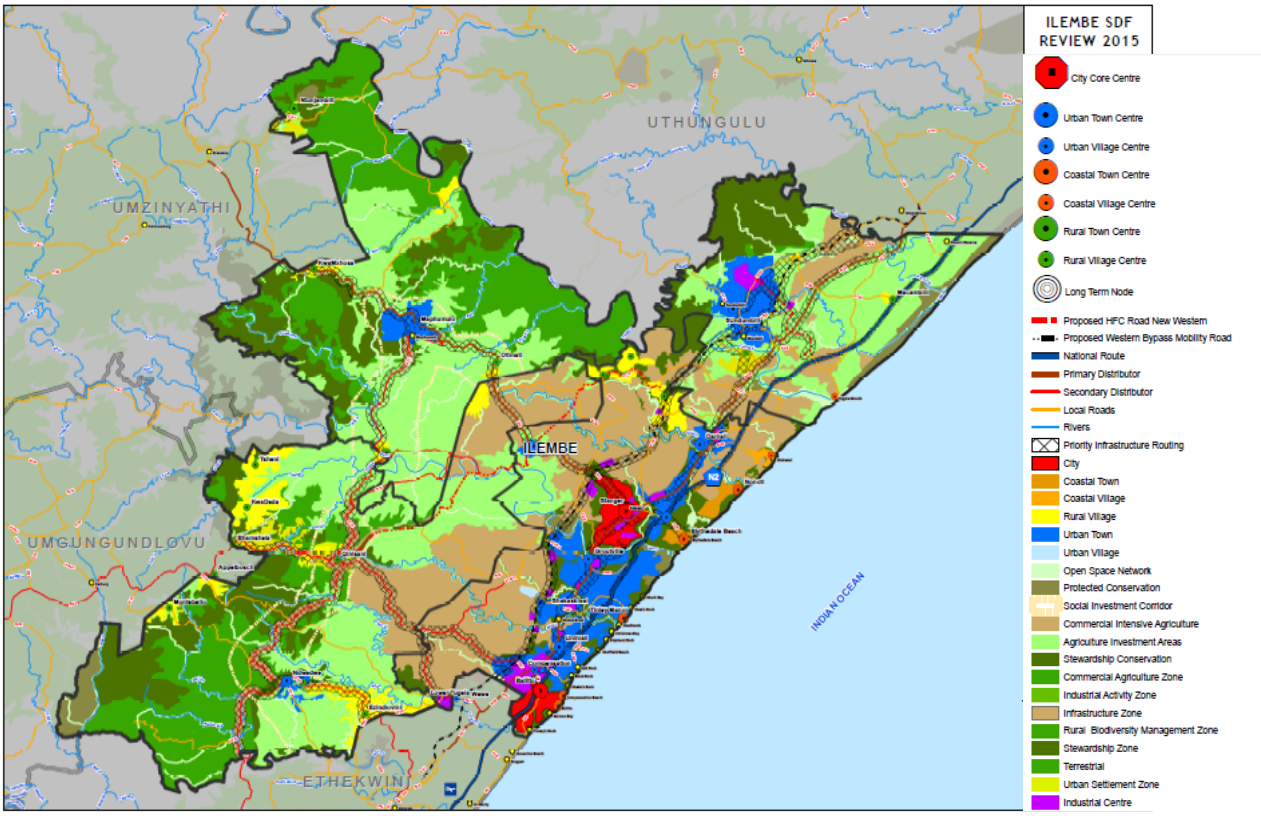
Source: Self-generated from https://www.skyscanner.net/flights-to/dur/airlines-that-fly-to-durban-king-shaka-international-airport.html

Annexure 3: Planning Context for KwaZulu-Natal Provincial Planning Context



(South Africa 2017c)

Annexure 4: Extract from the iLembe Spatial Development Framework



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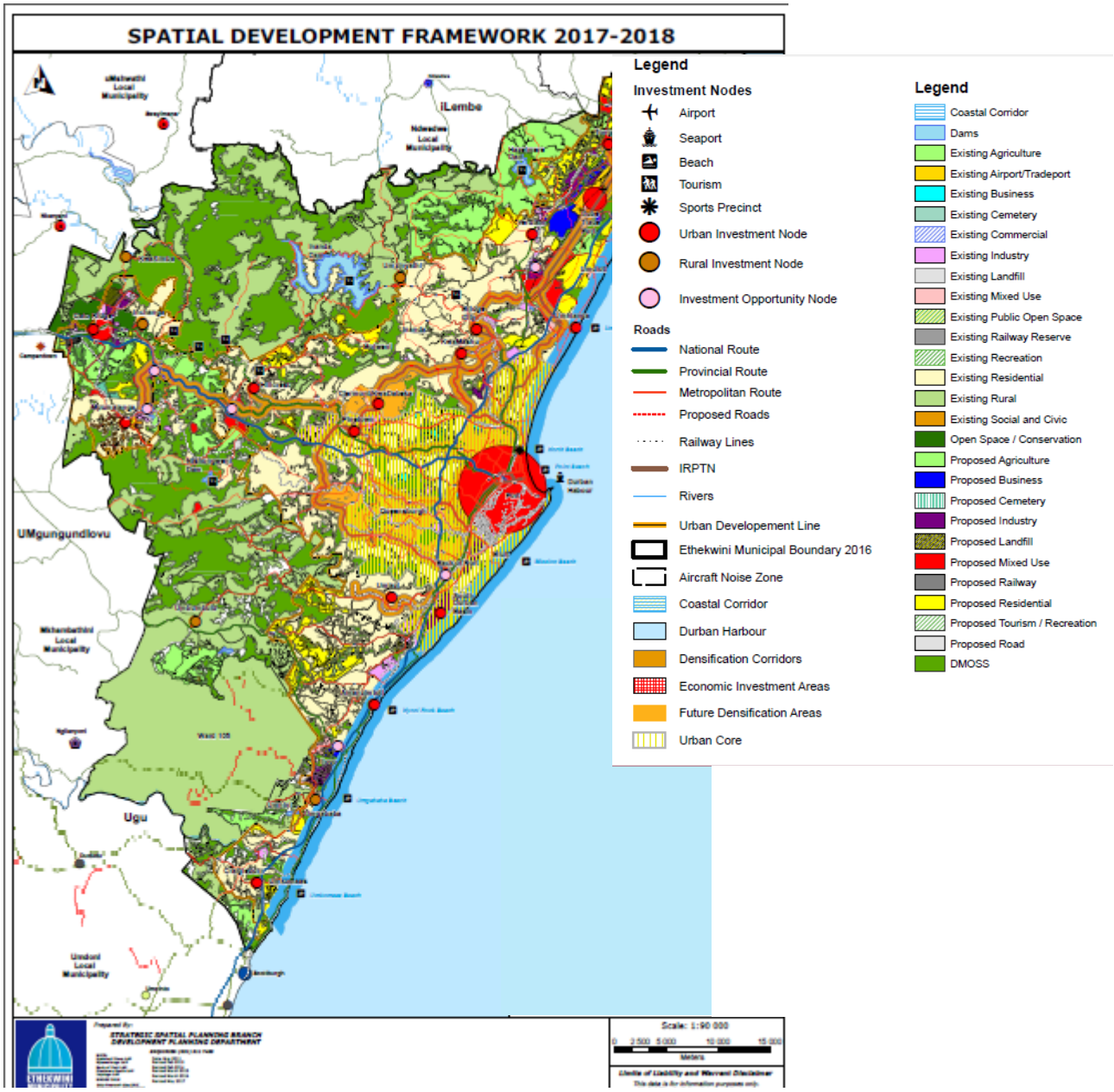
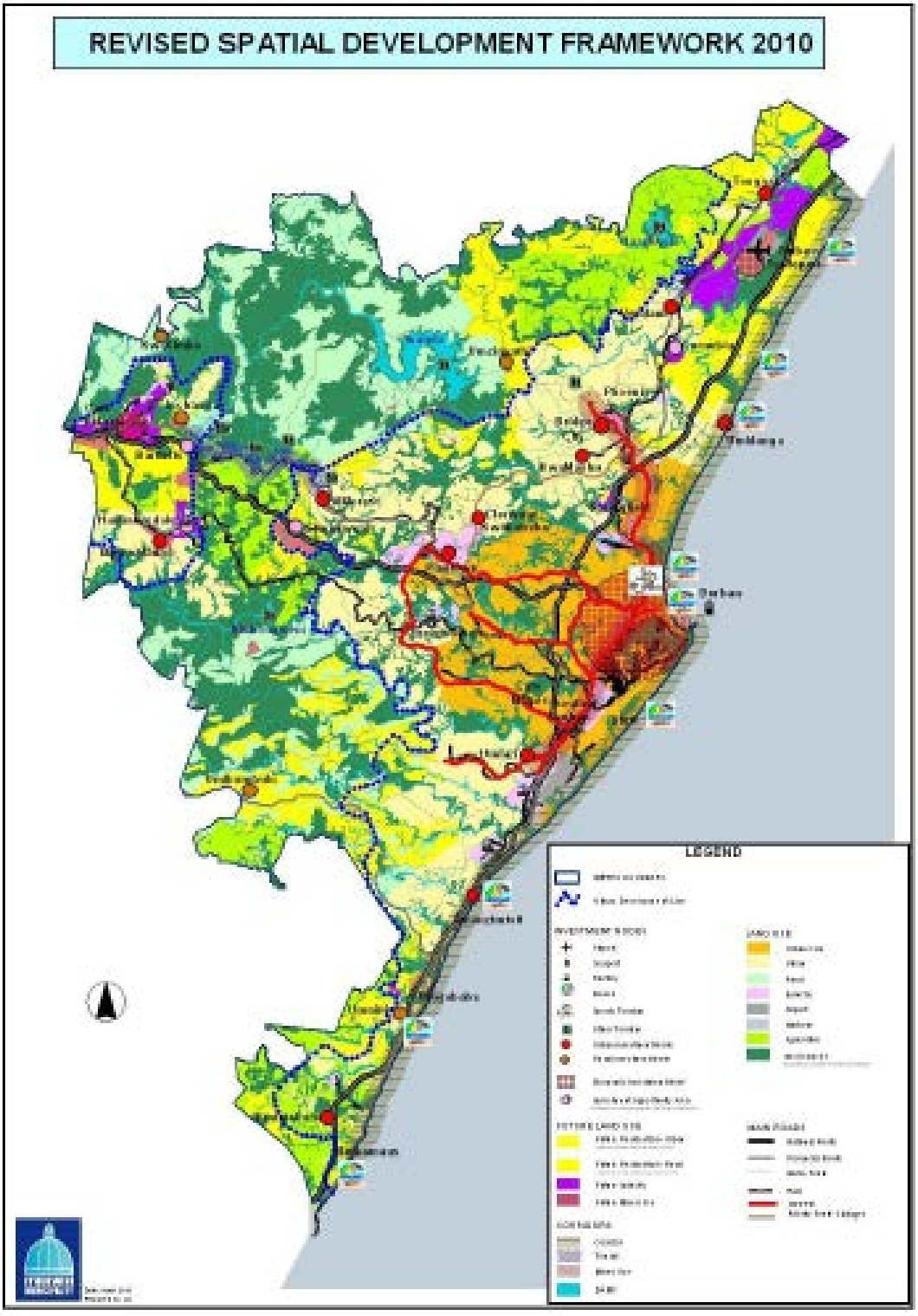
Annexure 5: Extract of eThekwini Spatial Development Framework 2017-2018



(South Africa 2018c)

Annexure 6: Extract of eThekwini Spatial Development Framework 2010



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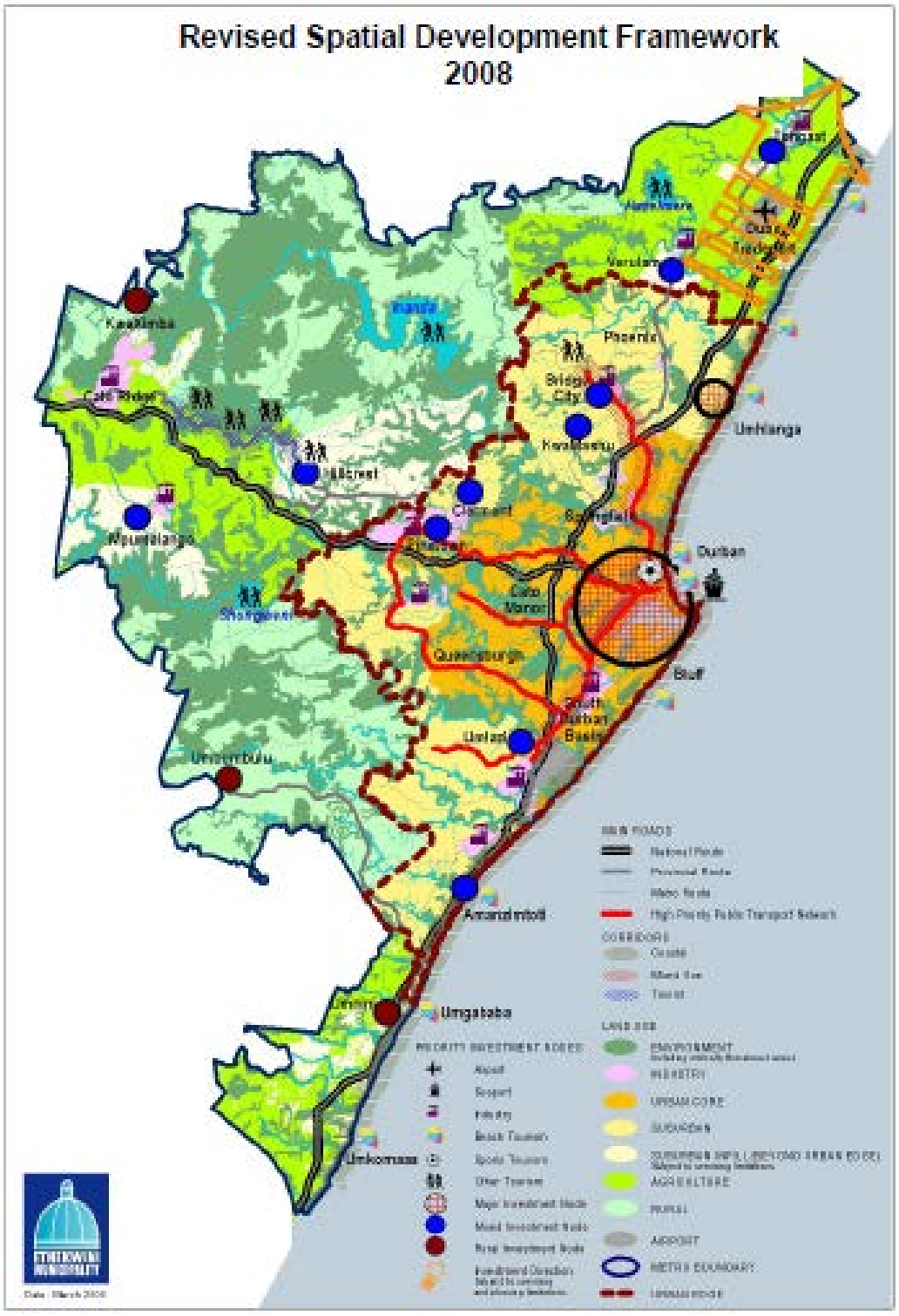
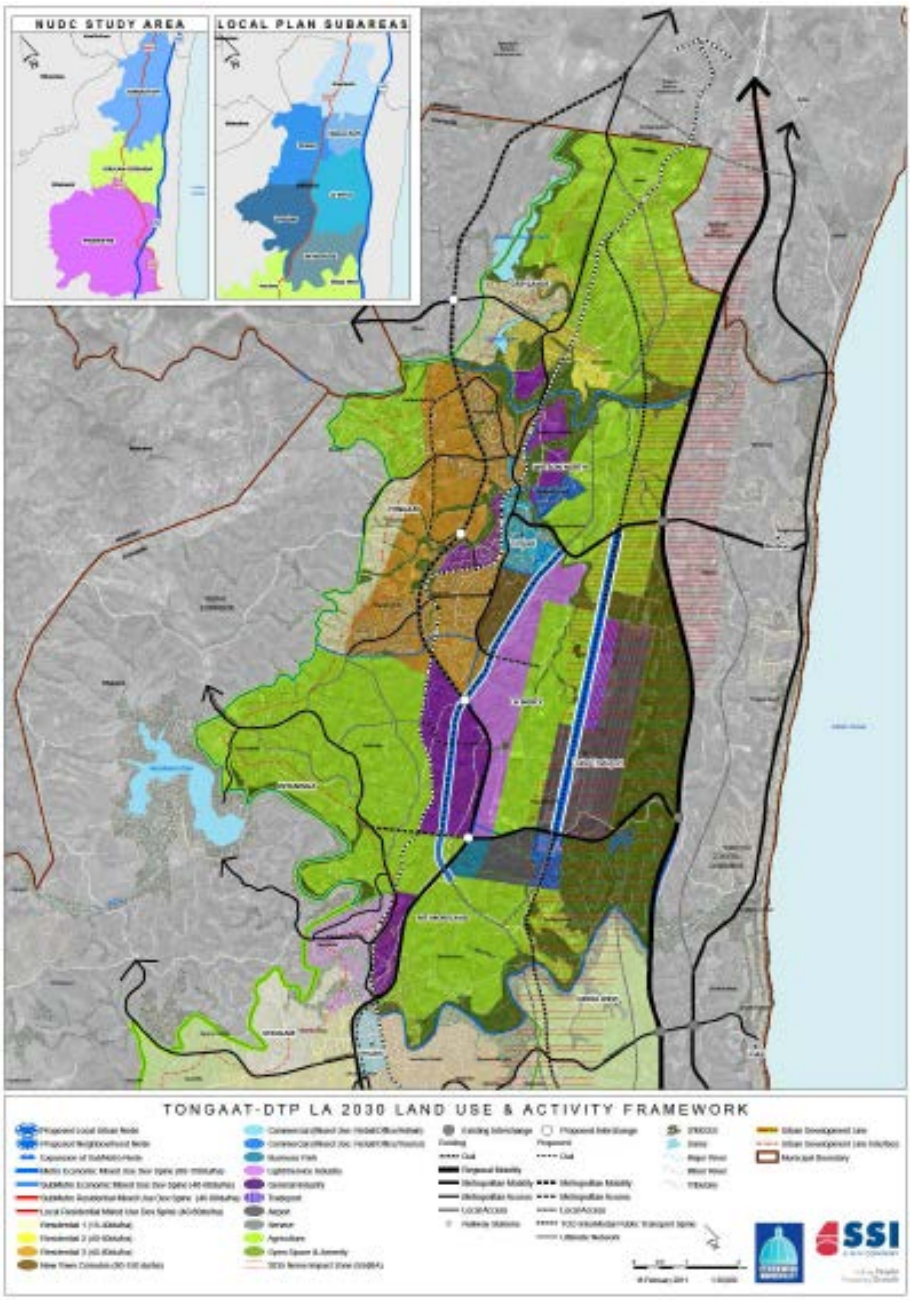
Annexure 7: Extract of eThekwini Spatial Development Framework 2008/09



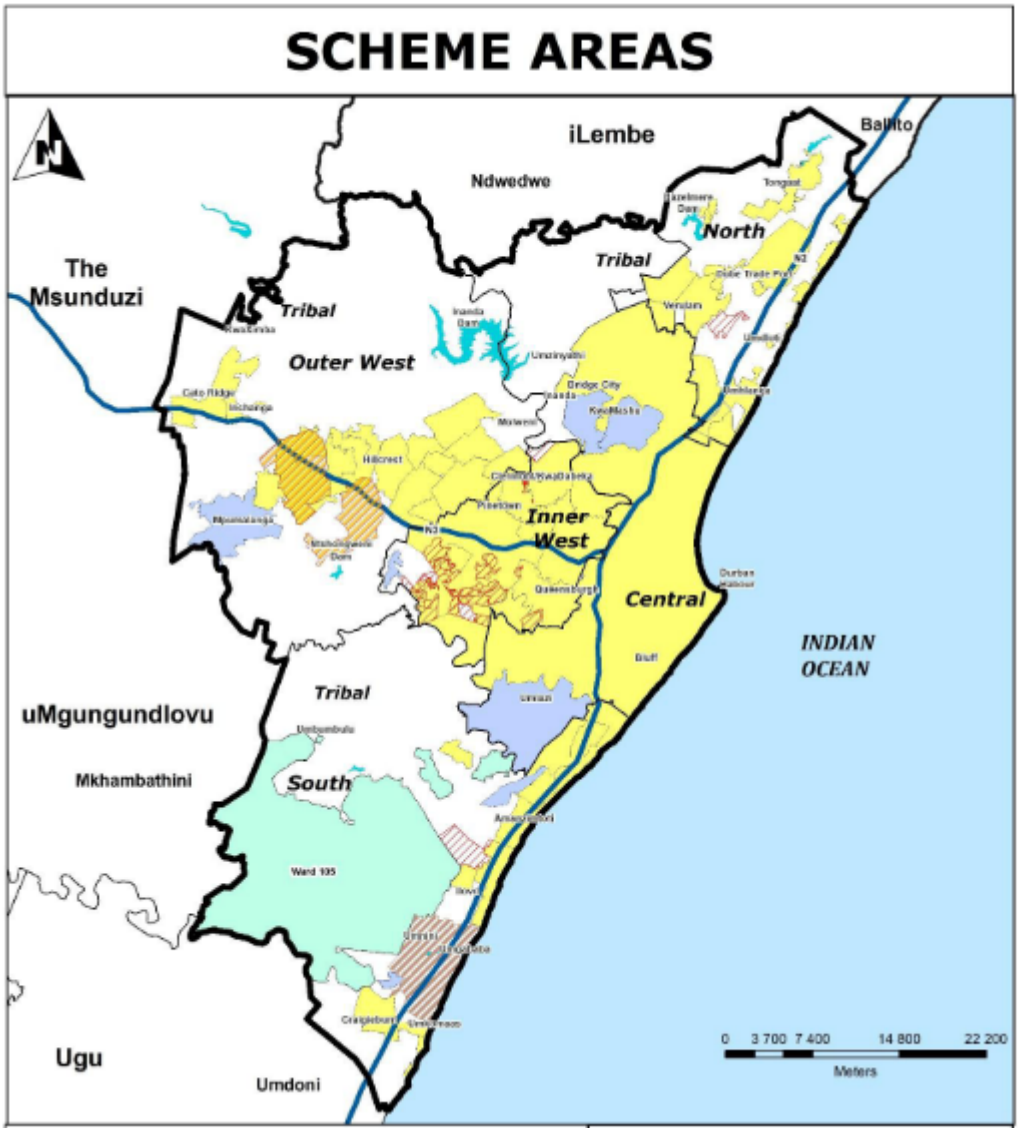
Source:http://www.durban.gov.za/Documents/City_Government/IDP_Policy/IDP_2009_10.pdf

