

UNIVERSITY OF KWAZULU-NATAL

**Optimising socio-economic benefits through competitive logistics
systems, infrastructure and novel concepts for the Durban
Aerotropolis**

By

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Doctor of Philosophy**

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DECLARATION

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ABSTRACT

This case-based research study contributes to the description and understanding of the Durban Aerotropolis strategy and intends to establish how it can be successfully applied, given the logistics and mobility dynamics in the region. It has been determined in various studies that relevant and specialised approaches to policy making, spatial planning and transportation and connectivity planning can be prioritized in creating sustainable urban developments. As outlined in the literature, the Durban Aerotropolis strategy is a spatial planning concept which embodies the creation of aviation-oriented, airport centric developments in which local businesses are closely linked to their suppliers. The exploratory research design approach was deemed appropriate since there are few studies that have reviewed the Durban Aerotropolis master plan using Porter's model of competitiveness and integrated logistics and mobility planning frameworks. In achieving the research objectives and answering the research questions, a mixed methods design was adopted in which qualitative and quantitative research approaches were used sequentially, concurrently, and iteratively. A plethora of sampling and data collection methods, including purposive and snowball sampling were applied, using 12 in-depth interviews, 5 focus group sessions involving 60 participants and organisational document reviews. In addition, 180 online questionnaire responses and observations from the 36 businesses located in the aerotropolis region were conducted. For the analysis and presentation of the research findings, thematic, content, descriptive and document analysis was applied, using Microsoft Excel, SPSS and CAQDAS. Evidence suggests that logistics and mobility planning and the infrastructure adopted has been instrumental in supporting an increase in passenger and cargo volumes. As much as the Durban Aerotropolis development is in its initial stages, there is evidence of socio-economic impacts relating to employment creation, growth in imports and exports and the creation of a competitive environment. The success of the strategy has been attributed to the adoption of novel strategies and concepts that enable improved logistics and mobility planning, connectivity and responsiveness among other critical success factors. This has seen several innovative strategies including roadway expansions, network designs, mobility platforms and many other infrastructural developments being considered for the Durban Aerotropolis.

Key Concepts: Durban Aerotropolis, Porter's Diamond Model, integrated logistics and mobility planning, aerotropolis, aerial, spatial, socio-economic, mobility planning

LIST OF COMMON ACRONYMS

ACI	Air Connectivity Index
ACSA	Airports Company South Africa
AIA	Aerotropolis Institute Africa
AMS	Amsterdam Airport Schiphol
BCG	Boston Consulting Group
CAQDAS	Computer-Assisted Qualitative Data Analysis Software
CBA	Cost benefit analysis
CBD	Central business district
CSF	Critical success factor
CTIA	Cape Town International Airport
DA	Durban Aerotropolis
DAMP	Durban Aerotropolis Master Plan
DC29	iLembe District Municipality area
DFW	Dallas Fort Worth
DTP	Dube TradePort
DWC	Dubai World Central
EDTEA	Economic Development Tourism and Environmental Affairs
GDP	Gross domestic product
GHG	Greenhouse gas emission
HKIA	Hong Kong International Airport
IAS	Integrated aerotropolis strategy
IRTN	Integrated Rapid Transport Network
JIT-L	Just in Time logistics

KSF	Key success factor
KSIA	King Shaka International Airport
KZN	KwaZulu-Natal
LULC	Land use and land cover
MDG	Millennium Development Goal
MEM	Memphis International Airport
MILE	Municipal Institute of Learning
NACO	Netherlands Airport Consultants
NDP	National Development Plan
ORIA / ORTI	Oliver Reginald Tambo International Airport
RET	Radical economic transformation
SANRAL	South African National Roads Agency
SEZ	Special economic development zone
SPSS	Statistical Package for Social Sciences
TBC	Time-based competition
TBL	Triple bottom line
TNIA	Tancredo Naves International Airport
UKZN	University of KwaZulu-Natal

TABLE OF CONTENTS

DECLARATION.....	1
ACKNOWLEDGEMENTS	2
ABSTRACT.....	3
LIST OF COMMON ACRONYMS.....	4
TABLE OF CONTENTS	6
LIST OF FIGURES	13
LIST OF TABLES	15
CHAPTER 1: INTRODUCTION TO THE STUDY	17
1.1 Introduction.....	17
1.2 Background to the study	18
1.2.1 Aerotropolis strategy era.....	18
1.2.2 Strategy adoption	19
1.3 The research problem.....	19
1.4 Research questions.....	21
1.5 Research objectives.....	21
1.6 Conceptual framework.....	22
1.6.1 Logistics strategy	24
1.6.2 Aerotropolis planning	24
1.6.3 Logistics and mobility planning.....	25
1.6.4 Regional competitiveness	25
1.7 Significance of the study.....	26
1.8 Scope and limitations	27
1.9 Structure of the study	28
1.9.1 Chapter 1: Introduction to the study	28
1.9.2 Chapter 2: Aerotropolis strategy era	28
1.9.3 Chapter 3: Aerotropolis developments in developed and developing countries	28
1.9.4 Chapter 4: Evaluating the aerotropolis developments	29
1.9.5 Chapter 5: A review of the Durban Aerotropolis.....	29

1.9.6 Chapter 6: Research methods and approaches	29
1.9.7 Chapter 7: Qualitative data analysis.....	29
1.9.8 Chapter 8: Quantitative data analysis.....	30
1.9.9 Chapter 9: Study findings and conclusions	30
1.9.10 Chapter 10: Recommendations and contributions	30
1.10 Conclusion	30
CHAPTER 2: AEROTROPOLIS STRATEGY ERA	31
2.1 Introduction.....	31
2.2 Aerotropolis strategy defined.....	32
2.2.1 Geographical positioning	32
2.2.2 Spatial cluster.....	36
2.2.3 Distance factor	38
2.2.4 Economic linkages	39
2.2.5 Aerotropolis strategy conceptualised	41
2.3 Aerotropolis strategy conceptual blueprint	45
2.3.1 Level 1: Logistics and mobility planning.....	46
2.3.2 Level 2: Structural elements	54
2.3.3 Level 3: Soft, hard and technological infrastructure	57
2.3.4 Level 4: Critical success factors.....	59
2.6 Aerotropolis strategy development	62
2.6 Conclusion	68
CHAPTER 3: AEROTROPOLIS DEVELOPMENTS IN DEVELOPED AND DEVELOPING COUNTRIES.....	69
3.1 Introduction.....	69
3.2 Aerotropolis precedents	70
3.2.1 Memphis Aerotropolis, United States of America	72
3.2.1.2 Memphis Aerotropolis master plan.....	74
3.2.1.2 Economic impact.....	77
3.2.2 Hong Kong Aerotropolis, China	80

3.2.2.1 Hong Kong Aerotropolis master plan,	81
3.2.2.2 Economic impact.....	83
3.2.2.3 An analysis of demand projections	84
3.2.4 Belo Horizonte Aerotropolis, Brazil	90
3.2.5 Ekurhuleni Aerotropolis, South Africa	95
3.4 Conclusion	100
CHAPTER 4: EVALUATING AEROTROPOLIS DEVELOPMENTS.....	101
4.1 Introduction.....	101
4.2 Advantages of an aerotropolis.....	102
4.2.1 Re-defining economic development	102
4.2.2 Re-defining population migration.....	103
4.2.3 Re-defining the quality of life	104
4.3 Environmental impacts	105
4.3.1 Aerotropolis and sustainable development	105
4.4 Economic implications.....	114
4.4.1 White elephant?.....	114
4.4.2 Cash cow?	117
4.5 Systems and infrastructure integration.....	122
4.6 Conclusion	123
CHAPTER 5: A REVIEW OF THE DURBAN AEROTROPOLIS	125
5.3.1 Economic Development Tourism and Environmental Affairs.....	127
5.3.2 eThekweni Municipality	128
5.3.3 Ndwedwe and KwaDukuza municipalities	129
5.3.4 Dube TradePort Corporation.....	131
5.3.5 Aerotropolis Institute Africa (AIA)	132
5.3.6 Commerce and industry	132
5.4 Durban Aerotropolis Conceptualised.....	133
5.5.1 The New Mount Edgecombe 4 Level Interchange	136
5.5.2 Integrated bus rapid transport network, GO! Durban	138

5.5.3 Just-in-Time logistics	141
5.7 Conclusion	147
CHAPTER 6: RESEARCH METHODS AND APPROACHES	148
6.1 Introduction.....	148
6.2 Statement of the problem and objectives	148
6.2.1 Research problem.....	148
6.2.2 Research objectives.....	150
6.3 Research methods	150
6.3.1 Qualitative research approach	151
6.3.2 Quantitative research approach.....	151
6.3.3 Mixed methods approach	152
6.4 Research design	152
6.4.1 Exploratory research design.....	154
6.4.2 Descriptive research design	154
6.4.3 Case study research design	155
6.5 Research strategy	157
6.5.1 Surveys.....	158
6.5.2 Archival Analysis.....	159
6.5.3 Case study	159
6.6 Population and sample	160
6.6.1 Target population	160
6.6.2 Study site.....	162
6.6.3 Sampling methods.....	162
6.6.4 Sampling techniques applied	163
6.6.5 Sample size	164
6.7 Data collection	165
6.7.1 Secondary data review	166
6.7.2 Primary data collection	169
6.7.2.1 Qualitative data collection: In-depth interviews	169

6.7.2.2 Qualitative data collection: World Café technique	172
6.7.2.3 Qualitative data collection: Focus groups	175
6.7.2.4 Qualitative data collection: Observations	177
6.7.2.5 Quantitative data collection: Online questionnaires.....	178
6.8 Data analysis	182
6.8.1 Qualitative analysis	182
6.8.2 Quantitative analysis	188
6.9 Quality of the research	190
6.10 Ethical considerations	192
6.11 Conclusion	193
CHAPTER 7: QUALITATIVE DATA ANALYSIS	194
7.1 Introduction	194
7.2 Research Participants	197
7.2 Stakeholder insights: In-depth interviews	199
7.2.1 Why is aerotropolis planning essential?.....	199
7.2.2 What factors have informed aerotropolis planning?	202
7.2.3 The role of benchmarking in aerotropolis planning	203
7.2.4 Other issues affecting aerotropolis planning.....	204
7.3 Stakeholder insights: Focus group and World Café sessions.....	206
7.4.1 Growth and connectivity vs Durban Aerotropolis	206
7.3.2 Maximising airport development	211
7.3.3 Creating a competitive regional development.....	214
7.3.4 Guiding and informing urban development	216
7.3.5 Integrate the study area with the broader urban environment.....	218
7.4 Logistics and Transportation factors.....	221
7.5 Conclusion	223
CHAPTER 8: DISCUSSION AND ANALYSIS OF QUANTITATIVE DATA	224
8.1 Introduction	224
8.2 Data presentation	225

8.3 Quantitative research findings	225
8.3.1 Key Issue 1: Evaluating economic growth.....	226
8.3.2 Key Issue 2: Quantifying economic activities	231
8.3.2.1 Demand for aeronautical services and products.....	233
8.3.2.2 Conclusion:	236
8.3.3 Key Issue 3: Durban Aerotropolis users	236
8.3.3.1 Investigating the level and scale of dependence	236
8.3.3.2 User profiles.....	240
8.3.3.3 Conclusion	245
8.3.4 Key Issue 4: Determining the role of logistics and mobility.....	246
8.3.5 Key Issue 5: Economic (growth + development) for an aerotropolis	249
8.4 Conclusion	258
CHAPTER 9: FINDINGS AND CONCLUSIONS	259
9.1 Introduction.....	259
9.2 Research intention.....	259
9.3 Summary of sample profiles	260
9.3.1 Objective 1: The Durban Aerotropolis in context.....	261
9.3.1.1 What is the Durban Aerotropolis?.....	261
9.3.1.2 How does the Durban Aerotropolis optimise socio-economic benefits for KZN?	263
9.3.1.3 How does the Durban Aerotropolis improve regional competitiveness for KZN?	265
9.3.2 Objective 2: Durban Aerotropolis logistics strategy development	267
9.3.3 Objective 3: Durban Aerotropolis logistics and mobility infrastructure.....	271
9.3.4 Objective 4 and 5: Durban Aerotropolis CFSs in context.....	272
9.3.4.1 Porter's Diamond Model of Competitiveness and the Durban Aerotropolis	273
9.3.4.2 The impact of business factors.....	275
9.4 Conclusion	277
CHAPTER 10: RECOMMENDATIONS AND CONTRIBUTIONS	279
10.1 Introduction.....	279
10.2 Contribution of the study	280

10.2.1 Recommendations for government and policy makers	281
10.2.2 Recommendations for planners and strategists	282
10.2.3 Recommendations for aerotropolis planners.....	285
10.3 Limitations of the study	287
10.4 Areas of future research	288
10.5 Conclusion of the study	288
REFERENCES.....	290
APPENDIX A: ETHICAL CLEARANCE	328
APPENDIX B: INFORMED CONSENT	329
APPENDIX C: INTERVIEW GUIDES: IN-DEPTH INTERVIEWS.....	331
APPENDIX D: WORLD CAFÉ AND FOCUS GROUP SESSIONS GUIDE.....	334
APPENDIX E: ONLINE QUESTIONNAIRE	336
APPENDIX F: TURNITIN REPORT.....	341
APPENDIX G: STUDY PERMISSION LETTERS	342
APPENDIX H: PROOFREADER CONFIRMATION	344

LIST OF FIGURES

Figure 1. 1 Aerotropolis planning framework	23
Figure 2. 1 Airport city model	34
Figure 2. 2 Dubai Airport corridor.....	35
Figure 2. 3 Cape Town Airport catchment	37
Figure 2. 4 Global Air networks	40
Figure 2. 5 Aerotropolis model schematic	42
Figure 2. 6 Mobility Planning Cycle.....	48
Figure 2. 7 Aerotropolis network design outline	51
Figure 2. 9 Logistics network planning phases.....	52
Figure 2. 10 Diamond model of competitiveness	63
Figure 3. 1 Memphis Aerotropolis study area.....	72
Figure 3. 2 Hong Kong Aerotropolis master plan.....	82
Figure 3. 3 Amsterdam Airport Schiphol Aerotropolis view.....	89
Figure 3. 4 Tancredo Neves International Airport (TNIA) aerial view	92
Figure 3. 5 Ekurhuleni aerotropolis aerial view.....	96
Figure 4. 1 Integrated Smart City Development	106
Figure 4. 2 Boston Group Consulting matrix.....	119
Figure 5. 1 King Shaka International Airport aerial view.....	135
Figure 5. 2 Mount Edgecombe interchange	137
Figure 5. 3 Durban Integrated Rapid Transport Network design.....	140
Figure 5. 4 Just in Time logistics for the Durban Aerotropolis	142
Figure 6. 1 Research Study Road Map	158
Figure 7. 1 Factors instrumental in the Durban Aerotropolis planning	203
Figure 7. 2 Dube Airport City Aerial view	220
Figure 8. 1 Durban Aerotropolis industry and firm cluster.....	227
Figure 8. 2 Airlines at King Shaka International Airport.....	230
Figure 8. 3 Commodities imported and exported.....	232
Figure 8. 4 Durban Aerotropolis passenger volumes.....	235
Figure 8. 5 Do you make use of the airport city / Durban Aerotropolis?.....	237
Figure 8. 6 User dependence to the Durban Aerotropolis.....	238
Figure 8. 7 Durban Aerotropolis development uses	239
Figure 8. 8 User industry profiles	240
Figure 8. 9 Proximity to the Durban Aerotropolis	241
Figure 8. 10 User organisational status.....	242
Figure 8. 11 Related supporting industries and rivalry	243
Figure 8. 12 How would you describe the location of your market partners?	244

Figure 8. 13 User dependence on logistics and mobility	247
Figure 8. 14 User benefit from aerotropolis infrastructure	248
Figure 8. 15 Evaluating aerotropolis logistics and mobility infrastructure.....	248
Figure 8. 16 Impacts of the Durban Aerotropolis on regional competitiveness	250
Figure 8. 17 Benefits associated with aerotropolis developments	251
Figure 8. 18 Aerotropolis and global competitiveness.....	252
Figure 8. 19 Impact to unemployment	253
Figure 8. 20 Industry influence of the Durban Aerotropolis.....	254
Figure 9. 1 Durban Aerotropolis Aerial View	262
Figure 9. 2 Durban Aerotropolis planning levels.....	270
Figure 9. 3 Durban Aerotropolis integration.....	274
Figure 9. 4 Durban Aerotropolis Layout Strategy	276

LIST OF TABLES

Table 1.1 Integrated aerotropolis planning	25
Table 2. 1 Aerotropolis strategy attributes.....	43
Table 2. 2 Aerotropolis development framework	46
Table 2. 3 Mobility Planning Objectives	49
Table 2. 4 Planning for an aerotropolis network design	53
Table 2. 5 Aerotropolis planning pillars	57
Table 2. 6 Aerotropolis strategy key success factors	60
Table 3. 1 Aerotropolis strategy precedents.....	71
Table 3. 1 Aerotropolis strategy precedents.....	71
Table 3. 2 Memphis Aerotropolis planning elements	76
Table 3. 3 MEM aircraft movements (2000-2004)	78
Table 3. 4 Quantitative attributes of Memphis International Airport	79
Table 3. 5 Belo Horizonte Aerotropolis Masterplan Development Phases.....	94
Table 3. 6 Ekurhuleni Aerotropolis master plan developmental phases	97
Table 3. 7 Total Combined GDP Impacts of (Rm)	98
Table 3. 8 Passenger and Flight volumes for ORIA	99
Table 4. 1 Transport and mobility system challenges related to sustainability.....	110
Table 4. 2 Categories of the Boston Consulting Group Matrix	120
Table 5. 1 KwaDukuza and Ndwedwe Municipality profiles.....	130
Table 5. 2 Passenger volumes for the Durban Aerotropolis	138
Table 5. 3 Review of the Durban Aerotropolis infrastructural developments	144
Table 5. 4 Flight volumes to KSIA	146
Table 6. 1 Study research approaches.....	157
Table 6. 2 Essential steps in document analysis	168
Table 6. 3 Hermeneutics data analysis approach process	185
Table 6. 4 Components of statistical analysis	189
Table 6. 5 Provisions for data quality	191
Table 7. 1 Summary of research methods.....	196
Table 7. 2 Study Participants	198
Table 7. 3 Summary of stakeholder perceptions.....	201
Table 7. 4 Economic growth and the Durban Aerotropolis	210
Table 7. 5 Infrastructural developments for an airport city	212
Table 7. 6 Checklist for the Durban Aerotropolis infrastructure	217
Table 8. 1 Industry value added GDP	231
Table 8. 2 Dependence scale.....	238
Table 8. 3 Summary of user profiles.....	245

Table 8. 4 The Durban Aerotropolis vs economic (growth + development)	255
Table 8. 5 Checklist for the Durban Aerotropolis development	257
Table 9. 1 Durban Aerotropolis strategy critical success factors	277
Table 10. 1 Revised logistics and mobility planning framework.....	283
Table 10. 2 Aerotropolis measurements	286

CHAPTER 1: INTRODUCTION TO THE STUDY

1.1 Introduction

Over the past years the world has transformed into a global market, characterised by an increase in economic integration, transfer of policies, goods, services and knowledge across regional and international borders (Al-Rodhan and Stoudmann, 2006:3). In keeping up with these, countries have invested in the adoption of innovations in logistics models and connectivity platforms in order to facilitate the efficient interaction between global buyers and sellers. This systemic shift has resulted in traditional airports being transformed into strategic areas that can integrate markets and foster improved economic advantages through the various logistics competencies they offer, moving away from viewing them only as transit areas (Norin, 2008). Gleissner and Femerling (2013:3) accede to the important role played by logistics and transportation, which encompasses planning, execution and controlling the movement and placement of goods and services in the global environment.

In South Africa, airports positively contribute to the national economy, having generated R6.2 billion during the 2016 financial year (ACSA, 2016). Additionally, there are associated social benefits that are directly linked to airports, which include an improvement in quality of life and in living standards and their contributions to sustainable development (Air Transport Action Group, 2014). Based on this evidence, planners and researchers have been interested in further identifying how airports can best be strategically positioned and managed so that they operate at optimal level and thus contribute socially and economically (Robbins, 2014:1). As such, ideas and innovations aimed at enhancing the opportunities offered by airports are being explored by various consulting agents and planners. The aerotropolis is one of the key strategies that has gained momentum over the past few years (IATA, 2015). It is considered as a strategy which facilitates the realignment of airports into economic hubs through increasing their scope of activities and through a strategic focus which has the potential of enacting regional competitiveness (Wang et al, 2011:820).

Although the benefits of the aerotropolis strategy are well established, its implementation requires coordinated planning efforts in logistics infrastructure systems and strategies to ensure that airport transportation corridors provide fast, responsive, agile and flexible services for the needs of the end user (Jain and Hailemariam, 2010:4). The strategy is epitomised by the creation of a new city model that is centred on a functional airport. As a result of its stated and

implied benefits, various regions in the world including South Africa have embraced this strategy as part of their future developmental plans. However, this has provoked questions among planners, economists and transport specialists on what exactly the strategy entails, including its viability, feasibility and real contributions to the socio and economic context in certain regions. This study intends to address some of the issues that have been the subject of investigation, particularly around aerotropolis planning. The approach here includes a narration of the aerotropolis strategy and an exploration of how it can be successfully implemented in order to derive optimum socio-economic results. In addition, part of the research focus is on the importance of logistics and how it supports the strategy. This involves an analysis of the various logistics infrastructures and concepts that need to be adopted as part of aerotropolis development. Lastly, the role of policy makers and various stakeholders is reviewed to determine how they influence the adoption and implementation of the aerotropolis strategy.

1.2 Background to the study

There are structural weaknesses¹ in the South African economy that need to be addressed in order to ensure that rapid economic growth, development and transformation is achieved. For instance, collective efforts need to be directed towards upgrading already existing transport infrastructure and networks. Also, further innovations and new infrastructural facilities should be prioritised especially in areas of strategic importance (National Planning Commission, 2014). Being identified as a competitive leader in the region is essential and thus factors including speed, agility and enhanced connectivity have been at the centre of development to attract direct domestic and foreign investment (Goksoy, Vayvay and Ergeneli, 2013:304). Kasarda (2015a:1) observes that only regions that focus on improving business mobility and connectivity through investing in logistics and transportation infrastructure are considered as prime locations and thereby have a competitive advantage over other areas. His argument that maintaining a competitive advantage requires the creation of new integrated business networks has allowed airports to be considered central due to their ability to become cargo and logistics centres that drive the economy (Bagwell and Stager, 2009:12).

1.2.1 Aerotropolis strategy era

The aerotropolis strategy has influenced the development of regions such as Amsterdam, Dubai, Memphis and Hong Kong and has transformed them into notable prime locations with

¹ Structural weaknesses as relate to the challenges experienced by any economy which can be attributed to low productivity, weak export growth, an undiversified export portfolio. These collectively result in sustained deficits in the balance of trade which holistically constrains any country's economic growth (Chikiamco, 2018).

significant economic successes (Callanan, 2016). The success of the aerotropolis strategy in these areas has fuelled its popularity among various governments and the strategy has been recommended and implemented in many other regions throughout the globe. It has also gained recognition because of its ability to foster a competitive business environment and sustainable economic development and growth (Memphis Airport City, 2014:12). It involves the creation of a new city model (urban renewal), which essentially requires coordinated planning and thus calls for a much deeper introspection on matters pertaining to logistics and transportation, real estate, entertainment and sustainability which, when ignored, can result to its failure.

1.2.2 Strategy adoption

As the excitement builds around the aerotropolis strategy, with most governments transforming their international airports into “aerotropoli”, there is a need for deeper insight into the supporting logistics infrastructure and policies that must be implemented in order to realise the benefits of the strategy (Menon, 2014). South Africa in its quest to gain global dominance has embarked on transforming several of its airport hubs. OR Tambo International Airport (ORTI), Johannesburg, Cape Town International Airport (CTIA) and King Shaka International Airport (KSIA), Durban, have been commissioned as potential “airport cities” (Dube Tradeport, 2013). The success of the aerotropolis strategy is however dependent on the support offered by various stakeholders, including government, in terms of policy creation and implementation. Thus, the KwaZulu-Natal (KZN) provincial government has put in place various initiatives aimed at improving the planning, designing, locating, and synergising 21st century multi-modal logistics infrastructure and facilities, as part of building a sustainable aerotropolis (Baroto, Abdullah and Wan, 2012:122).

1.3 The research problem

South Africa is fast changing the way it addresses business development in the context of a growing and competitive global market and the rising threat of competition from other emerging regional economies such as Nigeria, Ghana and Kenya (International Monetary Fund, 2017). On the other hand, the country has struggled with a myriad of socio-economic factors, including growing levels of inequality and unemployment, a decline in investor confidence and deteriorating safety and security, among many other challenges. In response to all these factors, several initiatives and steps have been identified by government, including a renewed commitment to investing in multi-modal logistics and public transport infrastructure facilities by 2030 (National Planning Commission, 2014). Part of the agenda has also been the adoption

of radical economic transformation policies as these are aimed at speeding the extent of economic development and growth.

In principle, the strategy requires the creation of multi-modal logistics platforms to enhance connectivity and optimise mobility (Kasarda and Canon, 2016:5). An aerotropolis is considered an ideal site for time sensitive industries including freight and courier companies, and therefore it is essential for the right combination of logistics models and infrastructure to be set up in order to optimise the benefits of the strategy (Klos, 2014). However, it needs to be acknowledged that, despite the benefits associated with the strategy as evidenced in other regions, it is considered a new development strategy in Africa, and thus there are possibilities for it to be a success or to fail to live up to the intended expectations (Adhya, Plowright and Stevens, 2014:12). Considering that the development of an aerotropolis for South Africa comes at a price, there needs to be an assurance that similar benefits to those realised by Memphis, Hong Kong and Dubai can be easily transferrable to the South African context.

The process of planning, designing and locating an aerotropolis requires excellence in both execution and implementation. Human resource planning, logistics and mobility planning and policy making should be effective and properly coordinated, with the intention of creating economies of speed centred on improved connectivity between various business nodes (Local Economic Development in Airport Catchment Areas, 2014). Applying this strategy successfully to the South African context, given the various challenges and dynamics, means that a specialised approach to policy making, spatial planning and transportation and connectivity planning needs to be prioritised. Several research studies and presentations have provided the blueprint in which the strategy can be adopted, but none of these addresses how such a strategy can be effected in an environment characterised by extraordinary economic realities² such as South Africa. The real problem lies in taking this concept and correctly applying it to the South African context so that it works, which implies ensuring that it generates positive results within the socio-economic context. This study is therefore aimed at better understanding the aerotropolis strategy and how it can be applied in the South African context, including suggesting the various logistics and infrastructure required to optimise its

² The extraordinary economic realities relate to the various factors that distinguish the South African economy from other economies. The main variables include the rising unemployment rate, poverty and the increasing polarisation between the rich and the poor (inequality) which is mainly as a result of the under-educated and under-skilled population. On the other hand, these economic realities have created various social challenges such as crime and corruption which continue to present challenges to the question of broader economic development (Isaac, 1997: 60).

projected benefits. Most importantly, the study also outlines the role of various stakeholders, including government, in delivering a successful strategy.

1.4 Research questions

The research study aims to address the following questions.

- What is the aerotropolis strategy and how does it improve regional competitiveness and optimise socio-economic benefits?
- What are the key decisions and factors considered for airport, urban and business site planning in the development of an aerotropolis?
- What are the logistics and mobility planning strategies adopted in ensuring that the objectives and goals of the aerotropolis strategy are achieved?
- How do spatial and connectivity elements influence the implementation of logistics infrastructure, strategies, and novel concepts during aerotropolis planning?
- What are the key logistics competitive factors associated with the adoption of the aerotropolis strategy?
- How does the diamond model of competitiveness influence the decisions implemented during aerotropolis integrated planning?

1.5 Research objectives

To answer the above research questions, the following research objectives are considered:

- To describe the aerotropolis strategy and how it is dependent, influenced and informed by general knowledge and conventions related to airport, urban and business site planning
- To illustrate how socio-economic factors, demographic realities, and spatial and functional elements form the basis of an aerotropolis logistics planning strategy
- To explore the logistics strategies, novel concepts and infrastructural developments that are being considered in planning and implementing the DA
- To determine and assess the logistics success factors derived from integrated logistics planning contributing to the competitiveness of the DA as informed by the diamond model of competitiveness

- To ascertain whether Porter's diamond model of competitiveness influences the decisions adopted and implemented for the DA integrated planning.

1.6 Conceptual framework

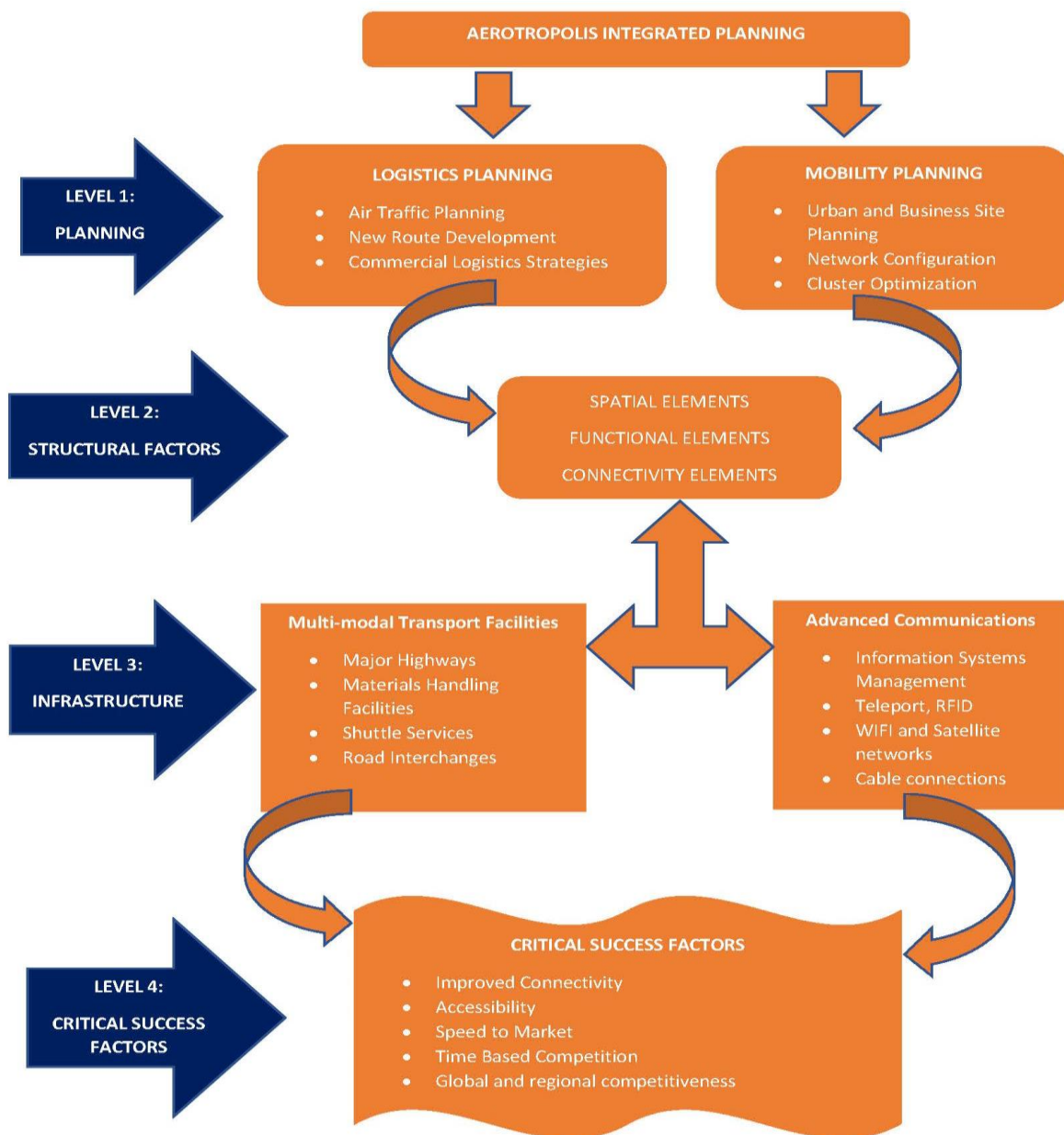
As defined by Yabeeren (2009:4) any research study should be grounded or embedded in either a model or a framework of variables considered as essential in providing a clear understanding of the phenomenon under investigation. The aerotropolis strategy is best characterised by its ability to seamlessly move passengers and goods competitively from one point to another (Klos, 2014). In order to attain this, the emphasis is directed towards adopting logistics infrastructure, models and novel concepts that will support and ensure that the objectives of the strategy are achieved. Given that the aerotropolis strategy has been successfully implemented in various regions in the globe, it is important for a closer assessment to be conducted on these areas for a better understanding (Air Transport Action Group, 2014).

This research study posits that further knowledge and learning on the aerotropolis strategy can be achieved through induction and a bottom-up approach in which various patterns are derived from observation of how it has been implemented in certain areas or regions (Hofstee, 2006). This is in line with the epistemological philosophy³ which suggests that, for knowledge and conclusions about a process to be derived, evidence should be considered to either support or reject the hypothesis. Previous research and evidence tend to have an influence in determining the questions and assumptions adopted for future research, which implies that the constructs adopted for this study are mainly informed by the various decisions adopted (Allen, 2017).

A combination of logistics variables which include the regulation and management of the movement, safety and efficiency of passengers, goods and services in and around the aerotropolis catchment have been used in informing the research framework of aerotropolis related studies (Memphis Airport City, 2014:51). The study will further refer to a set of logistics issues that are influential in the success of an aerotropolis including transportation corridors, transit systems and the transport models and their impact on regions within the socio-economic context. Embedded in the philosophical constructs of the study is the multi-disciplinary nature of aerotropolis planning, which requires efforts regarding logistics and mobility, spatial, infrastructure and social elements planning as illustrated in Figure 1.1.

³ Epistemology is about how we know what we know, it can be collectively discussed as inclusive of all the efforts concerned with acquiring knowledge about reality and on what essentially forms the basis of the knowledge (Ritchie et al, 2013).

Figure 1. 1 Aerotropolis planning framework



Source: (Compiled by researcher)

The variables and linkages that are discussed throughout the study relate to aerotropolis planning and its associated impacts as categorised in four levels of planning as follows:

- **Level 1** emphasises logistics and mobility planning,
- **Level 2** identifies the aerotropolis elements influencing the adopted planning decisions for instance spatial, functional and connectivity elements. These are also considered as key in influencing aerotropolis policy development.

- **Level 3** focuses on the infrastructure implementation involved during aerotropolis planning and this is limited to transportation, communication and mobility facilities that are adopted to facilitate the various activities conducted in the aerotropolis region.
- **Level 4** emphasises the success factors of aerotropolis planning, which primarily represent the set of factors that characterise a competitive aerotropolis region.

The study framework provided in Figure 1.1 emphasises how aerotropolis planning incorporates logistics and mobility planning through the implementation of various logistics infrastructure and concepts with the intention of ensuring that key success factors (KSFs) are achieved for the creation of a sustained competitive advantage. The main paradigms of the research study framework include logistics strategy, aerotropolis planning, logistics and mobility planning, and regional competitiveness, described in turn below.

1.6.1 Logistics strategy

Logistics strategy has the objective of ensuring the minimisation of cost and investment and, at the same time, the maximisation of customer service and profit (Harrison and Van Hoek, 2008:44). The main factors that are considered when determining a logistics strategy include achieving improved customer service levels through facility location, infrastructure and transportation decisions. The competitiveness of any firm, as stated by Stock, Greis and Kasarda (1998:38), depends on changes in logistics capabilities, technologies and the approaches implemented and adopted by the management. For a successful aerotropolis strategy what needs to be adopted is a successful logistics strategy influencing airport planning, multi-modal transportation and urban and business site planning. The planning begins at the strategic level where the overall description and objectives of the aerotropolis strategy are determined by all the stakeholders. Based on these factors, the planning and implementation of the supporting logistics elements are then conducted with due consideration of other influences.

1.6.2 Aerotropolis planning

The logistics approach and strategies adopted for the aerotropolis are informed by structural elements categorised into spatial or functional and connectivity elements. Following Kasarda (2015b), these interdependent variables are described as follows:

- **Spatial / functional elements:** these consist of aviation-oriented businesses and associated residential developments around the airport, stretching outwards along its transport corridors and generating a physically observable form. The individuals and stakeholders active in this spatial set-up depend upon the accessibility and ease in mobility offered by

the connectivity elements to interact with their distant suppliers, customers and other enterprise stakeholders.

- **Connectivity elements:** these consist of connecting infrastructure and facilities, among which are considered air routing, highways, rail systems and surface linkages to ports which provide the aerotropolis with both internal and external accessibility.

It therefore needs to be acknowledged that aerotropolis logistics planning is informed mainly by the spatial and connectivity elements which define the success factors of the strategy. The study therefore focuses on how these have informed the adoption of various infrastructure.

1.6.3 Logistics and mobility planning

For the success of the aerotropolis strategy, the implementation of supporting logistics and mobility infrastructure is essential, which in turn is responsible for driving wealth creation through revenue growth, operating cost reductions, working capital efficiency and fixed capital efficiency (Aerotropolis Milwaukee, 2017). Therefore, urban, airport and business site planning need to be meticulously and efficiently managed through logistics and personal mobility planning. Planning at all levels is essential when a region is considering the implementation of the aerotropolis strategy (Ashford, Mumayiz, and Wright, 2011). This requires the adoption of an integrated approach which considers the creation of a viable development focusing on urban, airport and business site planning, as highlighted in Table 1.1.

Table 1.1 Integrated aerotropolis planning

Urban Planning	Airport Planning	Business Site Planning
Ground transportation planning	Infrastructure and facility planning	Market demand and risk analysis
Land-use planning	Air traffic generation and new routes	Regional development and cluster optimisation
Multi-modal connectivity planning	Airport commercial strategies	Time-cost accessibility

Source: Kasarda and Appold (2014)

1.6.4 Regional competitiveness

The impact of the aerotropolis strategy on regional competitiveness is also a subject of interest that is prioritised in this study. The competitiveness of a country can be defined as the state in which an economy contributes to the well-being of its inhabitants; a competitive economy is characterised by growth, development and other multiplier effects (World Economic Forum,

2008). Porter's diamond model presupposes that the success of a region depends on enabling factors which include factor conditions, demand conditions, firm's strategies, and related industries (1990:56). The diamond model provides a framework in which there is a distinct assessment of the internal competencies that allow a region to be considered to be competitive. The argument by Porter inclines to the belief that it is impossible for a nation to be competitive in all its industries; there is rather a right mix of determinants and factors that allows industries to compete in international markets (Smit, 2012:298). The key factors that influence its competitiveness and thereby position it ahead of other regions include the following:

- **Factor conditions** – these include physical inputs, natural resources, capital, skills and the level of education of the population.
- **Demand conditions** – this refers to a sophisticated and demanding home market which has a potential for future market growth and is also easily segmented in heterogeneous markets.
- **Firm's strategies** – this considers the structure and competitive position of the individual firms. Firm specific factors include culture, values and risk profile among others.
- **Related and supporting industries** – this focuses on the network of partnerships that are forged between businesses and it therefore emphasises the proximity of businesses to their major suppliers and customers.

The above factors are considered essential in contributing to regional competitiveness and therefore this study aims to determine how these have informed aerotropolis logistics and mobility planning. In addition, the emphasis is on providing a framework for the role that needs to be played by airport, urban and town planners, logistics and supply chain consultants together with politicians and investors in relation to implementing a competitive aerotropolis development.

1.7 Significance of the study

The implementation of the aerotropolis strategy sanctions coordinated efforts towards strategy, infrastructure and location planning among multiple stakeholders for the purpose of optimising the socio-economic benefits of the strategy (Kasarda, 2015b). A number of airports have successfully been integrated into "aerotropolis cities" and in an attempt to ensure that South Africa is not left behind in this economic strategy, there has been an increase in studies aimed at identifying how the strategy can be successfully implemented to ensure that global connectivity and competitiveness are achieved. This study aims at ensuring that questions relating to the implementation and application of the "aerotropolis strategy" and its feasibility

in a South African context are clearly understood. Its significance is to provide a detailed assessment and framework for planning, designing, locating and synergising intermodal transportation infrastructure for a successful aerotropolis.

Most importantly, the study is one of the first attempts to determine how the aerotropolis, from a South African, KZN context can be influential in addressing the various socio-economic dynamics of the region. Evidence suggests that strategies like the aerotropolis have been adopted but not properly implemented and thus their intended economic benefits have not been realised. In order to determine where this is the case, the study will further establish the real benefits associated with the aerotropolis strategy (Revello, 2014:55). The emphasis on referring to earlier global aerotropolis regions enables lessons to be drawn and insights achieved from exploring how other regions have successfully implemented the aerotropolis strategy. This will enable purposeful planning to ensure that South Africa is economically viable and competitive. Given that there are emerging economies in Africa that are considering the adoption of similar strategies, the study provides an overview of what the strategy entails, the KSFs and the systems and infrastructure that should be adopted in ensuring that its full benefits are realised, thus providing a blueprint for implementation. South Africa has identified its other main international airports (namely, Johannesburg and Cape Town) as airport cities; this therefore implies that the evidence from this study can be used in making decisions on these other areas.

1.8 Scope and limitations

The scope of this study is limited to the DA, located in KZN. The investigations were aimed at determining how the various logistics systems, infrastructure and novel concepts can optimise social economic benefits for the region. This therefore implies that the findings are reflective of only a single aerotropolis and thus conclusions can only be generalised based on this singular case. However, it should be further noted that the structural conditions of KZN are representative of other regions in South Africa.

Another limitation with regard to the scope of the study relates to the limited number of participants who are familiar with the DA as this is considered a new development. The researcher therefore had a limited number of participants who could provide essential data for the study. Most of the individuals identified are company executives, consultants and academicians, who generally have busy schedules, which was a major challenge when it came to data collection.

1.9 Structure of the study

1.9.1 Chapter 1: Introduction to the study

This chapter provides the blueprint of the study and offers a summary of the important study constructs, which include a background to the research study, the introduction to the research problem, the research questions and objectives and an overview of the philosophical underpinning of the study. The chapter articulates the factors, methods and constructs that will be considered for the research study, which mainly relate to the planning of an aerotropolis involving a multi-disciplinary process.

1.9.2 Chapter 2: Aerotropolis strategy era

This chapter provides an overview description of the aerotropolis strategy with the aim of ensuring that all variables associated with the strategy are described from the perspective of multiple sources. This chapter also presents a conceptual blueprint to the study and identifies the framework that can be considered in adopting the strategy. For instance, mention is made of an acceptable framework in which the aerotropolis strategy can be successfully implemented within the South African context, thus achieving socio-economic benefits for the economy. Therefore, frameworks including Porter's diamond model of competitiveness and other logistics and economic planning models and concepts are introduced. The chapter seeks to provide a practical viewpoint with regard to how the strategy can be successfully implemented.

1.9.3 Chapter 3: Aerotropolis developments in developed and developing countries

This chapter further describes the aerotropolis strategy but places an emphasis on the various regions that have adopted the aerotropolis strategy, particularly Memphis, Dubai, Hong Kong and Amsterdam-Schiphol, Tancredo Naves and Oliver Reginald Tambo international airports. In order to gain a clear appreciation and conception of the strategy, the chapter focuses on the various regions that have implemented the strategy and critically assesses the extent of their success or failure in implementing and managing the developments associated with the aerotropolis. The chapter interrogates the planning frameworks adopted and applied in the development of some leading aerotropolis regions.

1.9.4 Chapter 4: Evaluating the aerotropolis developments

The aim of this chapter is to ensure that the aerotropolis strategy is better understood and this is achieved through reviewing other aerotropolis developments in the globe. The key questions investigated included determining how the strategy has been defined, planned for, and implemented. This chapter also presents the different assumptions and motivations behind the development of the aerotropolis strategy, including a critical review which mainly exposes its strengths and weaknesses. It is mainly based on conducting a literature review of the regions that have adopted the aerotropolis strategy in order to determine how they view it.

1.9.5 Chapter 5: A review of the Durban Aerotropolis

This chapter is aimed at providing a description of the Durban aerotropolis strategy on how it was adopted, and the planning involved. It will provide a historical account to the implementation of the strategy and also review the contents of the Durban aerotropolis masterplan. In addition, emphasis will be on the socio-economic benefits that are projected to be accrued by the region and how these can address the contextual realities of the region. The objective of the chapter is to ensure that the Durban aerotropolis is clearly understood including its associated logistics related initiatives.

1.9.6 Chapter 6: Research methods and approaches

This chapter focuses on providing a blueprint of the research methods of the study. It includes a description of the research design, the data collection approaches, and the data analysis techniques adopted. The chapter further provides a reflection on the study objectives and how these are individually attained. In addition, ethical considerations are also discussed, focusing on how the data was collected from participants and how it was analysed and interpreted.

1.9.7 Chapter 7: Qualitative data analysis

This chapter provides an analysis of the qualitative data sets of the study and thereby provides a description of the Durban Aerotropolis (DA) strategy as provided by the various stakeholders including planners, policy makers and academicians among many others. The chapter further highlights the various steps followed in collecting the qualitative data and the key findings, which are categorised into various themes by means of thematic and content analysis.

1.9.8 Chapter 8: Quantitative data analysis

The aim of this chapter is to provide a summary of the quantitative findings of the study, prioritising the use of descriptive and inferential statistics. The main objectives addressed in this chapter relate to the economic benefits of the aerotropolis strategy that need to be measured mainly using quantitative methods. The findings in this chapter are derived from the online survey and questionnaires distributed to the various participants with a special emphasis on users.

1.9.9 Chapter 9: Study findings and conclusions

The aim of this chapter is to provide a general conclusion based on the qualitative and quantitative research findings. This is achieved through reflecting on the individual study objectives and determining how the data collected responded to these.

1.9.10 Chapter 10: Recommendations and contributions

This chapter focuses on providing recommendations as a result of the inferences stemming from the study objectives. It is essential for the purposes of future research that this chapter focus on determining the way forward regarding aerotropolis planning and implementation in developing countries. In addition, the contributions and limitations of the study will also be presented.

1.10 Conclusion

This study seeks to address questions related to the planning and implementation of logistics systems, infrastructure and novel concepts in supporting the aerotropolis strategy. The aerotropolis strategy promotes ease of access for passengers and cargo and this has been evident for areas that have successfully adopted it such as Memphis, Dubai and Belo Horizonte (Tancredo Naves) and Ekurhuleni (Oliver Reginald Tambo) international airports among others. Logistics planning plays a critical role in the success of the strategy and therefore efforts are invested in designing efficient and effective logistics infrastructure and systems. This chapter has provided a background to the research study, the objectives, motivation and a detailed account of the research constructs that will be used in the entire thesis. The following chapter describes the aerotropolis strategy in detail and its projected socio-economic benefits.

CHAPTER 2: AEROTROPOLIS STRATEGY ERA

“Not every great city will be an aerotropolis, but those cities which are an aerotropolis will be great ones” (Lindsay and Kasarda, 2017).

2.1 Introduction

Chapter 1 provided an overview of the research scope of the study and articulated the research problem and objectives. The intention of this chapter is to provide a holistic description of the aerotropolis strategy through presenting the different assumptions and motivations behind the adoption of the aerotropolis strategy. Additionally, a theoretical and conceptual blueprint for how the aerotropolis strategy could be successfully implemented within the South African context is also provided. The focus is limited to understanding the aerotropolis strategy in relation to economic growth, logistics and mobility developments, socio-economic factors and competitiveness. The frameworks to be considered include Porter’s diamond model of competitiveness, which explores the enabling environment for regional competitiveness.

This chapter specifies the essential questions of the research study pertaining to what needs to be done, how it should be done and why. This will allow for an analysis of how strategy, structure and innovations can be integrated when creating an effective and competitive aerotropolis region. For economic growth and development to be achieved through improvements and developments in airports, the adoption of the aerotropolis strategy has been inevitable (Wang et al., 2011:820). Aerotropolis developments have become popular among town planners, consultants, transportation experts and government policy makers mainly because of their ability to steer a region towards economic growth and competitiveness (Huston, 2015:1). This aerotropolis strategy is currently the subject of discussion and has been flagged for implementation in various regions because it is seen to have been central to the transforming of regions such as Amsterdam, Dubai, Memphis and Hong Kong into economically viable and global logistics centres (Memphis Airport City, 2014:12). However, the successful adoption of any strategy requires the development of a guiding framework to be used as the blueprint for both implementation and evaluation which is addressed in this chapter.

2.2 Aerotropolis strategy defined

The conception of the aerotropolis strategy is primarily the result of work conducted by a renowned air logistics and economics researcher, John Kasarda.⁴ It has been described as a strategy enhancing the constellation of social policy together with economic facilities through coordinated infrastructure and commercial real estate among other developments aimed at improving regional connectivity and competitiveness (Kasarda 2013, 2014 and 2015a). It has been further described as an extension of the metropolitan urban area where it is centred, and which derives economic advantages. However, other researchers and scholars participating in the dialogue have offered different definitions associated to the strategy. This makes it evident that how the aerotropolis strategy has been defined and understood has been primarily influenced by the diverse and multi-disciplinary interests and background of the researchers (Rodrigue, 2017:44). Some of the key terms highlighted in defining the strategy include its geographical positioning, spatial outlay and distance factor which will be highlighted and discussed extensively in the following sections.

2.2.1 Geographical positioning

The decision on where a company or organisation should be located constitutes a large part of strategy development (Chopra and Meindl, 2013:57). The geographical position of a facility has major impacts on the overall risk and profitability of a firm or region. One of the main variables that can easily be considered in defining the aerotropolis strategy relates to its geographic positioning. Kasarda (2016:1) defines the aerotropolis as an area in which the infrastructure, economic activities, land-use, and buildings are influenced by and centred on the geographical radius or precinct of an airport. The strategy is mainly derived by using the airport as the core infrastructure which is surrounded by aviation-oriented businesses and residential or commercial developments and which forms the hub of a cluster of related airport activities (Rodrigue, Comtois and Slack, 2009:56).

From a geographical view point the aerotropolis strategy can be considered as one in which the airport city development encroaches on the metropolitan city through rapid residential and commercial developments (Schaafsma, 2010:151). In an aerotropolis development, there are aviation-oriented facilities and businesses such as business centres, warehouses, distribution

⁴ John Kasarda is currently the director of the Center of Air Commerce at the University of Carolina's Kenan Flagler Business School. He has dedicated the greater part of his career researching on airport developments and has published books and articles relating to airport cities and how aviation infrastructure can spearhead economic development. In the aerotropolis and air logistics realm he is considered as one of the "gurus" (Aerotropolis Business Concepts, 2019).

centres and residential developments, within up to a 20km radius of the airport (Kasarda, 2013:6). In addition, the positioning of an aerotropolis is influenced by the availability of productive land which enables future expansions to take place uninterrupted (Hazel, 2013).

The positioning of an aerotropolis around an airport is one of the elements that should be included when defining the strategy. Further dimensions emanating from its positioning have, however, also been provided by researchers and these include an introduction of the airport city model (Güller and Güller, 2003) and airport corridor (Shaafsma, 2010) each of which can be explored in achieving an understanding the aerotropolis strategy.

- **Airport city model**

The airport city model was founded on the idea that airports, in addition to their aeronautical services, which mainly include air cargo and passenger transit services, can further focus and specialise in non-aeronautical services such as tourism, entertainment and retail among other interests (Kasarda, 2008:1). This means that the airport city model views the airport as having an economic and commercial impact which extends to boundaries outside of the airport region. This model has been adopted by various regions as an urban planning tool aimed at accommodating the population growth and the desired economic growth (Perry and Raghunath, 2013:12). It should be noted that the airport city model has the advantages of ensuring that it opens the economy for potential investments and growth thereby allowing for economic development which contributes to job creation.

The drivers of an airport city include its location within a strategic international and regional geographical space, the connectivity of the airport to other modes of transportation and the availability of land and logistics infrastructure (Raghunath, 2010:35). In summary, the airport city model emphasises the development of businesses within the airport borders ‘inside the fence’, within a radius stretching up to 20km from the airport, as illustrated in Figure 2.1. The notion presented by some planners, such as Revello (2014), Kasarda and Appold (2016) and Reza (2017), is that airports are becoming cities as they are now serve as main centres of employment and transportation, thus providing access corridors to different regions. This is a change from the previous situation of airports being developed as outliers on the edges of cities. An illustration of the airport city model would indicate the area immediately beyond the airport runways which is managed and planned by airport authorities as it lies within their aerial catchment (Correia and Wirasinghe, 2004:4).

Figure 2. 1 Airport city model



Source: Leigh Fishers (2013:35)

- **Airport corridor**

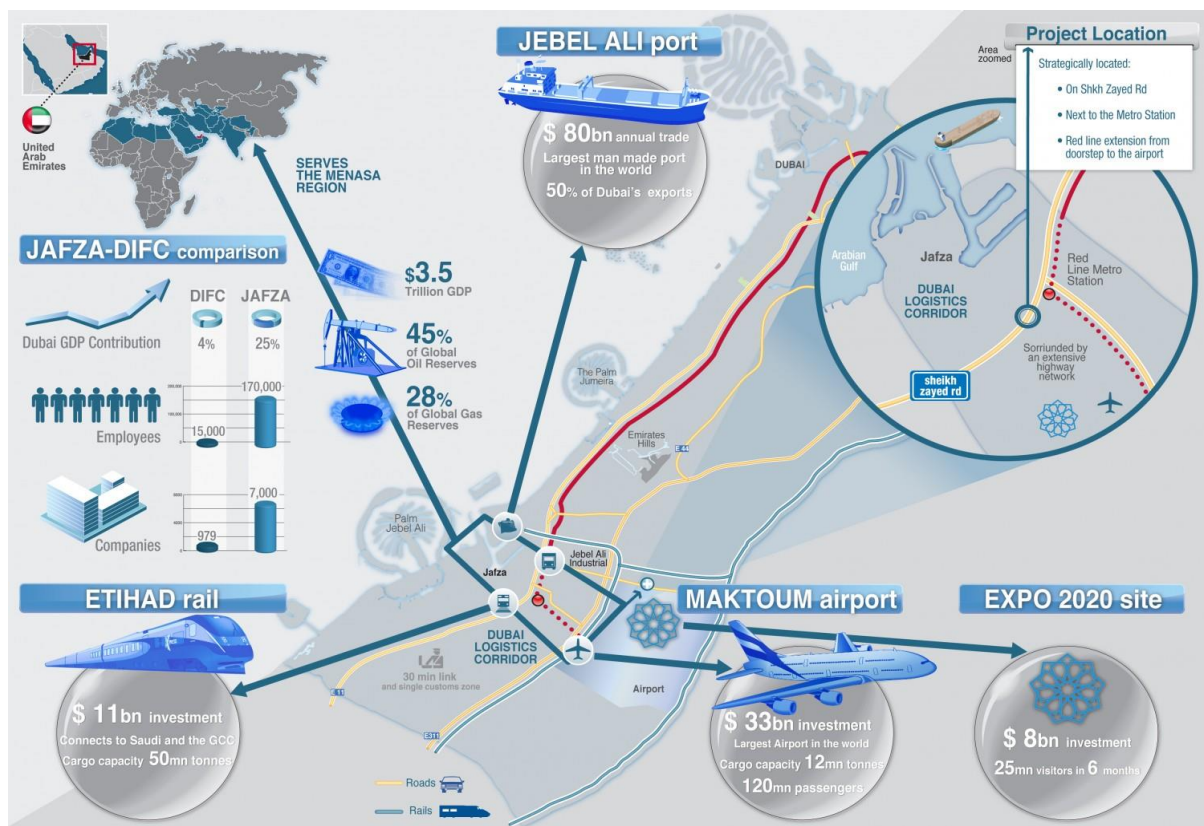
An airport corridor is defined as the primary link of inland nodes to major economic destinations or geographical regions. It involves a series of infrastructure that facilitates the movement of goods between ports, rail stations and airports (Corridor System Management Plan, 2011:1). There are several projects that have been carried out in different major airports that are aimed at ensuring that creation of a new urban design that facilitates connections between airports and metropolitan cities (Robbins, 2014:4). This has been achieved through an urban design encompassing optimised transport access, zoning, density regulations and the integration of existing landscape structures. Correia, Wirasinghe and De Barross (2008:610) observe that an airport corridor involves a series of public and private planned infrastructures that aim to create a conurbation between the airport and the metropolitan city through the creation of residential, commercial, logistical and recreational activities along the highways and railway networks. Freestone and Baker (2011) consider the airport corridor to be a coordinated provision by public and private authorities of infrastructural developments between the airport and the central business district (CBD).

There are several regions that can be used as reference points when defining the airport corridor; these include the highway-oriented corridor of Denver, the transit-oriented airport corridor of Zurich and the city-oriented corridor of Copenhagen (Peneda, Reis and Macario, 2010:7). Along the airport corridor there is a systematic development of logistic parks, business

community (hotels, golf courses, technology parks and conference centres), stadiums and shopping malls, as these are mainly attracted by infrastructure that supports connectivity and timeliness (Perkins, 2010). A corridor that encompasses rail, road, pedestrian and bicycle infrastructure extends the catchment area of transit services. Creating an airport corridor, however, requires coordinated efforts between the government and the private sector as it involves significant investments in infrastructure. As discussed in the Airport Boulevard Corridor Development Program (2014:3), the development of a corridor between the major city nodes and the airport results in an improvement in passenger mobility and allows for easy accessibility. This essentially addresses the challenges associated with traffic flow and thereby reduces transit time.

In order to illustrate the airport corridor as an important foundational concept for the aerotropolis strategy, reference can be made to the Dubai Airport corridor (Figure 2.2), which mainly comprises of a cluster of roads, rail and port channels that are directly linked to the airport (Dubai Airport Company, 2015).

Figure 2. 2 Dubai Airport corridor



Source: Dubai Airport Corridor (2018)

As illustrated in Figure 2.2, approximately \$11 billion has been invested in the railway network through ETIHAD rail and the creation of JEBEL ALI port, which also forms a part of the corridor. What constitutes an airport corridor are the various modes of transportation networks that open the airport ready access from various nodes; it is evident from the figure that roads and rail are the main modes in the Dubai Airport corridor (Dubai Airport Corridor, 2018). It should also be highlighted that the strategic positioning of logistics platforms within the airport corridor is aimed at ensuring ease of access and a reduction in the time and costs possibly incurred by either passengers or cargo.

2.2.2 Spatial cluster

In defining and understanding the aerotropolis strategy spatial, functional and connectivity forms are also considered as essential elements (Kasarda, 2017:2). Spatial form is a representation of the physical observable developments around the airport while functional form provides a description of the role that the airport plays in supporting and enhancing the activities of businesses and travellers who are clustered around the metropolitan cities but are highly dependent on the airport for their daily activities through various connectivity elements (Pisonero, Garcia and Ordonez, 2016:549). A cluster in this case is described as a geographic concentration of infrastructural developments that are interconnected and are directly related to each other (Coetzee and Swanepoel, 2017:2). Porter (1999) is of the view that the creation of clusters results from several factors among which are a desirable location and a supportive business infrastructure. The aerotropolis strategy is viewed as a “spatial cluster” due to its ability to bring together businesses offering complementary goods and services (Rodrigue, Comtois and Slack, 2013).

Spatial elements relate to the observable developments that form around the airport belt, thus maintaining an open connection to the airport corridor (Hanly, 2015:6). Urban planners describe the aerotropolis strategy as an urban form of spatial manifestation which allows the interaction of airport-centred commerce, real estate and multi-modal transportation (Peneda, Reis and Macario, 2010: 8). In order to be classified as an aerotropolis, an area should achieve the required density, access quality and environmental sustainability (Güller and Güller, 2003:1). As also established by Porter (1999) in the theory of maintaining a competitive advantage, various airport locations are categorised in terms of their individual competitive spatial clusters. A study by Prosperi (2007) revealed that Dallas Fort Worth (DFW) and Memphis International Airports exist within a spatial cluster characterised respectively by finance, manufacturing and computer services and by transportation firms. This implies that

the emergence of the spatial cluster will be dependent on the social or economic pull factors (Fernandes and Rodrigues, 2009).