Annexure 8: Local Area Plans: Northern Urban Development Corridor Tongaat-DTP Local Area Plan



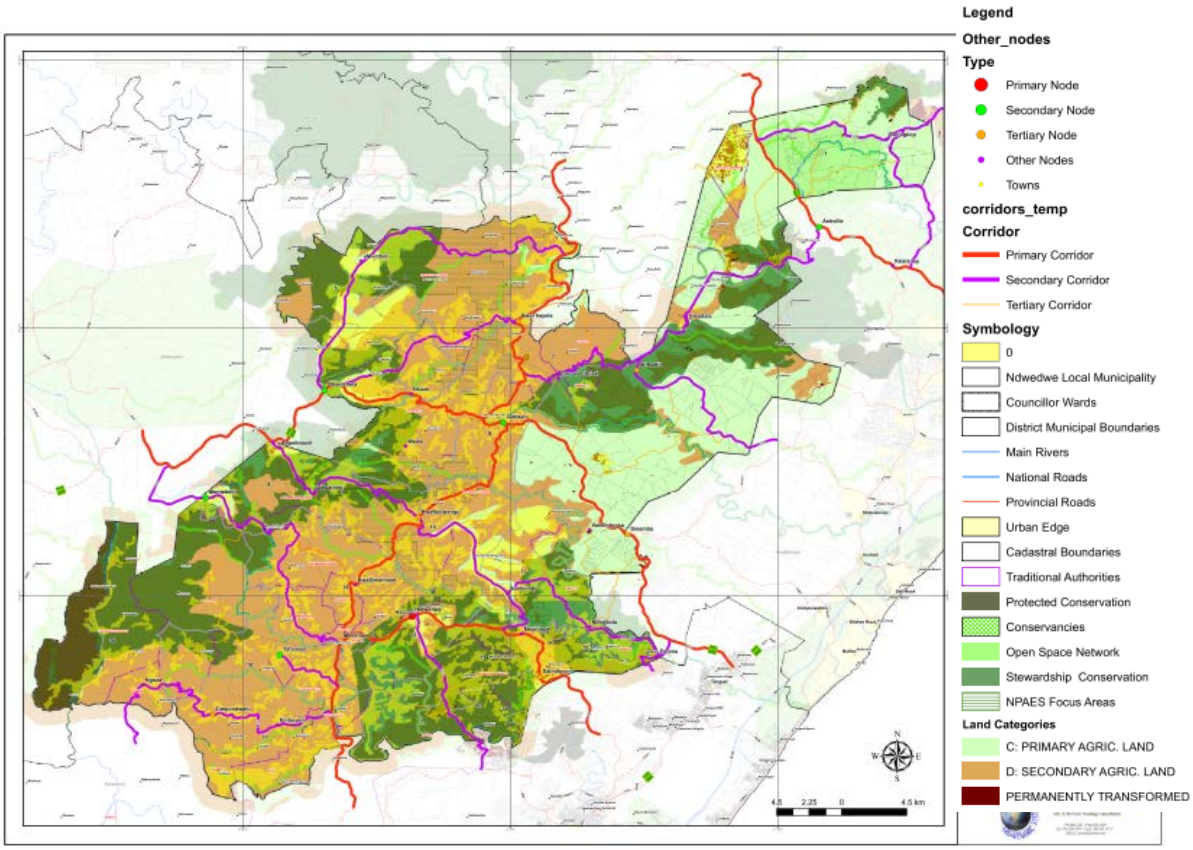
(South Africa 2011a: 57)

Annexure 9: Areas falling within the Land Use Schemes in eThekwini Municipality, 2018.



Source: (South Africa 2018c: 510)

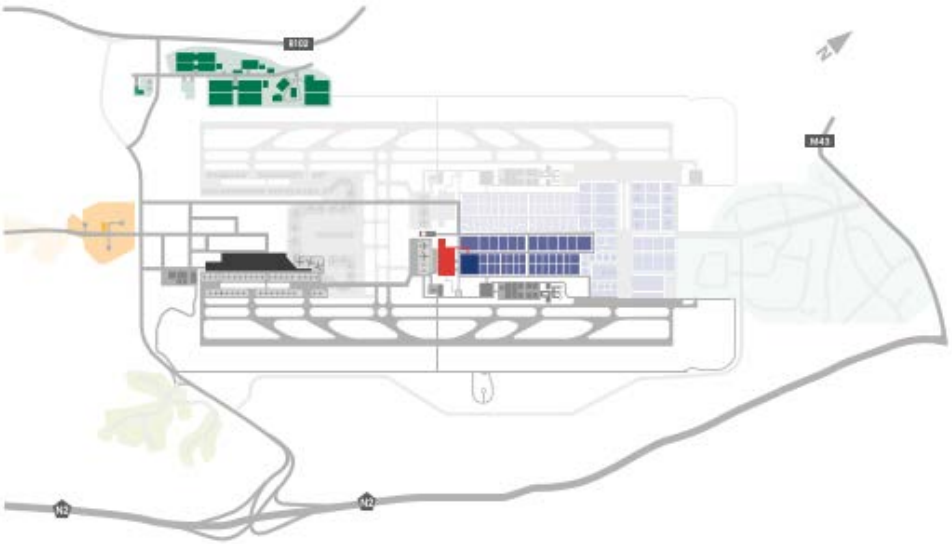
Annexure 10: Extract of Ndwedwe Spatial Development Framework



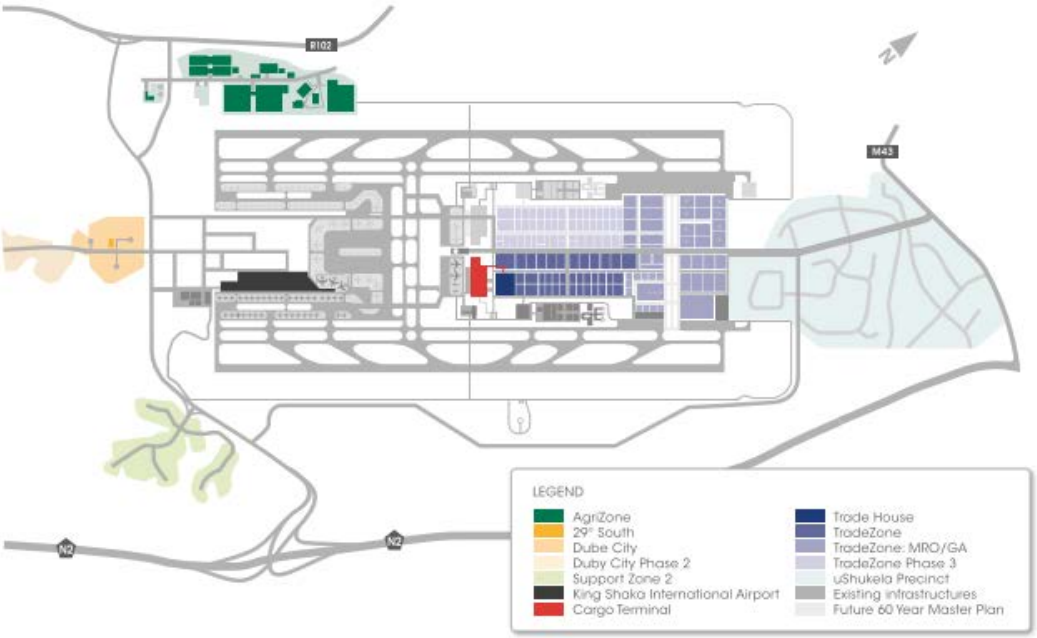
(South Africa 2017d)

Annexure 11: Dube TradePort Master Plan 2010-2015

Phase 1:



Ultimate Development



Annexure 12: African airport construction projects 2000-2019

African Region	Country	Type of Project	Airport	Value USD billion	Estimated completion	Notes	Source
Central/Western Africa	Nigeria	Greenfields proposed	Umurei (Umuleri) Cargo Airport Development	2	2018	Funded by Elite International Investments and Orient Petroleum Resources/ State Government No progress on google maps.	(Centre for Aviation 2019)
Central/Western Africa	Nigeria	Brownfields redevelopment for Terminal 2 and adjacent new terminal	Murtala Muhammed International Airport	0.36 replacement of burnt down terminal 2	2003-2007 Terminal 2	Handles 6,3mill passengers in 2017 Most expensive airport project in Sub-Saharan Africa (Tomová 2009: 13)	(Kable 2019)
Central/Western Africa	Senegal	Greenfield project constructed	Aéroport International de Blaise Diagne, Dakar	0.6	2007 - 2017 Construction	4500 Ha Capacity for 3 million passengers pa and 50000t of cargo	(Kable 2019)
Eastern Africa	Ethiopia	Brownfields redevelopment	Addis Ababa Bole International Airport	4	2024	Transfer hub for Sub-Saharan Africa Current capacity from 22 million	(Centre for Aviation 2019)

African Region	Country	Type of Project	Airport	Value USD billion	Estimated completion	Notes	Source
						passengers to 80mill	
Eastern Africa	Ethiopia	Brownfields redevelopment	Addis Ababa Bole International Airport	0.34	2018 opening	Cargo terminal upgraded in 2017 Home to Africa's largest carrier Ethiopian Airlines	(Kable 2019)
Eastern Africa	Kenya	Brownfields redevelopment	Nairobi Jomo Kenyatta International Airport	3.6 and next phase 3.6	Ongoing	Capacity for 8 mill pax Proposed concession of Airport Operation to Kenya Airways	(Kable 2019)
Eastern Africa	Rwanda	Brownfields redevelopment	Bugesera Airport Kigali	0.818	Completion in 2020	Located 25km from Kigali Increase from 1,8 mill pax to 4.5 mill pax	(Centre for Aviation 2019)
Eastern Africa	Tanzania	Brownfields redevelopment proposed	Dodoma Airport	2	2020 Not started	Project on hold	(Centre for Aviation 2019)
Eastern Africa	Uganda	Brownfields redevelopment	Entebbe International Airport	0.48 Export-Import Bank of China	Construction started in 2015-2018 Phase 1 2019-2023 Phase 2	Planned to handle 6.1 mill passengers and 172000 t pa cargo by 2033	(Kable 2019)
North Africa	Egypt	Expansion of existing capacity	Cairo International Airport	14.5	2015	Current Cairo Airport handles 14.4 million passengers; 275 000	(Centre for Aviation 2019)

African Region	Country	Type of Project	Airport	Value USD billion	Estimated completion	Notes	Source
						tons cargo (cairo-airport.info)	
North Africa	Egypt	Greenfield proposed	Al Minya Airport	4	2017 Not started	Project on hold	(Centre for Aviation 2019)
North Africa	Egypt	Greenfields project constructed	Marsa Alam International Airport		1998	I mill passengers focused on European tourism	(Kable 2019)
North Africa	Libya	Expansion of existing capacity	Tripoli	1	2019	Terminal reconstruction delayed due to political situation	(Centre for Aviation 2019)
North Africa	Morocco	Brownfields redevelopment of the terminal	Casablanca Mohammed V International Airport	0.553 African Development Bank	Completed in 2013	Substantial delays Capacity for 150 000tons pa freight	(Kable 2019)
North Africa	Sudan	Greenfields proposed	New Khartoum International Airport	1.5	2017 Not started	Proposed for 40km south of current airport. No construction started.	(Centre for Aviation 2019)
Southern Africa	Angola	Greenfields under construction	New Luanda International Airport	3.8	Under construction since 2008 Opening in 2020/22	Designed to handle 15 million pax and 600000 tons of cargo pa	(Centre for Aviation 2019)
Southern Africa	Mozambique	Brownfields redevelopment of airbase	Nacala International Airport	0.25	2015 opening	Capacity for 500000 passengers pa and 5000 tons of cargo. Cargo focus, some 5km west of Nacala	(Kable 2019)

African Region	Country	Type of Project	Airport	Value USD billion	Estimated completion	Notes	Source
						port terminal	
Southern Africa	South Africa	Greenfields constructed	Dube TradePort and King Shaka International Airport	0.86	2007-2010	Capacity for 6 mill passengers pa and 150000 tons of cargo	(Kable 2019)
Southern Africa	South Africa	Expansion of existing capacity	Cape Town International Airport	1	2019	Airport expansions, runway realignment and Cargo Facility upgrade	(Centre for Aviation 2019)

Source: Compiled by the Researcher

Annexure 13: Land use survey metadata

Scheme land use definitions

Noxious industry

ZONING IN ('NOXIOUS INDUSTRY', 'Noxious Industrial')

General Industry

ZONING IN ('GENERAL INDUSTRY', 'GENERAL INDUSTRY 1', 'GENERAL INDUSTRY 1', 'GENERAL INDUSTRY 2', 'General Industrial', 'General Industry', 'Industry')

Service / Light Industry

ZONING IN ('LIGHT INDUSTRY 1', 'LIGHT INDUSTRY 4', 'Light Industrial', 'Light Industry', 'SERVICE INDUSTRY', 'SERVICE INDUSTRY 1', 'SERVICE INDUSTRY', 'SPECIAL INDUSTRY', 'Selected Light Industry', 'Service Industry', 'Special Light Industrial Zone', 'Special Light Industrial Zone 3', 'Warehousing')

Extractive industrial Zones

ZONING IN ('Controlled Industry', 'EXTRACTIVE INDUSTRY', 'Extractive Industrial', 'Extractive Industry', 'Harbour')

Similar / Consent industrial zones

ZONING IN (' ', '0', 'ACTIVITY NODE', 'AIRPORT', 'Activity', 'Airport', 'Business Park', 'CREMATORIUM', 'Commercial', 'Commercial Sub-Zone', 'Depositing Area', 'Enterprise Zone', 'Fuelling and Service Station', 'GENERAL COMMERCIAL 1', 'GENERAL COMMERCIAL SPECIAL ZON', 'General Business', 'General Business 2', 'General Business 3', 'General Business 4', 'General Commercial', 'General Commercial Special Zon', 'INdeterminate', 'Indeterminate', 'Industrial and Commercial Park', 'Institution', 'Institutional 1', 'Institutional 3', 'LIMITED COMMERCIAL 2', 'Limited commercial', 'MIXED 3', 'Mixed Use', 'Mixed Use 1', 'NOT CODED', 'Office Park 2', 'Office Zone', 'Offices', 'Offices 1', 'Offices 2', 'Opportunity Space', 'Petrol Service Station', 'Public Transport Facility', 'Research Station', 'Special', 'Special Commercial', 'Special Zone', 'Special Zone 10', 'Special Zone 2', 'Special Zone 3', 'Special Zone 5', 'Special Zone 8', 'Special Zone No 1', 'Special Zone No 17', 'Special Zones', 'Transition Zone', 'Transport', 'Transport Use', 'Transport Use Zone', 'Transport Zone', 'UNZONED', 'Undetermined')

Other Zones: Not of interest

ZONING IN ('AGRICULTURE 1', 'AGRICULTURE 3', 'Agriculture', 'Amenity', 'Amenity Reserve', 'BEACH', 'Bantu Compound', 'Beach', 'CONSERVATION RESERVE', 'Cemetery', 'Civic & Social', 'Closed Street', 'Community Facility', 'Conservation Reserve', 'Duplex 900', 'ENVIRONMENTAL

CONSERVATION RESERVE', 'Education', 'Educational', 'Educational 1', 'Environmental Conservation Reserve', 'Environmental Protection Reserve', 'Existing Roads', 'Existing Street', 'Golf Course Estate', 'MOBILE HOME', 'National Road', 'New Street', 'New Street to be Donated', 'Nursery School & Creche', 'Pedestrian Way', 'Place of Worship', 'Prop New Road & Widening', 'Proposed New Road', 'Proposed Pedestrian Ways', 'Proposed Road', 'Proposed Road & Widenings', 'ROAD', 'ROADS', 'ROW Serv', 'RURAL RESIDENTIAL 1', 'Religious', 'River', 'River Reserve', 'Riverside Reserve Walk & Drainage', 'Road', 'Road Reservation', 'Road Reserve', 'Road Widening', 'Worship')

Spatial development framework definitions

SDF_LU	JKSDFClas
Existing Commercial	Existing Commercial
Industry	Existing Industry
Airport/Tradeport	Existing Related
Business	Existing Related
Landfill	Existing Related
Mixed Use	Existing Related
Transport Facility	Existing Related
Utilities and Services	Existing Related
Future Industry	Future Industry
Future Business	Future Related
Future Landfill	Future Related
Future Mixed Use	Future Related
Agriculture	Other/ Not applicable
Dams	Other/ Not applicable
Environment	Other/ Not applicable
Existing Cemetery	Other/ Not applicable
Future Cemetery	Other/ Not applicable
Future Railway	Other/ Not applicable
Future Residential	Other/ Not applicable
Future Road	Other/ Not applicable
Future Tourism / Recreation	Other/ Not applicable
Open Space Conservation	Other/ Not applicable
Public Open Space	Other/ Not applicable
Railway	Other/ Not applicable
Recreation	Other/ Not applicable
Residential	Other/ Not applicable
Rural	Other/ Not applicable
Social and Civic	Other/ Not applicable

Annexure 14: Dube TradePort land sale 2010-2018

Land sale	Description	Extent	Purchase price	Land purchased from	Value per m^2
HERWOOD Municipal land value was R330 658 482 for Herwood in 2010 (Dube TradePort Corporation 2010: 67)	This comprises the purchase of the remainder and portion 11 (of 3) of the Farm Klip Fontein No. 922 in extent of approximately from Tongaat Hulett Ltd	57-hectares	R123 733 875	Tongaat Hulett	R 217
AGRIZONE/ TRADEZONE 1+2 Municipal land value was R1 757 481 737 in 2010 (Dube TradePort Corporation 2010: 66)	This comprises the purchase of sub-divisions 5 and 9 in extent of, of the La Mercy Airport No. 15124 from Airports Company South Africa Ltd	302,9605-hectares	R428 815 725	ACSA	R 142
LA MERCY JV The municipal value of this investment property is R887 000 000 (Dube TradePort Corporation 2010: 67)	This comprises the purchase of sub-divisions 4, 6, 8, 10 and 11 of the La Mercy Airport No. 15124 from Airports Company South Africa Ltd	848,808-hectares	R348 194	ACSA	R 0
COTTONLANDS Boundary change to DTP to include	Cottonlands farm remainder of portion 1220 of the Farm	172-hectares	R 90 239 872	Canelands Trust	R 52

southern portion of Cottonlands (Dube TradePort Corporation 2013: 56)	Cottonlands No.1575, registration division Fu, province of KwaZulu-Natal, in extent 172.3491 hectares, held under title deed No. t1949793 together with all fixed improvements thereon.				
COTTONLANDS (Dube TradePort Corporation 2013: 56)	Cottonlands farm remainder of portions 271, 1181, 114, 450, 430, 854, 617, 1907 and 216 of the Farm Cottonlands No. 1575 from Canelands Trust	109 - hectares.	R 54 264 513	Canelands Trust	R 50
DUBE CITY Purchase of land from La Mercy JV Property Investments Proprietary Limited for a portion of Dube City (Dube TradePort Corporation 2015: 15)	DTPC purchase of 55% of the sites in Dube City from its subsidiary, La Mercy JV Property, leaving ACSA with 45% 15	Not specified	R 58,294,105	La Mercy JV Property	N/A
Tongaat Hulett sold 190 developable hectares (not yet	Key land parcels were purchased from Tongaat Hulett in 2013/14 (Dube	190- hectares		Tongaat Hulett	Not reported.

shovel ready) to Dube TradePort in the airport region surrounding King Shaka International Airport (Tongaat Hulett 2014: 21)	TradePort Corporation 2014: 31). Sale not reported in the Annual Reports of DTPC.				
MOUNT MORELAND THDev reported a R2,4 million per developable hectare profit for the Mount Moreland North transaction (Tongaat Hulett 2014: 24)	Mount Moreland Land Erf 1000 Mount Moreland held under Title Deed No. T348/2014 (Dube TradePort Corporation 2017c: 61)	408.6977 hectares	360 416 772		R 88
AUTOSUPPLY PARK Purchase agreements for the for the Automotive Supplier Park undertaken by the Department of Economic Development, Tourism and Environmental Affairs (EDTEA). (Dube TradePort Corporation 2015: 26)	Remainder of the Farm Illovo 16946 held under Title Deed No. T012751/2016 (Dube TradePort Corporation 2018b: 81)	825.96-hectares	178 376 484		R 22

TOTAL		1679,769Ha	R1,294,489,540		R77/m2

Note: The values have not been adjusted to present values and relate to the year of reporting.