Evidently, the most important attribute defining an airport location relates to the spatial model and how the various infrastructural developments are arranged and land space utilised. This is illustrated in Figure 2.3.

Figure 2. 3 Cape Town Airport catchment



Source: Mokhele (2016)

The aerial view in Figure 2.3 displays the spatial outlay of the Cape Town International Airport within the Cape Town Metro as presented in a study by Mokhele (2016). It demonstrates the arrangement and placement of infrastructure and various services, most notably tourism and leisure facilities and factories, that are within the airport city boundary. Evidently there has been a growth in the mix of land use within the airport region with an increase in diversity, meaning that the boundaries between the airport and its surrounding territories have become blurred, with a combination of hotels, retail malls, factories, leisure facilities and logistics intermediaries (Freestone and Baker, 2011:266).

2.2.3 Distance factor

Regional and global access is widely measured by the time and distance in which a location is separated from key nodes or location points. Rodrigue, Comtois and Slack, (2009:3) provides evidence that the time in which one can travel from the main economic zones, traditionally referred to as urban cities, depends on a variety of factors and ranges from one hour to ten days. This is dependent on factors such as the nature of roads and rail networks, shipping lanes and land cover. According to Rohr and Correa (1999: 233), there seems to be a strong relationship between time and competitive success. Transit time is one of the factors that is considered influential in determining the competitiveness of an area as it influences inventory carrying costs, inventory cycle time and the costs of transportation (European Research Council, 2018). Therefore, it has been observed that, for cargo that is of high value and perishable, the preferred transportation option is the one that is considered fastest in terms of time and that follows the shortest possible route (Grubb and Ellis, 2014:1). Areas that have been identified as having an advantage of accessibility due to their regional and global freight flows provide the best distance and time advantages for business and consumers. However, these areas are also prone to challenges that relate to traffic congestion (Rodrigue, Comtois and Slack, 2009:22).

Distance from the airport to the other business nodes within its cluster is considered an order qualifier.⁵ In this context, the emphasis is on accessibility in terms of time and distance from the nearest metropolitan area and how it is connected to other essential aeronautical services. As highlighted by Kasarda and Appold (2014:4), the aerotropolis strategy mainly provides an airport city as its core, with a series of aviation linked businesses stretching for up to 32

⁵ Order qualifiers according to Jaller and Ullstrom (2008) are the variables or factors that form part of the criteria that an organization should meet in order to be considered by potential customers. This criterion ensures that the organization is considered as being better than its competitors and thus can gain market dominance.

kilometres, which translates to approximately one hour of travel time (Hanly, 2015:8). The distance and time factor can also be discussed in the context of the positioning of airports, which is influenced by the projected benefits to be derived. For instance, the positioning of many airports, including Memphis, Guangzhou and Paris Roissy-Charles de Gaulle, is strategic as they are at the nexus of economic activities and supported by world class infrastructure and extensive transport links (Freestone and Baker; 2011:277). The nearness of an aerotropolis to a metropolitan city (city centre) translates to shorter transit times and allows both passengers and goods to easily access the facility (Rodrigue, Comtois and Slack, 2013:34).

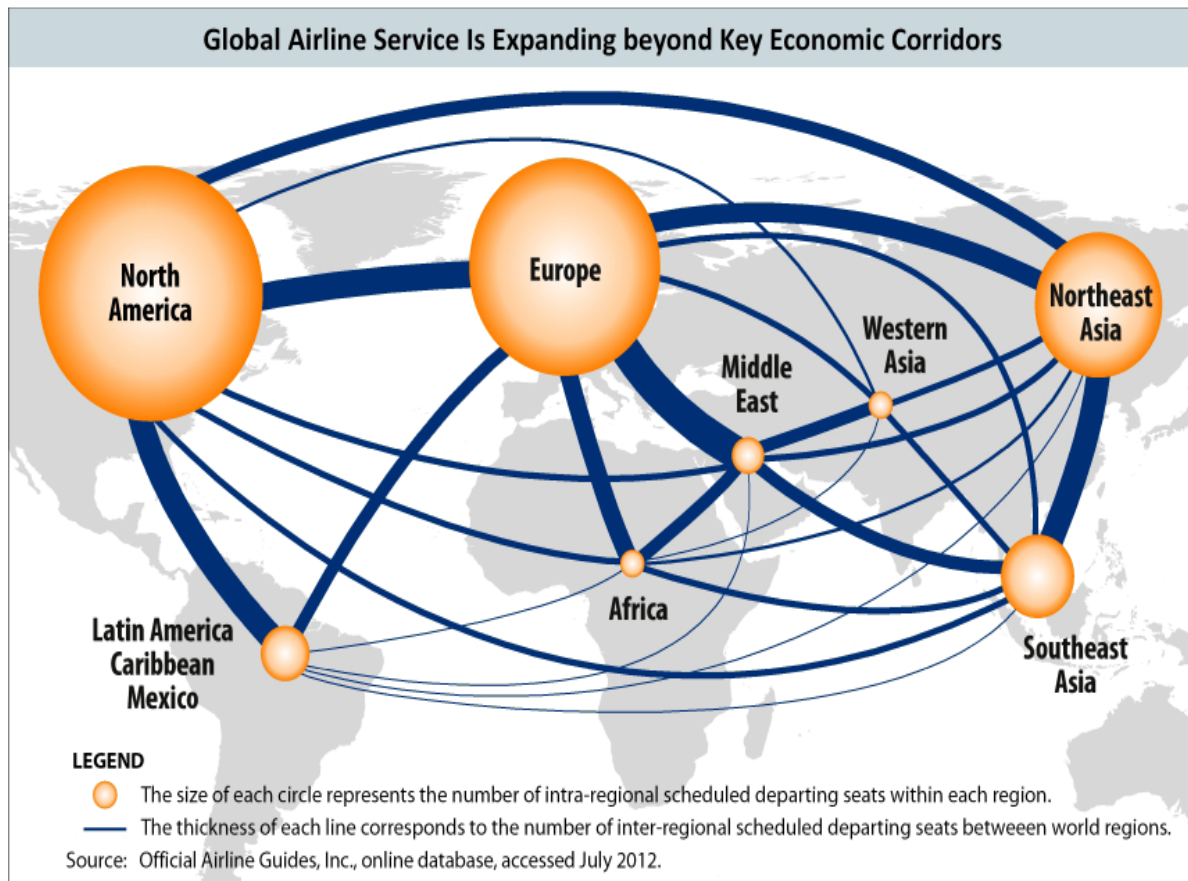
An aerotropolis presents a convenient and tolerable commuting distance as evidenced by already existing aerotropoli such as Dubai International, which is 4.6 kilometres from Dubai, Memphis, 11.2 kilometres south of Memphis, and Schiphol, located 9 kilometres from Amsterdam (Schaafsma, 2010:12). Many of researchers including Rohr and Correa (1999) have argued that time offers a source of competitive advantage even though there is little empirical evidence that can be used to back this assertion. The idea is that time-based competition (TBC), often understood as referring to competition expressed in response time, becomes more important when delivery time is a criterion for a business (Ashford, Mumayiz, and Wright, 2011). Given the findings related to time, there is an inclination to view distance and time as essential in defining the aerotropolis strategy as there is always the strategic thrust of minimising response time.

2.2.4 Economic linkages

In further describing the aerotropolis strategy, (Kasarda, 2013:3) brands it as representing the physical manifestation of globalisation that has been attained through the alignment of aviation-oriented, airport-centred residential and business developments where most of the local business units are dependent on distant suppliers and customers rather than those in their own regions. According to the Ekurhuleni Municipality (2012:9), the aerotropolis model is one that enhances municipal and provincial success through improved multi-modal access and aviation-linked business developments that effectively make the airport, the city and the province better connected, as well as more economically efficient, attractive and sustainable. Tuero et al. (2017:1030) summarise the strategy as comprising an area that has its economy centred around an airport and thus serves as the economic engine of the area. This seems to be a consistent view among economists and policy developers of the aerotropolis strategy as they view it simply in terms of its ability to facilitate the clustering of economic activities in and around the airport precincts (Burghouwt and Redondi 2013:40).

As highlighted in Figure 2.4, the ease of interaction of markets (businesses and customers) influences global trade and capacity flows. Africa's biggest trading partner is Europe and thus there is evidence of the constant flow of goods and services.

Figure 2. 4 Global Air networks



Source: Padgett and Powell (2012:2)

There has been an increase in the world's inter-regional airline capacity and the inter-regional trade figures for Africa have been increasing by an average of 7.1% per year (World Trade Organisation, 2016), dating from the year 2000. Figure 2.4 also shows that Europe trades with other regions including North America, Northern Asia and the Middle East. It is essential to note that these figures are poised to increase over time and thus there is a need to ensure that correct measures are implemented to support this growing demand (Hoffman and Hellstrom, 2008). It is estimated that approximately one third of the value of international trade is comprised of goods and services that are transported via air transport and this makes the aerotropolis strategy important in fostering economic advantage (Hancock, 2011:1). Since these figures are expected to triple over the next 18 years, the aerotropolis strategy is expected to be foster sustainable solutions and economic benefits.

Rogerson (2005:75) describes the aerotropolis strategy as an economic development concept designed to improve regional competitiveness. It is primarily about taking advantage of all the opportunities offered by an airport which result in extensive infrastructural developments and commercial land use that stretch for a radius of more than 30km or more from the airport. The regions that have enjoyed economic benefits because of implementing the aerotropolis strategy include Amsterdam, Chicago, Dubai, Memphis and Singapore among others (Kasarda, 2015b:1). Without any doubt, the emergence of airport cities has been driven by the need to create businesses and regions that are time sensitive and that are able to respond to the dynamic global demand.

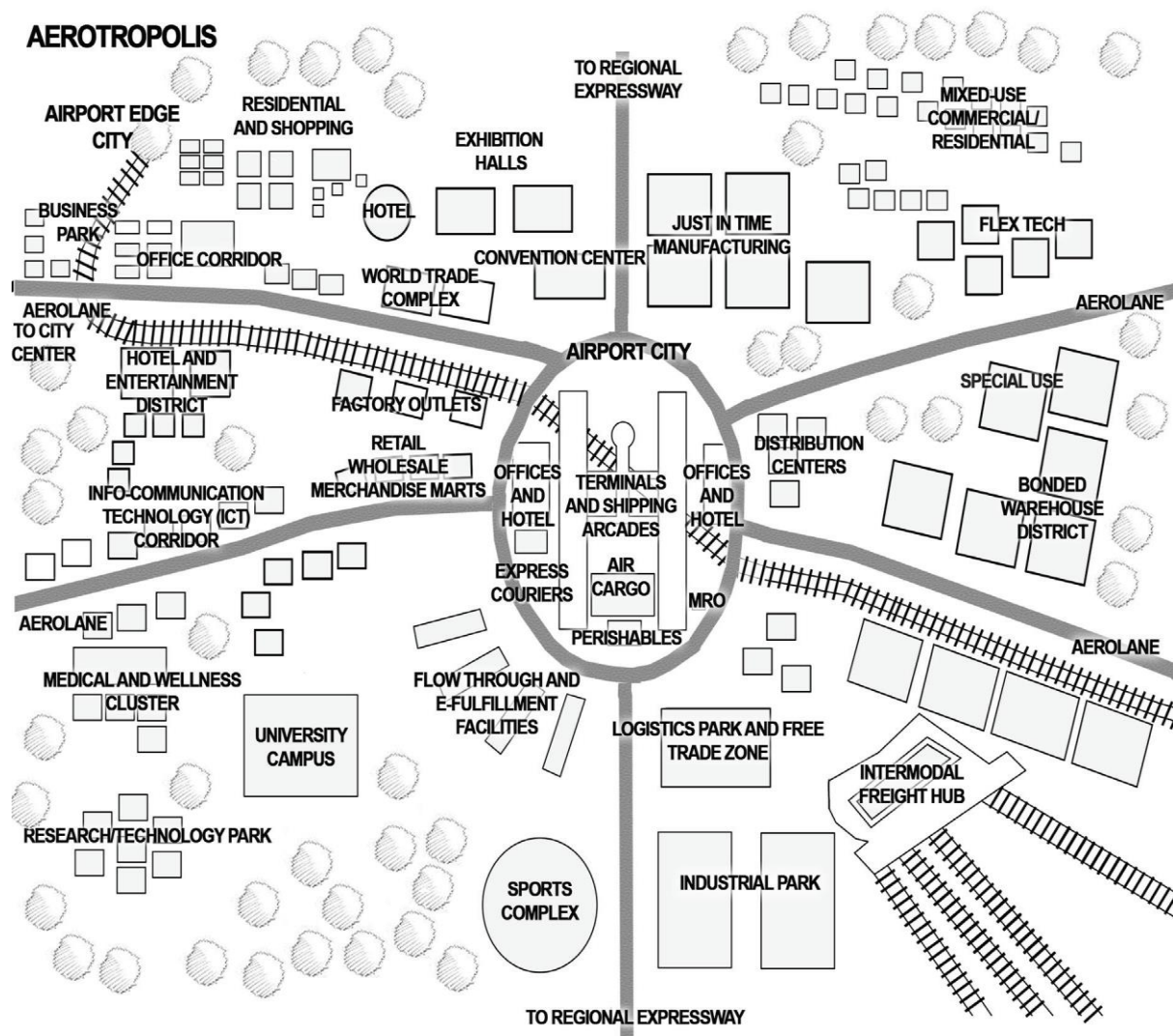
2.2.5 Aerotropolis strategy conceptualised

Based on the discussions above of some of the factors that are essential in defining the aerotropolis strategy, it is evident that the aerotropolis strategy can be viewed from a multi-discipline perspective. The aerotropolis strategy is best illustrated in Figure 2.5, in which all the variables defining the concept are highlighted, namely the geographic dimensions or positioning, spatial outlay, distance factor and the economic linkages. The broad definition of the aerotropolis strategy incorporates different variables which are essential in identifying the environment in which it successfully operates and the main benefits that it provides to the area in which it is adopted (NSW, 2019:23). The development of the strategy is mainly credited to the advantages that it provides to businesses in the long term (Chopra and Meindl, 2013). An aerotropolis is a city built around an airport, so that the surrounding businesses are supported through enhanced connectivity to their suppliers, customers and competitors (EDTEA, 2017:3). The strategy is primarily focused on the development of an airport and can follow three developmental stages:

- airport cities growing outside of terminals,
- cities growing towards the airport, and
- cities following ground transportation corridors.

The development of the strategy is a result of airports being viewed as more than passenger relays but rather as economic engines and hence over time having attracted multiple business activities and having involved careful planning (Robey et al., 2010:13).

Figure 2. 5 Aerotropolis model schematic



Source: Greis and Kasarda (1998)

Having examined the various factors associated with the aerotropolis strategy, it is essential to provide evidence for how these factors have influenced its development in some of the areas that have successfully adopted it, as illustrated in Table 2.1. In particular, the analysis includes reviewing the areas in terms of infrastructural developments, distance factors and land use.

Table 2. 1 Aerotropolis strategy attributes

	ATTRIBUTES			
Aerotropolis (Main Airport)	Feeding Urban Centres and Average Travel Time (hours) and Distance (km's)	Land Used/ Terminal Size/ Capacity	Key Infrastructural Developments	Major Economic Activities
Hong Kong International Airport	Hong Kong City (24 minutes)	550 000 square meter terminal	\$20 billion project (1992). Express trains, Ferry links to Kowloon, Hong Kong and mainland China	Hotels, Extensive Commercial and freight facilities
Tancredo Neves International Airport (TNIA)	Belo Horizonte (39km, 44 minutes)	54000 square metres terminal and has a passenger capacity of 5 million.	Features a 3000m long runway and is capable of accommodating 17 aircrafts simultaneously.	Medical services, pharmacies and baggage handling facilities.
OR Tambo International Airport	Ekurhuleni, Johannesburg (26 km, 20 minutes)	28 million passenger capacity	Gautrain, Tambo Springs Logistics Gateway	Hotels, Logistics hubs and Office parks.
Dubai International Airport	Dubai city centre (5 km)	25 million passengers	Dubai Airport free zone, Cargo Village, Passenger terminals, Mega Cargo terminals, Rail connections to the city	Health clubs, hotels, Logistics and transit activities

Schiphol Airport	Amsterdam (17 km, 15 minutes)	58 million passengers per annum	Fast rail connections	Office complexes, hotels, logistics park, Museum, 58 000 people employed, 450 000 aircraft movements (2015)
Memphis Airport	Memphis Metropolitan (20-30 miles)	63,5 million passengers.	Planned bus rapid transport (BRT) providing regional mobility and major roadways connected to the main city	Logistics Hub, Tourism and Medical Health services, 322 direct worldwide destinations

Source: Researcher's own construction

2.3 Aerotropolis strategy conceptual blueprint

As observed by Kasarda and Canon (2016) and Carmo, Silva and Baltazar (2019), the aerotropolis strategy is characterised by its ability to seamlessly facilitate the effective movement of passengers and cargo from one node to another within the confines of an airport city at the least possible time and cost. Despite the popularity of the strategy, it has been noted that implementing it requires a myriad of systems and processes which encompass the adoption of logistics infrastructure and the application of novel models and concepts (Graham, 2004). These concepts are aimed at ensuring that the strategy delivers based on the expectations. As defined by Yabeeren (2009:4), a conceptual framework represents a network that is comprised of interlinked concepts that provide a clear understanding of the phenomenon under investigation, with the major concepts included in the framework playing an important role in determining the relationships among the key factors, variables and constructs identified as essential for the study.

The conceptual framework applied in this study provides a possible description of how logistics strategy, structural elements, infrastructural developments and models can be closely integrated and applied in the context of developing an economically viable and competitive aerotropolis (Greis, 2011:14). Logistics is one of the variables that is considered essential in influencing the success of the aerotropolis strategy. As articulated by Stock, Greis and Kasarda (1998), logistics is well positioned to assume the sole responsibility for providing a bridge between strategy and structure within a rapidly transforming urban environment. Considering that most of the activities around the aerotropolis depend on logistics planning, the framework therefore includes variables that inform the regulation and management of the movement of both passengers and cargo efficiently within the aerotropolis catchment (Memphis Airport City, 2014:51). In addition, some of the variables actively considered in building the conceptual framework include models that have been developed from a logistics context and that are instrumental in the alignment of transportation corridors, transit systems and transport models to suit the requirements of the aerotropolis strategy.

Porter's diamond model, is one model that has been considered in describing the aerotropolis strategy and it presupposes that strategy success depends on enabling factors such as factor conditions, demand conditions, firm's strategies and related industries (Porter, 1990:56). The diamond model provides a framework in which there is a distinct assessment of the internal competencies of the aerotropolis strategy that will allow a region to be considered competitive.

The argument by Porter relates to the notion that it is not possible that all the regions in a nation be considered to be competitive; instead there is a right mix of determinants and factors that allows a region to be competitive and to successfully make its way to the international markets (Goksoy, Vayvay and Ergeneli, 2013:308). Some of the factors closely linked to competitiveness include factor conditions, demand conditions, firm's strategies and related supporting industries. These factors are considered at the different levels of the aerotropolis framework.

Against this background, the conceptual framework comprises four constructs, which provide the basis of aerotropolis strategy development, planning and implementation and at the same time provide direction on the innovations and concepts to be adopted, as shown in Table 2.2. The aim of the study is to determine how socio-economic benefits can be optimised through the adoption of logistics systems and infrastructure. In order to determine how this can be achieved, a four-step framework will be considered, as highlighted in Table 2.2.

Table 2. 2 Aerotropolis development framework

Level 1: Logistics and mobility planning	Level 2: Structural elements
This level focuses on the integration of constructs that are essential to ensuring that the movement of people, cargo and equipment is properly planned and regulated within the aerotropolis.	This level considers the various structural elements that have a significant influence in the way the aerotropolis is designed. These include an emphasis on the spatial, physical, environmental, functional and connectivity elements.
Level 3: Physical and technological infrastructure	Level 4: Key success factors
The emphasis for this level is to facilitate the consideration and implementation of physical and technological infrastructure essential for an aerotropolis development to be fully functional.	This level provides the metrics for measuring the success of the aerotropolis strategy and its related developments. It considers the expectations of all the stakeholders, especially the customers, and ensures that continuous improvement is holistically emphasised.

Source: Researcher's own construction

2.3.1 Level 1: Logistics and mobility planning

Logistics and mobility planning serve as a link that integrates and synchronises the network of partners and processes involved in a system (ASEAN, 2014). In this study, the aerotropolis is considered as a system involving multiple partners, stakeholders, processes and infrastructure whose existence depends on the functionality of an airport. Logistics thus provides a link between the elements of the aerotropolis and its role is to create value through its ability to time and position

people, cargo and supplies (Cheong, Bhatnagar and Graves, 2015). This can be achieved by ensuring that the systems regulating transportation, warehouse management, materials handling, and packaging are properly implemented and managed (Greis, 2011:3). Mobility, on the other hand, as defined by Handy (2005:430), is the quality of being able to move and be moved using assistance or transportation. Webber, Porter and Menec (2010) define mobility as a variable that reflects one's ability to travel from one place to another without any restrictions or hinderances. Suen and Sen (2004) in their definition include the notion of being informed with regard to travel options and how to use them as well as the means to pay for them. From an aerotropolis perspective, mobility planning encompasses all the initiatives that are aimed at improving the potential for movement, a direct reference to the ability of people, cargo and supplies to be got easily from one place to another (Hanly, 2015:15).

Logistics and mobility planning have become one of the essential factors responsible for driving the aerotropolis strategy. Logistics and mobility planning are mutually inclusive and have common measurement metrics that can be used when considering strategy development and adoption. For instance, in transportation planning, mobility is considered an essential metric; actual movement is a factor in determining mobility and can be measured through considering the number of trips made and the total distance travelled (Litman, 2011a:4). Strategies adopted to influence mobility are also directly aimed at contributing to accessibility and making it easier for people, cargo and supplies to reach destinations. Los (2007), Litman (2011b) and Alba (2003) argued that within one area there can be evidence of both poor mobility and good accessibility; for instance, there can be high congestion while at the same time residents reside closer to essential facilities and desired destinations. Macdonald and Grieco (2007:5) posit that good mobility is neither adequate nor a necessary condition for good accessibility. To determine how planning can be conducted for an aerotropolis, the essential primary variables that need to be included in the framework relate to logistics and mobility planning, which are considered as Level 1 factors. They tend to have an impact on the other levels of the framework as is illustrated in sections 2.2.3 and 2.3.4.

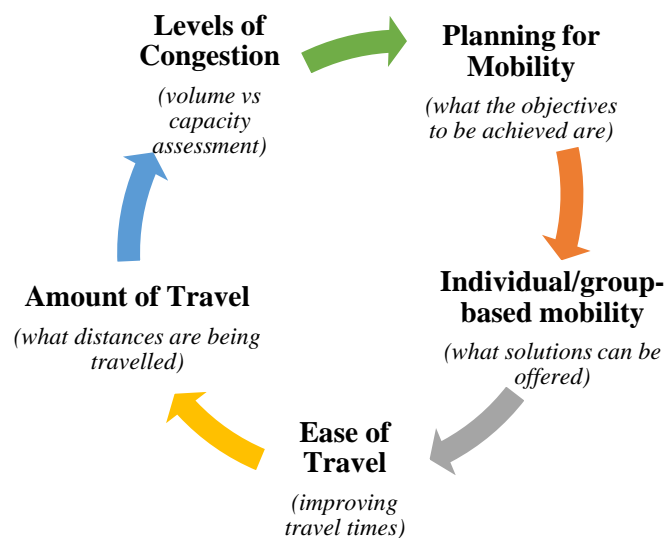
- **Mobility planning in context**

One of the key goals of an aerotropolis is to ensure improved accessibility and ease of movement around the airport region, achievable through the adoption of relevant mobility models, strategies and concepts (Handy, Cao and Mocktarian 2005:430). Planners and policy makers have prioritised

achieving improved mobility and logistics excellence through considering the application of novel concepts rather than purely focusing on end results that seem to vary from one place to another depending on the prevailing conditions and environment (Interreg Central Europe, 2017:4). A mobility plan can be described as a user-centred roadmap defining the long-term vision for regulating, planning and controlling movements within the region. It outlines the strategies and concepts that will be adopted holistically to achieve its objectives (Litman, 2011a). The plan tends to prioritise the attainment of sustainable and inclusive mobility for all people and thus involves the development and upgrading of pedestrian facilities, non-motorised transport measures and public transport systems, including buses and sustainable BRT systems (UNHABITAT, 2013). It also can be considered as a blueprint designed to satisfy the mobility needs of people and businesses in and around the aerotropolis region.

In planning for mobility, input factors that need to be considered include an analysis of demand projections and the nature of activities that will be conducted. The activities include the current and future volumes to be managed to determine which mobility enhancement tools and systems to adopt (Czepkiewicz et al, 2016:20). Researchers from UNIHABITAT (2013) and Handy et al (2005) put together a mobility planning cycle and categorised it as a five-stage cycle, as shown in Figure 2.6, which can be incorporated in planning for an aerotropolis.

Figure 2. 6 Mobility Planning Cycle



Source: UNIHABITAT (2013)

The mobility planning cycle involves a variety of initiatives spanning from clarifying the objectives to creating solutions, as well as identifying further initiatives that could be adopted as the process changes from time to time (Handy, 2003:23). Mobility planning should be people-centred and must involve an integrated plan that focuses on infrastructure design and on the users (Wafering et al, 2014:9). Therefore, planning should include a focus on socially equitable accessibility, promotion and improvement of public and non-motorised transport options, establishing an effective means of integrating land use and transport planning, as summarised in Table 2.3.

Table 2. 3 Mobility Planning Objectives

PLANNING VARIABLE	DESCRIPTION
Creating socially equitable accessibility	Designed to address the needs of the poor and the vulnerable and ensure that the public modes of transport are safe as well as financially viable and geographically placed closer to users (Wafering et al, 2014)
Promoting and improving public and non- motorised transport options	An emphasis on the introduction of environmentally friendly modes of transportation, which will result in a reduction in the number of vehicles on the road and in the cutting down of pollution and congestion and will also prioritise the improvement of road safety (Halkias, 2014)
Establishing an effective means of integrating land-use and transport planning	Involving options and initiatives that are aimed at integrating residential and commercial transport and mobility developments in order to influence positively transportation and logistics plans consistent with the aerotropolis (Hautala et al, 2014:11)
Creating a multi-modal strategy	An emphasis on ensuring that all the modes of transport are equally considered and are optimally adopted within the aerotropolis context to achieve the stated goals (Czepkiewicz et al, 2016:23)

Source: Researcher's own construction

- **Logistics planning in context**

A logistics strategy involves a set of initiatives designed to ensure that objectives such as the reduction of operational costs and maximising of customer service are collectively achieved (Harrison and Van Hoek, 2008:44). A logistics strategy provides a guide as to how the stated objectives might be achieved through focusing on decisions such as facility location, infrastructure and transportation (Glistau, Schenk and Machado, 2015:4). Stock, Greis and Kasarda (1998:38) further acknowledges that regional competitiveness is influenced by the advancements in logistics capabilities and technologies that are deemed important for an aerotropolis development.

Logistics planning begins at a strategic level, where the overall description and objectives of the aerotropolis strategy are determined. The planning and implementation of the supporting logistics elements is then conducted with due consideration of other influences (Malmborg and Richardson, 2000:4). Some of the supporting initiatives that can influence efficiency within the aerotropolis region include coordinated efforts in airport planning, multi-modal transportation initiatives and business site planning. The logistics performance index suggests a number of factors for a logistics strategy, including the quality of transport related infrastructure, ease of arranging competitively priced shipments, competence and quality of logistics, ability to track and trade consignments and timeliness, representing the frequency with which shipments reach their final destination.

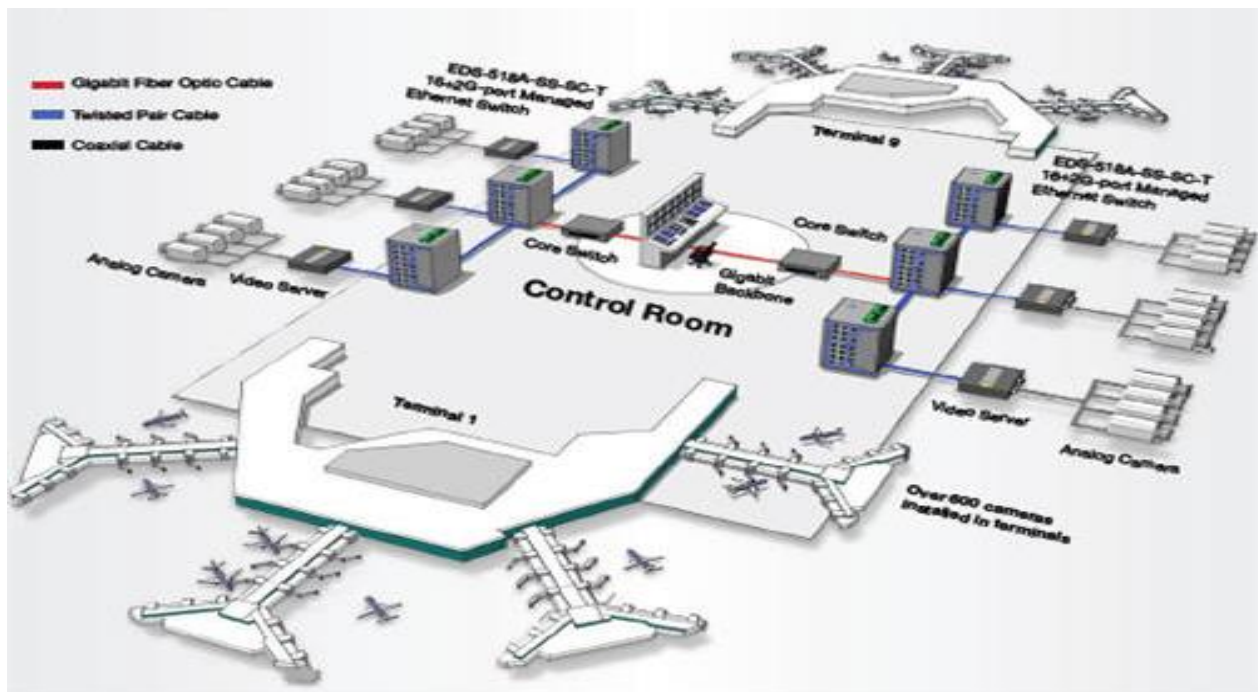
Logistics serves as a mechanism that integrates the organisation's geographically dispersed stakeholders and elements. From a global perspective, successful airport cities are measured by their ability to provide fast, flexible, reliable and responsive services in line with customer needs, mainly through the use of advanced information technology and high speed transportation, which are attributes of a successful logistics system (Du and Bergqvist, 2010:1). The role that logistics plays is to ensure that connectivity, speed and agility are attained to satisfy customer requirements for a competitive offering. Kasarda and Appold (2006) posits that the ability to meet customer demand can be realised through the existence of a ground-to-air shipping network, consisting of air cargo carriers, trucks, freight forwarders and logistics providers.