Source: Compiled by the researcher from Dube TradePort Annual Reports 2010-2018

Annexure 15: Draw down of Dube TradePort site development rights, 2019

DUBE TRADEPORT SITE AREA	Ha
Special Zone 10 Total Area	675
Total Floor Area of plans submitted in SZ10	46
Total Floor area of plans submitted in area zoned Undetermined - Agrizone	1
TOTAL FLOOR AREA	47
Total Building Footprint In SZ10	31
TOTAL FOOTPRINT	
Balance of floor area to be allocated in SZ 10 with FAR of 1	629
Balance of floor area to be allocated over the whole area of DTP site i.e. The Farm La Mercy Airport No. 15124 with an FAR of 1	2003
SUBDIVISION AREA	
Portion 4 SP5	108
Portion 5 Agrizone	64
Portion 6 SP3	64
Portion 7 Airport	898
Portion 8 SP1 Dube City	118
Portion 9 TradeZone incl Cargo ter	240
Portion 10 SP6	364
Portion 11 SP2	195
Total DTP site area	**2 050**

Source: Development and Review Panel and Dube TradePort June 2019

Annexure 16: Land use and ownership at the Dube CargoTerminal and Dube TradeZone

Company	Services	Ownership	Air Connectivity
Air Menzies International SA and Menzies Aviation (SA) (Pty) Ltd Unit 8	Freight Handling and Forwarding services at Dube Cargo Terminal. Core services across 200 cities include; Ground Handling, Cargo, Fuelling, Executive Services and Offline Services. http://menziesaviation.com/	Global parent company, John Menzies PLC listed on London Stock exchange *	Air freight services
Berry & Donaldson (Pty) Ltd Unit 7	Core services include International Sea and Air Freight Forwarding, Customs Clearing, Warehousing (Bonded and Duty Paid), Cartage (Deliveries), Project Freight, Marine and Airfreight Insurance http://www.berrydon.co.za/home	South African Company	Air freight services
Bidvest Facilities Management Unit 1A	Services, including Integrated Facilities Management, Technical Services, Business Support Services and Specialised Services https://bidvestfacilitiesmanagement.co.za/	Subsidiary of BidVest Group listed on the Johannesburg Stock Exchange and B-BBEE Level 1 *	Not part of core business
Bidvest Panalpina Logistics (BPL) Unit 4 and 5	Services include Airfreight, Ocean Freight, Transport, Warehousing, Supply Chain Solutions, Customs Brokerage https://www.bpl.za.com/	Subsidiary of BidVest Group listed on the Johannesburg Stock Exchange and B-BBEE Level 2 *	Air freight services
Bolloré Logistics	Services extends across Multimodal Transport (consolidations and chartering), Customs and Regulatory Compliance, Logistics, Global Supply Chain and Industrial Projects. https://www.bollore-logistics.com/en	Subsidiary of global company, French owned Bolloré who are a transport company listed on the European Stock Exchange *	Air freight services
Consolidation and Wholesale Cargo East Coast Unit 20	CWC are a wholesaler of air and ocean freights, offers services. https://www.candwc.co.za	Unlisted company in Durban and Johannesburg	Air freight services
Endless Summer Technologies cc Units 13, 14, 15	Design, Develop and Manufacture technologies. http://www.endless-summer.co.za/	Unlisted company	Not part of core business

Company	Services	Ownership	Air Connectivity
Emazweni Import &Trading cc Unit 1B	Import and Export Services http://www.emazweniimportexportandtrade.yolasite.com/services.php	South African company	
Hazpak Trainaid cc Unit 3	Services in packaging, consultation & training in the Dangerous Goods industry within South Africa. https://www.hazpak.co.za/	South African company	Not part of core business
Interloc Freight Services (Pty) Ltd Unit 9	Airfreight consolidations https://interloc.co.za/	South African company	Air freight services
Millhouse International (Pty) Ltd Unit 16, 17	Logistics services include in house support, packaging and labelling, critical-expedite freight, full truck load, LTL freight, Air freight, Air charters worldwide, and ocean freight and door-to-door options. https://millhouse.com/	Company based Fletcher, North Carolina, United States of America *	Air freight services
Ocean View Marine Services Unit 23A	Freight Forwarding Agents	Not known.	Air freight services
Röhlig-Grindrod (Pty) Ltd Unit 18, 19	Intercontinental air freight, sea freight and individually solutions for project business as well as land freight logistics. http://www.rohlig.co.za/history-2/	listed on the Johannesburg Stock Exchange and B-BBEE Level 2 Subsidiary of Röhlig Logistics global company based in Bremen Germany *	Air freight services
Sozo Logistics (Pty) Ltd Unit 2	International services in Air Freight, Sea Freight, Clearing and Forwarding, Warehousing/, Distribution, Customs and Insurance http://www.sozo.co.za/	South African company	Air freight services
SST Logistics cc Unit 6	Not available	Not available	Air freight services
Tsebo Solutions Group (Pty) Ltd Unit 24A	Facilities Management and related Catering, Cleaning and Protection services http://www.superclean.co.za https://www.tsebo.com/	Tsebo Solutions Group and B-BBEE Level 1 *	Not part of core business

Company	Services	Ownership	Air Connectivity
Swissport South Africa (Pty) Ltd Unit 22, 23	Ground handling services and cargo services across 300 airports http://www.swissport.com/ Customer networks • Air Cargo Germany • Air Malawi • Air Mauritius • Air Namibia • Air Seychelles • Air Tanzania • Atlas Air • British Airways World Cargo • Cargolux Airlines International • Cathay Pacific Cargo • Congo Airlines • Ethiopian Airlines • Iberia • Jet Airways • Kenya Airways • KLM Cargo • LAM - Linhas Aereas de Moçambique • Lufthansa Cargo • Martinair Holland • MK Airlines • Qantas Freight • Qatar Airways • Saudi Arabian Airlines • Singapore Airlines • Swiss WorldCargo • Virgin Atlantic Airways	Global company that is Chinese owned and known as HNA Group *	Air freight services

Company	Services	Ownership	Air Connectivity
Teqal (Pty) Ltd Unit 10, 11	Manufacturer of rigid plastic packaging servicing the cosmetic, automotive and industrial markets http://www.teqal.co.za/	Unlisted South African Company	Not part of core business
TNI (Pty) Ltd Unit 21	Not available	Not available	Unclear
Turners Shipping (Pty) Ltd Unit 12	Services include Airfreight Express / Charter Seafreight, Rail and Road Freight, Project Shipments and Warehouse / Distribution https://turnersshipping.co.za/	Turners Shipping is a freight forwarding subsidiary of BDP Global Network Group B-BBEE Level 2 *	Air freight services
Ziyenzeka Weed Control & General Services Unit 24B	Services include environmental management in general and grass cutting, alien vegetation control clearing and hard landscaping. http://www.ziyenzeka.co.za/	Exempted Micro Enterprise B-BBEE Level 2	Not part of core business

* Refers to firms or subsidiary firms, are part of networks that either operate, own or control production of goods and services in at least one other country than their home country.

Source: Adapted from Dube TradePort Corporation (2019a) and updated on a site visit on 24 October 2019.

Annexure 17: Firms located in the TradeZone 1

TradeZone 1	Service	Ownership	Air Connectivity
Air Chefs	Air chefs run their catering operations for inflight catering and airline lounge catering and staff restaurant catering http://www.airchefs.co.za/	Wholly owned subsidiary of South African Airways and is a state-owned company	Air logistics catering
Bundu Gear 11D Mzimkhulu Drive	Official off road supplier to Mahindra South Africa https://bundugear.co.za		Automotive component supplier
BrencoReelin Bearings Amsted Reelin Bearings	Sophisticated bearing manufacturing and refurbishment facilities. Manufacturing expanded and localised through the development of a Gear facility next to the Bearing Plant. http://www.reelin.co.za/	Amsted Reelin Bearings, in a Joint Venture with Brenco, an American company *	Automotive manufacturing; air and road connectivity
DB Schenker (developer: Hodari)	World's biggest logistics and freight service providers, with airfrieght network covering 700 locations. Warehouse to support logistics services. https://www.dbschenker.com/	DB Schenker is a wholly owned subsidiary of Deutsche Bahn *	Air logistics
Gift of the Givers Foundation	Warehouse for disaster relief organisation of African origin on the African continent, namely Gift of the Givers Foundation. http://www.giftofthegivers.org/	Non-profit organisation	Air connectivity
HBM-SA Health (developer: Shree Property Holdings)	Production of 700000 condoms per day for local and export markets http://sahealth.org.za/ http://www.hbmgroup.com/	Based on partnership between US-based HBM Group and SA Health	Manufacturing and distribution
Clark's Auto Renovators	Approved manufacturer repairer and specializing in panel beating and spray painting	Relocated from Trurolands, Tongaat.	AAutomotive service

TradeZone 1	Service	Ownership	Air Connectivity
iDube Cold Storage	This multipurpose cold storage facility has the capacity to handle chilled as well as frozen cargo. http://www.idubecoldstorage.co.za/	South African Company Level 2 B-BBEE contributor	Air logistic food
Laser Junction (developer: Hodari)	Manufacturing of laser cutting, precision bending and steel fabrication. http://www.laserjunction.co.za/	South African company as a B-BBEE Level 2 contributor	Manufacturing
National Stationary cc	Importers and wholesalers of stationary with stock based in the TradeZone and distributed nationally http://www.natstat.co.za/	South African closed corporation	Distribution
Retractaline 15A Mzimkhulu Drive	Manufacture and supply of a comprehensive range of laundry care products and accessories, supplying international markets in Canada, Ireland, Switzerland, the United Kingdom, Australia and New Zealand. Delivering through DHL, UPS, Aramex and Fedex. http://www.retractaline.com/	South African company	Manufacture and distribute
Rossi SA (developer: Shree Property Holdings)	Gearbox manufacturing https://www.rossi.com/en/southafrica/the-group	Rossi Southern Africa is a subsidiary of the Italian owned Rossi Spa Group *	Automotive component manufacturing
HR Matters Properties (Pty) Ltd	Warehousing and distribution services through planning, controlling and implementing effective receipt, forward, reverse flow, storage and transporting of goods to final destinations regionally and nationally	South African company	Road based distribution

TradeZone 1	Service	Ownership	Air Connectivity
Samsung SA (developer: Shree Property Holdings)	Warehouse and distribution facility for Samsung Electronics. https://www.samsung.com/za/	Samsung SA is a subsidiary and a B-BBEE Level 1 contributor *	Road based distriution
Tufbag SA (developer: Shree Property Holdings) 21 Mzimkhulu Drive	Tufbag are manufacturing Bulk Bags, Polyethylene products, Polypropylene products, Dunnage Bags. Container Liners and Mine Support Systems http://www.tufbag.com/	South African Company	Road based distribution
Ukuphanta Holdings (Replaced by Signcraft in 2019)	Warehouse for logistics and distribution operations.	South African company and not part of a group	
Signcraft (Pty) Ltd 7 Mzimkhulu Drive	Manufacturing and installation of signs in Sub-Saharan Africa www.signcraft.co.za	Signcraft is an emerging microenterprise with level 2 status	Manufacturing and road based distribution
Yangtze Optics Africa (YOA) Cable (Pty) Ltd (developer: Shree Property Holdings).	Yangtze Optics Africa Cable is a communications equipment company that manufactures and distributes purpose-built fibre optic cables. https://www.yoacables.com/	Partnership of Yangtze Optical Fibre and Cable Joint Stock Limited Company (YOFC) and Mustek Limited (a JSE listed company), YOA Cables The parent company Yangtze Optical FC has head-quarters in China *	Manufacturing and road based distribution

TradeZone 1	Service	Ownership	Air Connectivity
AIH Logistics in partnership with Mahindra SA https://mahindra.co.za	Semi knock-down facility and assemble the complete range of Mahindra Pik Up single- and double cab pick-ups. It represents an initial investment of R10 million in facilities and equipment.	Mahindra SA is owned by the Mahindra Group with headquarters in India. The Mahindra Group employs over 240,000 people across 100 countries*. The facility in South Africa was constructed in partnership with AIH Logistics, a level 2-rated BBBEE company with proven credentials in the automotive sector.	Automotive logistics and road based distribution
Conlog (Pty) Ltd https://www.conlog.com/ 10 Mzimkhulu Drive	Conlog specialises in electricity prepayment solutions with manufacturing and distribution;	South African owned BBBEE company	Manufacturing and road based distribution
National Stationers cc http://www.natstat.co.za/	Supply and distribution of stationary nationally.	No information.	Manufacturing and road based distribution
Mara Phones South Africa 5 Umkhomazi Drive https://maraphones.com	Manufacturing, logistics and distribution of the first high specification, affordable smartphone manufactured in Africa. .	Ashish Thakkar, founder of Mara Group	Manufacturing and road based distribution
Domasmart	No information.	No information.	

TradeZone 1	Service	Ownership	Air Connectivity
Monmouth	New development to cater for manufacturing, logistics and distribution;	No information.	

* Refers to firms or subsidiary firms, are part of networks that either operate, own or control production of goods and services in at least one other country than their home country.

Source: Adapted from Dube TradePort Corporation (2019a).

Annexure 18: Typical payload, volume and density for belly hold lower deck cargo

	Payload with full pax load (t)	**Volume for cargo (cu.m)**	**Maximum density (kg/cu.m)**
A320	1.0	3.6	277.8
B737-300	2,3	21.0	107.1
B737-400	2,9	24.0	120.7
B737-800	3,6	28.0	128.6
A330-200	14	61.8	228.2
A330-300	15	80.2	187.0
B767-300	16.5	63.0	261.9
B747-400	20	73.4	272.5
A380	20	68.0	294.1

Source: Morrell (2012: 132)

Annexure 19 Cargo Terminal volumes and data, 2018/9, '000 tons

	Volumes (thousand tonnes)		Value (Rm)	
	2018	**2019**	**2018**	**2019**
Total KSIA exports	2 922,18	4 917,74		
% growth KSIA exports		68%		
Total KSIA imports	7 411,59	10 332,18		
% growth KSIA imports		39%		
Total international aircargo market	**10333,77264**	**15249,91663**	**4509931980**	**5263823895**
% growth DTP potential aircargo market		48%		17%

Source: Dube TradePort, 2019

Annexure 20 General Freight Traffic. 2015, '000 tons

RAIL CORRIDOR	RAIL	ROAD	FREIGHT VOL	*FREIGHT %*
N2/NORTH COAST CORRIDOR	Rail	Road	Total	
Northbound General Freight	102.7	2 389.6	**2 492.4**	*69%*
Southbound General Freight	55.7	1 070.6	**1 126.3**	*31%*
	158.4	**3 460.2**	**3 618.7**	***7%***
	4%	***96%***		
N3/NATCOR CORRIDOR	**Rail**	**Road**	**Total**	
Northbound General Freight	3 469.5	22 958.4	**26 427.9**	*58%*
Southbound General Freight	2 727.8	16 044.4	**18 772.2**	*42%*
	6 197.3	**39 002.8**	**45 200.1**	***93%***
	14%	***86%***		
TOTAL CORRIDORS	**Rail**	**Road**	**Total**	
Northbound General Freight	3 572.2	25 348.0	**28 920.3**	*59%*
Southbound General Freight	2 783.5	17 115.0	**19 898.5**	*41%*
GRAND TOTAL	**6 355.7**	**42 463.0**	**48 818.8**	
	13%	***87%***		

Source: Conningarth Economists (2016:2)

Annexure 21: Extract on Logistics Zone from the Durban Land Use Scheme adopted on 19 October 2019

ZONE: LOGISTICS

SCHEME INTENTION: this zone is meant to promote all activities related to the logistics sector and that includes opportunities for warehousing, the de-stuffing and 'breaking of bulk' and related industrial land-uses, all associated with the movement of goods and services

MAP COLOUR REFERENCE: Dove Grey with Dark Grey border **MAP REFERENCE:**

PRIMARY	SPECIAL CONSENT	PRECLUDED
• *Private Open Space • Container Depot • Direct Access Service Centre • *dwelling house • Fuelling and Service Station • Industry - Light • Motor Vehicle Test Centre • Laundry • Office • Recycling Centre • Restaurant / Fast Food Outlet • *Shop • Transport Depot • Truck Stop • Warehouse	• Airport • Base Telecommunications Transmission Station • Builder's Yard • Car Wash • Conference Facility • Government/ Municipal • Industry - General • Market • Motor Display Area • Motor Garage • Office - Medical • Special Building • Utilities Facility	• All other uses not indicated in the Primary and Special Consent columns

ADDITIONAL CONTROLS – LAND USE

1. Logistics is an economic sector promoted within the Strategic Infrastructure Plan (SIP) 2 corridor in eThekwini.
2. Logistics is the process of planning, implementing, and controlling the effective and efficient flow of goods and services from the point of origin to the point of consumption. In giving effect to quality environments it is anticipated that sites no smaller than 1800m² will be allowed in this zone. Furthermore road widths of 18m wide to accommodate the easy movement of transport associated with this land use. All parking and loading facilities will be provided on-site and stacking of vehicles on public roads will not be allowed. Landscaping, lighting and responses to storm-water runoff will be managed by each applicant. Innovation regarding green buildings is a statutory requirement in this zone.
3. *A Flat may be permitted to accommodate a manager, foreman, caretaker or security personnel.
4. *Pre-scheme uses should be exempt from Special Consent applications as long as the use is according to the scheme.
5. *A shop maybe permitted provided it is ancillary to a site zoned for logistics purposes.
6. It is noted that a canteen is an ancillary land use and is free entry
7. A Place of Worship maybe permitted only if it is an ancillary.
8. No stand-alone facilities maybe provided.
9. Parking shall be in accordance with Section 8 of this scheme.

DEVELOPMENT PARAMETERS

SPACE ABOUT BUILDINGS		DWELLING UNITS PER HECTARE	MINIMUM SUBDIVISION(m²)	HEIGHT	COVERAGE	FLOOR AREA RATIO
BUILDING LINE	SIDE AND REAR SPACE					
Nil	Nil	N/A	1800m²	6	N/A	N/A

Source: eThekwini Municipality (2019: 88)

10 APPENDICES

Appendix A: Gate keeper letters

Pod 1, Second Floor, Intuthuko Junction, 780 Mary Thipha Street, Umkhumbane, Cato Manor, Durban 4001.
Tel: 031 322 4813, Fax: 031 261 3405, Fax to email: 086 268 7180, Email: mile@durban.gov.za, Website: www.mile.org.za

For attention:
Chair of Ethics Committee
Faculty of Management Sciences
Department of Public Management and Economics
Durban University of Technology
Durban
4001

8 August 2019

RE: LETTER OF SUPPORT TO R.HANSMANN, STUDENT NUMBER 21556831 - GRANTING PERMISSION TO USE ETHEKWINI MUNICIPALITY AS A CASE STUDY

The Development Planning and Management Unit and eThekwini Municipal Academy (EMA), have considered a request from Robynne Hansmann to use eThekwini Municipality as a research study site leading to the awarding of a Doctor of Philosophy (Public Management).

Research title: "Planning for airports and logistics: Case of Dube Trade Port."

We wish to inform you of the acceptance of her request and hereby assure her of our utmost co-operation towards achieving her academic goals; the outcome which we believe will help our municipality improve on its service delivery outcome. The student is reminded on the ethical considerations when conducting this study. In return, we stipulate as conditional that she contacts Collin Pilley, collin.pilley3@durban.gov.za, Program Manager at MILE to present the results and recommendations of this study to the related unit/s on completion - accompanied by her academic supervisor.
Wishing Ms Hansmann all the best in her studies.

Mr Ulhio Phewa
Dep Head: Dev, Plan & Mang. Unit
eThekwini Municipality

Dr M. Ngubane
Head: eThekwini Municipal Academy
eThekwini Municipality

I Robynne Jean Hansmann, by signing, hereby accept that I will comply fully as per the conditions stipulated above.

Signed: ..... Date: 2019.09.02

KwaDukuza Municipality

Department:
OFFICE OF THE MUNICIPAL MANAGER

Enquiries / Imibuzo / Navrae	C. PEREIRA	Telephone / Ucingo / Telefoon	(032) 437 5161	Postal Address / Ikheli lasePosini / PosAdres	P.O. BOX 72 KWADUKUZA 4450
Reference / Isikhombi / Verwysing	DUT PHD RESEARCH	Fax / iFeksi / Faks	(032) 551 4513	Date / Usuku / Datum	09 DECEMBER 2015

RE: PERMISSION LETTER - DURBAN UNIVERITY OF TECHNOLOGY - PHD RESEARCH ON PLANNING FOR AIRPORTS AND LOGISTICS

Durban University of Technology
Faculty of Management Sciences
PO Box 1334
Durban
4001

Attention: Ms Robynne Hansmans (robynne@dut.ac.za)

Dear Robynne,

We refer to your letter dated 9 December 2015.

In response to your letter introducing your research project on planning for airports and logistics: Case of Dube TradePort, we acknowledge receipt of your request to support my staff being interviewed in the study.

The Office of the Municipal Manager has no objection to participate in the study as outlined in the DUT Institutional Ethics Research Committee documentation.

I have read and understood the attached statements and thereby give permission for the research to be conducted.

Kinds Regards

MR NHLANHLA J MDAKANE
MUNICIPAL MANAGER

KwaDukuza Municipality
E: municipalm@kwadukuza.gov.za / JanetG@kwadukuza.gov.za
W: www.kwadukuza.gov.za

dube tradePORT

Durban University of Technology
Faculty of Management Sciences
PO Box 1334
Durban
4001

10 December 2015

Attention: Ms Robynne Hansmann
robynne@dut.ac.za

Dear Robynne,

RE: PERMISSION LETTER - DURBAN UNIVERITY OF TECHNOLOGY - PHD RESEARCH ON PLANNING FOR AIRPORTS AND LOGISTICS

We refer to your letter dated 9 December 2015.

In response to your letter introducing your research project on planning for airports and logistics: Case of Dube TradePort, we acknowledge receipt of your request and I am in support of my staff being interviewed in the study.

Dube TradePort have no objection to participate in the study as outlined in the DUT Institutional Ethics Research Committee documentation.

I have read and understood the attached statements and thereby give permission for the research to be conducted.

Kinds Regards

Mr. Hamish Erskine

Acting Chief Executive Officer

29 South, 7 Umsinsi Junction, Dube City, La Mercy, KwaZulu-Natal, 4399
Tel: 032 814 0000 | Fax: 032 814 0100 | Email: info@dubetradeport.co.za | Web: www.dubetradeport.co.za

Appendix B: Interview schedule

LETTER OF INFORMATION

Title of the Research Study: Planning for airports and logistics: Case of Dube TradePort.

Principal Investigator/s/researcher: Ms Robynne Hansmann, Masters in Town and Regional Planning.

Co-Investigator/s/supervisor/s: Prof Nirmala Dorasamy, PhD. Prof Jeff McCarthy, PhD.

Brief Introduction and Purpose of the Study: The purpose of this qualitative case study is to explore the multi-scalar role of airports in the flow of goods in order to develop a normative framework for planning that integrates land use and transportation planning. At this stage in the research the term flow of goods refers to an aspect of logistics that deals with the distribution of goods, however the physical movement of goods from point of production to the point of consumption cannot be separated from the value-added activities of production in the supply chain. This study is specifically concerned with how airports, as precincts containing specialised infrastructure and related uses, interact with the movement of goods between different modes of transportation and land use.

Outline of the Procedures:

Qualitative data will be collected through public documents to establish the context for airport led development and what is the role of the airport in logistics flows, secondly through semi structured interviews to understand key decisions impacting on the movement of freight and cargo between 2010 and 2018 and the role of the planners in the process and land use survey observations to understand the connectivity between uses on site with the production and distribution of goods.

Risks to the Participant: Do not hesitate to ask any questions about the study. I will be happy to share my findings documented in a case study report after the research is completed.

The main purpose to the semi structured interviews is to draw on the knowledge of staff on airport related development and there are no know risks associated with participation in the study.

Benefits: The study provides a contribution to the global south body of knowledge on how airports relate to logistics, specifically on the role of the airports in the production and distribution of goods. The work provides a critical reflection on the practice of airports and logistics with recommendations for the field of urban planning.

Reason/s why the Participant May Be Withdrawn from the Study: Participation in this study is voluntary. The participant can choose to participate fully or in part of the project, and can withdraw at any stage without affecting the relationship with the researcher or Durban University of Technology.

Remuneration: There is no remuneration for participation in the study.

Costs of the Study: The participant is not expected to cover any costs towards the study.

Confidentiality: The identity of participants or their designations, will not be associated with the research findings and only the researcher and supervisor will know the identity of the participants.

Research-related Injury: The risk of a research-related injury in the study is low.

Persons to Contact in the Event of Any Problems or Queries:

Please contact the researcher (Robynne Hansmann on 031-3732666), my supervisor (Prof Nirmala Dorasamy on tel no. 031-3736862) or the Institutional Research Ethics administrator on 031 373 2900. Complaints can be reported to the DVC: Prof Sibu Moyo on 031-373 2576 or moyos@dut.ac.za.

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, Robynne Hansmann, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature**

I, Robynne Hansmann, herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**

_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**

Faculty of Management Sciences

Department of Public Management & Economics

PO Box 1334

Durban 4001

Dear Participant

DURBAN UNIVERSITY OF TECHNOLOGY: DOCTORAL RESEARCH INTO THE ROLE OF AIRPORTS IN LOGISTIC FLOWS: THE CASE OF DUBE TRADEPORT

The purpose of this letter is to introduce the proposed study and request your participation in the study. You should be aware that you are free to withdraw from the study without affecting your relationship with researcher or the Durban University of Technology.

The purpose of this qualitative case study is to explore the multi-scalar role of airports in the flow of goods in order to develop a normative framework for planning that integrates land use and transportation planning. At this stage in the research the term flow of goods refers to an aspect of logistics that deals with the distribution of goods, however the physical movement of goods from point of production to the point of consumption cannot be separated from the value-added activities of production in the supply chain. This study is specifically concerned with how airports, as precincts containing specialised infrastructure and related uses, interact with the movement of goods between different modes of transportation and land use.

Qualitative data will be collected through public documents to establish the context for airport led development and what is the role of the airport in logistics flows, secondly through semi

structured interviews to understand key decisions impacting on the movement of freight and cargo between 2010 and 2015 and the role of the planners in the process and land use survey observations to understand the connectivity between uses on site with the production and distribution of goods.

Do not hesitate to ask any questions about the study. I will be happy to share my findings documented in a case study report available after the research is completed. However, the identity of participants or their designations, will not be associated with the research findings and only the researcher will know the identity of the participants. The main purpose to the semi structured interviews is to draw on the knowledge of staff on airport related development and there are no know risks associated with participation in the study.

Please sign the attached letter is your consent with full knowledge of the nature and purpose of the study.

Robynne Hansmann

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031-3732666

cc Prof Nirmala Dorasamy Supervisor (nirmala@dut.ac.za)

Prof Jeff McCarthy Co-Supervisor (profmac@mweb.co.za)

INTERVIEW SCHEDULE

Interviewer Name:	Not to be disclosed	**Code Reference:**	Not to be disclosed
Designation:	Not to be disclosed	**Organisation:**	Not to be disclosed
Email:	Not to be disclosed	**Venue:**	
Date:		**Time:**	

The purpose of this semi structured interview to introduce the proposed study, request participation in the study, request permission to record the conversation and to have a discussion based on the main question on the role of the airport in the movement of goods in Durban. You should be aware that you are free to withdraw from the study without affecting your relationship with myself or the Durban University of Technology.

Do not hesitate to ask any questions about the study. I will be happy to share my findings documented in a case study report available after the research is completed.

Context Questions

1. What is your perspective on how do goods move around Durban? By goods I am keeping the definition broad to delink the word from the type of transport and be inclusive.

2. How do you think the movement of goods relate to land uses? How does the airport integrate with other land use in Durban and beyond? Give me some examples. How do you know that?

Main Question

3. What is the role of the airport in the movement of goods? How was this intended? What was the concept behind this?

- (Follow discussion) or
- Prompt with how does DTP relate to OR Tambo / Hub+Spoke Relationship or
- Prompt with challenges to connectivity?

Ending off

4. In your opinion what are the challenges for logistics?
5. What are the challenges for planning?

NOTE: The researcher will not be confined to asking all the question.

Appendix C: Land use analysis

Northern Corridor Land Use Survey

Industrial township location	Relationship between land use and transport in terms of material flows	Relationship to logistics	Relationship to airport
Shakashead is a 55 hectare site, some 20 kilometres north of KSIA. The industrial area is bound by the R102 to the north west, N2 to the south east, northern railway line traversing the site.	Although the northern rail crosses the industrial park, relatively few logistics uses are road based.	Logistics related uses include Kalishari Park, import and export company and MM Logistics (logistics services). Logistics related are warehouses including Store It (storage) and Boxer (distribution)	Logistics uses appear to relate to the port more than airport. Logistics related uses respond to local demand for storage and construction related growth.
Ballito West is a 65,70 Ha site, although only 1.82 Ha is developed for industrial purposes. The industrial portion falls to the west of the N2 and east of the R102, with access to rail. The site is bound by the N2 to the south east, Ballito Drive to the west and the northern rail.	Despite good road and rail connectivity and some 20 kilometres north of the airport, there are no logistics uses.	No logistics or related uses.	No land use relationship to the airport.
Ballito is a 55 Ha commercial node and business park with a small industrial component of 1,16	Ballito is entirely road based in terms of how goods and people move.	Store-Wise Ballito is the only logistics related use, although the storage is not related to production	There is no direct land use relationship to the airport on the cargo side.

Ha. The site is to east of the N2 and south of the R627 Ballito Drive.		processes but as a service.	
Fairbreeze is a 63,28 Ha industrial township in Tongaat, with remnants of textile related industries/ The site is bound by the R102 and the northern rail line to the north west, Hlawe River to the south and sugarcane fields to the east.	The industrial area of Fairbreeze was designed with rail connectivity. The Tongaat station is to the west of the site, with Farm AG usine solide farm equipment, and Celrose (Pty) Ltd having direct rail and road access.	Schenker International arranges warehouse storage and transportation of freight and cargo.	No direct land use relationship to the airport exists, other than the common Schenker name. DB Schenker are within the SEZ and the Schenker warehouse in Fairbreeze.
Trurolands is a 53,86 Ha industrial estate to the west of Tongaat. The site is bound to the south by the northern railway line, to the west and north by Edmund Morewood Street and Cane Growers Road to the east.	The industrial portion falls to the north of the rail and west of the town centre. Industry related to construction, automotive, clothing and textiles feature. Although the northern rail is adjacent to the area, there is no direct siding.	There are no logistics or related uses.	Clarks Auto Renovators are located at 12a Krishna Desai Circle and have recently opened in TradeZone next to Mahindra. Other than this there is no direct relationship to the airport.
The extended Dube TradePort Precinct is some 2692 Ha, with the TradeZone reflected as the 239 Ha industrial portion. The site is bound by the N2 to the northwest, M43 to the north, R102 to the	The air cargo freight forwarded firms located within the TradeHouse have a strong relationship to handling air-cargo with some 13 freight forwarded on site and some 100 freight forwarders engaged with the CargoTerminal.	TradeZone 1 accommodates a number of automotive and automotive component related logistics (4), air cargo services (3) and distribution of	Goods that tend to move as air cargo are time critical, low weight, high value goods such as cold chain perishables handled by iDube Cold Storage, Air Chefs and LSG Sky Chefs. A number of

south west and the Mdloti River and Mount Moreland to the south.		goods that could include air freight.	firms are time critical and related to sectors suitable for air cargo, such as auto components, electronics and pharmaceutical. The majority of firms in the SEZ are distributing by road.
Canelands is approximately 100 Ha, with 75 Ha classified as industrial. Approximately one quarter of the site (28,08Ha) is used for land extensive logistics. The site is a 10 minute drive south west from the airport in Verulam.	The firms are largely related to consumables and perishables in Canelands with road based distribution for Checkers, Freshpak, Colgate, Colgate Palmolive (Pty) and Grafton Everest.	Logistics in Canelands are largely related to the distribution of consumables and perishables in the Checkers/Shopright supply chains, including the Shopright Distribution Centre, Freshmark warehouse and Checkers. warehouse.	There is no direct relationship to the airport.
Umdloti Heights is a 24,8 ha industrial suburb to the west of the R102 in Verulam.	Logistics related activity is primarily road based, and the site is less than a 15 min drive from KSIA.	There are no logistics firms within Umdloti Heights, other than Dawn Trucking. Firms are related to the local demand for automotive parts, consumables and perishables. Logistics related firms are road based.	There is no direct relationship to the airport.

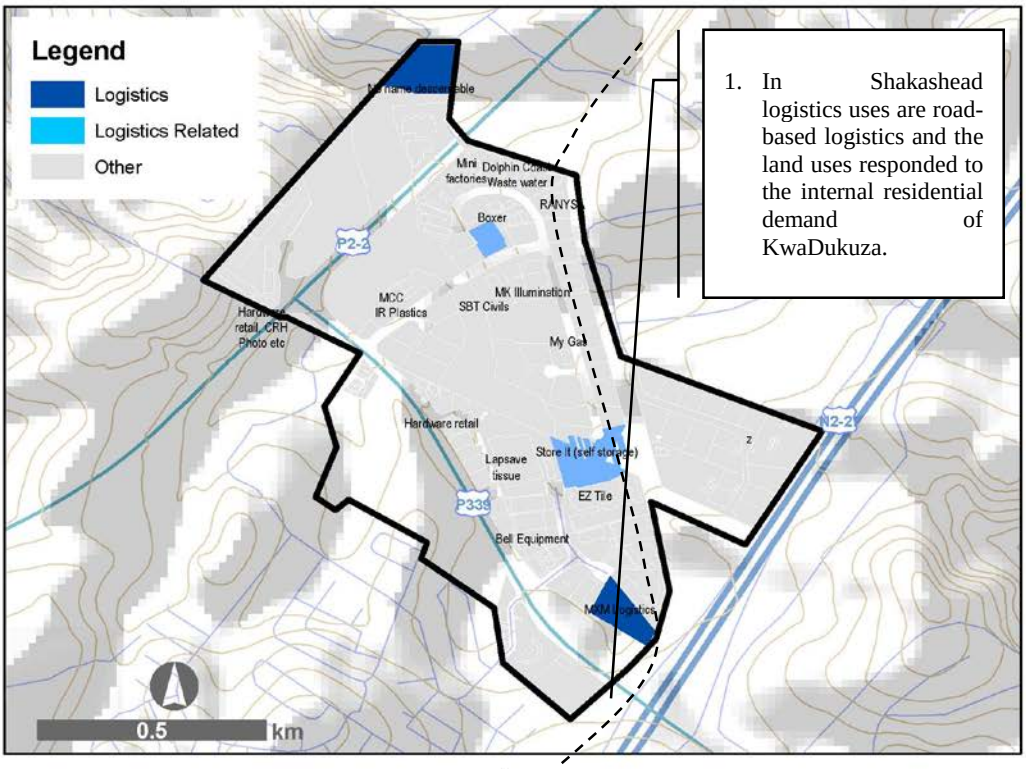
Riverview Park is a 27 Ha industrial suburb to the north of Verulam and some 15min from KSIA.	Logistics related activity is primarily road based.	There are no logistics firms, however logistics related firms service Frimax Foods (Pty) Ltd and Kwik Bites Foods as local food manufacturers who distribute by road.	There is no direct relationship to the airport, although the area is 15 min drive from KSIA.
Cornubia was developed by Tongaat Hulett after the opening of KSIA as a 166.09 Ha industrial and business development, with almost half site undeveloped.	The site is designed as road based with MR79 access east of Ottowa and the northern rail line. The area is marketed as less than 10km from KSIA for light industrial (non-noxious) development of warehousing, light manufacturing and service orientated offices (https://cornubia.co.za). Logistics is largely road based with linkages to the port and inland distribution. Hirt and Carter, Paton Tupper Associations are value-added marketing and design services.	Logistics developments include ID Logistics, Cargo Compass Cornubia, Cargo Compass SA (Durban), Digistics Durban Distribution Centre, Vision Business Park, Cornubia Ridge Logistics Park, Uniterm Direct, NVL Logistics, IC-Express International Courier Express.	ID Logistics is a GVC specialising in fast moving consumer goods, with potential for perishable air cargo, yet specialise in road based distribution.
Mount Edgecombe is a 122,5 Ha industrial development in Mount Edgecombe, south west of M47 and R102 interchange.	KwaZulu-Natal Spar Perishables Warehouse and distribution centre generates substantial road based freight movements. Road based carriers and logistics related companies are concentred in Mount Edgecome. Apart from	Logistics services in Mount Edgecombe include Image Freight and Logistics, Forum SA Logistics, First Class Logistics, Siyazi Logistics and Trading, Urban	Logistics services are predominantly road based.

	distribution, warehousing and logistics, there are also logistics related uses such as Storage City and paramount mini warehouses.	Containers according to Google. The land use survey identified Ospla Logistics, Heavy work logistics, Fast and Furious, Renwood Carriers, TFD Network (freight forwarder) and Imperial retail logistics.	
Phoenix Industrial is a 224,81 Ha industrial estate initially designed with direct railside access, although currently road based, located north of the MR25.	The industrial area of Phoenix was designed with rail connectivity. Phoenix Industrial Park accommodates large distribution warehouses and road based logistics services. Major land uses include ABI, Spar Distribution and Hypercheck distribution, Tradeport distribution and locally focused Favours Cash and Carry, and Browns Hyper Store.	The land use survey identified RB Logistics, Ashfrieght, Fastway Couriers, East Rand Bulk and Roys Bus and Truck, House and home distribution and Checkout distribution. According to Google Maps the following logistic services are also located in Phoenix Industrial Syndicate Transport cc Star Logistics Seacrest Logistics Phoenix Galvanizing MSD Road Freight and Logistics	There is no clear airport related logistics providers. KSIA is some 24 minutes away or 27km and DCT 33 minutes or 32 kilometers.

Riverside Logistics Park is a 36,47 Ha industrial area with approximately 16 Ha related to logistics uses. The site sounds the R102 and N2 intersection and is relatively accessible to the port, N3 and airport.	Logistics land uses respond to the road accessibility of the industrial land.	Riverside Park includes the DHL warehouse. World Courier South Africa (Pty) Ltd, World Net Logistics. Logistics related uses are East Coast Distributors, IQUAA cold storage, Cargo Pak, Right Side Up Distribution, SDV transport service and Durban Pallets and Medilogistics abd Supply Chain services are pharmaceutical related logistics.	DHL and courier services have a linkage with KSIA and the TradeZone, however the main warehouses not specifically airport related.
Riverhorse Valley North is an industrial development of 68 Ha at the highly accessible intersection of the N2 and R102. The site is 24km south of KSIA and 25 kilometers north of the DCT.		To the south of the industrial area, logistics uses included East Coast Distributors, Cargo Pak, Morgan Cargo (air and sea freight). The logistics related uses include Store Town, TSB Exports, Durban Pallets, IQUAA Cold Storage.	DHL and courier services have a linkage with KSIA and the TradeZone, however the main warehouses not specifically airport related.
Riverhorse Valley	Apart from the strong logistics role of Riverhorse	Logistics firms included City	DB Schenker and Swissport are

	Valley, there are a number of related services include Interstat, Hardy Boys, Otto Bros, Gotlib Group, UTI Pharma, Adcock Ingram, Waltons.	Logistics (transport service), Aramex (couriers), DB Schenker (SA) (Pty), Barlow Logistics, Logistics Freight Services, RTT and Intelligent Logistics, Timefreight and Dawning Global Express, Dion Wired/Game Storage, Swissport, Magnet Group Globe Flight, Berco Express.	located in the TradeZone and KSIA.

Shakashead Land Use Survey, 2016-2017



1. In Shakashead logistics uses are road-based logistics and the land uses responded to the internal residential demand of KwaDukuza.

Table showing land vs. buildings (Area)

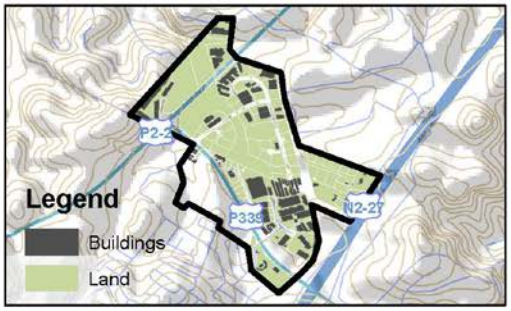
Type	Area (m)	Area (Ha)
Buildings	101601.97	10.16
Land	448181.50	44.82
Total		**54.98**

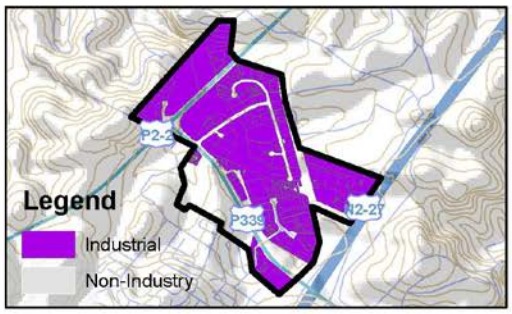
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industrial	549783.47	54.98
Non-Industry	0.00	0.00
Total		**54.98**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistics	19486.66	1.95
Logistics Related	31464.02	3.15
Non-Industrial	194805.57	19.48
Other Industry	240638.60	24.06
Vacant	63388.62	6.34
Total		**54.98**





2 Logistics Related uses

2 Logistics uses

SHAKASHEAD
Logistics and Industrial Uses

Ballito West Land Use Survey, 2016-2017

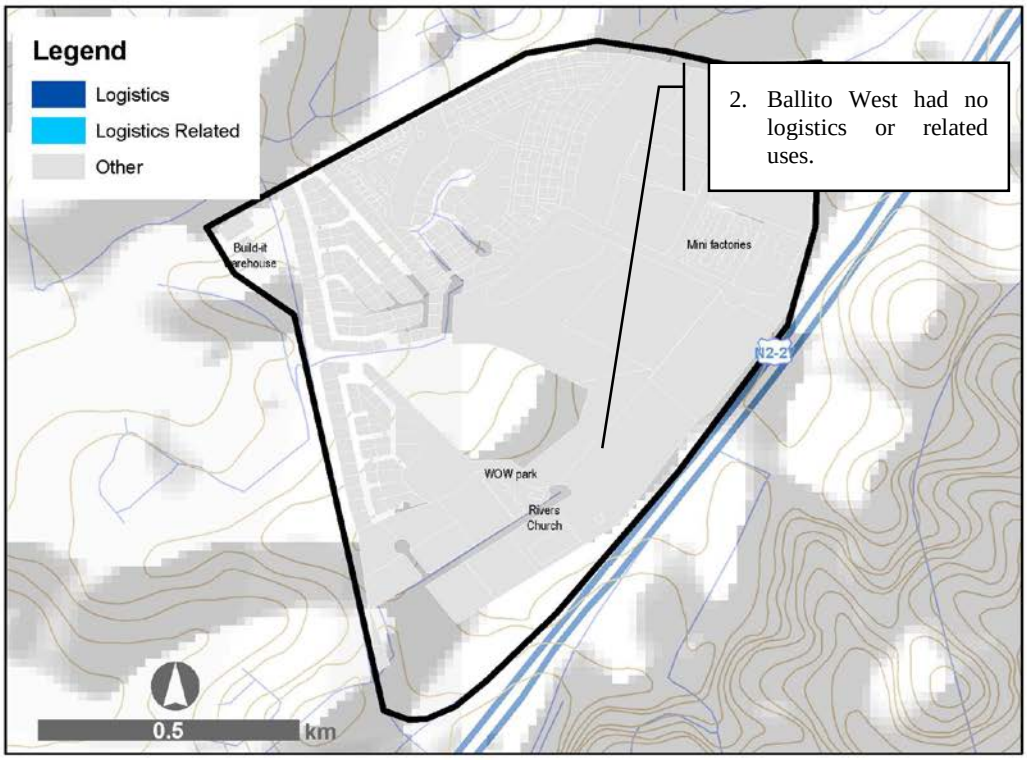


Table showing land vs. buildings (Area)

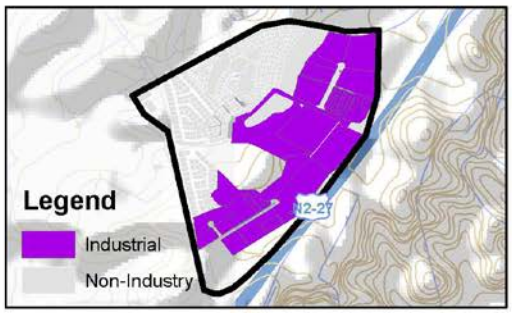
Type	Area (m)	Area (Ha)
Buildings	33171.40	3.32
Land	623867.22	62.39
Total		**65.70**

Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industrial	339269.90	33.93
Non-Industry	317768.72	31.78
Total		**65.70**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Non-Industrial	417360.22	41.74
Other Industry	18244.25	1.82
Vacant	221434.15	22.14
Total		**65.70**