A successful logistics strategy depends on a collective of initiatives that are aimed at improving the movement and mobility of people and materials into and outside of the designated region (Glistau, Schenk and Machado, 2015:10). One initiative involves an emphasis on the logistics network design, which focuses on how nodes are efficiently and economically dispersed within a certain area. The network design mainly addresses the facility location problem, which consists of a set of potential facility or infrastructure sites and a set of demand points that must be selected with the goal of selecting sites that will minimise the distance between the demand point and facility site (Qian, 2004:4). In logistics planning, the design of the network tends to influence the level of success and thus should be given priority.

- **Logistics network configuration**

The success of the aerotropolis strategy also depends on how the logistics and supply chain network is designed, relating to the linkages and connections between the airport and the various facilities and infrastructure (Cheong, Bhatnagar and Graves, 2015:2). Logistics network configuration is concerned with managing and determining how facilities such as warehouses, production plants, and administrative offices among others are clustered within the aerotropolis region. This also further emphasises the allocation of key customer service areas and how they are integrated, with the objective of ensuring that the optimal design is able to deliver the products to the customer at the least possible time and cost (Melo, Nickel, Saldanha-da-Gama, 2001). Designing a logistics and supply network is often considered a complex task since it requires an analysis of the customer, products and services to be manufactured as well as demand projections and information about future conditions, data that is often difficult to generate (Li and Schulze, 2011:2). As illustrated in Figure 2.7, the network design within an aerotropolis focuses on positioning facilities efficiently and economically to enhance mobility and logistics activities. It also encompasses how the various locations and facilities exist within a common network, which is usually manned through internet and cable connections.

Figure 2. 7 Aerotropolis network design outline

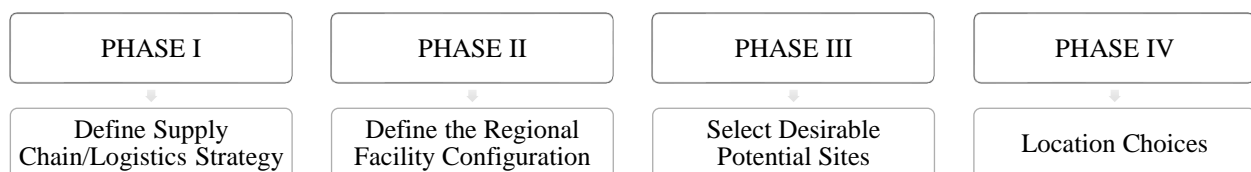


Source: Florres-Fillol, Garcia-Lopez and Nicolini (2013)

In designing a logistics network, the usual aim is to ensure that profits are maximised while prioritising the meeting of customer needs through an emphasis on TBC,⁶ responsiveness⁷ and flexibility⁸ (Lee et al, 2013:806). The attainment of logistics systems that are efficient and sustainable has led to the need for planners to invest in planning efficient distribution systems which provide solutions to facility planning problems. For instance, a review of the Memphis aerotropolis region displays how facilities have been optimally located, resulting in improved accessibility. This has also resulted from the flexible transportation facilities adopted that have strengthened its regional and global competitive position (Memphis Aerotropolis, 2014:7).

Notably, the design of a network is considered an essential element for an aerotropolis development. It involves an analysis of how various facilities are clustered within the aerotropolis region and how they are connected to the transportation platforms. A myriad of network design approaches are available in the literature, including deterministic analytical models, stochastic analytical models, economic models and simulation models, all of which have the objective of ensuring that all locational decisions are correctly implemented (Selim and Ozkarahan, 2008:401). For the purposes of this study, the adoption of a model suggested by Chopra and Meindl (2013:127), which comprises creating a network through four stages, will be applied. The phases, displayed in Figure 2.9, emphasise the various steps and processes that should be considered ahead of selecting the ideal location, and these are easily applied to the aerotropolis concept.

Figure 2. 8 Logistics network planning phases



Source: Chopra and Meindl (2013)

⁶ The concept of TBC is one that involves efforts by various organisations to compress the time that it takes for them to fulfil customer needs, including a reduction in the time it takes to develop and launch a new product and to deliver it to the end customers; approach involves the adoption of strategies and the implementation of decisions affecting speed and also investments that eliminate the time it takes to complete a task (Demeter, 2013:1533).

⁷ From a systems thinking perspective, responsiveness is defined using both the customer and marketplace as the main subjects, referring to an organization's ability to react purposefully to customer or market needs within an acceptable time scale to bring about or maintain a competitive advantage; it also encompasses the organization's ability to detect and fulfil the customer needs within acceptable timelines determined by market forces (Holweg, 2005:604-605).

⁸ Flexibility relates to the ability to respond to change driven by market forces, adjusting to suit the current conditions; the term has been used interchangeable with other concepts such as adaptability and responsiveness (Magalhaes, Rech and Moraes, 2017:187).

One of the success factors determining the competitiveness of an aerotropolis region relates to the placement and location of facilities and infrastructure. Achieving this requires a step-by-step process which should be consistently applied by planners and policy makers. Rather than discussing a model, the idea is to provide a blueprint for how an ideal network can be attained. Table 2.4 describes and illustrates how these processes fit into the broader aerotropolis logistics and mobility planning framework.

Table 2. 4 Planning for an aerotropolis network design

<p>AEROTROPOLIS LOGISTICS NETWORK DESIGN PHASES</p> <p>Phase I: Definition - The objective of this phase is to define the broad logistics and / or supply chain strategy which will then influence the steps taken in achieving the broader strategies. The factors that need to be considered in this phase include;</p> <ul style="list-style-type: none"> • Studying the level of competition (global and local competitors) • Identification of possible constraints and how these can be overcome. <p><i>This phase mainly identifies the KSFs of the development, for instance it ensures that expectations are be clearly stated.</i></p> <p>Phase II: Analysis - This phase is concerned with the identification and analysis of the locations for facilities / infrastructure, their potential roles and approximate capacity. The key activities include:</p> <ul style="list-style-type: none"> • Demand forecasting of the services or products offered for local and international markets • Consideration of any economic benefits associated with specific locations and demand. <p><i>This phase considers how other environmental factors social, political and economic will support the development of an aerotropolis.</i></p> <p>Phase III: Analysis - This phase focuses on selecting desirable sites based on the <i>hard infrastructure requirements</i> (availability of suppliers, transportation services, communication utilities and warehousing facilities) and <i>soft infrastructure requirements</i> (availability of skilled workforce, workforce turnover and community receptiveness).</p> <p><i>This phase will determine where each aerotropolis development will be located and provide an economic, social and logistics justification for the location including the placement of infrastructure.</i></p> <p>Phase IV: Implementation - This phase is aimed at selecting the precise location for each facility after having considered all the necessary factors; the location is the optimum placement.</p>

Source: Chopra and Meindl (2013)

Including these phases in the framework ensures that every decision pertaining to the location of facilities and infrastructure will be carefully accessed and justified, mainly because the aerotropolis strategy enforces competitiveness.

2.3.2 Level 2: Structural elements

Level 1 of the framework (Table 2.2) provided a basis and foundation on which strategic planning in an aerotropolis development is to be conducted for logistics and mobility excellence. Then Level 2 focuses on the structural elements that need to be considered in order to achieve the strategic plans laid down in Level 1. Structural elements include environmental factors related to, amongst other factors informing logistics and mobility strategy implementation, the geography, economy or population dynamics. A study by Peneda, Reis and Macario (2010) makes mention of the factors considered as catalysts for a successful aerotropolis and airport city development that should be carefully considered before drafting any master plan. Structural elements for this framework have been categorised into spatial, environmental, socio-economic, functional and connectivity variables. These categories determine the success and influence how the strategy formulated in Level 1 could be best implemented (Kasarda, 2014:32).

- **Spatial variables**

The spatial variables relate to the topography and natural physical attributes of a geographical area, essentially determining the scale, size and structure of the aerotropolis development (Arlinghaus, 1995:2). Topography as defined by Shah et al (2000:14) resembles the slope and level of land, which is classified as flat, plain or sloping; it measures the elevation of the slope percentage change in the elevation over a certain distance. The reason why spatial variables are considered essential in determining the form that the aerotropolis takes is because they involve elements such as the gradient of paths, determining the design, use of areas and the placement of buildings. Planning for an aerotropolis is challenging because it involves the altering of natural boundaries in order to fit human needs and desires, which are often realised through the construction of various infrastructural developments (Hanly, 2015).

Ideally for the purposes of planning, areas considered as sloping are not considered for airport developments as they pose structural challenges (Imoke, Ibu and Etta, 2014:1). The other determining factor that ought to be discussed pertains to the nature of the soil; types of soils vary

from place to place and they affect construction activities (Huber and Kurzweil, 2012:8). Ground conditions, the availability of space and the stability of the area also need to be considered in order to determine the suitability of a place for certain construction activities and / or infrastructural developments.

Spatial variables also need to address the question of whether boundaries or land spaces can be designated for specific developments and whether the specific land use is consistent with the general character of the wider region (Arlinghaus, 1995:4). Aerotropolis developers and planners always aim to identify an area with the correct attributes for aviation, residential and commercial developments, stretching within the nexus of an airport and spreading towards other urban boundaries through strategic transport corridors. Including the structural variables in the aerotropolis framework will help determine the ideal conditions in which the strategy should be adopted.

- **Environmental variables**

From an aerotropolis perspective, the environment is considered as complex physical, chemical and biotic factors acting upon an ecological community and determining its form and survival (Sameh and Scavuzzi, 2016:3). Kumarasamy and Shresta (2002:186) note that the environment consists of interlinking systems, namely the atmosphere,⁹ hydrosphere¹⁰ and biosphere,¹¹ which are always in constant change and have a direct impact on construction and infrastructural developments. In defining the environment, the main factors to be considered would encompass the weather, matters relating to climate change, environmental regulations and the trends or expected future developments with regard to any of the identified factors (Luther, 2007:8). Some of the factors to be considered as part of the environment include an analysis of the ecology, which is the study of the organisms and their surroundings and how these can affect and be affected by human habitats. The inception of the aerotropolis strategy, among other economic development strategies, has the potential to influence the nature of the interactions between humans and the environment. This can be illustrated by the increase in the consumption of food, energy and water

⁹ Atmosphere this is defined as a relatively thin gaseous envelope that surrounds the planet and the earth, it provides life among many of its functions (National Weather Service, 2017).

¹⁰ Hydrosphere is a combination of all the free water on earth which is not chemically confined within the minerals of the earth's crust (Vuglinsky, 2013)

¹¹ Biosphere represents a biological component of earth's systems which encompass the lithosphere, hydrosphere and atmosphere, it mainly focuses on the living organisms on earth and the dead organic matter (Encyclopedia of Earth, 2010).

in urban developments which has mainly been driven by urbanisation (Ng et al, 2016; Sheate, 2016:720). One other factor that has become a basis for the planning of new developments is the emergence of sustainable initiatives. Environmental variables play a key role in determining the structure and form of the aerotropolis development and therefore should be included in the planning framework.

- **Socio-economic variables**

Socio-economic variables in this framework are defined as involving the factors emanating from social and economic experiences and the realities that play an influential role in determining the lifestyle and way people behave (Bimerew and Beyene, 2014:150). It should be recognised that economic processes and factors are affected by social structures; the allocation of resources and factors of production to any social group or area is determined by the social characteristics and relations among them. On the other hand, the social structures also have an influence on determining the reallocation of resources and the distribution of goods and services through various markets (World Bank, 2016:6). In this context, the variables classified as socio-economic factors would encompass the prevailing macro-economic policies,¹² labour market,¹³ poverty and inequality, social sector,¹⁴ globalisation and the South African economy as well as the level and quality of education. The emphasis and inclusion of socio-economic variables in developing an aerotropolis allows for sensitivity to the key dynamics as these are essential in determining the success of the strategies to be adopted.

Level 2 focuses mainly on the factor conditions that need to be considered and assessed before implementing the aerotropolis development. For an area to be competitive and achieve its key objectives, there is a need for emphasis to be directed to the spatial, environmental and socio-economic factors which play an important role in ensuring that the strategy is a success. After all these factors, the next stage focuses on the actual implementation of the strategy through the adoption and implementation of various infrastructural developments.

¹² Macro-economic policy relates the government's policy in influencing job creation, economic growth and inflation.

¹³ Labour market is an examination of the employment and unemployment levels, skills shortages and labour market flexibilities (Estache and Garsous, 2012).

¹⁴ Social sector focuses on the provision of social services such as education, health housing and welfare services and measures the extent of the financial burden carried by the government and other organisations in funding such initiatives (Golder Associates, 2013).

2.3.3 Level 3: Soft, hard and technological infrastructure

Level 3 in this framework (Table 2.2) explores the possible physical infrastructure to be considered for an aerotropolis development. Since Level 1 and 2 have provided the basis for the planning, what are needed now are supporting developments, categorised as soft, hard and technological infrastructure. Soft infrastructure at its most basic level involves ideas and frameworks that give shape and direction to physical infrastructural developments (Martinovic and Baxter, 2013:6). Soft infrastructure provides the platform on which initiatives are identified and adopted for a sustainable aerotropolis strategy. It is mainly responsible for ensuring that ideas, whether expressed in the form of legislation, regulations or organisational policy, are easily integrated with the hard infrastructure. Soft infrastructure provides the foundation for both the implementation and maintenance for both physical and technological infrastructure as it embodies all institutional facilities used to deliver these, it also provides the institutional means for citizens to get most of their economic activities (Khan, 2006:5). Important at this level is the creation of legal institutions that are responsible for the implementation of hard and technological infrastructure, for instance, the aerotropolis master plan committee that is responsible for spearheading the planning and execution of the aerotropolis development (Hamutuk, 2014:1). As depicted in Table 2.5, soft infrastructure will provide a platform for discussion and innovations to decide what the integrated aerotropolis plan should achieve from a planning and regulatory perspective and which departments or legal bodies should be responsible for the different tasks.

Table 2. 5 Aerotropolis planning pillars

INTEGRATED AEROTROPOLIS PLANNING			
Focus Area	Urban Planning	Airport Planning	Business Site Planning
Institutions Responsible	Local Municipalities or Metropolitan Departments	Aviation Authority, Aerotropolis Steering Committee, Department of Transport	Chamber of Commerce, Department of Trade and Industry, Local Municipalities
Main Activities / Responsibilities	Ground transportation planning Land-use planning Multi-modal connectivity planning	Infrastructure and facility planning Air traffic generation and new routes Airport commercial strategies	Market demand and risk analysis Regional development and cluster optimisation Time-cost accessibility

Source: Kasarda and Appold (2014)

As indicated, soft infrastructure spells out the path which hard and technological infrastructure should follow. Level 3 is particularly interested in describing the hard infrastructure¹⁵ and technological infrastructure¹⁶ associated with the aerotropolis development (Kasper, 2015:6). Infrastructure in this context is considered as essential in ensuring that the aerotropolis is functional. According to Martinovic and Baxter (2013) it contains:

- Transport infrastructure, which includes roads, railway lines, airports and ports
- Regulated infrastructure which includes water, electricity and fuel
- Social infrastructure, such as schools and hospitals, which the regulating authorities are responsible for managing and maintaining
- Other physical innovations that tend to improve the way in which tasks are performed within the aerotropolis region.

The development and consideration of the nature and type of infrastructure to be adopted is informed by the variables discussed in Levels 1 and 2, which are thereafter clustered into planning pillars categorising the infrastructure that should be adopted according to its functionality, as depicted in Table 2.5. Kasarda (2015a:12) provides an account of the pillars that need to be considered in implementing aerotropolis infrastructure, such as urban, airport and business site integrated planning. The essence of physical and technological infrastructure is to ensure that it provides the platform on which the KSFs of an aerotropolis are achieved, as will be further clarified in Level 4. For a successful aerotropolis to be implemented, supporting logistics infrastructure is essential to ensure that all the nodes are easily connected. Technological infrastructure from the context of an aerotropolis assumes the function of installing, managing, securing and supporting core enterprise information and includes services such as networking, general server administration, operations and communications.

Of all the levels discussed in this framework, Level 3 requires the greatest financial investment. Weitzman (2012) recognises that investing in infrastructure tends to have an external effect on other industries because productive capital yields higher outcomes. More infrastructural

¹⁵ Hard infrastructure is a term that is used in reference to the large physical networks and infrastructural developments that are necessary in supporting any development.

¹⁶ Technological infrastructure represents the set of information technology components composed of virtual processes and resources that are responsible for supporting the flow, storage, processing and retrieval of data.

investment result in an increased demand for labour as such infrastructure consists of structures and installations and has a corresponding influence in increasing capacity due to the economies of scale.

2.3.4 Level 4: Critical success factors

Level 1, 2 and 3 (Table 2.2) have provided conditions that need to be in place for an aerotropolis strategy to be successfully implemented. Level 4 relates to the expected outcomes or results, which are reviewed in the form of KSFs. These factors are incorporated into the aerotropolis framework in order to allow for all the initiatives adopted within the aerotropolis to be measured in relation to their intended outcomes. KSFs are considered to represent the specific key areas in which favourable results should be attained (Chan et al, 2010:484). As noted by Alazmi and Zairi (2003:200), any variable considered to be a KSF determines the success of a concept or system and therefore efforts are directed at ensuring that these are holistically achieved. Some of the KSFs for an aerotropolis include improved connectivity, speed and responsiveness, among others (Menon, 2014:14). Any strategy implemented in a region is result-driven and therefore it is essential for an assessment to be conducted, determining whether the strategy is achieving its objectives or not. The outcomes of a strategy are usually driven by the other inputs that are included in the strategy, as evidenced in the framework implemented in this study, which suggests the importance of the prevailing conditions for the success of any initiative. For instance, Level 1, 2 and 3 together imply that a conducive environment is needed which will ensure that the Level 4 variables are attained. The relationship and interaction between the different levels can best be illustrated in the form of an equation:

$$(Level\ 1 + Level\ 2 + Level\ 3) = Level\ 4$$

The equation suggests that all the factors on the left contribute to the attainment of the success factors to the right. The KSFs are determined first during the inception of the strategy so that the expected result (Level 4) is determined by the decisions taken at the previous levels (a bottom up approach). The framework as illustrated in Table 2.6 includes a variety of KSFs and criteria which are relevant for the aerotropolis, as highlighted by various researchers and planners.

Table 2. 6 Aerotropolis strategy key success factors

Authors (date)	Key Success Factor / Criterion
Loo (2008); Small, Winston and Yan (2005)	<i>Accessibility:</i> The variable defines the quality of travel in and out of the aerotropolis region, mainly focusing on a variety of factors, including travel time, travel options, comfort and the availability of multi-modal transit systems. Some of the factors also considered include access time, flight frequency and the modes of transport linking into the airport region.
Button and Lall (1999); Han et al (2012)	<i>Atmosphere:</i> The factors to be considered include image of facilities and location, dimensions of facilities and food and beverage services offered. The main focus is on the atmosphere and ambiance of the aerotropolis region.
Button and Lall (1999); Tosun and Uysal (2016)	<i>Flexibility:</i> This variable provides a measure of the ability of the aerotropolis region to respond quickly and efficiently to changing customer needs and requirements for inbound and outbound transit, delivery, support and other related services. In addition, it includes the liberalisation of regulations, which increases travelling options.
Skouloudis et al (2012); University of Alberta (2016)	<i>Sustainability:</i> This measures the relationship that exists between the aerotropolis development and the environment. The aim is to ensure that the strategies being implemented do not compromise future generations. This implies transforming the aerotropolis into an environmentally friendly region in which there is a balance between the environment, society and the economy (triple bottom line).

Linday and Kasarda (2011)	<i>Speed</i> : This involves the rate at which people and cargo can be efficiently moved from one node to the other; this is mainly facilitated by multi-modal transportation networks which increases the speed to market and reduces travel time.
Adya, Plowright and Stevens (2014)	<i>Economic development</i> : The goal is to ensure that the strategy attracts massive economic benefits and is also considered an economic epicentre. It should be characterised by airport-linked business parks, information technology complexes, logistics parks, free trade zones and the availability of public private partnerships relationships.
Hoffman and Hellstrom (2010); InterVISTAS (2014)	<i>Connectivity</i> : This represents the centrality of a location in relation to other networks or facilities; it also reflects the geography and the global structure of logistics and transport as well as logistics networks. There should be non-stop connectivity among transport modes within the aerotropolis region to improve its viability.
Sapkauskieene and Leitoniene (2007); Ror and Correa (1999)	<i>Time-based competition</i> : The variable describes the reaction time of organisations to the changes in the market as a result of competition and new innovations. The central idea of TBC revolves around reducing the time devoted to each stage of the general cycle and shortening the time involved.
Khan (2006)	<i>Cost</i> : The variable relates to the attitude that all efforts are aimed at reducing the cost of products and services provided within the aerotropolis region. This implies that strategic cost analysis is conducted within the value chain in order to ensure that lower costs of operations and capital are considered.

2.6 Aerotropolis strategy development

To further account for the success factors of the aerotropolis strategy, it is essential for this study to provide substantial evidence for why proponents have advocated for the aerotropolis strategy in various regions. It becomes a question of why the growing interest and at the same time what conditions need to be prevalent for the successful adoption of the aerotropolis. These questions are addressed by using Porter's diamond model which is an essential framework as far as the strategy adoption is concerned.

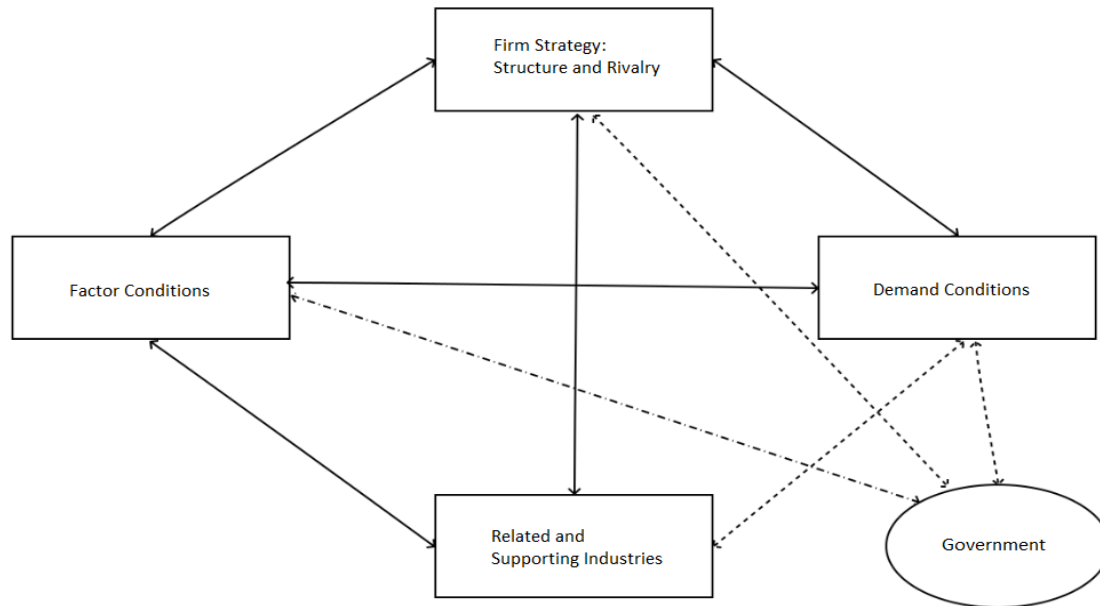
- **Porter's diamond model**

In his diamond model, Porter (1990:56) presupposes that the success of a nation is dependent on the enabling conditions that include factor conditions, demand conditions, firm strategies and related industries. These collectively influence the overall competitiveness of a nation, thereby positioning it ahead of competing nations. However, regional competitiveness can be defined as the practice in which various regions compete with one another with regard to retaining influence over domestic or export markets and thereby attracting human resources, organisations and investments (Kitson, Martin and Tyler, 2004). The attraction and retention of firms with a stable and growing market share by any urban centre leads to improving standards and this is synonymous to regional competitiveness (Storper, 1997). Essentially how competitive a region is will be is influenced by many factors which essentially contribute to the overall competitiveness of the nation, thus affirming the role that government plays in ensuring that the regional and national competitiveness is achieved (Pessoa, 2010:156).

There has been a growing interest among different countries and regions in enhancing their competitiveness influence within the global market (Smit, 2010:105). Governments are slowly considering the adoption of aggressive competitive strategies and their focus has shifted to an international perspective so that their central focus is limited to regional and global competitiveness (World Economic Forum, 2008). Given the assertions of Porter's diamond model, it is of paramount importance here to discuss also the projected impact of the aerotropolis strategy on regional competitiveness. The model provides a framework which includes a distinct assessment of the internal competencies that should be present for a nation to be considered to be competitive (Lau, 2008:179). The argument by Porter inclines to the notion that what should be at play is the right mix of determinants and factors allowing regions and organisations to compete

successfully in international markets; these include factor conditions, government, related supporting industries and demand conditions as illustrated in Figure 2.10.

Figure 2. 9 Diamond model of competitiveness



Source: Bhattacharjee and Chakrabarti (2015:22)

(i) Factor conditions

Factor conditions include the physical inputs, natural resources, capital and skills that characterise a specific area. The assumptions of the model are that the existing resources or factors identified in a region or location determine the extent of trade volumes and flows and thus present an opportunity for favourable gains in comparison to other regions (Smit, 2010:115). Factor conditions present the compulsory inputs required by any nation to compete in the market and these are grouped into human resources, physical resources, knowledge resources, capital resources and infrastructural resources (Jhamb, 2016:142). The model also highlights the presence of factorial determinants as being important and suggests that, in order to avoid stagnation, new factors should be created and existing ones improved (Frasineau, 2006:3494). To further categorise these factors, the model recognises the existence of basic and advanced factors. The basic factors include only aerial or national resources such as the location, capital and availability of raw materials and labour, while the advanced factors include modern infrastructure and specialised personnel (Jhamb, 2016:148).

As outlined by Lau (2008:182), regional factors cannot be ignored in determining competitiveness and therefore factor conditions are best illustrated as the basic factors that provide the initial advantages, for instance, natural resources, climate and location. In a study conducted at Hong Kong International Airport, it was discovered that the airport is in an optimal location, connected to more than 150 locations and 47 countries. These locational advantages have the effect of ensuring frequent flights, further providing flexibility for the customers and positioning the airport as the prime location for cargo shipping and passenger mobility (Airport Authority Hong Kong, 2007). The basic factors associated with the airport further enhanced its success as a superior global aviation hub. However, basic factors on their own do not provide a sustainable competitive advantage; what is also required is the participation of individuals, governments and businesses in investment into the development of such basic factors (Lau, 2008:183).

There have been widespread discussions pertaining to the nature of the factors that will ensure the attainment of competitiveness of an area. In the context of an aerotropolis, the specialised factors of production cited have included individual expertise and skills, infrastructure technology and communication (Helfat and Peteraf, 2003:1001). There is evidence from airports around the globe, for instance, Hong Kong, Dubai and Memphis, where large sums of money have been invested in increasing the capacity of their operations (De Wet, 2010:23). Their target has been limited to servicing large passenger and cargo aircrafts, building enabling cargo infrastructure and passenger terminals and the coordinated emphasis on these factors has played a significant role in ensuring that these regions are considered as strategic positions (Airport Authority Hong Kong, 2007).

(ii) Demand conditions

Porter's diamond model recognises competitiveness as being directly related to domestic demand, an economic principle referring to the total quantity of products or services that are required by the end customer at a given price in order to satisfy a stated need (Holfstrand, 2011:2). In the context of the diamond model, demand is based on composition, size and patterns of growth and internalisation among various markets. An emphasis on the domestic market assumes that nations will gain a competitive advantage if the domestic market is more sophisticated and demands more diverse products and services from both domestic and international markets (Porter, 1998). An increase in demand can easily be translated to the profitability motive, which has been one of the key factors influencing the direction of progress in terms of innovation and the design of new

products and services by various organisations (Karayiannis, 1998:47). Increasing pressure from sophisticated domestic clients acts as a pull factor for firms to improve their performance, allowing them to satisfy existing and future market needs. As a result of the domestic demand trends, regions can easily be recognised as competitive destinations by both international and domestic businesses (Jhamb, 2016:142).

An increase in innovation has a proportional influence on domestic demand since new demand is created and existing demand rejuvenated and thus, to capitalise demand, there should be a focus on ensuring that improvements made to the product and service offerings (Ryerson and Woodburn, 2014:141). This can be illustrated through exploring the example of Hong Kong International Airport, which has formed strategic partnerships in order to improve efficiency for exporters and cargo agents and thereby improved reliability and connectivity in relation to other competitors (Lau, 2008:183). From an aerotropolis point of view, it can be argued that creating demand can only be directly related to the competent processes involved in facilitating the flow of passengers and goods and cementing its position as the primary gateway for cargo and passengers (Kasarda and Appold, 2014:10). Demand depends on the various processes involved in ensuring that present and future customers are attracted to the products and services provided by an organisation and therefore innovative strategies must be adopted which have the effect of increasing the scope of products and services (Hofstrand, 2007). Developments in airports as well as in air transportation services and facilities have resulted in more people making use of services and have thus resulted in these becoming strategic factors.