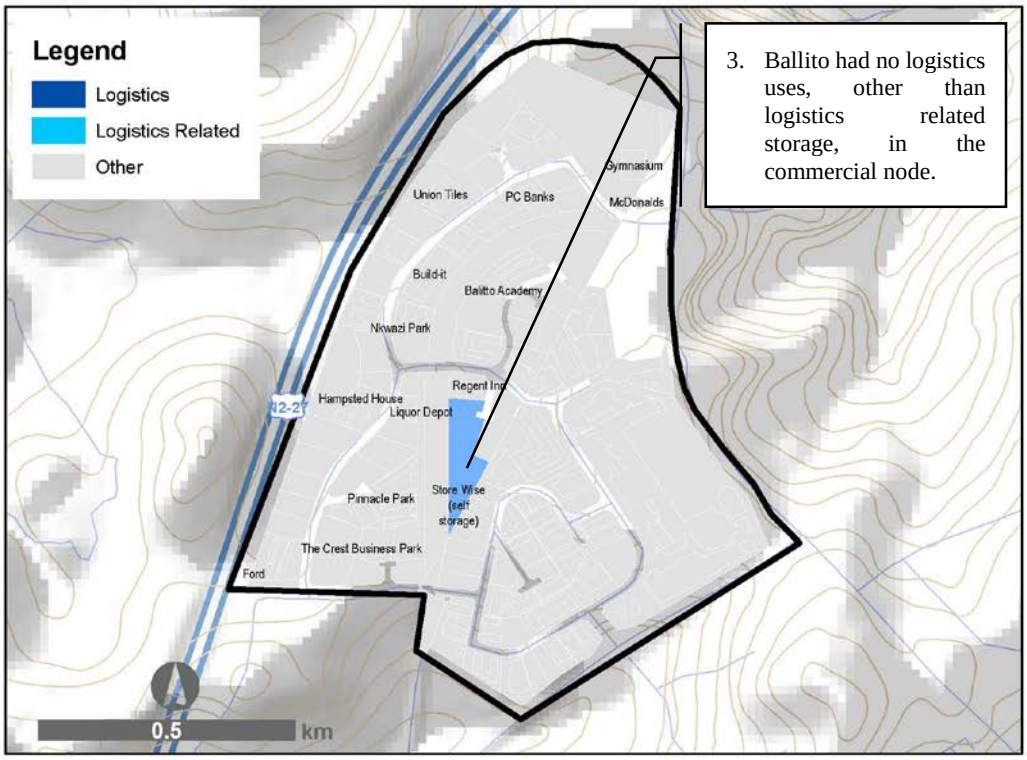


0 Logistics Related uses

0 Logistics uses

BALLITO WEST
Logistics and Industrial Uses

Ballito Land Use Survey, 2016-2017



3. Ballito had no logistics uses, other than logistics related storage, in the commercial node.

Table showing land vs. buildings (Area)

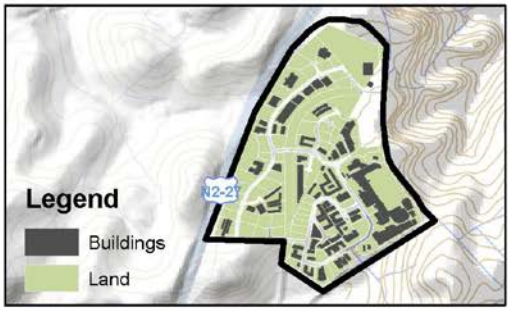
Type	Area (m)	Area (Ha)
Buildings	117575.49	11.76
Land	432844.83	43.28
Total		**55.04**

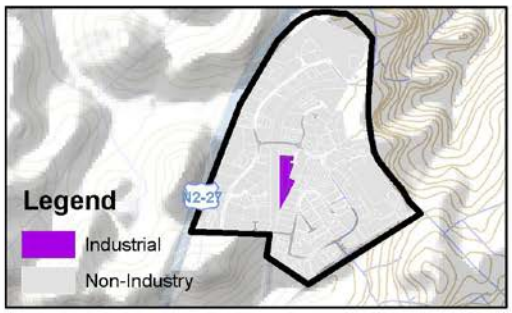
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industrial	11577.68	1.16
Non-Industry	538842.64	53.88
Total		**55.04**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistics Related	11577.68	1.16
Non-Industrial	448510.52	44.85
Vacant	90332.12	9.03
Total		**55.04**



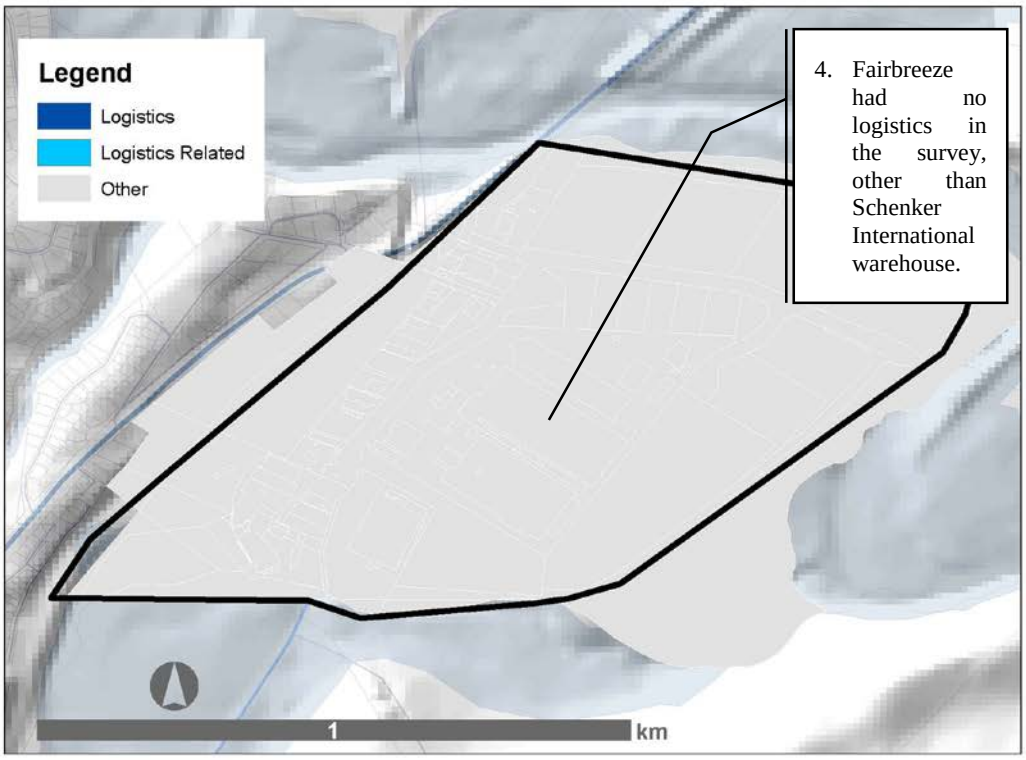


1 Logistics Related uses

0 Logistics uses

BALLITO
Logistics and Industrial Uses

Fairbreeze Land Use Survey, 2016-2017



4. Fairbreeze had no logistics in the survey, other than Schenker International warehouse.

Table showing land vs. buildings (Area)

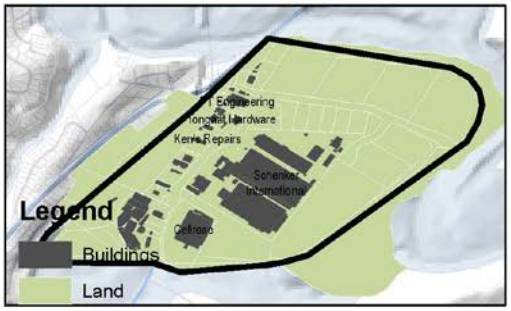
Type	Area (m)	Area (Ha)
Buildings	101760.72	10.18
Land	531019.63	53.10
Total		**63.28**

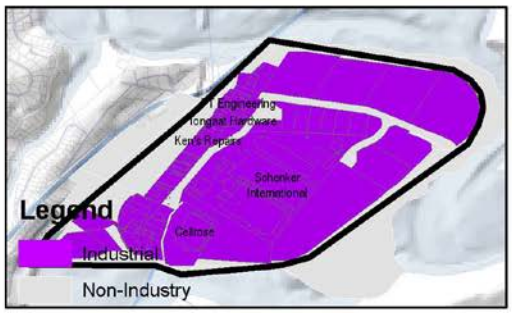
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	481178.70	48.12
Non-Industry	151601.65	15.16
Total		**63.28**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Non-Industrial	169908.20	16.99
Other Industry	217544.65	21.75
Vacant	245327.42	24.53
Total		**63.28**





0 Logistics Related uses

0 Logistics uses

FAIRBREEZE
Logistics and Industrial Uses

Trurolands Land Use Survey, 2016-2017

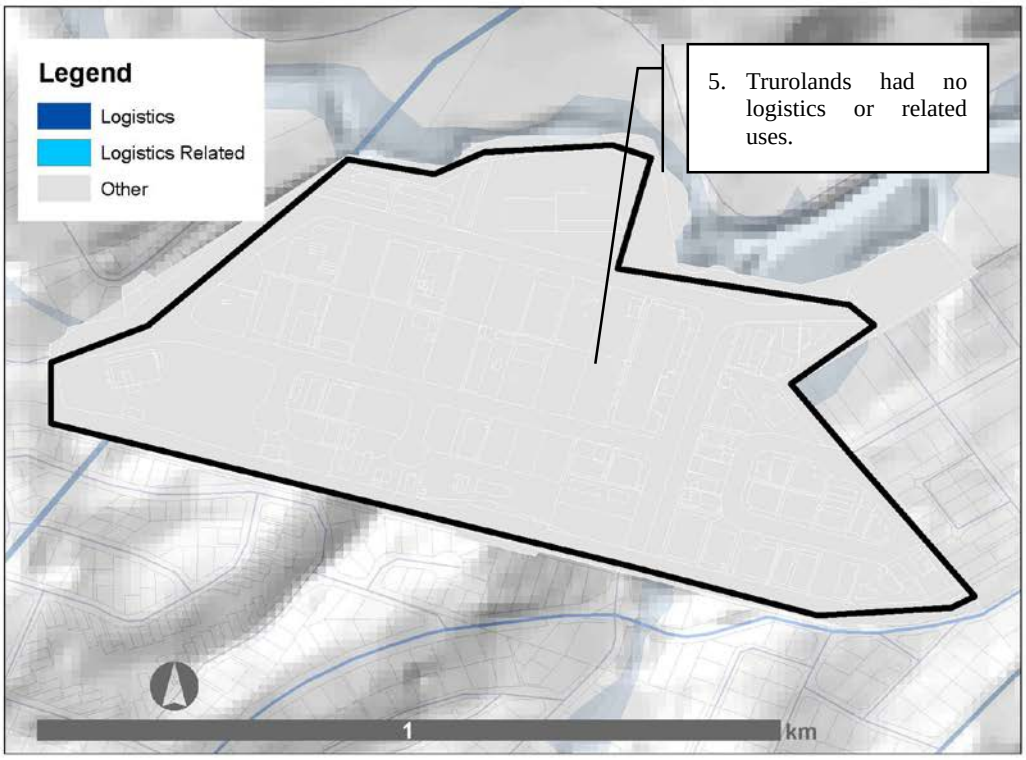


Table showing land vs. buildings (Area)

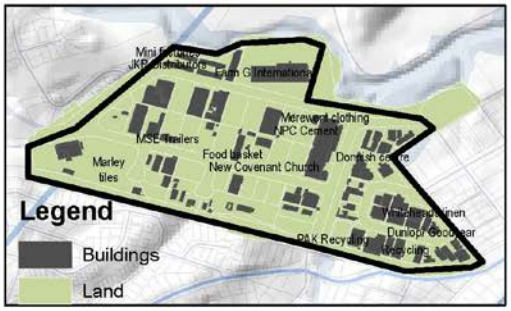
Type	Area (m)	Area (HA)
Buildings	103610.14	10.36
Land	334977.10	33.50
Total		**43.86**

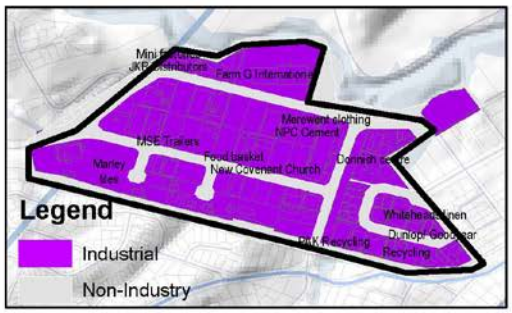
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	297111.36	29.71
Non-Industry	141475.88	14.15
Total		**43.86**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Non-Industrial	149514.27	14.95
Other Industry	289072.97	28.91
Total		**43.86**





0 Logistics Related uses

0 Logistics uses

TRUROLANDS
Logistics and Industrial Uses

Airport Land Use Survey, 2016-2017

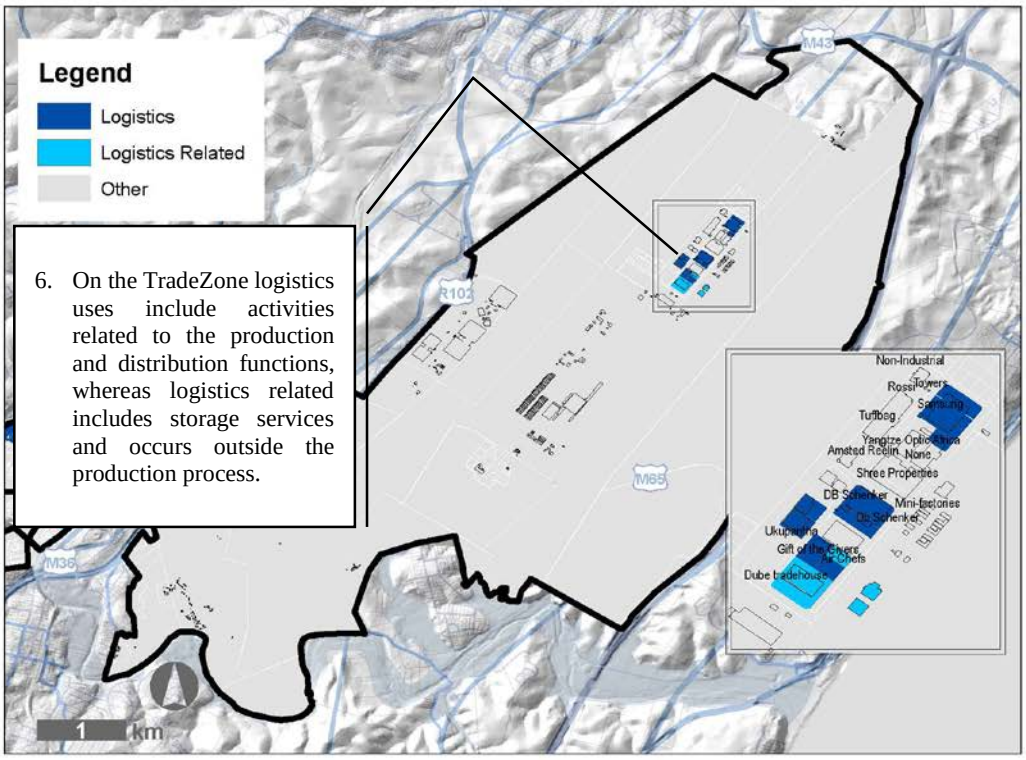


Table showing land vs. buildings (Area)

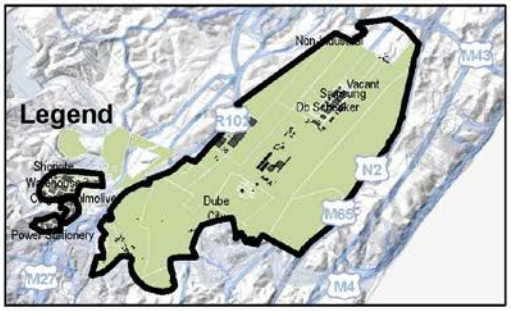
Type	Area (m)	Area (Ha)
Buildings	430071.15	43.01
Land	26496984.06	2649.70
Total		**2692.71**

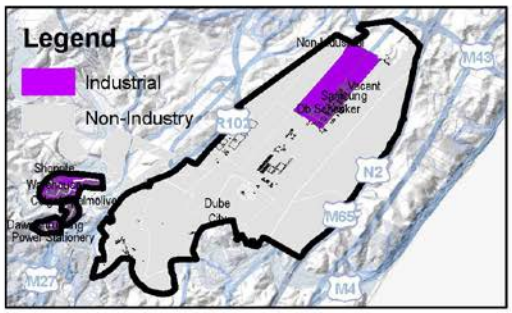
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	2390009.7800	239.001
Non-Industry	24537045.4300	2453.705
Total		**2692.706**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistcs	90119.08	9.01
Logistcs Rel at ed	35759.25	3.58
Non-Industrial	12689618.61	1268.96
Other Industry	97305.25	9.73
Under Constructon	36789.71	3.68
Vacant	13977372.51	1397.74
Total		**2692.70**



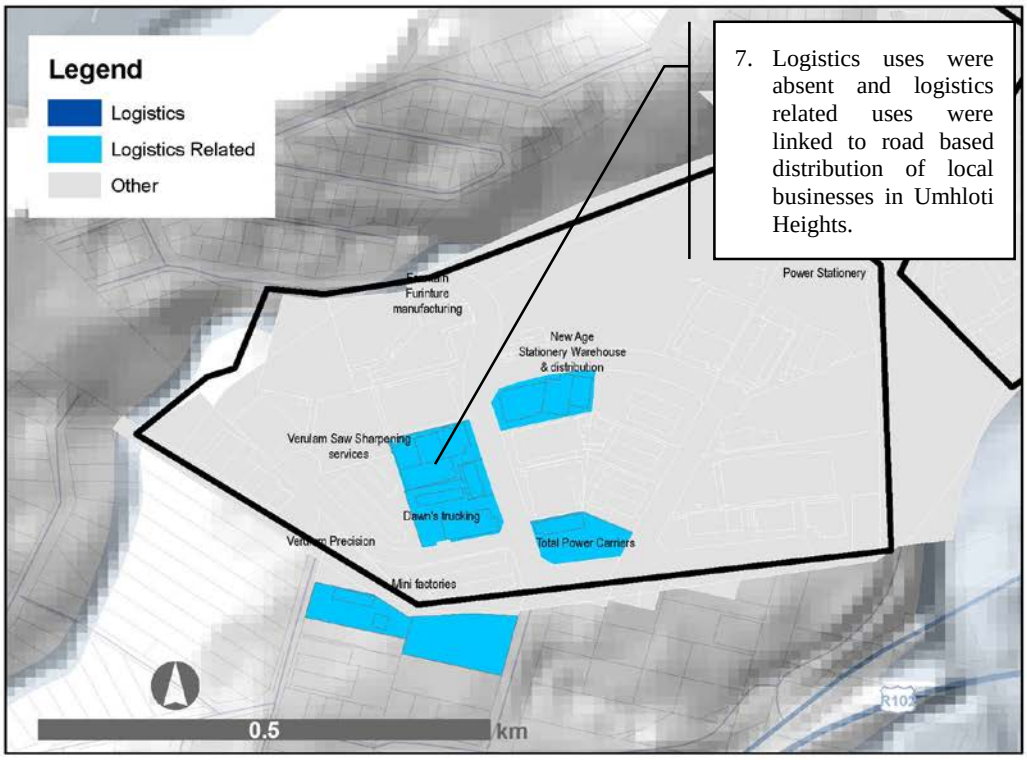


4 Logistics Related uses

6 Logistics uses

AIRPORT
Logistics and Industrial Uses

Umhloti Heights Land Use Survey, 2016-2017



7. Logistics uses were absent and logistics related uses were linked to road based distribution of local businesses in Umhloti Heights.

Table showing land vs. buildings (Area)

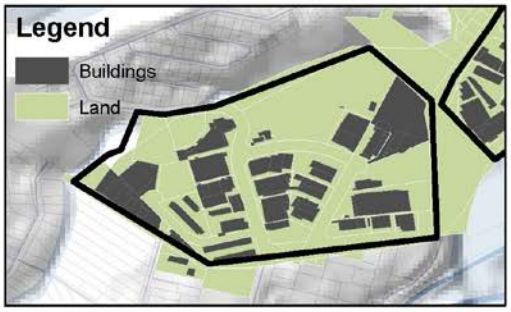
Type	Area (m)	Area (Ha)
Buildings	81605.61	8.16
Land	166378.23	16.64
Total		**24.80**

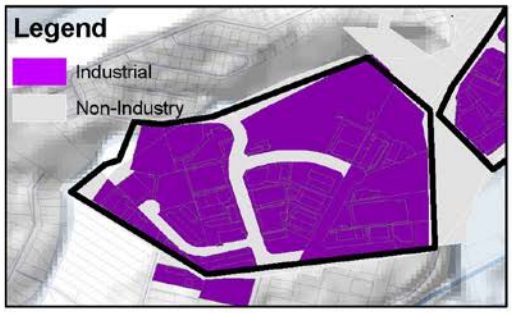
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	203879.01	20.39
Non-Industry	44104.83	4.41
Total		**24.80**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistics Related	19762.66	1.98
Non-Industrial	44504.58	4.45
Other Industry	153981.74	15.40
Undeveloped Open Space	12064.24	1.21
Vacant	17661.81	1.77
Total		**24.80**



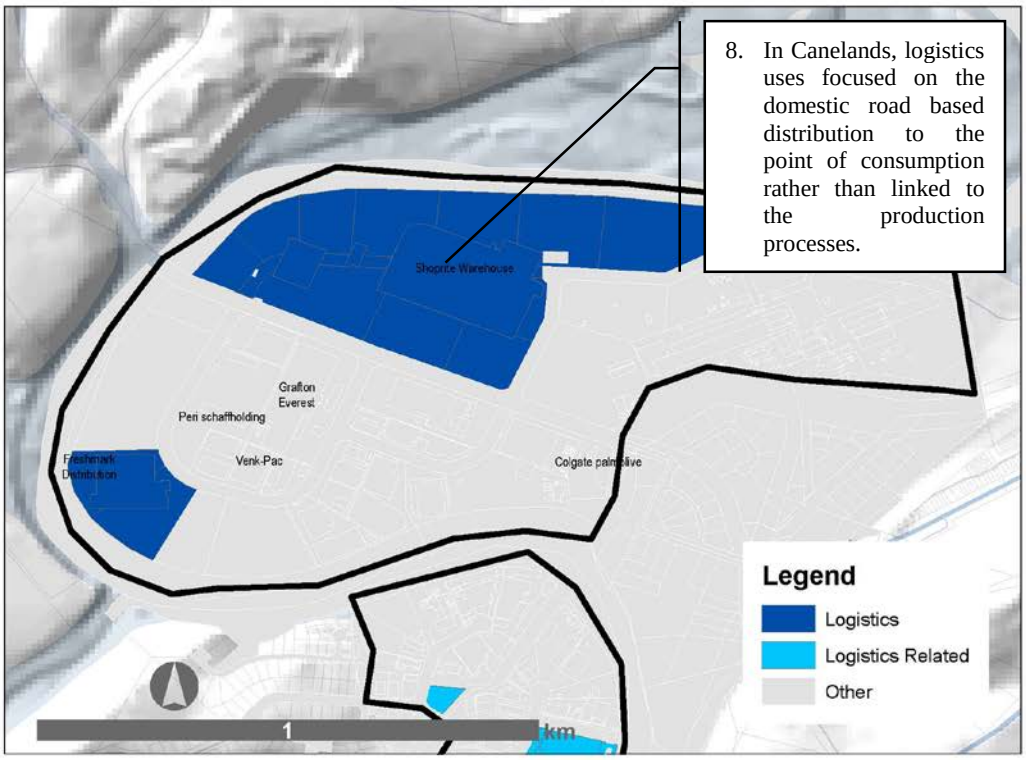


3 Logistics Related uses

0 Logistics uses

UMDLOTI HEIGHTS
Logistics and Industrial Uses

Canelands Land Use Survey, 2016-2017



8. In Canelands, logistics uses focused on the domestic road based distribution to the point of consumption rather than linked to the production processes.

Table showing land vs. buildings (Area)

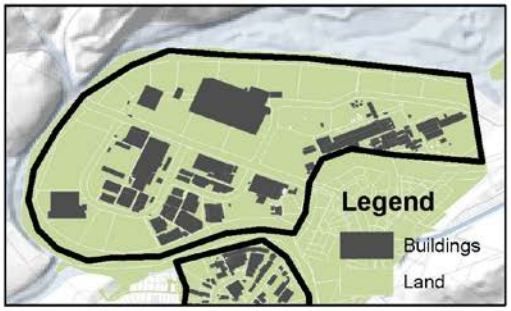
Type	Area (m)	Area (Ha)
Buildings	223833.70	22.38
Land	773293.79	77.33
Total		**99.71**

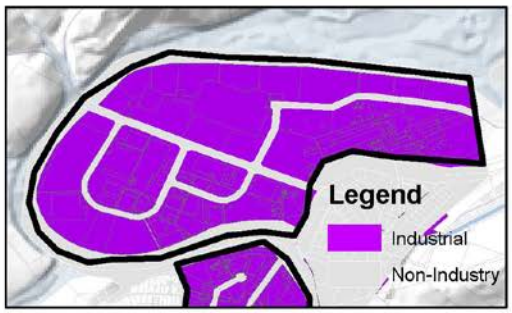
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	748490.64	74.85
Non-Industry	248636.85	24.86
Total		**99.71**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistcs	260777.20	26.08
Non-Industrial	91582.77	9.16
Other Industry	371406.08	37.14
Undeveloped Open Space	167427.54	16.74
Vacant	105884.35	10.59
Total		**99.71**





0 Logistics Related uses

2 Logistics uses

CANELANDS
Logistics and Industrial Uses

Riverview Park Land Use Survey, 2016-2017

Table showing land vs. buildings (Area)

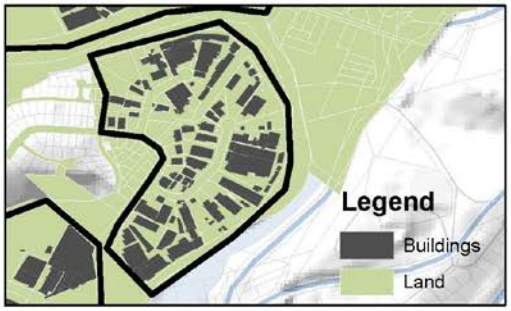
Type	Area (m)	Area (Ha)
Buildings	78957.73	7.90
Land	196256.00	19.63
Total		**27.52**

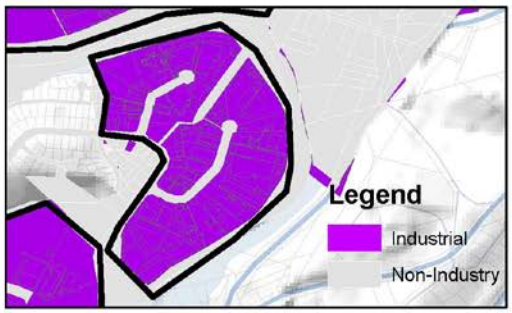
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	184107.78	18.41
Non-Industry	91105.95	9.11
Total		**27.52**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistcs Rel at ed	18499.86	1.85
Other Industry	159998.16	16.00
Undeveloped Open Spac	91105.95	9.11
Vacant	5609.45	0.56
Total		**27.52**



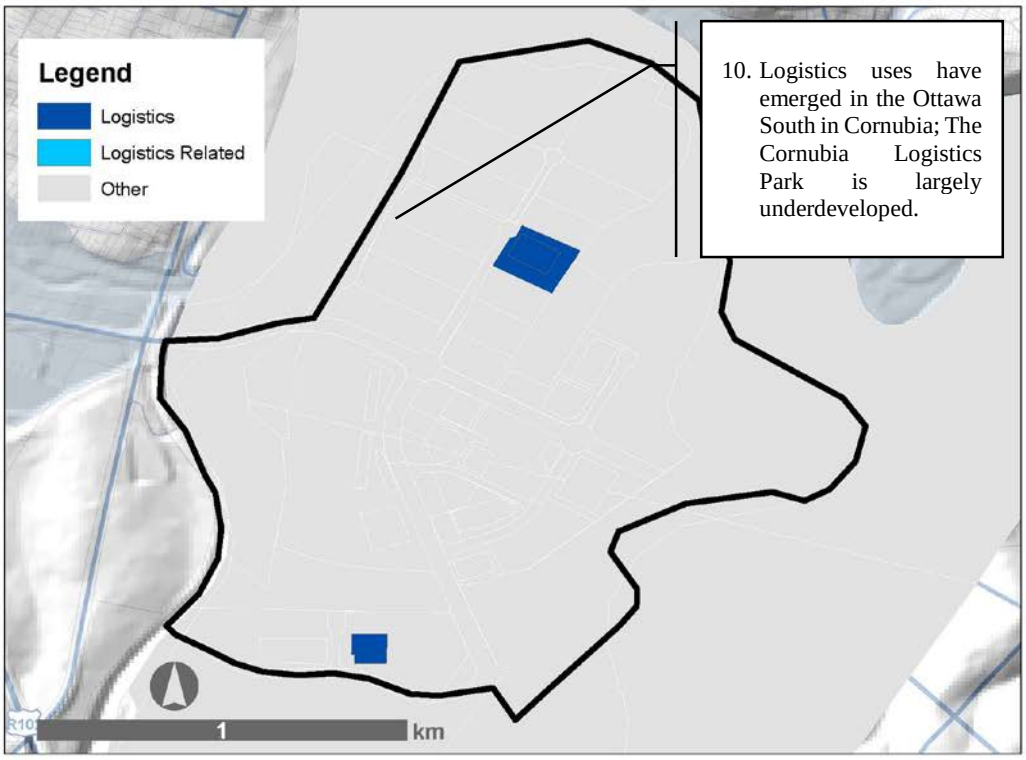


3 Logistics Related uses

0 Logistics uses

RIVERVIEW PARK
Logistics and Industrial Uses

Cornubia Land Use Survey, 2016-2017



10. Logistics uses have emerged in the Ottawa South in Cornubia; The Cornubia Logistics Park is largely underdeveloped.

Table showing land vs. buildings (Area)

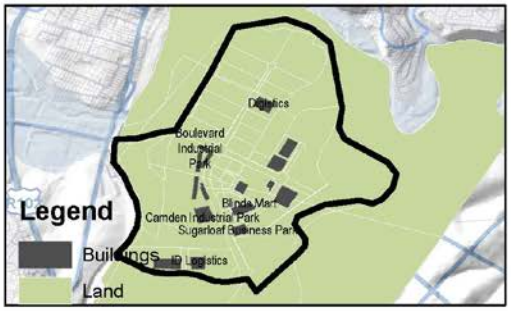
Type	Area (m)	Area (Ha)
Buildings	93955.05	9.40
Land	1566898.62	156.69
Total		**166.09**

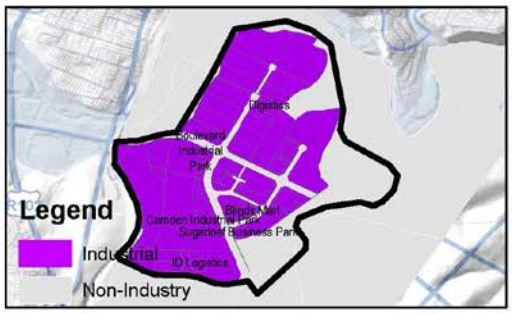
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	1203268.9500	120.3269
Non-Industry	457584.7200	45.75847
Total		**166.0854**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistics	27895.25	2.79
Non-Industrial	246155.12	24.62
Other Industry	135567.12	13.56
Undeveloped Open Space	419507.97	41.95
Vacant	831727.44	83.17
Total		**166.09**

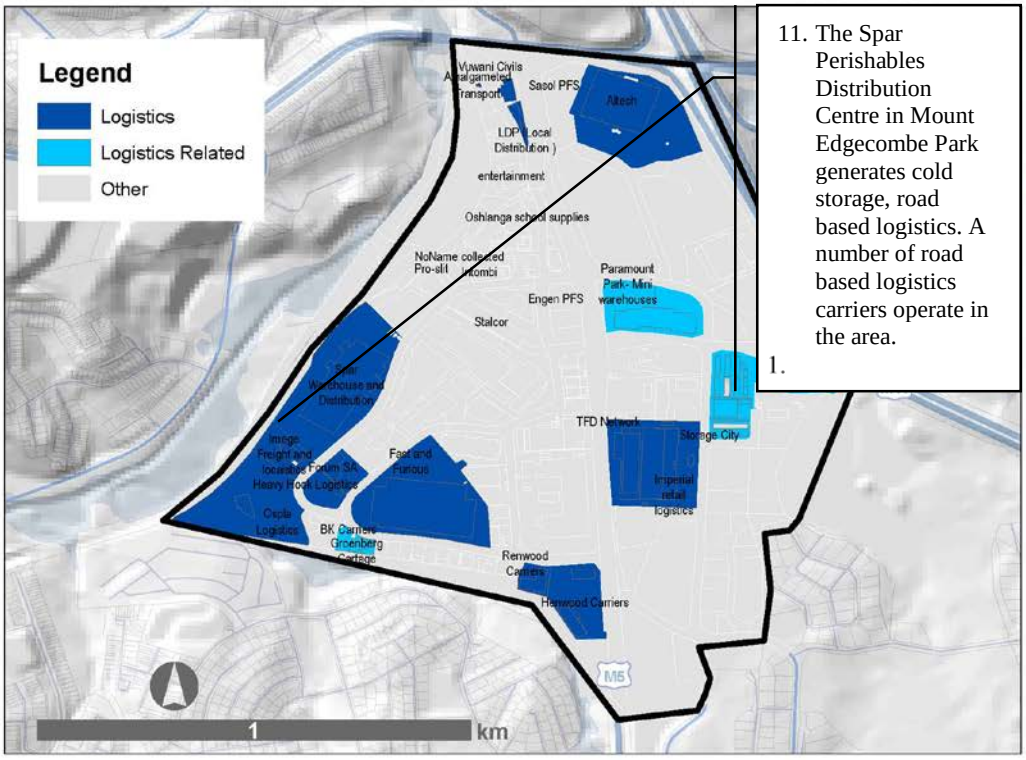




0 Logistics Related uses

2 Logistics uses

CORNUBIA
Logistics and Industrial Uses



11. The Spar Perishables Distribution Centre in Mount Edgecombe Park generates cold storage, road based logistics. A number of road based logistics carriers operate in the area.

1.

Table showing land vs. buildings (Area)

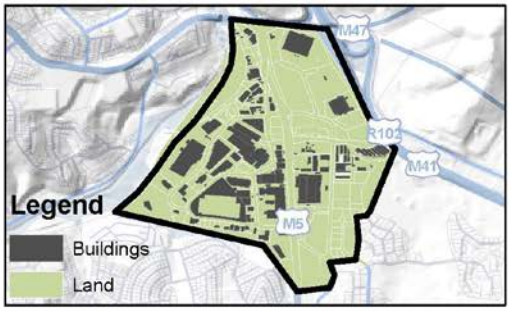
Type	Area (m)	Area (Ha)
Buildings	261678.68	26.17
Land	963369.25	96.34
Total		**122.50**

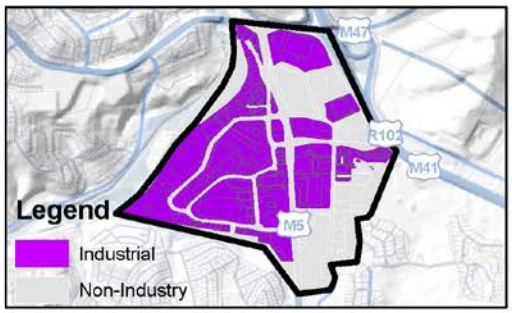
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industry	673638.81	67.36
Non-Industry	551409.12	55.14
Total		**122.50**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistics	259865.09	25.99
Logistics Related	55840.70	5.58
Non-Industrial	497822.55	49.78
Other Industry	410572.09	41.06
Vacant	947.07	0.09
Total		**122.50**



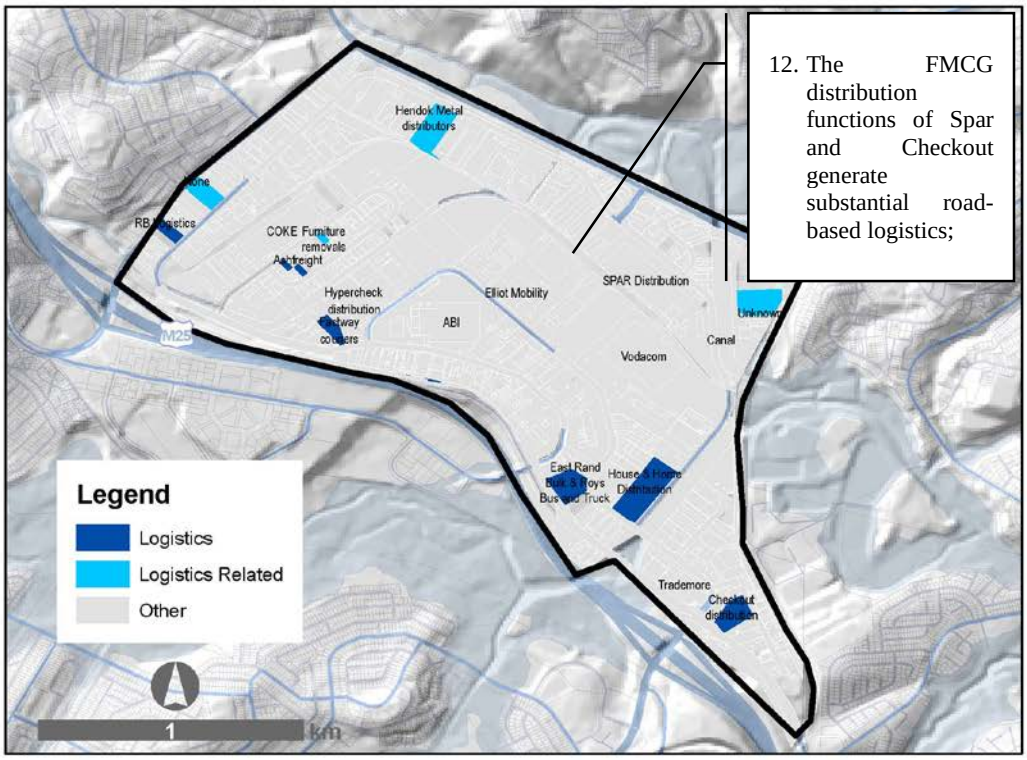


4 Logistics Related uses

14 Logistics uses

MOUNT EDGECOMBE
Logistics and Industrial Uses

Phoenix Land Use Survey, 2016-2017



12. The FMCG distribution functions of Spar and Checkout generate substantial road-based logistics;

Table showing land vs. buildings (Area)

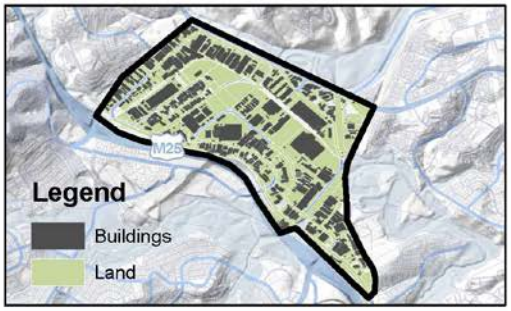
Type	Area (m)	Area (Ha)
Buildings	763937.32	76.39
Land	1484195.84	148.42
Total		**224.81**

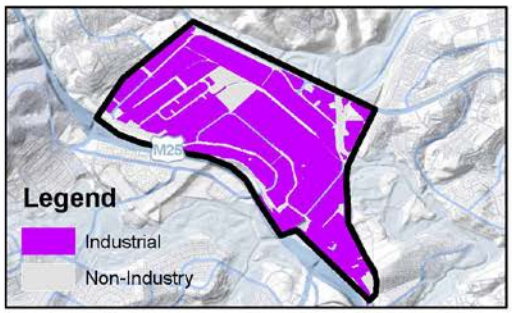
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industrial	1915966.7200	191.5967
Non-Industry	332166.4400	33.21664
Total		**224.8133**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistcs	59802.43	5.98
Logistcs Rel at ed	37565.46	3.76
Non-Industrial	219278.48	21.93
Other	27830.83	2.78
Other Industry	1818598.83	181.86
Vacant	85057.13	8.51
Totals		**224.81**



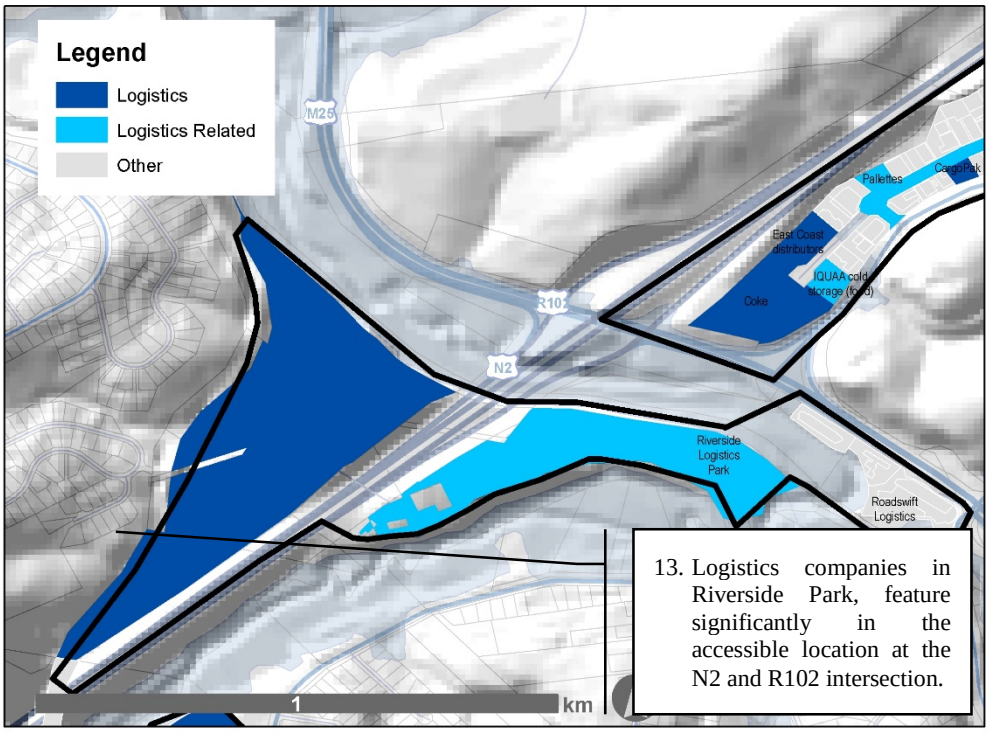


4 Logistics Related uses

7 Logistics uses

PHOENIX INDUSTRIAL
Logistics and Industrial Uses

Riverside Land Use Survey, 2016-2017



13. Logistics companies in Riverside Park, feature significantly in the accessible location at the N2 and R102 intersection.