(iii) Firm strategy and rivalry

Porter's model advocates that to remain competitive, organisations should adopt aggressive practices aimed at ensuring that costs are contained while collective efforts are directed to improving their product and services complements (Graham, 2004). This implies that the strategy or strategies adopted by any individual firm are essential and can distinguish it from its competitors so, from an operational perspective, strategy can be classified as either cost leadership¹⁷ or differentiation¹⁸ (Cheong, Bhatnagar and Graves, 2015:22). Increasing rivalry from competitors

leads to organisations considering measures and strategies to maintain a competitive advantage, this involves the reduction of operational costs and improvement in quality and extent of their innovation (Bhattacharjee and Chakrabharti, 2015:24).

As indicated above, the collective efforts of various organisations will determine the overall competitiveness of a region; for instance, if a cluster of firms around the region implement either of the strategies discussed above, they can influence the overall perception of the market regarding the region (Lau, 2008:184). A case in point is the Silicon Valley, which continues to be referred to as one of the most important centres of innovation only because of the presence of technology giants, world class innovation centres which have created what is viewed as a hypercompetitive environment (Deloitte University Press, 2016). This tends to support Porter's view that competition and rivalry among the different players in a region is influential in determining the level of regional competitiveness (Jhamb, 2016:142). A clear illustration derived from the current analysis of the functional aerotropolis are the strategies that have translated into a regional competitive advantage for Dubai International Airport (Kasarda, 2011:17). An ideal competitive environment is evidenced when firms and organisations consider the reactions of other competitors before formulating and implementing a strategy, since it generally implies that due consideration has been given to issues of innovation and continuous improvement (Goksoy, Vayvay and Ergeneli, 2013:310).

(iv) Related and supporting industries

The fourth and final attribute that accounts for regional competitiveness as advocated by Porter involves the establishment of an environment in which there are close working relationships and coordinated efforts among different but dependent 'supporting industries' (Porter, 1998). The term has been widely referred to in production economic theories as describing a cluster of industries that provide essential production inputs in the form of parts, components and tools for each other or for specific industries (Thuy, 2009). Practically, this can be illustrated by considering a shoe manufacturer who needs a reliable network of supporting industries producing essential supplies such as leather processing machinery, raw and processed leather and design services among others. While there are numerous definitions that can be considered in explaining supporting industries, for the purposes of this study they are recognised as businesses producing parts and components to be used in the production process of other supply chains (Mori, 2006). These are organisations

that supply materials and processes deemed essential in the production process of products before they are marketed to the end user (US Department of Energy, 2015).

Based on the description provided, from an economic perspective there tends to be a relationship between competitiveness and the existence of supporting industries. A case in point is the success of Hong Kong International, which has been considered a prime aviation hub due to the presence of a diversity of airline companies, freight forwarders, air cargo terminals, third party logistics providers and logistics and transportation businesses, creating a viable environment in which these business provide products and services to each other (Airport Authority Hong Kong, 2007). The existence of related industries and organisations provides a better chance for the firms located in the same cluster to share information and identify new opportunities (Jhamb, 2016:142). The links between different industry branches contributes to international growth and thus enhances the competitive advantage of a single area. In the view of Porter (1990), successful industries in the world are grouped into clusters characterised by networks of related industries in a geographically limited area. Other researchers further explain that close working relationships in geographically limited areas provide chances and possibilities for a rapid flow of information and technology, resulting in innovations and developments (Barth, Holm and Larsen, 2013:3). A region essentially draws an advantage from internationally competitive, related and supportive industries which foster the interaction of different industry players, providing better chances that a destination will be considered as offering a more competitive environment than others (Lau: 2008:185).

(v) Government

Porter's diamond framework acknowledges the role that government plays as a catalyst in propelling regional competitiveness as it influences policy adoption and determines the nature and type of developments that should be considered for any given area (Accelerate Cape Town, 2017). The role of government at national and provincial levels has been recognised in creating the legislation, policy developments and amendments that have determined the nature and scope of possible investments. This is because policy development and involvement tend to influence and impact on socio-economic developments. Global and regional competitiveness, due to its influence in contributing to economic growth and development, has become a paragon in public policy (ASEAD, 2014). What needs to be further acknowledged is the fact that government has played an active role in influencing how the different components of the framework interact and are

individually managed. For instance, the promotion of firm strategies and rivalry has aimed at ensuring the creation of a competitive and regulated market. In regions such as KZN, incentive schemes have been offered to motivate firms in settling in certain regions that are considered as economic zones or are underdeveloped (Luthuli and Houghton, 2019). Also, there are numerous examples in which the involvement of the state has been shown to influence demand through establishing the standards for and quantities of the products and services that can be supplied to markets.

2.6 Conclusion

An aerotropolis has been described as a region or sub-region in which the infrastructure, the land use and the economy are centred on an airport (Appold and Kasarda, 2012). The airport thus becomes the economic epicentre due to its ability to attract a network of businesses across various industries such as retail outlets, warehouses, production facilities, office parks and residential developments within a 25km radius. The aerotropolis strategy has been defined from various perspectives with evidence from the literature suggesting that a variety of stakeholders, including economists, planners, politicians and consultants, have described it in terms of their backgrounds and expectations. For instance, economists consider it as an innovative developmental concept which derives economic benefits (Gleisnner and Fermerling, 2013), while town planners refer to it as an urban form of development which takes place around the airport region (Nasution, Harrisdani and Napitupulu, 2017).

This chapter has identified all the constructs to be considered for the aerotropolis strategy. The conceptual framework in this study places an emphasis on four key levels that are considered as essential for an aerotropolis development. These include logistics and mobility planning (Level 1), structural elements (Level 2), soft and hard infrastructure (Level 3) and critical success factors (Level 4) together with Porter's diamond model of competitiveness. These collectively provide a template of the factors that need to be prioritised before, during and after the implementation of the aerotropolis strategy. Using the evidence provided by various regions that have adopted the aerotropolis strategy has played a crucial role in defining it, as has been highlighted in this chapter. To further understand the aerotropolis strategy, it is essential that a review is conducted of the regions that have successfully adopted it and on how they have planned for its implementation. This review will be presented in Chapter 3.

CHAPTER 3: AEROTROPOLIS DEVELOPMENTS IN DEVELOPED AND DEVELOPING COUNTRIES

“The 20th century was about cities building airports. The 21st century will be about airports building cities” (Kasarda, 2014).

3.1 Introduction

The previous chapters have provided an overview of the study context, including the objectives and research questions. Furthermore, the aerotropolis strategy was introduced and defined using viewpoints from various authors and researchers. In order to gain a clear appreciation and conception of the strategy, it is essential also that we focus our attention on the various regions that have implemented the strategy and critically assess their extent of success and failure in implementing it. As stated by Menon (2014:48), there is a need for developments and investments associated with the aerotropolis strategy to be closely analysed soon after commissioning. This allows for other regions to derive important lessons before they adopt it, especially because it involves significant financial investment. This chapter focuses on reviewing and comparing aerotropolis developments in developed countries centred around Memphis, Hong Kong, Dubai, Amsterdam-Schiphol international airports, which have been the subject of constant scrutiny among researchers and the public. In addition, cases in developing countries involving Tancredo Neves International airport (TNIA), Oliver Reginald Tambo international (ORTIA) who have been developed into aerotropolis regions are also be explored to allow for ease of transferability. The key questions to be explored include determining the successes of the strategy and the factors that contribute to these, as well as determining what planners, developers and policy makers should focus on in order to ensure that the strategy derives optimum benefits.

The use of a comparative analysis for an aerotropolis-related study offers the opportunity to explore the differences or similarities that exist within different aerotropolis regions operating in different contexts. This chapter focuses mainly on presenting an in-depth comparative analysis of different aerotropolis developments and captures the success stories and shortcomings associated with the various developments. To achieve a balanced analysis, the aerotropolis developments have been selected from different regions across Europe, Asia, America and Africa as these operate under differing socio-economic conditions.

3.2 Aerotropolis precedents

The aerotropolis strategy as a new phenomenon of 21st century urban development has resulted in an increased interest on the part of many governments and investors due to its influence on rapid economic growth and its focus on ensuring that inland cities can easily be accessible to global markets (Menon, 2014:48). Many areas and airports have been transformed into aerotropolis regions, for instance, Amsterdam-Schiphol, Memphis, OR Tambo, Tancredo Neves and Dubai international airports within the past ten years. The aerotropolis concept as highlighted in the previous chapters refers to an airport region that has been transformed into an urban centre with a strong economic impetus regarding domestic, regional and the international markets (Banai, 2017:359). It is also considered to be a central city that attracts infrastructural corridors and aviation-related businesses supported by a mixed use of residential and recreational developments (Jungwirth and Luxford, 2007:6).

This chapter explores different aerotropolis regions in various parts of the world, and these will be used as precedents or benchmarks for the Durban aerotropolis and other future developments. These include Memphis (Tongon, 2004), Dubai (Fernandes and Rodrigues, 2009), Hong Kong, Schiphol Amsterdam (Lee and Yang, 2003), Tancredo Neves (Brassil, 2016) and OR Tambo International airport (DIGL Report 2016). This allows for the findings to be used as a blueprint for future developments and at the same time inform regions regarding how the strategy can potentially influence socio-economic changes. The selection of these regions is based on the recommendations by Lindsay and Kasarda (2011), who have classified the status of each into categories such as aspiring,¹⁹ partially²⁰ or fully²¹ incorporated aerotropolis regions, using specific qualitative and quantitative variables. The use of cases from developed regions is for the purposes of determining best practices and thus fully and partially incorporated cases were considered. In the case of examples from developing countries this was meant to establish how the strategy can

¹⁹ An aspiring aerotropolis in this context refers to a region that is in the process of passing policies and adopting plans distinguishing it as an aerotropolis. This has been viewed as the initial stages, which includes an expression of interest and involves approaching all the relevant stakeholders so that investments can be pledged.

²⁰ A partial aerotropolis development is one in which the master plan has been adopted and the initial developments and infrastructural adjustments have been introduced. This is the level in which at least 40% of the plans have been implemented.

²¹ A fully developed aerotropolis means that at least 80% of the developments highlighted in the masterplan have been adopted and are functional and at the same time the strategy benefits are being equally realized.

be successfully applied within a region that shares the same demographic and economic contexts as Durban, South Africa.

The aim of the comparative analysis was to identify the various strategies implemented and adopted in each of the regions and to outline the pros and cons of the decisions adopted. This will inform a clearer understanding of the actions that ought to be undertaken and of the phases that an aerotropolis development goes through that are deemed essential for future aerotropolis developments. The regions under discussion are summarised in Table 3.1 and discussed fully thereafter.

Table 3. 1 Aerotropolis strategy precedents

REGION	STATUS	BUDGET AND AIRPORT SIZE	INCEPTION
Memphis International Airport (MEM), USA	Fully incorporated ²²	<ul style="list-style-type: none"> ✓ Approx.: <i>US\$214 million</i> (expansion phase) ✓ 1600 hectares ✓ 4 runways 	April 2010
Hong Kong International Airport (HKIA)	Partially incorporated ²³	<ul style="list-style-type: none"> ✓ Approx.: <i>US\$20 Billion</i> ✓ 1,255 hectares ✓ 2 runways 	June 2013
Dubai World Central (DWC), United Arab Emirates	Partially incorporated	<ul style="list-style-type: none"> ✓ Approx.: <i>US\$230 million</i> (modifications) ✓ 7,200 hectares ✓ 2 runways 	August 2017
Schiphol International Airport (SIA), Holland	Partially incorporated	<ul style="list-style-type: none"> ✓ Approx.: <i>Unknown</i> ✓ 2.787 hectares ✓ 6 runways 	June 2014
Tancredo Neves International airport, Belo Horizonte, Brazil	Partially incorporated	<ul style="list-style-type: none"> ✓ Approx.: \$300 million ✓ 2,698,000 square metres ✓ 3000m*45m runways 	June 2015
Oliver Reginal Tambo International airport, Ekurhuleni, South Africa	Partially completed	<ul style="list-style-type: none"> ✓ \$12,7 billion ✓ 5,4 million square metres ✓ 4 level passenger terminals 	March 2015

Source: Bogdanski, (2014), Bogetic and Fedderke (2015), Planning for People (2013).

²² Fully incorporated implies that all the planned developments have been implemented and its operating as per the master plan.

²³ Partially incorporated means that not all the developments as outlined in the master plan have been adopted, the region is still in the process of development.

3.2.1 Memphis Aerotropolis, United States of America

Memphis aerotropolis is in the city of Memphis (USA) and is centred around Memphis International Airport (MEM). Geographically, it is centrally located and is situated on the inland waterway system within the range of the fourth largest inland water port in the US. Economically it is within the range of influential commercial organisations such as FedEx, who contribute significantly to its employment and economic activity (Kasarda, 2000:12). The region is widely branded as America's leading distribution centre, popularly referred to as the location where 'Runway, Road, Rail and River Merge' (Memphis International Airport, 2011). In achieving this a series of plans and innovations have been considered, particularly the adoption of 21st century platforms and infrastructural developments that have positioned it to be one of the largest, fastest and most connected multi-modal logistics complexes in the globe (Wiedemann, 2014:150).

Figure 3. 1 Memphis Aerotropolis study area



Source: Memphis Shelby County Airport Authority (2005)

The airport has been strategically designed to be the lifeline of the city and thus further efforts by authorities have been directed to ensuring that the growth of the airport is achieved through excelling in the distribution of biotech and biosciences, which is one of its core competencies among other key areas (Ozdenerol et al, 2012). Figure 3.1 depicts an aerial view of the Memphis aerotropolis catchment. From the illustration it is evident that the economic activities stretch up to a radius of 20 miles from the airport, a distance that is projected to increase over the coming 2 years due to a continuous increase in the demand for both residential and commercial land as more businesses are being attracted to the area. As outlined by the Memphis-Shelby County Airport Authority (2005), the economic engine of Memphis begins and ends with the MEM, and thus long-term investments have been made through various partnerships that have generated billions of dollars and at the same time provided employment for the domestic economy.

There are a variety of attributes that position Memphis as one of the leading international aerotropolis and have attracted many regions to consider it as a benchmark (Fernandes and Rodrigues, 2009:44). Some of its notable characteristics encompass the following:

- There are a variety of infrastructural developments closely linked and associated with the airport, which include the centrally located national rail network that operates an average of 300 trains daily (Jungwirth and Luxford, 2014).
- The airport has also recently become a hive of activity, handling an approximate volume of 3.7 million metric tons of cargo in 2007 with at least 2 million packages being processed per night; this figure has been increasing substantially due to the airport's close proximity to FedEx, the biggest courier company in the Memphis region (Wiedemann, 2014:164).
- The tourism industry of the Memphis metropolitan generates an average of 4.2 million visitors per year (Schimitt, 2009:19). Its geographical location contributes to this; it is home to rock and roll and the gateway to Tunica Resorts.
- Memphis is well known for its medical and health services sector, which contributes significantly to the regional economy. The biosciences sector has been on the increase and has seen more industries focusing on technology development and production locating within the region (University of Memphis Planning Department, 2015).

3.2.1.2 Memphis Aerotropolis master plan

In order to evaluate the impact of the aerotropolis strategy on economic development it is essential also to understand the planning that is involved in putting it together (Fenton, 2014). This entails exploring the goals and strategies associated with the Memphis Aerotropolis master plan that influenced the form in which all the developments and investments were undertaken (Memphis Aerotropolis, 2014). For a successful aerotropolis it is evident that there are various levels of planning, namely, strategic, tactical and operational planning, which need to be carefully considered and implemented. From a strategic viewpoint, the intended vision of the Memphis aerotropolis development is aligned with the provision of a comprehensive framework for both public and private development. This includes transportation improvements and the establishment of new businesses and foster the revitalisation by leveraging the traffic volume of the airport.

To achieve the broader strategy goals will include building a community, strengthening connections (physical and mental perceptions), fostering an increase in competitiveness and promoting collaboration with various regional and international partners (Bridger, 2016). Based on the goals and vision provided, further attempts are made, organised around ensuring that there is an emphasis on the utilisation of and planning for the land, zoning, transportation corridors and transit systems. In addition, further policies are adopted, which include the promotion of smart growth, utilisation of parks and recreational policies and the strengthening of housing, neighbourhood, and community services facilities policies. Ideally the creation of a successful aerotropolis depends on conceptual planning and thus the planning framework considered and adopted for the Memphis Aerotropolis development is discussed in the following sections.

- **Memphis Aerotropolis framework planning elements**

The framework plan elements represent the factors considered to be behind the planning and implementation of the aerotropolis strategy. As defined by Montana State University (2015), a framework plan is a structure comprising interconnected variables in which each element resembles a set of independent values for the long-term vision. These elements are remarkable features that create form and function and interlock development strategies and principles (Janic and Reggiani, 2002:118). There tends to be a correlation between the framework adopted and the results obtained; hence it seems to be the practice in many organisations and regions for benchmarking by results that are determined by strategy and framework. Since the Memphis

Aerotropolis has achieved remarkable economic results, its framework of adoption and implementation ought to be examined. Table 3.2 illustrates some of the elements that are essential in the development of the Memphis Aerotropolis (Aerotropolis Milwaukee, 2017). These include planning about land use, transportation, infrastructure and the environment, housing and community resources, and economics and real estate as discussed below.

Kasarda (2016:13) proposes that the positive economic results associated with the Memphis aerotropolis development can be directly attributed to a combination of variables, including its ability to attract a vast number of domestic and international passengers, its implied operational capacity and also the level of infrastructural developments that facilitate its various daily operations. The positive developments of this region can also be credited to the efforts of FedEx, which operates a massive logistics operation in Memphis, making it the busiest cargo airport in the world (Schimitt, 2009). There has also been an influx of developments in and around the airport, making the airport a significant economic contributor and the prime business location for both aeronautical and non-aeronautical services. Since the inception of the aerotropolis, the regional employments figures have increased astoundingly, probably due to an increase in demand and propelled by the influx of shopping and business centres within and around the airport region (Memphis-Shelby County Airport Authority, 2013).

Table 3. 2 Memphis Aerotropolis planning elements

ELEMENT	DESCRIPTION	CRITICAL SUCCESS FACTORS
Land use and Urban Form	<ul style="list-style-type: none"> • This variable primarily focuses on the policies, concepts and strategies that determine and rationalise the use of land and patterns of the aerotropolis region (Airport City). • The element also addresses the unproductive land use and poor visual quality of the areas surrounding the airport that negatively affect it. 	Identification of activity nodes and gateways, land use and zoning and urban structure and visual character.
Transportation	<ul style="list-style-type: none"> • The transportation element is concerned with the development of connections between the airport city and the surrounding areas in order to ensure that there is enhancement of mobility, thereby supporting economic growth. • Transportation is also concerned with addressing inadequate roadway capacity, poor user safety and insufficient pedestrian and bicycle facilities. 	The areas of focus include an adequate road network, freight movement, public transit system, alternative modes and programmed improvements.
Infrastructure and Environment	<ul style="list-style-type: none"> • This element determines policies, strategies and concepts that will ensure that the aerotropolis region is considered to be more viable and sustainable through providing open space resources and promotion of the green economy. 	Emphasis is mainly on resource protection, the creation of sustainable parks and recreation, and the green industry and renewables.
Housing and Community Resources	<ul style="list-style-type: none"> • This element involves strategies and policies that are aimed at improving the liveability of communities by expanding the quality and accessibility of available resources. 	The focus is on identifying neighbourhood advancement zones and the improvement of community facilities and services.
Economics and Real Estate	<ul style="list-style-type: none"> • This element is aimed ensuring an improvement in the economic climate of the airport city through ensuring sustained growth for targeted industries and the encouragement of redevelopment. 	The areas of focus will include identifying economic districts in order to encourage competitiveness and create economic sectors.

Source: Memphis Aerotropolis (2014)

3.2.1.2 Economic impact

It is essential that a broader analysis be conducted for each aerotropolis region being investigated, including identifying its impacts. As evidenced from Memphis, there are advantages associated with aerotropolis developments and these contribute significantly to the local economy (Jungwirth and Luxford, 2014:3). One of the key motivations for an aerotropolis has to do with its influence in encouraging growth and expansion into global networks because of the continued interconnectivity between Europe, Asia, Middle East and the rest of the world. A report published by the Memphis-Shelby County Airport Authority (2005) indicated that there was a notable increase in the extent and volume of economic activity during the ten-year period (2005-2015) due to an increase in total aircraft movements. During this period there is evidence of the following:

- An upward surge of aircraft movements of 11.1% recorded, with figures moving from 354 448 to 393 690
- A noticeable increase in the movement of cargo, with an average growth of 54.7 per cent.

These increases have been supported by the aggressive investments in infrastructural developments servicing the airport. The degree and extent of investments committed to the development of the Memphis aerotropolis have further motivated critics to consider costs versus benefits analysis. One key measure that has been consistently applied in justifying the massive investments has been the performance of and improvements in the local economy that is evidenced in the form of employment, earnings and economic output benefits (Lindsay and Kasarda, 2011:44). There are multiple reports (Lee and Young, 2003; Klos, 2014; Makhoulfi and Davids, 2016) that were commissioned to provide a comprehensive picture of the increasing economic influence of the airports and airport cities many of which provide figures presenting quantitative evidence for and against aerotropolis developments.

For instance, Table 3.3 presents details of aircraft movements at MEM between 2000 and 2004. It is evident that there was a sharp increase in the volumes of cargo handled at the airport between 2000 and 2004, with regional movements being the highest as compared with national or international passenger and cargo movements. Senguttuvan (2006:2) considers air transportation as one of the fastest growing modes of transport at a regional, global and national level, although there are periods when political and economic interruptions may occur

temporarily slowing down the economic growth and prospects of the industry. There is evidence of Memphis being utilised as a logistics transport hub since the passenger aircraft movements give an indication of passenger movements.

Table 3. 3 MEM aircraft movements (2000-2004)

YEAR	NATIONALS	REGIONAL	CARGO	GENERAL	MILITARY	TOTAL	TOTAL PERCENT CHANGE
2000	103,704	88,962	104,456	76,237	4,651	378,010	-
2001	114,156	118,916	103,170	59,897	4,488	400,627	6.0%
2002	96,144	101,778	129,586	59,011	3,617	390,136	-2.6%
2003	94,738	119,824	133,030	55,111	1,712	404,415	3.7%
2004	77,942	132,236	131,766	49,994	1,752	393,690	-2.7%

Source: Memphis Aerotropolis (2014)

There are, however, many other spill-over effects arising from aerotropolis developments as highlighted by researchers such as Kasarda (2008) and Canon (2012). Efforts are continuously being made to ensure that the quantitative and qualitative contributions associated with the Memphis economic and aerotropolis development are accurately captured in order to be able to provide a clear comparison with other aerotropolis regions across the globe and, most importantly, to ensure that assessment of the concept is based on facts and not opinions. A closer analysis of the performance of the Memphis aerotropolis reveals that noticeable successes can be credited to the strategy based on the volume and movement of passengers and cargo as previously indicated. In order to further quantify these benefits, Table 3.4 provides a summary of the economic impacts associated with the Memphis aerotropolis development.

Table 3. 4 Quantitative attributes of Memphis International Airport

VARIABLE	DESCRIPTION	QUANTITATIVE CONTRIBUTION
Cargo Operations	<p>Cargo operations are defined as those activities involving the preparation of cargo shipments, loading and unloading of aircraft and the transfer of cargo between storage facilities and land transport, which mainly consists of inbound cargo,²⁴ outbound cargo²⁵ and transshipment cargo ²⁶(World Bank, 2016).</p> <p>Memphis International Airport has been identified as the busiest cargo airport since 1992; this is due to its location, which has attracted cargo businesses, including the FedEx Super Hub, which have consistently contributed well above 90% of the total cargo processed within the airport (Airports Council International, 2007).</p>	<ul style="list-style-type: none"> • Memphis is regarded as the number one ranking cargo airport in the United States, a factor that has positively contributed to the regional and federal economy. • In 2004 over 4 billion pounds of cargo was enplaned in the airport, which is equivalent to \$10 billion in revenue (Memphis International Airport Annual Report, 2011). • There are also, however, indirect expenditures, many of which are the result of the total cargo revenue. In 2010 alone the airport handled 3,9 million metric tons of cargo.
Passenger Operations	<p>According to Chopra and Meindel (2014), passengers in airport operations are classified into different categories. These are origination passengers (those that are travelling from the local airport to other regions), terminating passengers (those that are travelling from other airports to the domestic airport) and transfer passengers (those that are changing from one plane to another in order to reach their destination).</p>	<ul style="list-style-type: none"> • The airport is also highly ranked nationally and internationally as far as passenger operations and traffic generation are concerned. • During the 2014 financial year, the average of a total of over 4.8 billion domestic passenger miles and over 481.0 million international passenger miles were attributed to the airport. • When equated to revenue, this results in an estimate of domestic passenger revenue / sales of over \$561 million and international passenger revenue / sales of over \$50 million and a combined figure of \$611,480,856.
Construction of the Airport	<p>The ongoing improvements and investment in transportation and cargo infrastructure require monetary investments that could be derived from either public or private entities.</p>	<ul style="list-style-type: none"> • In the case of Memphis, the improvements ranged from taxiway upgrades to passenger facility upgrades. Construction and upgrades are projected to continue over the next few years due to the increase in innovations associated with improved efficiency. • The investments and expenditure associated with the airport between 2008 and 2015 amounted to \$213.4 million.

Source: Memphis-Shelby County Airport Authority (2005)

²⁴ Inbound cargo refers to the incoming materials from the various domestic and international flights that are processed and prepared upon arrival, which includes going through customs and other regulatory procedures and also deconsolidation (BARCELOC, 2015).

²⁵ Outbound cargo includes the activities involved in the moving of materials from suppliers to various customers; this essentially relates to the processing of cargo to be moved to other airports, involving consolidation of cargo, building up air cargo, pallets and containers and including inspection and documentation (Douven, 2015)

²⁶ Transshipment cargo as an airport cargo operation is limited to unloading, reconsolidation and reloading the cargo and involves the simple act of directly transferring cargo between aircrafts (tail-to-tail transfer) (Cootzee, 2017).

3.2.2 Hong Kong Aerotropolis, China

Hong Kong aerotropolis is developed around Hong Kong International Airport (HKIA) which is strategically located on the island of Chek Lap Kok. Appold and Kasarda (2016:1242) point out that the region is quickly taking over from Memphis as one of the leading cargo terminals. The aerotropolis is centred around an Asia's most connected airport due to its diverse route structure and its ability to accommodate a wide variety of cargo and passenger liners (Zhang, 2003:125). The airport has assumed this competitive position because of the extent of the activities taking place which are primarily driven by innovations and infrastructural developments (Eng, 2015). In 2010 alone, it processed over 4,1 million metric tons of cargo, a 23% increase from the previous year (Wong, 2002:3). The growth and expansion of HKIA cargo activities has been attributed to its geographical position, which places it closer to China's booming Pearl River Delta,²⁷ a central hub for global economic activity.

The HKIA was originally commissioned to accommodate an estimated annual volume of 35 million passengers, which was later expanded to 45 million passengers in 2010 and this is evidence of the growth of its passenger and cargo volumes. However, with an expected increase in demand over the coming years, the government has put together a master plan aimed at ensuring that the airport capitalises on its competitiveness (Chapman and Georgoulas, 2010). As published by the Airport Authority Hong Kong (2005), the projected annual passenger demand by 2020 was estimated at 87 million passengers. Furthermore, evidence suggested that the annual growth in commercial cargo flow had grown from 1,6 million to 2,7 million tons between 1997 and 1998 (McNeil, 2014). This resulted in annual gross revenues also increasing by close to 40% and 45% and meant that investing in the airport became much more attractive for both the government and the private sector (Zhang, 2003:123). With these figures showing the potential for growth, the HKIA planned for major infrastructural upgrades that had the goal of ensuring that it was transformed into a viable aerotropolis region (Klos, 2014:37).

The development of the Hong Kong Aerotropolis is driven mainly by an increasing demand for both aeronautical and non-aeronautical services, which implies the need for better planning in

²⁷ The Pearl River Delta is recognised as the “factory of the world” after having experienced the most rapid urban form of growth and expansion. A predominantly agricultural region in 1979, the region has recently become the manufacturing heartland of a global economic superpower today (Hilaire and Mead, 2016)

terms of managing the airport for optimised economic results (Ryerson and Woodburn, 2014:145). Of note is the extent and form of infrastructural developments identified for implementation in a bid to transform the airport into a viable aerotropolis region so that it may meet future air traffic growth and maintain its competitiveness (Arts, Hanekamp and Dijkstra, 2014). The master plan includes the construction and development of facilities such as land reclamations, expressway connections, harbour crossings, suspension bridges, railway crossings, rail stations, a container terminal and freight handling facilities and improvements to mass transit railways as well as residential areas, schools and community-based facilities among many others (Hanly, 2015:44).

3.2.2.1 Hong Kong Aerotropolis master plan,

The development of the Hong Kong aerotropolis is considered to have been strategically executed to leverage on the economic potential and geographical positioning offered by both the airport and the city (Civil Aviation Department, 2018). In particular, the airport has strong interconnections with mainland China, which from a global trading viewpoint attracts a third of the world's cargo traffic in the form of exports, and this has offered a support for the aerotropolis as it assumes the role of a key logistics hub (Hanly, 2015:15). Because of its geographical location, the Hong Kong Aerotropolis master plan was drafted to ensure that there are improved linkages between Hong Kong and the rest of the world, which has an impact in positively influencing economic growth. To ensure that this is achieved, various innovations and technologies as well as logistics and transportation infrastructure and models have been considered.

As outlined in the Hong Kong Aerotropolis master plan, the development of this aerotropolis follows a three-phase process which has seen first the creation of the Asia World-Expo Center, a Sky Plaza and the Sky Pier which is a cross boundary ferry terminal. Phase 2 has been aimed at creating the model Sky City which harbours Hong Kong Disneyland, which is aimed at attracting leisure tourists (Lau, 2008). The various phases of development are projected to continue into the future since this is considered a long-term project and constitutes of infrastructure such as ferry platforms and services, creation of subways and railways express lines and bridges which are rolled out in line with the master plan theme “*Connecting the Workshop of the World to the markets of the World*” (Zhang, 2003:126).