Table showing land vs. buildings (Area)

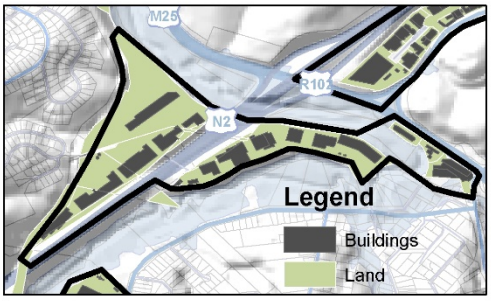
Type	Area (m)	Area (Ha)
Buildings	95842.98	9.58
Land	268857.18	26.89
Total		**36.47**

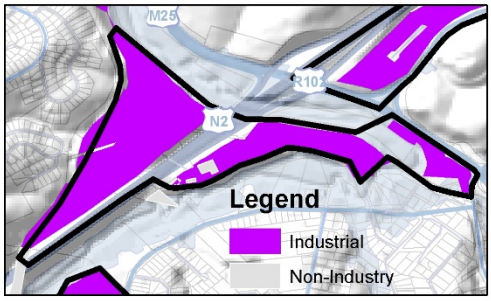
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industrial	326359.01	32.64
Non-Industry	38341.15	3.83
Total		**36.47**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistics	165311.09	16.53
Logistics Related	137658.16	13.77
Non-Industrial	31909.50	3.19
Other	6431.65	0.64
Other Industry	23389.76	2.34
Total		**36.47**



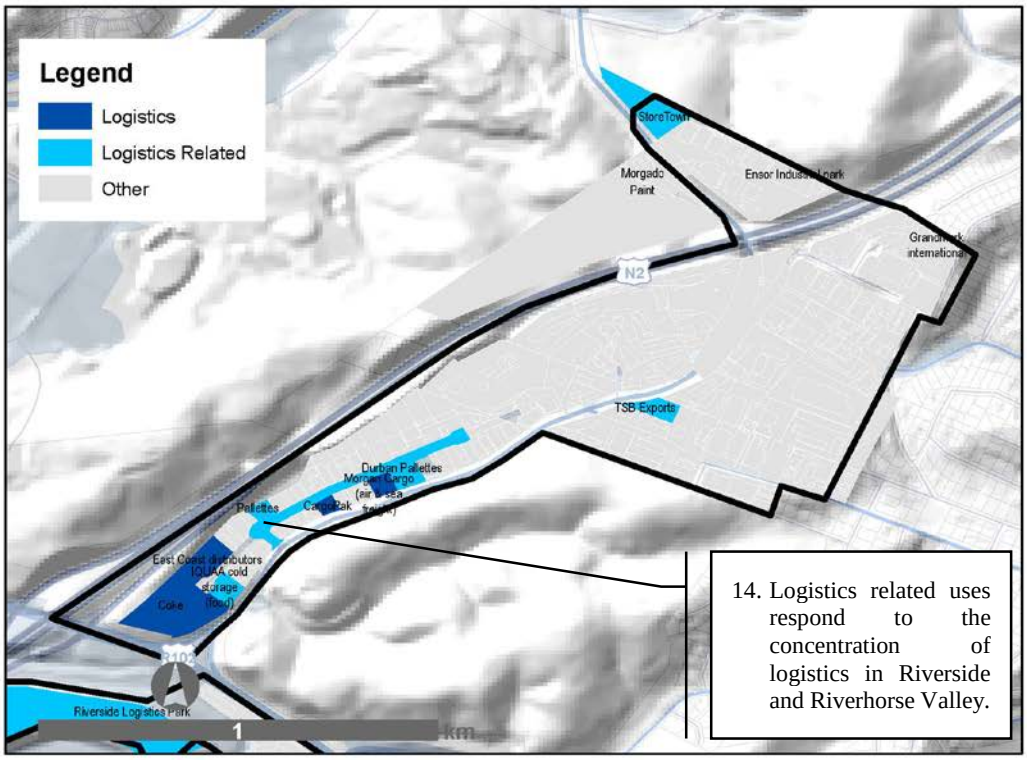


23 Logistics Related uses

16 Logistics uses

RIVERSIDE PARK
Logistics and Industrial Uses

Riverhorse North Land Use Survey, 2016-2017



14. Logistics related uses respond to the concentration of logistics in Riverside and Riverhorse Valley.

Table showing land vs. buildings (Area)

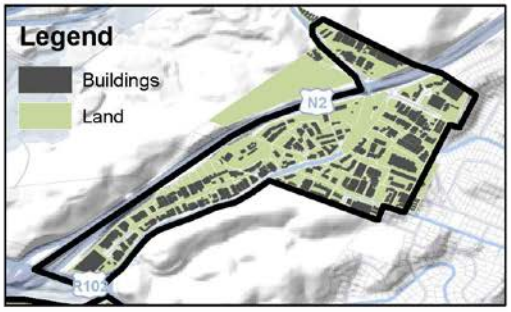
Type	Area (m)	Area (Ha)
Buildings	230573.08	23.06
Land	452089.18	45.21
Total		**68.27**

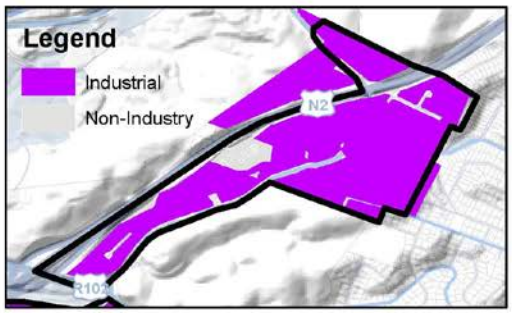
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industrial	645873.91	64.59
Non-Industry	36788.35	3.68
Total		**68.27**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistics	32191.05	3.22
Logistics Related	40666.91	4.07
Non-Industrial	29569.37	2.96
Other	7218.98	0.72
Other Industry	573015.95	57.30
Total		**68.27**



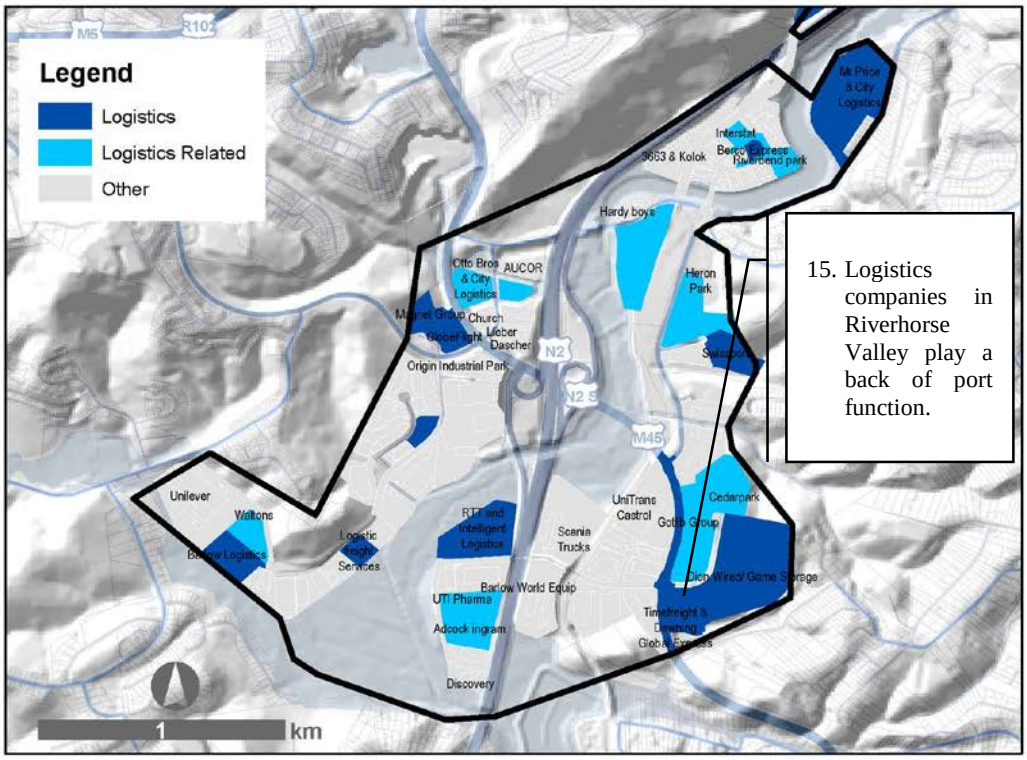


4 Logistics Related uses

5 Logistics uses

RIVERHORSE NORTH
Logistics and Industrial Uses

Riverhorse Main Land Use Survey, 2016-2017



15. Logistics companies in Riverhorse Valley play a back of port function.

Table showing land vs. buildings (Area)

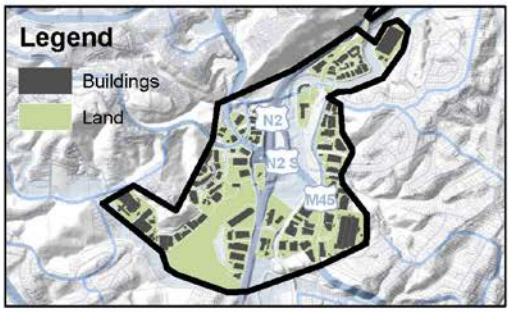
Type	Area (m)	Area (Ha)
Buildings	850545.03	85.05
Land	1609957.89	161.00
Total		**246.05**

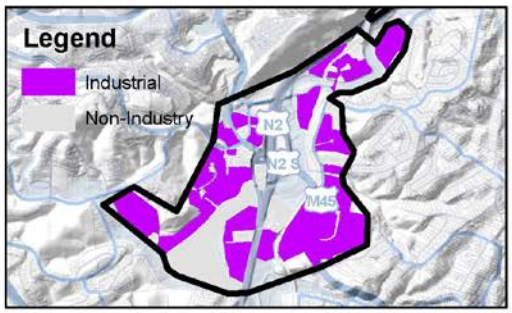
Table showing Industrial vs. Non-Industrial land (Area)

Type	Area (m)	Area (Ha)
Industrial	1811533.85	181.15
Non-Industry	648969.07	64.90
Total		**246.05**

Table showing land use breakdown (Area)

Type	Area (m)	Area (Ha)
Logistcs	447896.70	44.79
Logistcs Rel at ed	325867.47	32.59
Non-Industrial	160782.68	16.08
Other	469906.17	46.99
Other Industry	1037769.68	103.78
Vacant	18280.22	1.83
Total		**246.05**





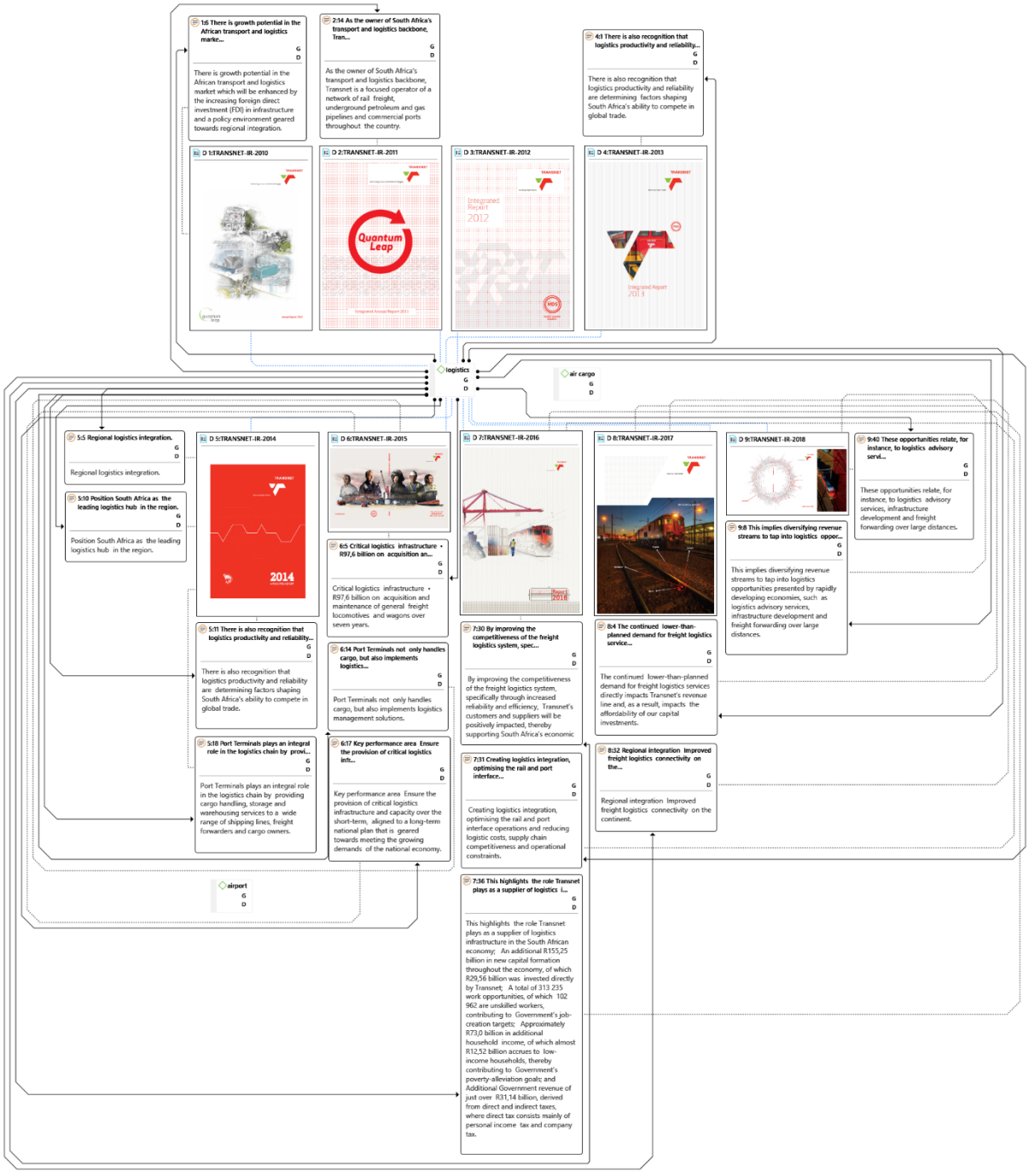
11 Logistics Related uses

10 Logistics uses

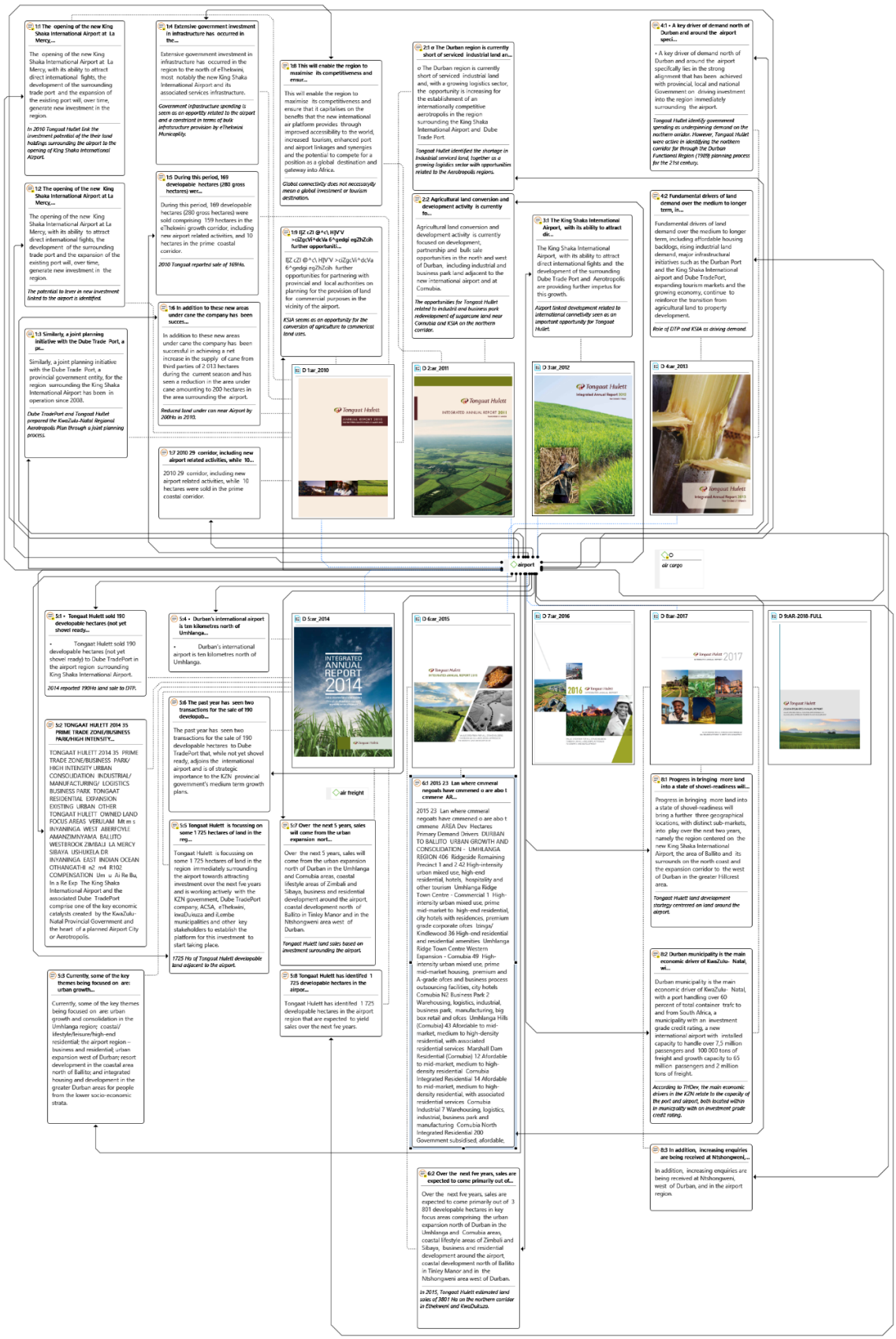
RIVERHORSE MAIN
Logistics and Industrial Uses

Appendix D: Atlas.ti Document analysis

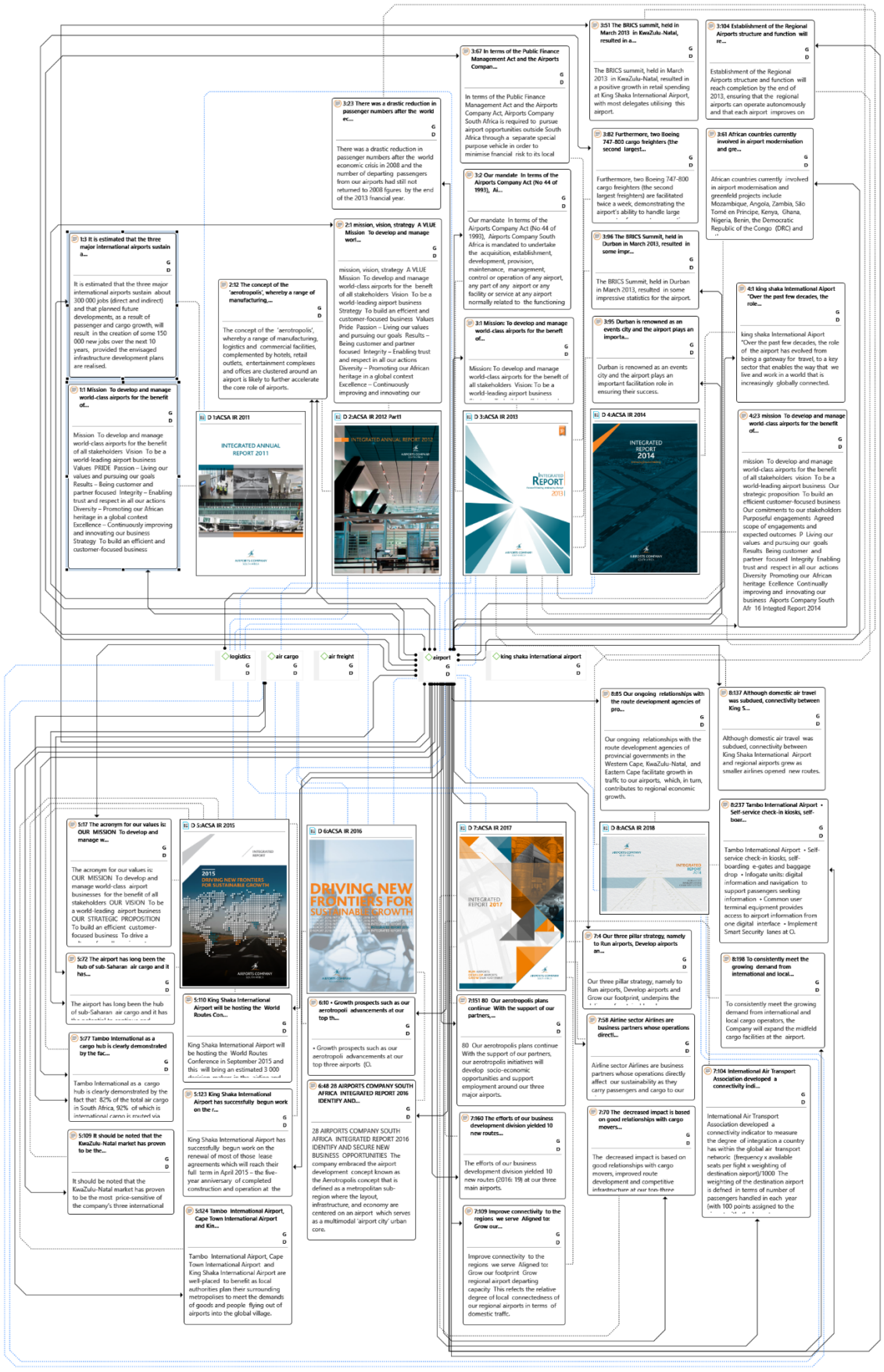
Transnet Integrated Annual Report 2010-2018 Document Analysis



Tongaat Hulett Integrated Annual Report 2010-2018 Document Analysis



ACSA Integrated Annual Report 2010-2018 Document Analysis



SAA Integrated Annual Report 2010-2018 Document Analysis

Appendix E: Thematic Analysis from the Interviews

Thematic	Disagreement	Agreement
1.1 Relative role of the port and airport integrating with local and international trade • "Airport is all very well, but it's actually about cities economies that drives how goods flow" (Respondent 8:1), with 95% of volumes moving through the port not airport. Significance of the port in terms of the volume of goods moving (Respondent 11:1) (Respondent 8:1) (Respondent 2.1). • Diminished interest in industrial land that is more than 15min driving time from the Port (Respondent 8:1), and distance impacted on take up in Cornubia (50min/30km), Inyaninga and Compensation (Respondent 8:3). • Importance of the port in terms of logistics related activity locating within the 30km distance of the DCT (Respondent 14:16), "holy distance" from port and airport respectively 15-50km (Respondent 11:1) • Related this is the sub-optimal landside split with less than 13%volumes moving on rail, as opposed to road, between the port and Gauteng. (Respondent 11:1) (Respondent 2.1). Practice falls short of the policy objective of 30% by rail (Respondent 2.1). • Congested national road based trucking on the SIP 2 corridor between Durban Port and Gauteng, had implications in terms of accident risks and carrying hazardous products (Respondent 11:5) • "Port is only as good as the landside distribution infrastructure" (Respondent 14:16).		2,4,8, 11, 14
1.2. Complexity in the flow of goods related to the supply of infrastructure and demand factors of price and timing affect modal routing • Certainly in African markets, freight follows passenger routes in belly hold cargo. Limited air cargo history (Respondent 14:2) • Port containers are destuffed (Respondent 14:2)		