The aggressive investments outlined and suggested in the master plan have attracted some criticism from planners, such as McNeil (2014:3000), who have argued that these investments were mainly based on an exaggeration of the positive performance of the local economy and that not much emphasis was placed on the realities of a declining economy. Despite these criticisms, the aerotropolis development continues to make significant economic contributions in the region. In 2010, Hong Kong was identified as the world's top cargo airport, coming ahead of Memphis and Incheon International airports and this has further cemented its competitive position in the global market (Greater Memphis Chamber, 2009). In addition, it should also be recognised that significant returns are also being enjoyed by the Chinese government and investors as the development has enhanced China's global competitiveness as it acts as a much-needed logistics provider. The Hong Kong Aerotropolis has been since transformed into a vibrant economic hub serving multiple local and international markets, as highlighted in Figure 3.2.

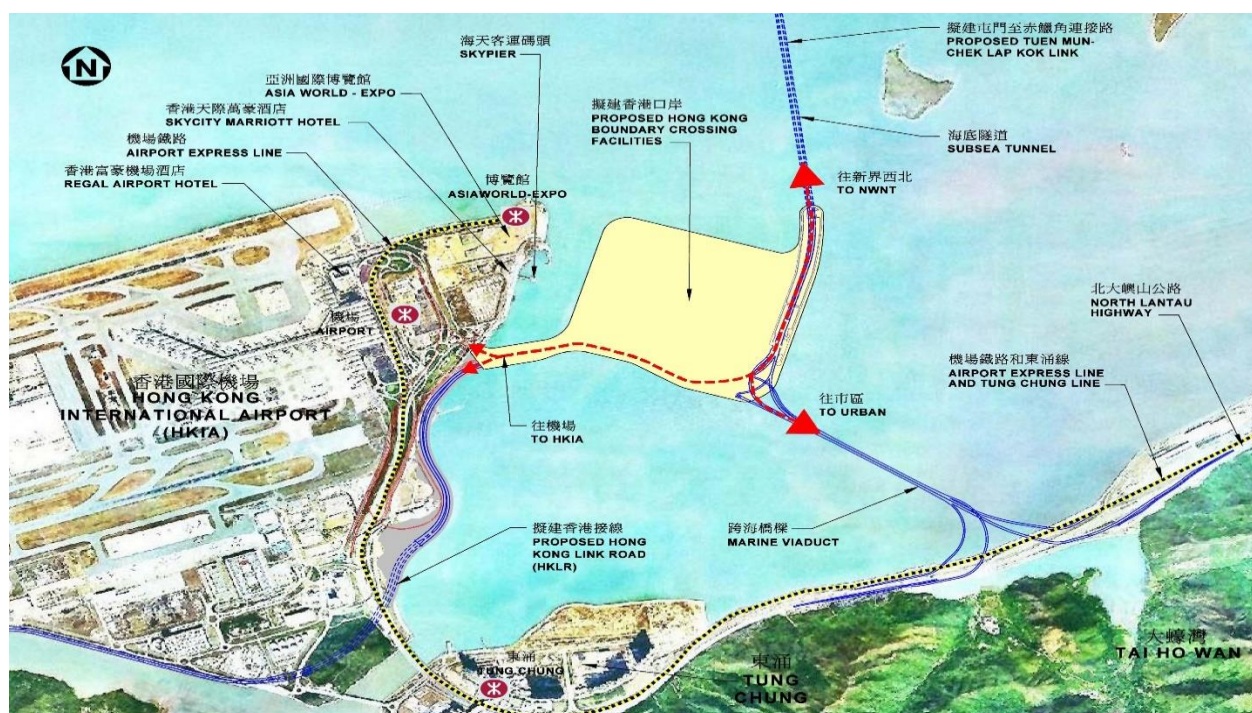


Figure 3.2 shows that developing the Hong Kong aerotropolis required proper and coordinated planning in terms of land-use, design and logistics infrastructural developments. Some of the main attractions forming part of the aerotropolis development include the following:

- The Regal Airport Hotel, which is linked to the terminal and is one of the largest in Hong Kong.
- Real estate town houses that can easily accommodate approximately 4500 individuals who work within the aerotropolis region.
- A world class shopping mall containing approximately 160 international stores.
- Office buildings and office parks.
- Trade port and stand-alone air cargo and expressway.
- Warehousing complex and air express hubs.
- Exhibition centres.

Transforming Hong Kong International Airport into an aerotropolis has taken place over a lengthy period; however, it should be noted that, despite significant investments exceeding US\$20 billion, the process has generated the projected growth for the domestic and surrounding economies (Chapman and Georgoulas, 2010). The emphasis on logistics excellence has quickly transformed the airport into a quadrimodal (air, highway, rail and sea) transportation and commercial destination.

3.2.2.2 Economic impact

The HKIA plays a central role in supporting the regional economy of Hong Kong through actively contributing to the extent and nature of activities in financial services, trading and logistics, tourism and professional services sectors, which are regarded as the four pillars defining the Hong Kong economy (Wong, 2002). In the same way as the other leading international airports, it has been instrumental in generating revenue through consolidated inbound and outbound cargo and passenger operations, including many other indirect activities and services that have positively influenced the economy (Eng, 2015:4).

In relation to annual cargo and passenger operations, in 2005 alone the airport handled 40.7 million passengers and 3.7 million tons of cargo, making it one of the busiest hubs for international passenger traffic and international cargo throughput (Zhang, 2003:125). The movements of aircraft

amounted to a total of approximately 264 000, from the 85 airlines linking Hong Kong to 150 other international destinations and 40 domestic destinations (Airport Authority Hong Kong, 2005). The shift in traffic patterns has also been of significance in contributing to the viability of the airport. Over one-third of the passengers processed at the airport are usually in transit (on their way to another destination) and this encourages airlines to operate more flights, a factor that has further boosted the status of the airport as a thriving international and regional aviation hub (Tongon, 2004:11). The economic benefits associated with the airport are also measured using other indirect variables such as employment and the extent of its contribution towards the gross domestic product; it was estimated that the airport contributed an estimate of HK\$2,88 billion to Hong Kong's GDP and that in addition it provided direct and indirect employment to about 60 000 people.

In the wake of the level of growth associated with rising demand, the government through its various departments has made continued efforts to ensure that the airport becomes a fully integrated aerotropolis. The airport authority (HKIA, 2025) envisions the airport as one that will be capable of servicing an expanded home market stretching outside of the borders of Pearl River Delta to the mainland. Also, it aims to enable it to operate a comprehensive network that serves the mainland destinations around Hong Kong and to provide an international network connecting China to the rest of the world.

3.2.2.3 An analysis of demand projections

There have been positive projections for growth in the aviation industry and more especially within the precincts of HKIA due to its positioning in the heart of Asia, where cross border trade is expected to quicken (Cheung et al, 2018). It is also located in the world's most populous continent, bordering China, the most populous nation (Banai, 2017:358). These factors collectively position the airport strategically and provide leverage for its expected success. The development of an aerotropolis should be visibly justified by demand figures to ensure that the nature and extent of investments are recovered over time from a cost and benefit analysis viewpoint (Chapin, 2002). Using references from evidence provided by government and aviation authorities responsible for managing and regulating the airport, the different factors that have contributed to the increasing demand of goods and services processed at the HKIA have been identified and this evidence can

be used in justifying the development of region into an aerotropolis. These factors are outlined as follows:

- **Increased globalisation**

Increased globalisation has been one of the factors responsible for most aerotropolis developments. It is the process of interaction and integration among organisations and people from different nations across geographical borders. This process is mainly driven by the increasing influence of international trade and investment (World Bank, 2016). Faster communications and improved efficiency in the flow of goods and services are deemed to be key variables characterising globalisation. With these on the rise, it is projected that the trade between countries is set to increase, especially with China, which has recently positioned itself as an economic superpower (Chapman and Georgoulas, 2010:12). Hong Kong, as a result of its favourable economic and political conditions, has been considered as the ideal destination by various organisations across the globe, who do business either in Hong Kong or with Hong Kong (Cheung et al (2018). Globalisation in Hong Kong is also enhanced by its proximity to mainland China, which is regarded as an international market as it trades with almost all countries, allowing it to become a highly globalised economy.

- **Tourism**

The positive economic climate of Hong Kong is at the forefront in boosting international tourism. The number of international tourists has increased over the years and is expected to reach 1.6 billion by 2020 (Civil Aviation Department, 2018). This increase is mainly attributed to the positive branding of the Asia-Pacific region, which is expected to contribute over 400 million inbound arrivals per annum by 2020. These figures project a positive picture about the prospects of growth in the region which supports the plan for transforming it into an aerotropolis. This has the benefits of ensuring that the airport can process and manage the increasing volume of people, remaining at the same time a competitive region (Bridger, 2017).

- **Growth in aviation**

The increase in globalisation and positive tourism growth figures directly influences and contributes to the growth and demand of aviation services. Based on forecasts by Boeing, passenger and cargo flows are both expected to increase by 5% per annum globally; however, the

growth of the Asia-Pacific region is expected to average at 6% per annum. On the other hand, the General Administration of Civil Aviation of China (2016) has projected abnormal growth of over 10% annually for passenger and cargo traffic in all the China mainland airports. This information and evidence provide the basis for developments and investments with regard to the HKIA aerotropolis so that these opportunities can be explored as they will have a positive economic contribution.

3.2.3 Amsterdam Schiphol Aerotropolis, Netherlands

The Amsterdam-Schiphol aerotropolis is designed around the Amsterdam Airport Schiphol (AMS). AMS is ranked as Europe's fourth largest airport, with a capacity to process over 50 million passengers annually, also managing an excess of over 130,000 tonnes of cargo per month (Accenture, 2017). These figures have grown over time and are expected to increase further at an average of 5% annually. This has presented an opportunity for the airport management and the regional government to take steps to exploit the increasing demand by introducing measures targeted at ensuring that the expansion of the airport accommodates increasing demand levels (Royal Schiphol Group, 2017). The growing number of passenger and cargo flows have also presented a multitude of problems for the airport which has resulted in inefficiencies in cargo and passenger management. One of the challenges is with security in the airport, which has become complex because of the growing volumes (Oxford Economics, 2011:33). However, the most significant challenge relates to airport capacity, which has fallen short due to the increasing number of flights and passengers over the years.

The adoption of the aerotropolis strategy for the AMS has mainly been a strategic decision in line with ensuring that the Netherlands is connected optimally with the rest of the world, thereby contributing to the prosperity and wellbeing of the country regionally and abroad (Lakerveld, 2011). The key strengths of the AMS lies in its network of destinations to which it is directly and indirectly connected. In 2016 there were 322 destinations connecting AMS and from all these connections it generated traffic flows amounting to more than 63,3 million passengers, 1 million tonnes of cargo, with close to 479 000 air transport movements (Schiphol Group, 2016). The airport has grown from strength to strength and has attracted a multitude of infrastructural projects aimed at ensuring that enhanced and efficient connectivity is attained (Ministry of Infrastructure and the Environment and Economic Affairs, 2015). Unlike the other aerotropolis regions

(Memphis, Hong Kong and DWC) that have been created primarily based on quantitative evidence such as a growing demand and an ability to attract more business, the development of the AMS aerotropolis region has been mainly focused on the qualitative elements associated with an aerotropolis development, which include improvements in the quality of life and in service quality for both cargo and passenger shipments (Aerotropolis Milwaukee, 2017).

3.2.3.1 The AMS Aerotropolis Master Plan

Development of an aerotropolis at AMS was motivated by the objective and goal of creating a metropolitan region that capitalises on a globally networked airport. For an area to be regarded as a 21st century urban development, careful analysis, and implementation of building blocks or supporting principles should be conducted (Banai, 2015:357). The AMS as an aerotropolis region was developed based on qualitative hallmarks and themes, including an emphasis on superior connectivity, excellent visit value, a competitive marketplace and sustainable and safe performance (Schiphol Group, 2016). These have been the cornerstone of the aerotropolis development and therefore need to be closely assessed to see how they have influenced the various developments creating the airport city. The developments and infrastructural innovations for the aerotropolis have mainly been adopted in line with the specific themes that are clearly articulated in the AMS master plan (Amsterdam Schiphol Airport Masterplan, 2015) as summarised below:

(i) Top connectivity

Connectivity as a variable seeks to ensure that AMS becomes one of the best and key hubs in Europe through capitalising on its competencies derived from its network of connections. This will be further strengthened by ensuring that more destinations are introduced, aimed at expanding the efficiencies of the main port (Hoffmann and Hellstroom, 2010). The main goals and objectives associated with connectivity ensure that logistics and transportation infrastructure are implemented, including road and rail platforms, allowing for enhanced connections and at the same optimising the already available infrastructure.

(ii) An attractive airport

The main goal is to ensure that the airport becomes the preferred destination for passengers, airlines and logistics service providers. This can only be facilitated by the adoption of world class passenger and mobility movement services through a consistent emphasis on the processes,

including facilities (Chapman and Georgoulas, 2010). More digitalised processes should be adopted in order to improve on the customer experience. One of the essential factors for any aerotropolis is to be able to attract demand in the form of passengers and cargo, which means that there needs to be an investment in those variables that will improve service quality.

(iii) Competitive marketplace

The AMS was developed as a competitive prime location designed for multiple purposes, including work and leisure, with ideal (Makhloufi and Davids, 2016). The growth in the interaction between businesses in different regions presents an opportunity for the airport region to attract international businesses and thus improve on the quality of the working environment. Being considered a competitive marketplace implies that the region becomes a prime area for both passenger and cargo movements.

(iv) Sustainable and safe performance

This is one of the most important fundamental themes considered in the development of the AMS Aerotropolis. The key aim is to ensure that all infrastructural developments and structural planning take into consideration society and the environment and that they have a long-term focus designed to create lasting value (Adhya, Plowright and Stevens, 2014). The key objectives are carefully aimed to balance the social, environmental, commercial and financial interests of people, planet and profit and to measure value creation rather than financial criteria alone.

Based on the above discussion, it is evident that the development of the AMS Aerotropolis has followed a unique path, which emphasised both economic and societal factors. As opposed to the development of other airport cities, which have responded particularly to the changes in demand, the AMS has emphasised a model in which enabling factors have been adopted in the airport city, such as ICT, retail, real estate and terminal infrastructure, which are considered as adding value to the economic engines, including the cargo city, logistic park, warehousing and business centres that contribute significantly to economic development (Mota, Boosten and Zuniga, 2017:14). As illustrated in Figure 3.3, the aerial view of the AMS Aerotropolis development has incorporated the various themes detailed in the master plan.

The success of the AMS Aerotropolis has been dependent on improvements in public transport platforms and the existence of direct and reliable connections in the form of road and rail network

3.3.2.2 Socio-Economic impacts

In a rapidly changing global climate, it is of paramount importance for a country like the Netherlands to maintain its global advantage. This can be achieved through ensuring that there is improved international accessibility. Aviation and related services are an essential element in ensuring enhanced international accessibility and accordingly the aerotropolis strategy was preferred mainly because of its ability to foster economic growth and at the same time allow the Netherlands to be timeously linked to the main economic centres of the world (Hantrais, Lenihan and MacGregor, 2015). It also should be noted that in the Netherlands the aviation industry plays an important role in economic development. This economic value can be interpreted as more than just contributing to the GDP, employment figures and revenue (Spalding and Ishmael, 2011). There are benefits created for the customer (passenger or shipper) using the air transport services. The geographical connections created between various markets and cities generate an influx of foreign direct investment and other spill-over impacts on the economy's productive capacity (Oxford Economics, 2011:4).

The development of an aerotropolis by the government of the Netherlands was based purely on its desired goals of creating the best conditions for the airport to thrive in the future, with the anticipation that prevailing conditions will attract a growth in demand in the years to come, what economists widely refer to as demand creation.²⁸ The aerotropolis strategy plays an important role in economic development as it makes substantive contributions through job creation and social prosperity. The Netherlands government in its projections indicated that the added value to be generated amounts of €9 billion and more than 100 000 employment opportunities. There are also other indirect benefits that could be considered (Makhloufi and Davids, 2016:34).

3.2.3 Belo Horizonte Aerotropolis, Brazil

For the aerotropolis concept to be easily transferable to the South African context it is important for cases that are in developing countries to be discussed. The Belo Horizonte aerotropolis development which is centred around the Tancredo Neves International Airport is extensively discussed. It is geographically located 30km away from the metropolitan region of Belo Horizonte

²⁸ Demand creation refers to the steps that are taken by any organization in order to create a need for their services or products, thereby attracting an increased customer base or market share; it is also identified as the art of educating buyers about the need for a particular service or product (StratMarketing Group, 2013)

within the vicinities of the Logoa Santa Karst Conservancy an ecologically delicate area which constitutes caverns, lakes and sink holes (Brassil, 2016). It is the main commercial airport that has been the major contributor to the regional economy of Belo Horizonte. The city is the third largest in Brazil with an estimated population of 5, 2 million inhabitants and is strategically located 300km from the Atlantic Ocean and Rio de Janeiro (IMF, 2020). The region is a mining area and has over the years been the main distribution and processing centre for gold and agricultural produce (Brazil Institute of Geography and Statistics, 2016). Belo Horizonte has over time become an economic hub and has been offering a variety of information technology and biotechnology services. It has thus attracted a plethora of multinational companies who have established their operations within the city (Miroff and Philips, 2016). TNIA has been serving as a regional hub that has mainly enhanced domestic connectivity through ensuring that there are direct movements between the north east and the southwest parts of Brazil (Braga, Moreira, 2010). It has attracted several airlines and has thus seen an increase in domestic and regional routes and also a growth in the international domain since airlines such as TAP (Lisbon), Copa Airlines (Panama), American Airlines (Miami) are operating routes daily (Brassil, 2016).

The aerotropolis development is influenced by an airport and therefore it is important to highlight the key factors that position TNIA as an ideal centre for the Belo Horizonte aerotropolis. Its main features are summarised below,

- Its operational capacity which is supported by a 3000m long and 45m wide runway which can accommodate up to 15 aircrafts of different sizes (INFRAERO, 2010).
- It lies within a 30km radius to the Technology Park of Belo Horizonte (BH-Tec), a hub for small- and large-scale companies who are in the biotechnology, information technology and pharmaceutical sciences.
- It is within a 20km radius to the Granbel Inland Port which is a key logistics hub that actively moves most of the locally manufactured agricultural and mining products.
- It is boarded by the Northern Ring a 45km roadway which has increased the regulation of traffic movements to and from the airport. This has further minimised the distance time between the airport and key economic regions in Belo Horizonte and surrounding municipalities.

Figure 3. 4 Tancredo Neves International Airport (TNIA) aerial view



Source: Changi Airports International (2018)

As can be seen from Figure 3.4 the success of the Belo Horizonte aerotropolis is accredited to TNIA which is uniquely positioned and allows for the various developments to be considered. The development of the Belo Horizonte aerotropolis masterplan was informed by Memphis and Schiphol-Amsterdam developments. What needs to be mentioned however is that planning for an aerotropolis requires a plan that is economically, socially, and environmentally sustainable and should respond to the market and social dynamics of the area.

3.2.3.1 Belo Horizonte Aerotropolis master plan

It has been noted that aerotropolis developments involve a great deal of planning and they are usually delivered in phases as they are long term in nature and encompass many stakeholders (Kasarda, 2018). The process of transforming TNIA into an aerotropolis region involved a series of steps and processes that should be considered to guide future developments particularly those in developing countries. The adoption of the Belo Horizonte aerotropolis masterplan was aimed at ensuring that a viable aerotropolis is created through considering the challenges of Belo Horizonte and the surrounding areas. Some of the notable challenges in the region included poor accessibility and a lack of efficient ground transportation between the airport, the city, and the other surrounding

areas. This therefore limited the volume of passengers and cargo that could be handled at any given time. Poor infrastructure was also identified as one of the reasons behind the failure of the airport to yield positive economic results (Mirroff and Philips, 2016). The Minas Gerais State Government, in partnership with the Belo Horizonte municipal authorities, implemented an upgrading project that sought to improve ground traffic accessibility to downtown Belo Horizonte and its Northern Areas, including the airport. This has been earmarked as being the first aerotropolis in South America and its planning has been primarily influenced by the precedents such as Memphis and Amsterdam (Kasarda, 2018). Some of the factors that have been considered in designing and planning for the TNIA aerotropolis include the environment and the socio-economic factors.

As part of the aerotropolis strategy development the project benefited from commitments in investments from both the government and private sector which resulted in the adoption of various infrastructural projects (World Bank, 2018). The projects that have been carried out as highlighted in the masterplan include improvements in logistics and ground transportation infrastructure connecting TNIA to Belo Horizonte downtown. Also, the expansion of the highway MG-10, also known as Linha Verde which was completed in 2014 at an estimated cost of US\$ 140 million is one of the key projects. The benefits that have been achieved as a result of these developments include a reduction in travel time between the airport and its surrounding region and a reduction in traffic congestion which was facilitated by the widening of the road networks to three lanes. As per the masterplan the aerotropolis complex has 15 million square meters and includes a single runway, passenger, and cargo terminal (Barga and Moreira, , 2010). The passenger terminal was designed to handle an estimated annual volume of 5 million passengers, and this has since been increased to accommodate the growing demand (Kasarda, 2018). The cargo terminal (TECA) was initially designed to handle 18,000 tons of cargo annually and be able to simultaneously accommodate 3 large cargo aircrafts.

One of the challenges that can be easily identified with major projects like the aerotropolis in developing countries is inadequate funding as the government often has limited resources. For Brazil, the Belo Horizonte aerotropolis was defined as a long-term development and thus had to be delivered in phases which as summarised in Table 3.5.

Table 3. 5 Belo Horizonte Aerotropolis Masterplan Development Phases

PHASE	KEY ACTIVITIES	INCEPTION DATE	APPROX COST
1	<ul style="list-style-type: none"> • The construction of new industrial plants (8 lots of 4000 square metres each) • Passenger and Cargo Terminal expansion (TECA) • Development of 500 square metres within the terminal for industrial use. • Expansion and development of existing runway. 	2015-2018	R\$4.6 Billion
2	<ul style="list-style-type: none"> • Industrial Condominium Phase • Development of one million square meters for tenant and industrial facilities and plants. • Implementation of the airport city model and technological upgrades • Expansion of road networks 	2018-2021	R\$13.2 Billion
3	<ul style="list-style-type: none"> • Creation of integrated transport systems connecting the airport to various nodes. • Development of housing facilities and entertainment centres and facilities. 	2021-2025	R\$20 Billion

Source: Researcher's own construction

3.2.3.2 Economic Impacts

One of the major reasons behind the adoption of the aerotropolis strategy is to improve the economic prospects of a region which include boosting GDP and easing the unemployment rates among other economic variables (Braga and Moreira, 2010). Brazil is considered a developing country which is characterised by low per capita real income, high population growth rate and high rates of unemployment which averaged 12.08% in 2020 (IMF, 2018). Therefore, the adoption of economically driven strategies has been the central focus of both the local and national government. The Belo Horizonte aerotropolis since its inception in 2015 has yielded positive economic returns for the region as it contributed to an increase in annual passenger and cargo volumes. Given that TNIA has an estimated annual operational capacity of 5 million passengers and processes 40 thousand tons of cargo, in 2016 alone it handled 9.5 million passengers, of which 422,000 of these were international passengers (Miroff and Philips, 2016). This was a 31% increase from the previous years for domestic and regional passengers and a 40% growth for

international passengers. In terms of cargo volumes, the TNIA handled 16,263 tons in 2016 which positioned it as the sixth airport in Brazil in terms of the cargo volumes processed and handled (Brassil, 2016).

Some of the attributes that are considered in measuring the economic impacts of the Belo Horizonte aerotropolis include trade volumes which in 2017 amounted to US\$ 175,971,016 in exports which was 15% higher compared to the previous years. Due to its vicinity to the Belo Horizonte technology hub the main products that are exported include automotive parts, pharmaceutical products, precious and semiprecious stones, and electronic parts (International Civil Aviation Organisation, 2018). It facilitated the movement and handling of imported products such as electronic, automotive and railroad parts and components amounting to US\$ 1,025,101,138 (INFRAERO CARGO, 2018). The aerotropolis has generated a gradual increase over the years for both cargo and passenger volumes and has attracted the more aviation and logistics companies which has made significant contributions to the creation of quality jobs and a steady growth in the region's income and GDP.

3.2.4 Ekurhuleni Aerotropolis, South Africa

South Africa is one of the countries on the continent to consider the adoption of the aerotropolis strategy in one of its economically active and viable regions, Ekurhuleni. The metropolitan city has an estimated population of 3.8 million of which 600 000 reside in growing informal settlements. It is the second most populated municipality within Gauteng, with the City of Johannesburg which lies adjacent being the first, with 4.4million inhabitants in 2011 (Statistics South Africa, 2018). The development is positioned in the province of Gauteng which in 2020 had a population of approximately 5.8 million. As a financial and economic hub of South Africa the province contributes 36% of South Africa's gross domestic product, 40% of total industrial output, 60% of exports and generates more than R1- trillion to the fiscus annually and thus regarded as the biggest contributor to national employment (Van de Walle, 2016). The province is influential in the SADC region as it is actively facilitating imports and exports to the surrounding countries.

The aerotropolis development is centred around the OR Tambo International, Africa's largest airport with the capacity to handle 400 000 tonnes of cargo and more than 21-million passengers per year (ACSA, 2016). ORTIA is regarded as the busiest airport in Africa and has excellent

connectivity to the region and the world (World Bank, 2018). One other notable development within the Ekurhuleni aerotropolis is the Special Economic Zone (SEZ) which was established to support industrial development in Gauteng province. The focus was in creating an export-oriented, value-added industry in Ekurhuleni. The positioning of the aerotropolis development should be strategic and should be aligned to logistics and transportation networks. The Ekurhuleni aerotropolis as highlighted in Figure 3.5 is positioned in an economic hub with an established transportation network.

Figure 3. 5 Ekurhuleni aerotropolis aerial view



Source: Airport Company South Africa (2019)

3.2.4.1 Ekurhuleni Aerotropolis master plan

The Ekurhuleni Aerotropolis is a platform for a host of physical, social, governmental, and economic planning efforts intended to improve the lives of residents and foster economic stability and sustainability. The early conceptual thinking behind the Ekurhuleni aerotropolis masterplan was released in 2013 at the Airport Cities World Conference and Exhibition which was hosted in Ekurhuleni. The development is aligned with South Africa's National Development Plan for 2030 which has identified the investment in infrastructural developments to propel development (Van der Merwe 2013). The plan was also aimed at ensuring that the regional challenges are addressed

through the adoption of sustainable methods. As stated by Misago (2016) planning the Ekurhuleni Aerotropolis was about taking advantage of the economic opportunities offered by the airport and using them for equitable socio-economic development through new infrastructure, alternative retail, employment and commercial land use that stretch far beyond the airport precinct.

The masterplan provided the blueprint on the steps and processes that will be implemented upon development with the intention of ensuring that the economic potential of the region is explored. Some of the areas highlighted included the transformation of 30 295 square metres of land for industry-specific infrastructural facilities. The Master plan identified a suite of projects for key economic clusters including advanced manufacturing, cargo logistics and e-commerce hubs, retail, aviation, cold storage, research and development hubs, information, and communication technology among others (Rangongo, 2018). At the heart of the master plan was also the redesign of the city's layout, infrastructure, and economy to be centred on the airport (Correia and Wirasinghe 2004). From a socio-economic context the aerotropolis masterplan was aimed on providing a solution to the uneven distribution of economic opportunities. As evidenced from other aerotropolis developments the implementation of the Ekurhuleni aerotropolis has followed three phases as illustrated in Table 3.6.

Table 3. 6 Ekurhuleni Aerotropolis master plan developmental phases

PHASE	KEY ACTIVITIES	INCEPTION DATE	APPROX COST
1	<ul style="list-style-type: none"> Feasibility study conducted by local and international consultants on the viability of the region. 	2013-2015	R4.6 million
2	<ul style="list-style-type: none"> Mobilising the relevant stakeholders to support the strategy development. Launching of the Gauteng City Region growth plan which mobilised for public and private investments. Aerotropolis Masterplan launched during an investor forum. 25 catalytic projects were unveiled which were aligned to the creation of an airport city and drive the growth initiative. 	2015-2030	R7.6 Billion
3	<ul style="list-style-type: none"> Creation of a sustainable city Expansion of infrastructure and the incorporation of innovative logistics and transportation models. 	2030-2050	Unknown

Source: Researcher's own construction

3.2.4.2 Economic Impacts

The Ekurhuleni aerotropolis has stimulated and propelled economic growth for the local and national economy through its various infrastructural developments. As a result, its geographical location within the Gauteng City Region which comprises of Johannesburg and Ekurhuleni metropolitan cities that account for more than 33% of the economic activities in South Africa. It has provided a platform for growth through the creation of a conducive business environment that has been complemented by the establishment of a SEZ. This has resulted in the creation of the country's largest concentration for industry and production for goods and commodities (Dube Tradeport, 2013). The region has established itself as an industrial and manufacturing base for Africa as it houses different companies who are actively involved in importing and exporting a basket of products. The SEZ continues to offer the ease of access to Africa's more than 200-million consumers through its connectivity capabilities and offers opportunities for the interaction of the various businesses (Nyilenda, 2017). In terms of GDP contribution, it should be highlighted that the aerotropolis region as an economic centre has resulted in increased production of goods and services in different sectors as highlighted in Table 3.7.

Table 3. 7 Total Combined GDP Impacts of (Rm)

SECTOR	ORTIA
Transport, storage and communication	55 657.2
Trade and accommodation	20 886.5
Business services	2 784.1
Manufacturing	19 109.1
Other	5 972.7
TOTAL	104 409.6

The Ekurhuleni aerotropolis has also seen an increase in passenger volumes and these are a direct reflection of the growth in economic activities. It has been noted from the other aerotropolis developments that their success is driven by the level of business activities that it can generate for instance attracting more flight and cargo volumes (Mota, Boosten and Zuniga, 2017). As noted in Table 3.8 there has been a steady increase in passenger volumes from 2013 (+1.1%) which

resembles the period in which the first phase of the development was commissioned thereafter increases are substantial particularly in 2015 (+6.5%). On the other hand, flight volumes have also maintained a steady growth with high figures being particularly recorded in 2017 and 2018. Although it should be noted that the periods 2019 and 2021 recorded significantly low passenger and flight volumes because of the imposed restrictions²⁹ that affected the aviation industry.

Table 3. 8 Passenger and Flight volumes for ORIA

Year	Passengers (mil)	Up/down	
2010/2011	18,643,146	+5.9%	
2011/2012	19,003,542	+1.9%	
2012/2013	18,621,259	-2.0%	
2013/2014	18,820,988	+1.1%	
2014/2015	19,135,093	+1.7%	
2015/2016	20,374,998	+6.5%	
2016/2017	20,692,780	+1.5%	
Flight Arrivals			
Year	International	Regional	Domestic
2017/2018	33,122	10,147	53,997
2018/2019	32,559	9,849	55,046
2019/2020	32,201	9,197	53,139
2020/2020	9,484	2,292	18,253
Flight Departures			
2017/2018	33,022	10,167	54,602
2018/2019	32,356	9,886	55,532
2019/2020	31,974	9,256	53,478
2020/2020	9,367	2,219	18,300

²⁹ COVID 19 pandemic resulted in the introduction of travel restrictions by various countries to curb the spread of the virus. These included international and domestic travel and thus had a significant impact to the aviation industry, one in three worldwide destinations are completely closed to international tourism which has had a negative impact to the global economy (UNWTO, 2021).

3.3 Conclusion

This chapter has presented a review of aerotropolis developments, namely Memphis, Hong Kong, Amsterdam-Schiphol, Belo Horizonte and Ekurhuleni. These have been the subject of interest and analysis among researchers and planners as they are considered as the benchmarks of the aerotropolis strategy. The main objective of the chapter was to interrogate the planning framework applied in these regions and to identify the motivations behind the adoption and implementation of the aerotropolis strategy. It is evident from this study that every aerotropolis development has followed a unique and customised path of development influenced by a variety of factors, including the competitive attributes of the area, demand and market trends. The findings of this chapter will be used as a reference point in determining the steps that should be considered for the Durban Aerotropolis and in considering whether it stands a chance of competing with other global developments.

Reviewing the individual master plans for the different aerotropolis regions has ensured that the various elements considered as essential in developing the strategy are discussed. Ideally, an aerotropolis is best suited for an area that already enjoys a degree of competitive advantage, which can either be its location or market focus. For instance, Hong Kong International Airport is strategically located close to mainland China and boasts an increasing tourism sector, which has meant that the adoption of the aerotropolis takes advantage of already existing opportunities (McNeil, 2014). On the other hand, Memphis is a logistics hub as it is in a booming logistics and transportation region which has also seen an increase in demand, motivating for the adoption of the aerotropolis to increase capacity. Similarly, Dubai and TNIA airports have been transformed into aerotropolis regions based on quantitative and qualitative factors including influencing customer service and enhancing connectivity and economic growth.

CHAPTER 4: EVALUATING AEROTROPOLIS DEVELOPMENTS

“Once the aerotropolis development is done, you have a monstrous economic engine quickly draining the life out of family businesses and often doing so while receiving huge tax waivers and other public subsidies” (Aviation Impact Reform, 2010).

4.1 Introduction

As discussed in Chapters 2 and 3, the investments and innovations considered for the aerotropolis strategy are implemented based on their implied returns, benefits and the spill-over effects on the economy and on society. In the previous chapters, evidence was presented that reflects the views of Kasarda (2000) and Appold (2012), who consider the aerotropolis as the ideal strategy to foster economic development and build cities of the future.³⁰ This chapter evaluates the aerotropolis strategy and presents the arguments for and against it as identified in literature. For instance, Louisville Aerotropolis created twice as many local jobs than had been initially projected (St Louis Regional Chamber and Growth Association, 2011). Moreover, Memphis Aerotropolis continues to pump close to \$28.6 billion into the regional economy annually through its various aeronautical and non-aeronautical activities which are forecasted to increase by the year 2025 (Aerotropolis Milwaukee, 2017).

Despite the much-publicised advantages of the aerotropolis, it is also important to determine the challenges that have been encountered by regions because of adopting the strategy. Spalding and Ishmael (2011:2) suggest that most of the projected benefits of the aerotropolis strategy are exaggerated and a misrepresentation of reality. These benefits are limited to only a small segment of businesses and private developers, who tend to cash-in at the expense of small businesses who are affected by the competitive environment created, and by the state, which is meant to fund most of the initiatives. Further, questions pertaining to the aerotropolis and its sustainability have been

³⁰ Cities of the future have been talked about for a number of years, with a significant contribution being made by the World Bank, which has been influential in ensuring that urban areas around the world are imagined, planned, conceived, built and analysed as either successful or failures (Wang, Madden and Liu, 2017:4). The future cities are imagined as capable of attracting talent and investment and will therefore need to be sustainable, citizen centric, economically vibrant, resilient, accessible, well governed and responsive (World Economic Forum, 2008).

raised by environmentalists and they have cited its contribution in depleting green fields and conservancy areas (Abrams et al., 2012). Such arguments by various critics are limited. However, this chapter aims at ensuring that all the challenges and issues associated with the aerotropolis strategy are highlighted and categorised. These issues are multi-disciplinary and range across social, economic, environmental and demographic factors and these factors arise during the planning, implementation and post-delivery of the strategy.

4.2 Advantages of an aerotropolis

Over a decade ago, airports were areas primarily designed for the movement of passengers and cargo. However, the 21st century airport has facilities such as factories, retail offices, hotels, entertainment areas, golf courses, and residential areas among many others located in its vicinity (Appold and Kasarda, 2012). This has resulted in changes of land use and has created a new form of airport-related demand (Menon, 2014:51). With an increasing emphasis on the aerotropolis strategy, more and more activities are being centralised to airports and thus they continue to be viewed as centres of development and champions of urbanisation.

Brisbane Airport has over the years grown to occupy over 80 000 square meters of retail and office space and close to 430 businesses operate from its premises (BNE Property, 2017). Memphis Airport has gained the reputation of being the logistics hub of America, given its world class warehouses and other ancillary logistics assets (Lynch, 2016:12). These represent only a few examples of the shift in the traditional understanding of planning in airports, a shift which has further been accelerated by the aerotropolis strategy. Bridger (2014) rightly describes the aerotropolis strategy as representing an airport centric form of urban development in which all logistics linkages, infrastructural and spatial planning developments support the airport as the central node of development. The numerous motivations cited in support of the aerotropolis strategy can be summarised as focusing on its ability to influence economic growth and development, re-define urban spaces and improve the standard of living and quality of life.

4.2.1 Re-defining economic development

The growing emphasis on the development of airports around the world has been increased by their proven ability to bring about socio-economic benefits for regions through attracting more

aeronautical and non-aeronautical activities (ASEF Outlook Report, 2016). These activities are key contributors to economic growth and development as noted in the previous chapters and have led to a steady increase in revenue for aerotropolis regions such as Memphis, Hong Kong and Dubai over the past few years (Callanan, 2016:4). This has resulted in a scramble among planners, developers and investors for land space around airports for development purposes. There has been a change in the utilisation of land surrounding major airports and this has created a scenario in which airports expand outwards into unoccupied areas or influence change in already developed areas, a phenomenon referred by planners as rezoning³¹ (Hanly, 2015). In Chapter 5, evidence is presented on the economic impact of the aerotropolis strategy in various regions. This evidence primarily indicates the ability of the strategy to influence demand trends and attract innovative infrastructural developments. In areas where there are new developments responsible for the creation of new jobs, there is always an influx of people, mainly due to the projected economic successes and the prospects of improved quality of life (Satterthwaite, 2010:3). In order to further accelerate aerotropolis developments, partnerships between the government and private companies have been created, with the government taking the leading role through adopting policies, plans and programs tailored towards facilitating advanced economic development, job creation and growth (NDP, 2016).

4.2.2 Re-defining population migration

It should be recognised that the aerotropolis strategy has been influential in fuelling population migration from rural to urban centres. This is due to its ability to create economic opportunities that act as pull factors for the various population groups in different geographical locations (Warin and Svaton, 2008:14). The pull factors include all the elements that attract individuals to move to new areas or locations mainly because of the growth in economic and social prospects emanating from the increase in business activities and infrastructural developments (Callanan, 2016:3). This facilitates increased revenues for the regional and local economies (Rana, 2017:237). The influx of people from the rural or primitive areas to industrial zones can be backdated to the industrial

³¹ Zoning is described as the process of planning for land use across certain geographic areas, this is mainly designed to ensure that the mixing of incompatible land uses is avoided in order to achieve both environmental and economic benefits (World Bank Group, 2015).

revolution in which factories were driving economic activity, thereby draining people from the underdeveloped areas (Kim, 2007:3).

The urban environment is a key factor of interest to developers due to its ability to attract an influx of people and thereby to encourage a wide range of infrastructural developments. As noted by S  necal (2007), the urban environment refers to a central lived space that comprises metropolises, urban centres, semi urban fringes, neighbourhoods, residential and commercial areas and mid-sized towns. In the context of this study, urban areas are viewed from the perspective of multi-criteria, ranging from their administrative functions, their size and density, facilities and infrastructure and level of economic activity to employment forms and sizes (Satterthwaite, 2010:7). The urban environment and urbanisation are usually discussed interchangeably by town planners. Urbanisation tends to be the term that is used to describe the demographic clustering process in which a significant share of the population tends to reside in urban settlements, where its residents are not dependent on farming as a source of income (Moore-Chery, 2015). In other contexts, the term is defined in relation to variables such as geographical focus, population size, economic activity and density.

4.2.3 Re-defining the quality of life

The aerotropolis strategy emphasises the establishment of new forms of development and infrastructure, including residential areas which are created within the airport domain. This has given rise to urbanisation since these constructions and infrastructural developments have taken place in areas previously referred as green fields (Abrams et al, 2012:13). Urbanisation inevitably involves a shift in the demographic, economic and environmental flows between rural and urban centres in both predictable and unpredictable ways. Despite the evidence presented on the relationship that exists between urbanisation and the attainment of Millennium Development Goals (MDGs³²), caution still needs to be exercised pertaining to the effects of urbanisation on sustainable development (World Bank, 2016).

³² MDGs are contained in the United Nations Millennium Declaration, in which world leaders are committed to the adoption of policies and principles that will result to the eradication of poverty, hunger, disease, illiteracy and environmental degradation among others within a set timeline (World Health Organization, 2010)

However, it can be noted that transformation from rural to urban results in changes in quality of life, given the extent of infrastructural developments especially for developing countries (Han et al, 2012:1005). Without a doubt, there are advantages associated with urbanisation as evidenced in multiple regions, specifically its ability to create economic opportunities and foster rapid economic growth and success which also influences the quality of life (Arouri et al, 2014:4). There seems to be a consensus among researchers, academics, international organisations and donors regarding the impact of urbanisation and therefore major steps have been taken to initiate consistent and effective policy actions in urban planning in most African regions to improve the conditions of previously disadvantaged groups.

4.3 Environmental impacts

The expansion of airports and the emergence of the aerotropolis is considered to be strategically important as it enhances the competitiveness of a region. However, as noted with the cases of prominent aerotropolis regions, there are major challenges resulting from this strategy, which include security related issues, environmental concerns, pollution, congestion and sprawl in illegal settlements (Huston, 2015). Some of the arguments presented by researchers and consultants who are considered strong critics of the aerotropolis strategy have mainly included questions pertaining to its environmental impacts (Charles et al, 2007). This has further resulted in many other studies that have defined the negative factors linked to the use of the triple bottom line (TBL)³³ framework. This section of the study will explore each of the arguments presented to ensure that the aerotropolis is understood from a balanced perspective.

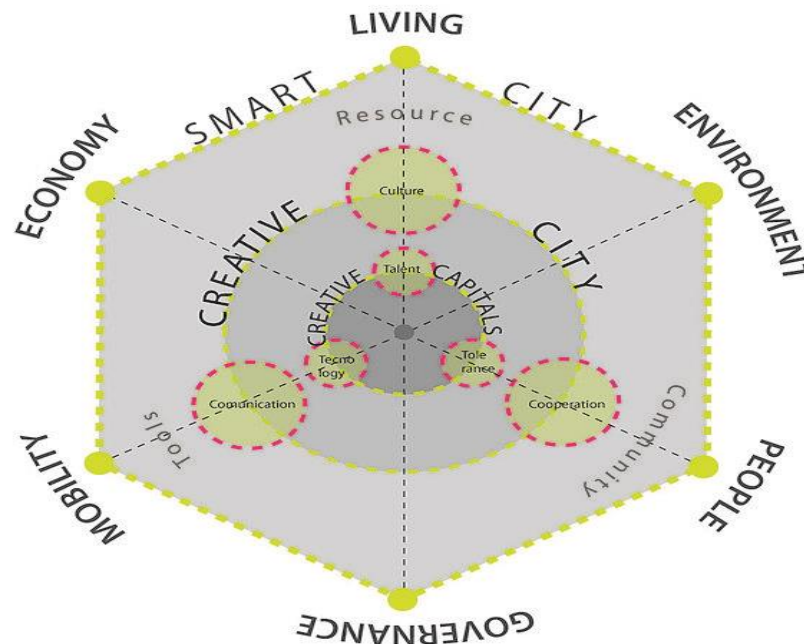
4.3.1 Aerotropolis and sustainable development

As mentioned previously, the aerotropolis strategy has been at the centre of facilitating urban growth and development, given that it is considered to be the hub of innovation in technology, commerce, social organisation and ideas (Huston, 2015:2). Its ability to attract a cluster of

³³ TBL is explicitly based on the integration of the environment, people and the economy. As a sustainability construct developed by Elkington (2013), its key assumptions regarding sustainable development places an emphasis on ensuring that the environmental agenda is advanced so as to integrate both social and economic aspects. This has also successfully provided a framework in which organizations can be measured, based on their economic performance and on social and environmental variables. Essentially as stated by Okanga and Groenewald (2017:2), TBL allows the conceptualization and implementation of reactive and proactive measures, resulting in the creation of favorable conditions in line with environmental, economic and social factors.

organisations and individuals has allowed innovation to expand at an exceptional speed, thereby generating increased wealth and economic activity (United Nations Development Programme, 2016:4). Given the trends associated with aerotropolis developments and its wider contribution to urbanisation, it has affected the environment and the well-being of urban dwellers. This has resulted to widespread deliberations on the question of sustainable development. Figure 4.1 provides an account of some of the key factors that need to be considered when addressing the question of sustainable development for an aerotropolis establishment. These can be considered as challenges associated with implementing the strategy.

Figure 4. 1 Integrated Smart City Development



Source: Huston (2015:1)

Most of the discussion on urban environments and their accelerated growth revolve around the regulation and impact of air, water, soil, vegetation, human and animal life. These issues have been central to the arguments presented by urban ecosystem theorists such as Duvignaud (1963), Odum and Barrett (1971) and Dansereau (1973) among many others. Their contributions have motivated discussions around the creation of sustainable cities and liveable communities and have also provided a platform for the analysis of the ecological footprint for the aerotropolis development and its related infrastructural initiatives as depicted in Figure 4.1. A particular focus has been on

ensuring that all the factors that directly affect the urban environment, such as planning, urban governance and policy making, are assessed in order to determine how best they can be optimised in order to contain the impacts they have on the environment (Huston, 2015:4). On the other hand, Kuhlman and Farrington (2010:3436) emphasise the synergies that exist between economics, politics, technology, society and environment and how these can collectively respond to the question of sustainability. The discussions among academics and researchers have been critical of any form of emerging developments especially given that the standard of practice has been associated with sustainable development,³⁴ popular with policy-oriented research, seeking to provide a framework for how policies to incorporate the question of sustainability.

Adhya, Plowright and Stevens (2014:17) noted that the complexities and challenges of the aerotropolis strategy as far as urban development and sustainability are concerned result mainly from the differing viewpoints among town planners and urban developers who are the key informants on how the strategy is adopted. Traditionally, urban design and planning was reserved for architects, urban planners and civil engineers, who refer to their professional biases and to views that do not necessary subscribe to sustainable initiatives (Okanga and Groenewald, 2017:5). The main goal of sustainable development is to ensure that balance and stability is created in the long term with regard to infrastructural developments, the economy and the environment. This can be successfully achieved through ensuring that there is an integration between social, economic and environmental factors in the decision-making processes that play a key role in infrastructure development and urban planning (Emas, 2015:2).

Studies conducted by the World Bank (2016) and Satterthwaite and Miltin (2013) provide an account of some of the environmental challenges posed by increased urban development, which include rising levels of pollution, including air and waste, among many other factors associated with climate change. In order to substantiate the arguments related to the negative contributions associated with the aerotropolis as far as sustainable development is concerned, it is important to discuss transportation and mobility systems, energy use and systems, environment protection and

³⁴ Sustainable development is best defined as associated with any form of development that meets the needs of the present without compromising the ability of future generations to meet their own needs (United Nations General Assembly, 1987:43). This has been the driving strategy aimed at ensuring that all the developments have an economic benefit whilst at the same time considering the protection of the value of the environment and society. With the increase in global warming, issues of sustainable development have taken centre stage.

waste management , all notable components of the aerotropolis strategy development and dealt with in turn below.

(i) Transportation and mobility systems

Transportation and logistics are among the main factors determining the success of the aerotropolis strategy and as such are considered as critical success factors (CSFs).³⁵ Logistics serves as a mechanism that integrates geographically dispersed stakeholders and elements in a catchment area³⁶ that is served by the aerotropolis region (Siegmann and Boloukian, 2015:801). From a competitive perspective, transportation systems should be highly prioritised as they are actively involved in determining the success of an enterprise or organisation (Stock, Greis and Kasarda, 1998:38). From a global perspective, successful aerotropolis regions are those that can provide fast, flexible, reliable and responsive services in line with customer expectations, using advanced information technology and high-speed transportation systems and infrastructure (Du and Bergqvist, 2010:1). It should also be pointed out that public transport systems are essential as they are responsible for enhancing the movement and mobility of passengers and cargo from the airport region and to surrounding regions (Sebhatu and Enquist, 2016:263).

The aerotropolis strategy has further encouraged the practice of positioning airports at the centre of economic activities as a result of their improved ability to attract industrial and trading activities. This has been facilitated mainly by the increasing volume of people accessing airport regions daily through various transport channels, with motorised road transport being the most widely used (Kenworthy, 2006:68). Recently developed airport cities and regions have prioritised the expansion of road infrastructure in order to accommodate the growing capacity as driven by projected economic growth. In order to illustrate the transportation trends associated with airport developments, one can consider the case of the Sydney Aerotropolis, which was developed based on a projected growth in future demand. This was further supported by the growth in the use of airport services as evidenced by an increase in passenger arrivals, inbound and outbound cargo

³⁵ CSFs are described as representing the limited number of areas on which the success of an organisation or company depends; for an organisation to gain a competitive advantage, the few key areas identified as CSFs must be in place, thereby contributing towards organisational success (Grunert and Ellegaard, 1998:2).

³⁶ Catchment area represents the geographical area from which an organization or region attracts its main customers, whether existing or prospective; this is usually important in determining an optimized distribution network (Geoconcept, 2018).

shipments and departure volumes (Sydney Airport Master Plan, 2016). Also, there have been notable changes in the use of transportation modes, with the aerotropolis strategy contributing to multi-modal platforms such as public BRT systems, private cars and high-speed trains.

It should, however, be mentioned that the transportation and logistics systems discussed have resulted in a considerable number of challenges, particularly to sustainable development (Siegmann and Boloukian, 2015:806). From a socio-environmental perspective, the increasing activities in and around airports have seen an increase in travel times and congestion of traffic which has contributed its fair share to environmental degradation (Kushwaha and Sharma, 2014:74). In a study by the Swedish Environmental Protection Agency (2013), it was found that transportation is a factor that negatively affects the environment to a significant extent, even though efforts aimed at ensuring that sustainable practices are achieved have been rigorously adopted. There are many reports and researchers providing evidence on the impacts that transportation and logistics developments have on the broader environment, summarised and categorised in Table 4.1.

Logistics and transport infrastructure and technological innovations are some of the factors that are associated with negative socio-environmental factors. However, there are other variables that need to be considered as well, for instance, health, education and human settlements that can be positively and negatively affected by aerotropolis developments (Sattel and Jarrell, 2014:33). From the discussion conducted, it is evident that the aerotropolis strategy can negatively affect the environment due to the nature of its operations, which mainly encourage growth in transportation and logistics activities. It can be noted that an increase in aviation activities does result in an increase in carbon emissions, which has dire environmental impacts. In addition, the other environmental related challenges resulting from aerotropolis developments can be attributed to a lack of planning, which essentially requires the integration of the various stakeholders who need to be considerate of the sustainable factors (Robert, Baker and Douglas, 2010:265). In order to avert these challenges, there needs to be an alignment of technology management and policy and this should be central in decision making, regulating the integration of people and communities, the natural environment, infrastructure and the economy (Huston, 2015:4).

Table 4. 1 Transport and mobility system challenges related to sustainability

ENVIRONMENTAL THREAT	DESCRIPTION	EVIDENCE	RESEARCHERS
1. Greenhouse gas emissions (GHGs)	This is considered as the emission of various gases into the atmosphere; numerous gases are emitted during transportation and hence gases such as carbon dioxide, methane and nitrous oxide are released into the atmosphere.	Use of energy and fuel in industrialised countries contributes a major portion of all carbon emissions. In the US alone, 27% of the GHGs are attributed to transportation while globally, transportation accounts for 14% (Shaheen and Lipman, 2007:6). This means that the increase in transportation activities and volumes because of the aerotropolis concept negatively affects the environment.	Adha, Plowright and Stevens (2014)
2. Depletion of the ozone layer in the stratosphere	This is associated with threat 1; it is mainly attributed to the release of gases more especially by aircraft at high altitudes contributing to the depletion of the ozone layer.	Given that all efforts aimed at developing an aerotropolis are aimed at inducing the demand for traffic volumes, this essentially means that there is an increase in the volume of emissions by aircrafts (Emas, 2015).	Arts, Hanekamp and Dijkstra (2014), Chakravarty et al (2012)
3. Health effects	These are the associated health effects resulting from the emission of gases by transport modes, which contribute to respiratory problems among other issues.	There has been strong evidence suggesting that the increasing gas emissions (air pollution) has contributed to the growing number of respiratory and cardiovascular problems and cancer and that it is the leading cause of premature death in Europe (Ohliger, 2019). Gas emissions are as a result of burning fuels in passenger transport systems.	Haakak and Ghodsi (2015),
4. Noise and urban air pollution	Noise pollution relates to the unwanted sounds that are broadcast into the air through various sources such as road traffic, jet planes, garbage trucks, construction equipment.	The sources of noise are mainly attributed to transportation, more especially vehicular traffic, air and railway (Singh and Davar, 2004:181).	Sebhatu and Enguist (2016)
5. Greenhouse gas emissions (GHGs)	This is considered as the emission of various gases into the atmosphere, given that there are numerous gases that are emitted during transportation, such as carbon dioxide, methane and nitrous oxide.	The use of energy and fuel in industrialised countries contributes a major portion of all carbon emissions. In the US alone, 27% of the GHGs are attributed to transportation while globally transportation accounts for 14% (Shaheen and Lipman, 2007:6). This means that the increase in transportation activities and volumes as a result of the aerotropolis concept negatively affects the environment.	Adha, Plowright and Stevens (2014)

Source: Researchers own construction

(ii) Land use and infrastructural developments

The prospects for economic growth have been related to an increase in the number of activities aimed at influencing the degree of production of goods and services and thus increasing per capita income (Buthelezi, 2017). A high rate of economic growth has been the goal of government and planners around the world, motivating the adoption of expansionary policies such as the aerotropolis strategy (Phimphanthavong, 2013:766). This involves immense developmental commitments as well as investments in infrastructure and other related facilities affecting land use, which are essential in attaining economic growth and development (Kasarda, 2014). Although it should be categorically stated that, with most of the suggested alterations to land use and infrastructural developments, there needs to be a willingness and capacity to spend financially, as most of these require adequate financing (Adair, 2007).

Infrastructure is considered to be a catalyst for economic growth and is essential in creating, supporting and sustaining economic development (INTOSAI, 2013). The nature of the infrastructural developments that usually reflect growth and economic development include investments in tarred roads, bridges, high-rise buildings and warehouses, usually covering sizable areas (Estache and Garsous, 2012:1). It is well recognised across political and academic platforms that infrastructural developments are positive contributors to growth. A plethora of anecdotal and more technical evidence has been presented to suggest that infrastructure can directly raise the productivity and quality of life through increasing jobs and income levels. For instance, in the UK, a 15-year £15 billion cross-rail project was initiated with the aim of regenerating the transport channels in East London referred to as the Elizabeth Line (Wright, Palczynski and Have, 2017:1). In South Africa, one of the key projects associated with the creation of the Ekurhuleni aerotropolis development was the Gautrain Rapid Rail Link launched in February 2000, the aim of which was to link Johannesburg and Pretoria to the Oliver Tambo International Airport (ORIA) at an estimated cost of R30 billion (Van de Merwe, Negota and Van Zyl, 2001:1).

Despite the intended economic benefits associated with the infrastructural developments of an aerotropolis, there are also challenges that need to be highlighted. These challenges span social, political, economic and environmental factors which build up during the construction phases or after being handed over to the intended communities or regions. In order to take note of these

challenges, a review of the various types of infrastructure that could be possibly implemented when developing an aerotropolis is made below:

- a. **Energy** - since there needs to be a reliable supply of electricity to support the various activities taking place within the aerotropolis, investing in energy infrastructure is considered as essential; this involves the installation of electricity transmission grids, gas and renewable energy technologies and generators, among other alternatives (Estache and Garsous, 2012:4).
- b. **Water and sanitation** - this includes the infrastructure that is mainly responsible for the provision of water and the creation of waste disposal systems which are essential for any form of urban development and for a growing economy. These include waste processing plants, water treatment facilities and water reservoirs (Ntuli, 2015).
- c. **Transportation facilities** - these are all the platforms that are responsible for the movement of people from one area to the other and include infrastructure such as rail, road, ports and air transportation facilities.
- d. **Other infrastructural developments** - these include infrastructural developments that are implemented for the purposes of real estate, recreation and administration and that involve significant financial commitment, at the same time enabling certain activities to be conducted.

New infrastructure certainly influences adjustments to land use as it incorporates the refurbishment, rebuilding or replacement of previous infrastructure and many of these adjustments result in various challenges. A study by ASTOSAI (2013) presented various impact areas resulting from the adoption and implementation of aerotropolis related infrastructure such as:

- The removal of trees and forests to open up space for developments can encourage environmental hazards like soil erosion which may impact on the ecology as a whole. This has been the key argument presented by environmentalists regarding the impacts of growing urbanisation and the quality of the environment (Reed, Andrzejewski and White, 2008:154). This has sometimes been referred to a land take by other researchers, who are of the view that the new land space that is required for the construction of the development is massive, occupying land that would have been used for housing and farming purposes (Chakravarty et al, 2012:17). In the case of Heathrow, its expansion led to the displacement of the Sipson Village and there was a proposal for the re-organisation of farm units, a noticeable occurrence in numerous aerotropolis master plans that tend to take up spaces that could have been used

for farming. The take-over of land or resettlement of populations can be considered to be one of the social challenges, especially if such developments are proposed for areas that have insufficient land (Chan et al, 2010).

- The use of heavy construction equipment and vehicles may affect the compaction of soil and may result in contamination of the soil with toxic materials, especially those that are used during construction. Construction projects can introduce new predators, pests and other invasive species from other areas due to the rapid movement of machinery and people from different locations (Domingos, Moura and Jones, 2014).
- The existence of buildings and the creation of concrete slabs may result in the reduced capacity of land to absorb rainwater, thereby increasing runoff, which has an impact on ground water storage and directly affects the sediment cycle.
- The change in land use can also affect and destroy existing habitats and affect the species that lived there. It may also hinder the movement of animals. These consequences are evidenced in projects that require the clearance of huge portions of land.
- Developments can also result to an increase in the demand for water, thereby increasing the pressure on the water supply in the local area, which often requires more resources in order to boost capacity (Chakravarty et al, 2012:77).

From the factors highlighted above, it is evident that the emergence of the aerotropolis and its related infrastructural developments have presented multiple challenges to society and the environment. Arts, Hanekamp and Dijkstra (2014:1) are of the view that there have been noticeable collective efforts among transport infrastructure authorities in the Netherlands, Finland, the USA and Japan which have resulted in many policy documents that encourage and enforce the need for integration between land use and infrastructural planning in order to achieve sustainable planning (UNDP, 2016:10). For instance, in India the increasing number of private and public projects motivated the government to consider environmental protection laws so as to address the adverse impacts associated with infrastructural developments; these included the Forest Conservation Act 1980, the Environmental Protection Act 1986 and the National Environment Appellate Authority Act 1997 (Raghuram, Bastian and Sundaram, 2009:3). there is therefore evidence of the realisation that infrastructural developments associated with an aerotropolis can be harmful to other stakeholders, especially if these developments are not carried out through consultation. For this to

be achieved, effective governance, policy coordination and coherence among the different government departments that play a role in the development of the concept have been encouraged.