• Growth in informality as a sector (Respondent 14:1) • Main cargo markets are America and Europe, not Africa (Respondent 12:2), UK, Germany, France and US (Respondent 10:1) • Air cargo related to pharmaceuticals, component parts, IT electronic goods and favoring imports over exports (Respondent 12:2) • High value, low weight and perishables including flowers (Respondent 11:2) • ORTIA increasing cold storage and vulnerable cargo facilities while KSIA does not currently have these capacities operation. (Respondent 12:2)		
1.3 Rail is considered as an important component in the overall multimodal logistics integration • The rail link was planned as part of the multimodal logistics at DTP (Respondent 14:5) and yet Transnet role to take up opportunities has not materialized. Respondent (4:12) attributes absence of rail connectivity in the north to Transnet capacity. • Respondent (8:5) attributes this to a structural issues of the type of goods moving by rail and the position of an intermodal facility on the northern line (Respondent 8:5). • Integration requires the landside distribution network in the back of port resolved as well as suitable break bulk infrastructure. In terms of transport, locate value-added activities within 30km of the port as road based and incentivize rail for long haul outside of that (Respondent 14:16). • There is recognition that moving goods by rail makes sense. Road transport efficient over short distance and breakpoint where rail more efficient from +-300km (Respondent 13:6) (Respondent 6:2) • Dedicated freight route planning by the city related to South Durban and the Port, excluding the north (Respondent 11:3) (Respondent 8:6)	4,8, 1, 13	5,

• "It was the vision of DTP to create this multimodal facility but for us it was clear that the seaport link, would be completely minor and does not need any consideration" (Respondent 6:1). In contrast Respondent (1:1) argued that DTP could not claim to be a multimodal logistics platform without a secure rail connection (Respondent 1.1) • No need for freight or freight modal interchange in proximity to the port (Respondent 5:2)		
2.1 There is substantial divergence from the initial concept after the implementation of the project • Limited development of the perishable sector, based on lower shipment times allow products to reach end-users faster and more reliably within a cold storage chain "What's up with the agricultural stuff?" (Respondent 8:5) • Extent to which the project is subsidized rather than attracting firms requiring air-connectivity (Respondent 8:3) • Initially the development of DTP, including KSIA, was planned as a PPP rather than a single operator with inherent inefficiencies and tendency towards a monopoly (Respondent 14:2, Respondent 14:6) • Elements to a logistics gateway include Dube TradePort, King Shaka International Airport, Inyaninga Logistics/Industrial Park with road, SEZ (Respondent 13:7)		8, 14, 13
2.2. Controversial decision to relocate the airport • Concept was linked to the economic development of the city, region and province as multimodal logistics platform (Respondent 14:3, Respondent 13:2 • Initial opposition from ACSA, City, DTI, Treasury (Respondent 14:4)"low points conflict" (Respondent 11:8) "the most difficult thing about the airport and DTP was the personalities…mistrust on both sides (Respondent 11:11). • Concerns related to the environmental side such as the rehabilitation of the wetland, roads traversing wetlands, stormwater attenuation ponds, degradation of wetlands (Respondent 11:6), and movement of fuel by road, s (Respondent 11:7).	8	2, 14, 11

• N3 Cato Ridge was ruled out as an alternative site due to topography, access requirements and alternative land uses (Respondent 2.2). Debate on the location of the airport, relates to the conflict surrounding the history of the project. • Site constraints at DIA of limited expansion, limited runway length (Respondent 13:3, Respondent 2.2) • The political ACSA deal constrained the nature of the development (Respondent 14:7) • Concerns for the airport relocation are related to impact of urban form, sprawl, suburbanization. "it is less about sprawl" and is related to environmental reasons (Respondent 11:8) "there is demand in the north despite the Tongaat Hulett factor" (Respondent 11:6) "in some ways the city is relaxed a lot about bigger projects outside the urban development line and urban edge (Respondent 11:8)		
1.1. Critique of the aerotropolis, and linked to the critique of state owned entities, SEZ and relationship of the Cargo Terminal to air-cargo volumes • One crititque is related to a perceived deficit in logistics role of the aerotropolis. The deficit is not only infrastructure but rail related concessions and joint ventures related to rail opportunities.is part of the overall role. (Respondent 1.1) (Respondent 2.2) • Secondly, there is a related to a lack of volume and critical mass using KSIA. Respondent (1:1) attributed this to failing to define a strategy to address this. The capture of the market is not dependent on organic growth but expanded market. (Respondent 1.1) • Critique of ACSA as single operator (Respondent 14:9, Respondent 14:11)		1,2, 14,
3.2 State owned entities underperforming • Transnet, "everybody just kind of gives up on Transnet….moving stuff by rail" (Respondent 11:5), "its mainly just talk of what could potentially happen" (Respondent 5:2)		1, 4, 5, 14

• Critique of ACSA and KSIA related to connectivity and the role of ACSA in perpetuating hub and spoke (Respondent 14:2) • Critique of ACSA as single operator (Respondent 14:9, Respondent 14:11) • DTP subsidized costs is perceived as monopolist behavior, particularly as the air infrastructure is already subsidized (Respondent 14:10) • DTP should be more active in driving development by facilitate planning decisions in Aerotropolis Initiative (Respondent 14:14); Natural evolution and piecemeal growth will not yield returns on the investment (Respondent 1:1).		
3.3 Critique of SEZ, TradeZone • SEZ incentives are attractive and been successful in securing investment in TZ1 and TZ2 (Respondent 10:2) (Respondent 5:7) Tough bags and Samsung were early SEZ operators (Respondent 5:2) • SEZ within 35km of the port is an added incentive (Respondent 10:2), but statement is in conflict with the experience of a private land owner where the demand is low (Respondent 8:3). Price may be a factor. • Firms, particularly GVC, in the TradeZone are dealing with assembly functions and distributing by road. Local production opportunities are questioned. • Development of the trade zone has more to do with land price and less with accessibility on the airport, absence of up and downstream value chains, development to do with incentives and not the airport (Respondent 14 • The sustainability can only be established in the long run • Growth of exports in current market sectors as the result of more efficient supply chains, yet playing more of a role ito imports. • SEZ meant that the focus broadened to high value goods not just air connectivity (Respondent 3,5,(Respondent 8,6)		5, 11 8

• Current tenants such as DB Schenker and Panel Pina have air-connectivity but no planes (Respondent 14:10). • SEZ and TZ1 tenants are road dependent with truck congestion issues emerging (Respondent 14:14), Mahinda, Samsung critiqued for land based distribution. (Respondent 8:3)		
3.4 Relationship of the Cargo Terminal to air-cargo volumes/air connectivity • Air cargo growth exceeded GDP growth for KwaZulu-Natal (Respondent 9:1) • Structural reason behind limited domestic airfreight is twofold. It relates to the relative ease of land based distribution but also that belly capacity is limited on narrow body planes such as Boeing 737, AirBus A320. Argument to build ahead of demand (Respondent 6:6). • Volumes are a long term objective (Respondent 6:9), particularly related to greenfields " If you extrapolate Durban in 50 years, grow and flourish by a couple of percent more than this do at the moment. I'm assuming the airport would grow at 5%, 5% in 10 years is 50% in 20 years it's 100% in 50 years' time. It's a 200%. So the 5 million pax goes to 10 million, 20 million. So it's feasible there to in 50 years' time, Durban could be 20 million.' (Respondent 6:9) • ACSA derives no tariff income from the regulator for cargo (Respondent 14:8) • Cargo not previously part of ACSA business until recently (Respondent 12:1) • Absence of integrators based at the cargo terminal, such as FedEx, Deutsche Post DHL Group and UPS, integrated with eBay, Amazon and Etsy (Respondent 10:4) (Respondent 5:13). They have runs to the airport but not main operations. • Strengthen strategies to incentives and grow the freight forwarders with their relationships to airlines (Respondent 14:9) • Exports have increased at DTP since opening and specifically related to new BA flight and three year block	7	4,5,7 6

service agreement with BA flight (Respondent 10:1). Yet more imports athna exports, contrary to SEZ incentives. • Ethiopian airlines introduced 737 but 787 better for freight (Respondent 10:2)		
4.1 Challenges for planning • Subsuming planning concerns within environmental processes and concerns • Limitations of planners having a "conceptual approach" "thinking in 3D", (Respondent 14:13). Part of the problem is that planning is too "conceptual" and they don't drill down. • "Not in my back yard" approach taken as opposed to managing spatial issues related to noise, airspace (Respondent 14:14), • Planners not having a vision, unclear leadership to facilitate solutions (Respondent 14:14), not solutions orientated (Respondent 14:17). • Inability to act as integrators within government (Respondent 14:14), and overcome "line functionary planning responses" (Respondent 11:9, Respondent 8:11) • Independence of planning thought and "if the money goes in a particular direction, then they speak your language" (Respondent 14:14). • Issues related to permitting noise sensitive developments in the airport flightpath, such as hospitals, schools and residential. Also managing height restrictions in airspace and reflective surfaces on radar requirement as well as compatible land uses within land use schemes (Respondent 12:3); inconsistencies around working with noise compatible areas (Respondent 8:10) • Planning for retrofitted land uses around the port constrained the role of planning as opposed to greenfields development at the new KSIA. • Boundaries arbitrary in terms of funding infrastructure (Respondent 11:7)"even if you look at the IDP, even if it's just a line we tried to accommodate it with the arrow going		2, 11, 14

north" but this wasn't aligned with services (Respondent 11:7). • There were opportunity costs related to not collaborating on funds and learning on the project (Respondent 11:7.) • Planning is political (Respondent 14:17) • Planning legislation, including Act 70/70 and rezoning, add time delays (Respondent 10:2) • Planning to be proactive, facilitate spatial interventions, directing land use activity when there is market failure. Inability to engage with the market (Respondent 8:10) • Lack of flexibility and responding to change (Respondent 8:10). Problem is less with the planning process and "more with the bureaucratic process". (Respondent 8:11)		
5.1 Challenges for logistics • The bulk and scale of logistics built form works against mixed use, fine grain uses that can be easily integrated in existing industrial areas (Respondent 11:4). Perceived as space extensive, perpetuating sprawl and sterilizing value well located land (Respondent 11:4), low employment density seen as problematic (Respondent 11:5, Respondent 8:8), logistics largely supports road based distribution (Respondent 11:5) and not a huge value-added sector (Respondent 8:8) • The direct integration connection between rail and airports is unclear as they move different types of cargos (Respondent 8:5)		11,8,

Source: Self –generated by the researcher

11 ENDNOTES

[i] La Mercy is the name of farm where King Shaka International Airport (KSIA) was built. Prior to the opening of the KSIA, the new airport was referred to as La Mercy Airport.

[ii] The term planning is the generic term and includes specific terms such as town and regional planning, and urban and regional planning (Friedman, 1987: 35).

[iii] Guba and Lincoln (1998: 111) note that the ontology of relativism differentiates constructivism from the other three paradigms of positivism, post-positivism and critical theory. Relativism 'assumes multiple, apprehendable, and sometimes conflicting social realities that are the products of human intellects, but that may change as constructors become more informed and sophisticated', Lincoln, Y. S. and Guba, E. G. 1994. Competing paradigms in qualitative research. *Handbook of qualitative research*: 105-117.

[iv] The use of the term dominant refers to way communicative theory has influenced planning and does not mean as suggested by Huxley and Yiftachel (2000: 107) 'the replacement of previous modes of theorizing'. There is agreement that there are multiple and other valid ways of thinking about planning. Huxley, M. and Yiftachel, O. 2000. New paradigm or old myopia? Unsettling the communicative turn in planning theory. *Journal of planning education*, 19 (4): 333-342.

[v] Dicken (2014: 15) identified transnational social networks that operate globally. As an example of these global networks Transnational Capitalist Class (TCC) Sklair, L. 2012. Transnational capitalist class. *The Wiley-Blackwell Encyclopedia of Globalization*, include owners and controllers of the major corporations, globalizing bureaucrats and politicians, globalizing professionals, merchants and media people. A second example would be Transnational Migrant Networks (TMN) Coe et al. (2003) with linkages created by labour migrants between their places of origin and their places of settlement Dicken, P. 2004. Geographers and 'globalization': (yet) another missed boat? *Transactions of the Institute of British Geographers*, 29 (1): 5-26.

[vi] There is debate over the recovery of manufacturing after the 2008 global financial crisis, with suggestions that value added services relative to the manufactured good is important.

[vii] The genealogy includes (1) the world-systems analysis of commodity chains; (2) the global commodity chains (GCCs) framework developed by Gary Gereffi and colleagues and (3) global value chains (GVCs) analysis with transaction cost economics Bair (2009: 1). The geographic focus is traced from the GCC framework.

[viii] Locally is used broadly to refer to the sub-national and sub-provincial scale and can mean within the metropolitan city scale or to include a portion within the local municipal scale or could include the regional scale across more than one municipal boundary. The local scale is then broadly referring to the place when planning has influence.

[ix] Structuralism places emphasis on the underlying processes and systems that determine individual action Given, L. M. 2008. *The Sage encyclopedia of qualitative research methods*. Sage publications. In attempting to emphasis the role of structures over individual agency, Giddens, A (1986) developed structuration theory for sociological analysis. Giddens, A. 1986. *The constitution of society: Outline of the theory of structuration*. University of California Press.

, ibid.

[x] Agglomeration economies are commonly divided into two types. Localised economies or "Marshallian externalities' and these are produced when firms in the same industry co-locate (Marshall, 2009). These firms tend to cluster geographically due to specialized local providers of inputs, secondly a concentration of firms employing workers of the same type of labour market pool, and thirdly clustering offer benefits from sharing information and knowledge. Secondly, the urbanisation economies or 'Jacobs externalities' (Jacobs, 2016) are those that result from the agglomeration of a large and diverse set of business activities, not necessarily in the same industry, in a particular place, providing access to services and promoting exchange of knowledge and technology.

Marshall, A. 2009. *Principles of economics: unabridged eighth edition*. Cosimo, Inc.

Jacobs, J. 2016. *The economy of cities*. Vintage.

[xi] According to Storper (1997:5) untraded interdependencies "take the form of conventions, informal rules, and habits that coordinate economic actors under conditions of certainty; these relations constitute region-specific assets in production. These assets are a central form of scarcity in contemporary capitalism, and hence a central form of geographical differentiation in what is done'. Storper, M. 1997. *The regional world: territorial development in a global economy*. Guilford press.

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[xiii] Global production networks are defined by Coe, Dicken and Hess (2008:272-274) as organizational and geographic platforms of economic organization and is "one whose interconnected nodes and links extend spatially across national boundaries and, in so doing, integrates parts of disparate national and subnational territories'. Local production networks reflect the fundamental structural and relational nature of how production, distribution and consumption of goods and services are—indeed always have been—organized.

Coe, N. M., Dicken, P. and Hess, M. 2008. Global production networks: realizing the potential. *Journal of Economic Geography*, 8 (3): 271-295.

[xiv] In my view, planners use the word regional to refer to an area more than municipal and less that provincial; while political or international development writers use regional to refer to many countries in a continuous geographic territory.

[xv] According to Boeing (2018:14) containership pricing is generally 10 to 20 times less expensive than air cargo per unit weight, the transit times are longer and less reliable than air cargo. Boeing. 2018. *World Air Cargo Forecast 2018-2037*. Available: http://www.boeing.com/resources/boeingdotcom/commercial/about-our-market/cargo-market-detail-wacf/download-report/assets/pdfs/2018_WACF.pdf (Accessed 10 February 2019).

[xvi] Bidirectional trade is the overall tonnage of the trade surplus or deficit.

[xvii] Integrator or integrated carrier are defined by Morrell (2012:319) as firms that 'perform their own pickup and delivery services of smaller parcels, operate aircraft and trucks to support the door-to-door delivery operations supported by advanced information and communications technologies'. Morrell, P. S. 2012. *Moving boxes by air: the economics of international air cargo*. Ashgate Publishing, Ltd.

[xviii] Yamoussoukro Decision according to the African Union (2017:30) is the decision related to the implementation of 'the liberalization of air transport markets access in Africa'Africa of 14th November 1999, approved by the Conference of Heads of State and Government of OAU and signed by the current Chairman in Lomé on 12th July 2000'. This decision was later affirmed by the African Union Commission's Statutes adopted by the Assembly of the African Union in Durban (South Africa) on 10th July 2002; the Resolution on the follow-up of the implementation of the Yamoussoukro Decision of 1999 adopted by the First African Union Conference of Ministers responsible for air transport in Sun City (South Africa) in May 2005; and resolution on air transport safety in Africa adopted by the Second Conference of African Union Ministers responsible for air transport in Libreville (Gabon) in May 2006 (African Union, 2017:30). African Union. 2017. *Regulatory and institutional texts for the implementation of the Yamoussoukro Decision and framework towards the establishment of a single African air transport market*. Available: https://au.int/sites/default/files/treaties/36197-treaty-yamoussoukro_decision_regulatory_texts_e.pdf (Accessed 25 July 2017)

[xix] According to South Africa, eThekwini Municipality 2018b:16 the BEPP is a requirement of the Division of Revenue Act (DoRA) for the draw-down of six Built Environment Grants, namely the Urban Settlements Development Grant; Human Settlements Development Grant; Public Transport Network Grant; Neighbourhood Development Partnership Grant; Integrated National Electrification Grant; and Integrated City Development Grant. Collectively these grants make up a significant percentage of the Capital Budget. The BEPP attempted collate the built environment aspects of the IDP, SDF, SDBIP, and Capital and Operating Budgets into a single framework.

South Africa, eThekwini Municipality. Executive Committee. 2018a. *Built Environment Performance Plan: 2017/18 to 2021/22*. Durban: www.durban.gov.za. Available: http://www.kzncogta.gov.za/municipal-idps-201718/ (Accessed 30 June 2019).

[xx] There is recognition of cross boundary forums, however these are issue based and not aligned to joint processes between municipalities.

[xxi] The Tongaat Dube Local Area Plan (2011:118) defines logistics as 'a business involving the planning and management of the flow of goods and services to a destination'. Logistics is significantly broader than distribution functions and value-added services in the supply chain including production and storage functions.
South Africa, eThekwini Municipality. 2011a. *Local Area Plans: Northern Urban Development Corridor Tongaat-DTP Local Area Plan*. SSI Engineers and Environmental Consultants. Available: http://www.durban.gov.za/City_Services/development_planning_management/Documents/NUDC%20Tongaat%20Dube%20LAP%20v3.1%20Final%2018%20February%202011.pdf (Accessed 1 August 2018).
[xxii] References to the Port across municipal plans reveal some 4800 grounded codes to the Port, with 30 for Dube TradePort through the analysis in Atlas.ti
[xxiii] There is a notable absence of reporting on container handling figures such as TEUs and volumes in the 2018 official reports. Transnet reported that revenue increased by 11,3% to R72,9 billion for the year, driven by a 4,3% increase in railed export coal volumes; a 6,5% increase in railed automotive and container volumes and a 6,1% increase in port container volumes (Transnet SOC Limited. 2018a:2).
Transnet SOC Limited. 2018a. *Annual Financial Statements 2018*. Available: https://www.transnet.net/InvestorRelations/AR2018/Transnet%20Annual%20Financial%20Statements.pdf (Accessed 27 June 2019).
, Transnet SOC Limited. 2018b. *Transnet Online Integrated Report 2018*. Available: https://www.transnet-ir-2018.co.za/from-mds-to-transnet-4-0.php (Accessed 30 July 2019).
[xxiv] The previous Durban International Airport (DIA), formerly Louis Botha Airport, opened in 1951, the OR Tambo International Airport (ORTIA), formerly Jan Smuts Airport, in 1953 and Cape Town International Airport (CTIA) in 1954.
de Freitas, F. 1968. *Airports of South Africa*. Johannesburg: Da Gama..
[xxv] According to the South Africa, Public Investment Corporation (2018:7) the Public Investment Corporation, is the asset management company for the Government Employees Pension Fund and is wholly owned by the South African government and owns a share in ACSA. The assets managed by PIC grew from R461 billion in 2005 to R2,083 trillion as at 31 March 2018.
Statistics South Africa. 2018. *Provincial Kwazulu-Natal Profile Community Survey 2016*. Available: http://cs2016.statssa.gov.za/wp-content/uploads/2018/07/KZN.pdf (Accessed 2 August 2019).
[xxvi] Load volumes is the capacity filled in Unit Load Devices (UDL) to carry air-cargo. Refer to Annexure 18. The typical maximum gross weight of UDL is around 500 kgs (Respondent 10:1).
[xxvii] Defined by Dube TradePort (2017c:26) as investment by companies with at least 51% black African-ownership for property developments.
[xxviii] This refers to the range or distance from transport infrastructure, such as 15 kilometres from the port and 30 kilometres from the airport, where there is a demand for industrial land based on acceptable transportation costs. Beyond the range there is an anticipated drop off in demand for land.
[xxix] The zone of logistics includes the following free entry uses, namely private open space, container depot, direct access service centre, dwelling house, fuelling and service station, industry – light, motor vehicle test centre, laundry, office, recycling centre, restaurant / fast food outlet, shop, transport depot, truck stop, warehouse. the uses of airport, base telecommunications transmission station, builder's yard, car wash, conference facility, government / municipal, industry – general, market, motor display area, motor garage, office – medical, special building and utilities facility are permitted by special consent
eThekwini Municipality. 2019. *Durban Scheme Central Region.* Available: http://www.durban.gov.za/Resource_Centre/Current%20Projects%20and%20Programmes/LUMS%20Consolidated%20and%20Revised%20Town%20Planning%20Scheme/Durban%20Scheme%20Review%20Final%20Draft%2029.pdf (Accessed 31 October 2019).
[xxx] Structural deficit is referring to the twin or double deficit, where government spending exceeds income, combined with a trade deficit with the value of imports exceed the value of exports.
South African Market Insights. 2019. *South Africa's Trade Data Page*. Available: https://www.SouthAfricanMI.com/south-africas-trade-data-page.html (Accessed 9 July 2019).
[xxxi] Portions 5 and 9 of the Farm La Mercy Airport No. 15124 were purchased for R428 million in 2009. Refer to Annexure 20.
[xxxii] Schedule C is a listed State Owned Entity established in the terms of the Public Finance Management Act, 1999 (Act No. 1 of 1999). These entities have mandates to fulfil specific economic or social responsibilities of government, and are funded by government.