4.4 Economic implications

One of the key arguments among economists has been the question of the supposed real economic benefits associated with the aerotropolis strategy (Plumer, 2008; Bridger, 2017). There is often a limited understanding among planners and politicians of the real costs and benefits associated with mega-projects like the aerotropolis. Without conducting the correct analysis, it would be unfair to dismiss most of these investments as poor because their costs far outweigh their intended benefits (Atlanta Regional, 2010:2). The emphasis therefore among consultants, researchers and critics now is on providing substantial evidence and understanding of the qualitative and quantitative benefits associated with the aerotropolis strategy. Robinson and Torvik (2004:1) present the argument that most of the mega-projects involving extensive infrastructural developments do not necessarily result in the anticipated growth in output but rather have a negative social surplus.³⁷ Against this background it is evident that one of the challenges of the aerotropolis strategy has to do with measuring its real contribution and determining if a region is better or worse off with the strategy. Also, it becomes the task of planners and economists to determine the industry clusters that can best enhance economic growth and development and at the same time which activities will attract investments. For the purposes of this research study, the economic contributions of the aerotropolis will be best understood by referring to the Boston matrix framework, with the aim of identifying it as either a white elephant or a cash cow which have been key argument noted in literature relating to the strategy

4.4.1 White elephant?

The term ‘white elephant projects’ has been frequently used in economics and project financing literature for describing projects involving significant investment in infrastructural developments which cannot be easily disposed of and the costs of which in the long run are considered to be greater than their real benefits (Onyinyechi and Ogwene Mairo, 2014:1). These developments seem to incur more costs in terms of their day-to-day operations in comparison to their projected

³⁷ Negative social surplus refers to the amount of welfare value or utility that the society derives from its current consumption of all goods, services and products purchased, in this instance this presents a case in which the cost of the investments has resulted to the dissatisfaction of the consumers or supposed beneficiaries of the investment (Domingos, Moura and Jones, 2014).

and real gains, meaning that they essentially run at a loss. In other words, these are projects that fail to meet their short term and long-term financial obligations. It is common for the benefits to be forecast before any infrastructural commitments are made; for instance, the aerotropolis master plans clearly outlines all these benefits, most of which are positive social benefits, such as an increase in employment, economic activity and government revenue, and thus motivate investors and government into easily giving in to these initiatives (Golder Associates, 2013:1). What is common to white elephants is that they fail to live up to any of the benefits. Some examples are discussed below in order to further define white elephant projects:

- The Olympic Stadium in Montreal cost the government approximately \$1,6 billion (Canadian dollars) and thereafter failed to attract any tenants as previously projected making it difficult for the investment to be completely paid off as expected due to the insufficient cash inflows received (Patel, Bosela and Delatte, 2013). This investment in the long run became a burden to the regional fiscus of Montreal.
- The New South China Mall in Dongguan, China, was constructed with the hope of attracting close to 100 000 customers daily but upon its initial opening it remained virtually empty, thereby making it a classical example of overinvestment (Ai, 2005). The real benefits could not cover the initial capital outlay.
- A cattle-based industrial complex in Ghana, involving the construction of a footwear factory to be linked to the meat factory in the north through the transportation of the hides to a tannery in the south (a distance of over 500 miles) which has now been abandoned. The leather was to be backhauled to the footwear factory in Kumasi, in the centre of the country and about 200 miles north of the tannery. With the market being positioned in Accra, these shoes needed to be transported an additional 200 miles back to the south. This, as indicated by Killick (2009), was a project whose viability was undermined by inexistent social and economic benefits. Upon the completion of the new infrastructure the concept failed to take off.

The question that continues to baffle researchers regarding projects considered as white elephants is why they are implemented in the first place. One of the main contributing factors is the failure

to conduct an accurate cost-benefit analysis³⁸ and feasibility study before initiation (Robinson and Torvik, 2004:199). Thus, in order for a project to be developed, there should be a clear projection of the costs and associated benefits, which involves an analysis of factors encompassing long-term projections of demand, revenue and expenditure, future costs and benefits, an assessment of the net present value of the project and also an evaluation of the associated risks and uncertainties (Beria, 2007:28). There are numerous methodologies adopted in the public and private sector that indicate the measures, steps and policies that need to be taken into account before investments are approved, especially those involving high cash outflows, and this has contributed in prioritising the selection of favourable investments with potential benefits (Holgeid and Thompson, 2013).

In order to determine successfully the economic success and viability of a project, informed and tested strategic models need to be implemented, influencing the implementation of feasible decisions. This would essentially provide an analysis of whether there is an increase in the future cash flows, placing the emphasis on ensuring that the discounted cash flow maximisation rule is applied for every project and initiative (Bewari et al, 2009:4). Although the aerotropolis strategy is a mega-project in which there is a possibility of over-stating benefits and thus committing to investments that do not pay off over time, conscious decisions seem to be made by politicians and some organisations to go ahead with the construction of projects even with the full knowledge of their negative benefits, implying that they actually pick certain projects with the full knowledge that they will result in negative returns (Robinson and Torvik, 2004:200). Why this has been a prominent trend is explained by the consideration of political factors and benefits ahead of economic factors in selecting potential projects; many white elephant projects have been commissioned despite a feasibility study advising against them and a few have been commissioned without any feasibility study (Hamutuk, 2014).

As stated by Bewari et al (2009:12), the necessary and noble approach is that, each time there is a project in which public funds are to be spent, an economic study should be carried out in order to determine the associated dollar and employment impacts of the proposed project or investment. The implication of this approach is to ensure that government and public enterprises devote funds

³⁸ Cost benefit analysis (CBA) is an analytical tool used for judging the economic performance or advantages and disadvantages of an investment decision by assessing its associated costs and benefits in order to assess welfare change attributable to it (Sartori et al, 2014).

to investments that have a potential for massive economic impacts or returns (Chapin, 2002:3). However, the challenge has been that most of the economic impact methodologies used in assessing projects have contributed to inaccurate conclusions and inconsistencies pertaining to the selection of projects (Sartori et al, 2014). The major problems have been as a result of the theories used in measuring the impacts of economic benefits of projects. For instance, the ‘local production fallacy’ suggests that the local economy is always the benefactor of all the economic developments associated with the investment (Domingos, Moura and Jones, 2014), while the ‘Taj Mahal syndrome’ suggests that the local economy is considered as being better off with the increasing costs of the project, based largely on the assumption that these represent an input to the local economy which translates to higher output (Hunter, 1988:1).

There are various factors that need to be considered in order to provide an account of the financial and economic benefits of the aerotropolis strategy which have been used to justify and discourage its adoption in certain regions. For instance, the key argument that such developments are a guarantee of job creation may need also to incorporate the fact that some of these jobs are low paying and at the same time might not be significant. Given that airlines strive to reduce their operational costs, they adopt new technologies and innovations, such as e-ticketing, that have the impact of reducing the number of jobs created (Popa, Popa and Codescu, 2016:9). At the same time, the economic realities might be overstated in terms of the contributions to regional and national GDP. Without any doubt there needs to be a thorough financial analysis before the strategy is adopted, which is a challenge to many regions as there is no accurate methodology that can be consistently applied in projecting and measuring success from one region to the other. This implies that the adoption of the strategy can be considered a trial and error scenario in which an investment is first committed and then one determines if it will work or not.

4.4.2 Cash cow?

In further discussing the challenges related to determining the financial feasibility of the aerotropolis strategy, it is important to explore other arguments and tools of analysis that have been presented by various researchers. As outlined by Bjornsdottir (2010:1), before any investment is commissioned, a feasibility analysis should be conducted which evaluates the investment from a multi-perspective approach, considering social, legal, financial and market factors. One of the variables used in determining and projecting the success of any aerotropolis

development is the level of demand that it generates on terms of passenger and cargo volumes (Strat Marketing Group, 2013). However, determining demand is a challenge on its own since it responds to global economic trends, which are not constant as they evolve from a recession to a boom within short periods of time (Karayiannis, 1998:50).

A review of the challenges concerned with level of demand and financial feasibility requires the application of the Boston Consulting Matrix. The Boston Consulting Group (BCG) matrix³⁹ is one of the strategic management tools used in presenting a financial analysis for project investments. The challenge presented by the matrix before any investments are considered is to identify the nature of the market, categorised as question marks, stars, dogs and cash cows. Based on the BCG, the extent of investments should be limited to sectors that show evident prospects for high growth. In other words, investment will be confirmed if there is potential for growth. These investments act as drivers in financing the anticipated increase in the output and productivity needed for the market share to be maintained or increased (Wayland and McDonald, 2013:44). This further suggests that the appetite for investing in projects should be carefully reserved for sectors that have a prospect of positive returns. In the context of the aerotropolis strategy, it would also suggest that related aerotropolis investments must be informed by relative market share⁴⁰ and perceived industry growth⁴¹ (Muller et al, 2010). The aerotropolis strategy has the objective of ensuring that it attracts a specific market segment, which has primarily been limited to the aviation industry, with the major players in this industry being mainly involved in providing air traffic control, aircraft fuelling and maintenance, baggage and cargo logistics services and with other participants such as travel agents and various service agents (Airports Council International, 2007:8).

³⁹ The BCG matrix as a strategic management tool was developed in order to provide comparisons between the current firm's market share and the anticipated growth for the market in five years. With mathematical precision, the matrix proposes a quantitative scale to be provided in the analysis of projects; there needs to be an anticipation of market growth, for instance 30% in the next 5 years, before any interventions are provided for. The rationale is that, for an anticipated higher market growth, there needs to be high investment for the firm to remain competitive and grow and also that the higher the market share more cash can be generated (Boston Consulting Group, 2008)

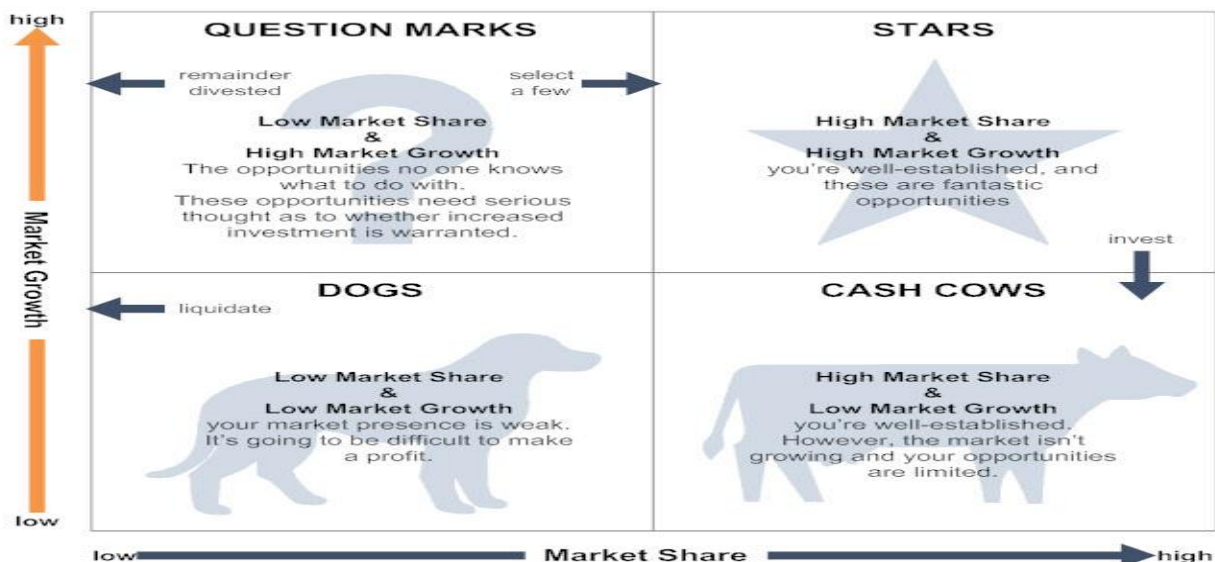
⁴⁰ Relative market share indexes describe the market share of organisations or firms compared to that of their key competitors. The aerotropolis market is one that is primarily driven by customer experience enhancement and therefore the emphasis among different strategic regions (North America, Europe, Asia Pacific, Latin America and Africa) has been on ensuring that they attract more passengers and companies to utilise the services and products offered in their airport cities (Kasarda, 2014).

⁴¹ Perceived industry growth rates relate to the percentage change of a specific variable within a time period and, given a certain context, this is noted mainly through an increase in the revenues, earnings, dividends, GDP and retail sales (Lankauskiene and Tvaronaviciene, 2013:356).

An analysis of the aerotropolis strategy using the BCG matrix would imply defining the market share, which can be broken down into airport users, transactions taking place within the catchment area of the airport and the cargo that is handled within the airport. As identified by Berawi et al (2009:1), the aerotropolis region as a catchment area is designed to have a significant influence on economic growth and development and, because of its design incorporating the industrial area developments, airport related services and supporting infrastructure, which all have a potential market in which they serve.

According to Airports Council International (2007), the airports that are located in emerging markets, such as Asia, the Pacific, Middle East and Latin America, have displayed good prospects for industry growth because of the rapid increase in the market size; this trend is also expected for other regions, particularly in Africa. This is partly because the industry is influenced by business and leisure air travel and the frequency, amount and size of aircraft fleets. Market categorisation and demand projections are important in considering the success of the aerotropolis strategy and therefore it is essential to incorporate a detailed market analysis and profitability techniques in order to expose the potential flaws and challenges resulting from adopting the strategy. Figure 4.2 demonstrates the different categories that should be considered in justifying the level of investment for an aerotropolis as suggested by the BCG matrix:

Figure 4. 2 Boston Group Consulting matrix



Source: Mohajan (2018:3)

As identified in Figure 4.2, the Boston Consulting Group Matrix categorises market share and growth for any single investment or product into four classes as described in Table 4.2:

Table 4. 2 Categories of the Boston Consulting Group Matrix

MATRIX CATEGORY	DESCRIPTION
1. QUESTION MARKS (low market share and high cash consumption)	This category represents products or projects that have the potential for rapid growth and, as a result, consume large amounts of cash; however, due to their low market share, they produce limited amounts of cash to be used for the initial investment. Although in the long term all the products and projects classified in this category have the potential of growing their market share, the trend has been to analyse these closely in order to determine whether the supposed investments will be worth the cash inflows (ACCA Global, 2010)
2. STARS (high market share and high market growth)	In this category, a substantial amount of investment is needed in order to maintain growth rates and defend the market leadership position. This category has the potential of generating large sums of money as a result of the strong market share and because it is known that the amounts spent and amounts received net out. The stars are also activities or ventures that provide the basis for long term growth and profitability. In the event that an organisation or region is interested in building a sustainable competitive advantage, there should be an emphasis on this category (Chapin, 2002:15).
3. DOGS (low rate of market growth and low market share)	This category represents businesses or ventures that are created in slow growth markets, where the active businesses have a low market share. The strategy is to ensure that, for a market in this category, minimum investments are committed since there is a limited amount of cash that is generated rendering it highly risky to make high investment commitments.
4. CASH COWS (low rate of market growth and high market share)	Businesses in this category exhibit a higher return than the market growth and tend to generate more cash than they consume. They provide the cash that can be used in supporting the other business ventures. The projects in this portfolio are the most profitable and as the market matures, the need for investment reduces; as a general rule, the investments in this category are justified as they earn above normal returns.

Source Debrecht and Levas (2014:66)

As alluded to in Chapters 1, 2 and 3, the aerotropolis concept encompasses a wide variety of initiatives and infrastructural developments such as aeronautical developments, real estate, transportation and cargo facilities, logistics and warehousing facilities, and recreational and tourism facilities (Bridger, 2015:1). This therefore implies that each of the developments identified in the aerotropolis master plan needs to be isolated in terms of its individual contributions and, if need be, the level and extent of investments should be individually assessed for each portfolio and industry with regard to how it will contribute to the overall economy (Perkins, 2010:25). There are noticeable challenges pertaining to the holistic application of the BCG matrix to the aerotropolis concept since it emphasises the idea of clustering the concept into individual markets with varying growth and market share rates (Debrecht and Levas, 2014:67). This, however, contradicts the propositions made by the aerotropolis advocates, who view the concept from a single market perspective and have projected that it will holistically result in a faster growth rate and market dominance in the coming years, more especially for the regions of Europe, the Middle East and Africa (Transparency Market Research, 2018).

The BCG matrix as presented in Table 4.2 emphasises the determination of the investments that need to be considered for the aerotropolis development, using market share and growth as the determining factors. For instance, one of the categories provided for in the matrix is the ‘cash cow’, the segment with the potential of reporting high levels of stable related profits (Shulman, 2008:2). Therefore, in order to influence an increase in income, there should be a willingness to invest in infrastructural developments. Every government or region aims to ensure that efforts are dedicated in influencing high growth and return through the adoption of latest technology and systems that increase production and allow organisations a chance to earn abnormally high returns (Faulkner and Loewald, 2008:11). On the other hand, the ‘question marks’ category has a low market share and high cash consumption, and thus investments should be discouraged. However, it should be noted that most of the developments associated with the aerotropolis are first time endeavours and thus market growth and share remain unknown for a period.

Based on this discussion, it can be pointed out that there seem to be inconsistencies and a lack of a universal format to be used in determining the nature and extent of developments and investments to be considered for an aerotropolis region, especially from a cost benefit analysis (Domingos Moura and Jones, 2014). Despite the availability of tools and techniques that can

be used in conducting a detailed feasibility analysis, the aerotropolis strategy still falls short as far as the Boston Consulting Group Matrix is concerned due to the inability to place all the investments in the provided categories. The argument still rages among researchers which developments are to be seen as white elephants and which as cash cows.

4.5 Systems and infrastructure integration

One of the key factors that contribute to the success of the aerotropolis strategy involves the seamless implementation of infrastructural developments aimed at ensuring the improvement of efficiency and mobility within the aerotropolis region (Klos, 2014:17). This is because of the extent of developments that need to be implemented by the different agents or stakeholders, including those responsible for transport systems planning, water and sanitation facilities, residential and commercial facilities, energy facilities and many others who need to collectively work together in order to deliver a competitive aerotropolis region. Integration therefore becomes a key attribute as it involves the practice of ensuring that all selected infrastructural developments and initiatives are holistically aimed at advancing the overarching objectives of the aerotropolis strategy (Schaafsma, Amkreutz, and Gukker, 2008).

From a planning perspective, the integrated aerotropolis strategy (IAS) should essentially include the commitment of the regional government in ensuring that all the facilities, such as the airport, the ports and any other infrastructural developments, are fully exploited to advance economic development. Achieving this requires the synergising of operations around the airport through bringing together municipalities, the provincial government departments, state-owned entities and other private sector investors and developers to foster strategically a competitive aerotropolis region (ISOCARP, 2016:3). As much as this is considered to be the ideal, it has been difficult to achieve in practice since there has been a lack of shared vision between the different parties as they usually operate in silos (ECLAC, 2016:1).

Infrastructural integration has emerged as a central discourse in how future developments, including the aerotropolis, can be successfully designed and implemented, given that there are multiple stakeholders involved during the entire process, ranging from town planners, politicians and consultants, who collectively play a critical role (Eng, 2015). averting financial impacts, as discussed earlier during the study, can be seen as providing the other key motivation for integration. Also of note is the fact that sustainable urban developments and special economic zones (SEZs) can only be a success if integration is emphasised in order to allow for

the maximisation of investments, reducing the negative impacts as well as eliminating the duplication of roles and technological implementations. According to Brazilian et al (2011) integrated infrastructural thinking moving away from considering separate and disconnected institutional entities offers efficiencies and widespread benefits to society, planning, decision making and policy evaluation. The promotion of the idea of integrated infrastructure and land use planning maximises the benefits to the public afforded by investment decisions and is fundamental to the continued growth and the success of the aerotropolis strategy (Department of Infrastructure, Local Government and Planning, 2017:1).

Schaafsma, Amkreutz, and Gukker (2008) note that approximately all infrastructural developments are managed and organised around independent institutions and structures which are mainly formed to achieve certain objectives. However, countries differ in how they view the roles of central and local government and how different views of the state's role can filter through regional and urban government networks to affect how infrastructural systems are managed. Despite the availability of research on the regulatory and policy issues governing technical infrastructures at national and supranational levels, little has been done in determining how the institutional variations between cities, regions and countries can limit or facilitate potential for various forms of infrastructure integration (Gradebo and Olalusi, 2014). Despite the realisation of the benefits associated with infrastructural integration, there remain challenges as many infrastructural networks remain siloed and splintered from each other and there is still a gap in understanding, managing and coordinating multiple systems (Lorrain, 2001). The aerotropolis strategy should be viewed as a holistic concept that affects the performance of a national and regional economy and thus there is a need for cooperation between the different parties. This has been one of the major challenges which still need to be appropriately addressed and handled.

4.6 Conclusion

This chapter was mainly aimed at presenting an assessment of the aerotropolis strategy, including a review of all its associated challenges related to its implementation and adoption. As proposed by Menon (2014), it is equally important for one to be critical of any concept or strategy, especially when it involves a great deal of resources and investments. Some of the arguments that have been explored in the chapter have questioned the suitability of the aerotropolis concept, given some of its impacts on land use, the environment and contribution to the economy. A review of these factors has indicated several challenges that have been the

basis of the discussions. These challenges have been associated with a lack of collaboration between stakeholders and planners during the initiation, planning and implementation stage, the socio-economic dynamics and the environmental impacts, thus indicating the need for synchronised efforts by the various developers in order to fully realise the objectives of the concept. In addition, there are financial and economic challenges that tend to complicate the strategy adoption process as it has proved to be a challenge in most regions to assess accurately its financial viability and feasibility. This has attracted criticism from various individuals who consider aerotropolis related developments to be white elephants as their contribution to economic growth and market share cannot be accounted for despite massive investment commitments.

The expectation among planners and developers regarding urbanisation and the aerotropolis strategy has been limited to its positive impact and its contribution to sustained economic development. This can be confirmed by various studies in which emphasis has been placed on the investigation and identification of factors related to urban development and how these affect the socio-economic environment, particularly with regard to education, employment and health services (Arouri et al, 2014:5). Urbanisation has seen an increase in the agglomeration of people and firms into developed urban centres, a factor that has also had an impact on economic development, resulting in multiple socio-economic challenges. Such challenges can also be attributed to the various infrastructural developments that have negatively impacted the environment, especially from a sustainability perspective.

CHAPTER 5: A REVIEW OF THE DURBAN AEROTROPOLIS

“The creation of an aerotropolis around King Shaka International Airport is considered a catalyst to economic development and promotes sustained urbanisation in KwaZulu-Natal”

(Erskine, 2018).

5.1 Introduction

The previous chapters provided a context of the aerotropolis strategy and how it has been successfully adopted in various regions across the globe. There is evidence of the socio-economic benefits associated with the strategy which are presented in chapter 4. This chapter provides an in-depth description of the Durban aerotropolis including a review of the masterplan with the sole objective of ensuring that the planning frameworks considered as part of the strategy are considered. The adoption of the aerotropolis strategy for the KSIA was conceived as part of the KZN provincial government’s growth and development strategy which was aimed at expanding the economy through opening new trading networks, creating employment and redressing the socio-economic challenges facing the region (Department of Economic Development, Tourism and Environmental Affairs, 2017). The aerotropolis strategy has the potential impact of influencing various other sectors of commerce, including logistics and transportation, manufacturing, tourism and recreation among others, and it is holistically expected to achieve extra-ordinary economic impacts on the South African economy (Banai, 2017:358).

This chapter outlines the eclectic and pragmatic steps that have been adopted by the various role players in developing and implementing the Durban aerotropolis. It should be clearly stated that the adoption of the strategy has been mainly informed by the conceptual frameworks offered by consultants and academicians who have been at the forefront of aerotropolis developments (Wing and Silver, 2019:4). In line with the research objectives, this chapter further ensures that a description of the strategy is offered as well as its impacts from the perspective of the stakeholders. In this chapter, the researcher presents the realities of KZN, Durban together with the surrounding areas and provides for the various planning steps that have been incorporated in developing the Durban Aerotropolis master plan (DAMP).

5.2 Durban Contextual Realities

Durban is in the province of KZN the second most populated province in South Africa, with an estimated 11.1 million inhabitants, which equates to 19.8% of the national population as at

2018 (Statistics South Africa, 2018). The province has diverse population dynamics which are equally important in determining the nature of investments and developmental policies adopted. Of note is the fact that 35% of the population are children below the age of 14 and 37% are in the 15 to 34-year age group, considered to be the economically active (National Treasury, 2018). Some of the economic realities include high levels of unemployment, standing at 21.8% in 2018, and a high dependency ratio.⁴² Given these economic challenges and realities, the provincial government and the national government have been making coordinated efforts to address the prevailing economic conditions through the adoption of sustainable economic policies (Van Niekerk and Williams, 2014:428).

Given the diversity of the population groups in the province, the policies that have been favoured by government are mainly inclined to addressing the contextual needs of the province such as high levels of unemployment, the dependency ratio and economic growth prospects among others. As highlighted by the World Bank (2016), the population dynamics and adjustments require different approaches to be adopted in different regions in order to respond successfully to the various challenges; these policies need to be relevant to the populace and should specifically address the challenges and offer sustainable solutions.

The backbone of the KZN economy is in the mining, agriculture and forestry, transportation and logistics and the manufacturing sectors, which contribute equally to the provincial GDP (National Treasury, 2018). The various landscapes and marine and aquatic features offered by the province have also positioned it as a preferred tourist attraction, which has been the key source of its economic growth and performance. However, a combination of factors has subdued the economic prospects of the province. This has mainly been due to a decline in local and foreign direct investments. As accurately projected by global economic bodies, the economic outlook and performance of emerging markets and developing economies has become weaker since the financial crisis. This has been the case in South Africa and thus economic growth in KZN has been affected as well (IMF, 2017).

Despite the prevailing economic climate outlined above, there have been coordinated efforts to boost economic growth through the adoption of several projects and initiatives. One initiative has included the KZN IAS, which recommended the development of the DA centred on the

⁴² In economics the dependency ratio refers to the age-population ratio of the people considered not to be in the labour force and those that are in the labour force; it can be used to measure the pressure on the productive population (United Nations, 2016).

KSIA. The inception of this strategy was primarily motivated by the realisation of the role that regional airports play in economic development. As suggested by Hardy et al (2009), transportation and economic development are intertwined, with the latter depending on the former. Other motivating factors included the supposedly rising passenger and cargo demand for air linkages to and outside of KZN. This provided the basis for prioritising infrastructure upgrades at airports that will support the strategic goals and economic development of the province. With hindsight, creating an aerotropolis centred around KSIA will allow for opportunities to be fully utilised, thus increasing the competitive advantages of the province.

5.3 Durban Aerotropolis key stakeholders

The description of the Durban aerotropolis has been informed and determined by various stakeholders who have influenced the extent and the nature of the planning involved. As highlighted in chapter 3, the development of an aerotropolis involves the efforts of both the private and public sector who collaborate in delivering the required infrastructure. These will be discussed in detail in the following sections including how they conceive and define the strategy.

5.3.1 Economic Development Tourism and Environmental Affairs

As the key department driving economic development in the province, the EDTEA is mandated to oversee and drive socio-economic development and radical economic transformation⁴³ initiatives. It has played a central role in putting together strategic and policy initiatives directed at promoting growth and development in the various sectors of the KZN economy. It has played a leading role in the development of various policy frameworks such as the New Growth Path, which is designed to facilitate the implementation of a set of macro and micro economic interventions, with the goal of moving South Africa into faster, dynamic, inclusive and sustainable growth (Hendricks, 2012:7). Other key areas of emphasis include the Industrial Action Plan, which focuses on ensuring the growth of the national and regional economies through increasing industry activities, more especially the manufacturing sector, which has been declining. In 2017 alone, the manufacturing sector contributed only 13.2% of the national

⁴³ Radical economic transformation is a concept that has recently dominated public discourse. It has various interpretations among economic researchers, with some considering it as including policies that are radically different from those that preceded them (Bernstein, 2017). On the other hand, it has also been used in reference to policies aimed at nationalising the commanding heights of the economy and rebranding the existing policies, insisting on their urgency even in the face of slowing growth.

GDP, which is relatively low when compared to other developing economies (Department of Trade and Industry, 2012).

In KZN the provincial government has made significant strides in an attempt to facilitate the growth of the provincial economy through passing acts and adopting strategies, such as the Dube TradePort Act, the Green Economy strategy and the Airport strategy, all of which prioritise regional economic performance (Luthuli and Houghton, 2019). The key policies that have been collectively driven in order to eliminate these challenges include the policy discussions on SEZs, infrastructure development, trade policies and economic development. In addition, these have the combined impact of offering solutions to the challenges faced by the province, challenges that include poverty, unemployment and inequality. The EDTEA played a pivotal role in facilitating and drafting the adoption of the aerotropolis strategy. From the viewpoint of the EDTEA, the aerotropolis strategy is an economic growth enhancement initiative based on airport and spatial developments.

In summary, it needs to be pointed out that the EDTEA has mainly been responsible for the creation of the aerotropolis strategy through setting up acts, frameworks and strategies that can be actively used by various organs of the local government to deliver effectively on the objectives of the strategy. In line with its mandate, it views the strategy solely from an economic development perspective and considers it as a catalyst to economic development and sustainable development, one that will be able to provide a conducive trading environment. The involvement of the department in setting up the DA has mainly been strategic as it has been responsible for crafting the acts and strategies and identifying the frameworks for how the concept should be successfully adopted.

5.3.2 eThekwini Municipality

eThekwini is classified as a category A⁴⁴ municipality and is the largest in the province of KZN, covering an area of approximately 2, 297 square kms and considered the leading tourist destination in the country (eThekwini Municipality, 2018). The strategic priorities for the city are primarily based on ensuring that there is the creation of a caring, liveable, financially sustainable, socially cohesive, accessible and environmentally sustainable city. As a result of its positioning within the DA, as most of the land demarcated for the aerotropolis lies within

⁴⁴ This is the category that classifies a single-tier municipality, one which has an exclusive municipal executive and legislative authority in its area; municipalities in this category have more than 500,000 registered voters and administer urbanised regions and centres in South Africa (District 8 Planning, 2011).

the precincts of the municipality. In this regard it has been considered as one of the many important stakeholders in the development of the strategy and has as such aligned its strategic priorities to those of the aerotropolis. For instance, as described by the municipality, the aerotropolis strategy is considered a catalytic project, a term that is used in reference to projects that have the potential to deliver and contribute towards the city's strategic priorities (Trade and Investment KZN, 2018).

The municipality has been involved in the planning of the aerotropolis since its inception and has provided the necessary assistance through availing planners and resources to the aerotropolis steering committee. The growth in population size in the city has resulted in multiple challenges, including an increase in levels of unemployment and other factors such as traffic congestion and cluttering in urban centres. Thus, further efforts are to be dedicated to the development of new urban locations and infrastructure upgrades to cater for the growing population. The city has therefore considered the aerotropolis development as an initiative offering an answer to some of its inner problems, given that the extent and nature of developments and investments earmarked for the aerotropolis positively influence the city and thus it has a vested interest in the strategy. Its involvement in the aerotropolis has been based purely on these projected benefits to the municipality. For instance, as per the master plan, the aerotropolis is considered an urban form of regeneration and rezoning in which developments are limited to a certain area.

5.3.3 Ndwedwe and KwaDukuza municipalities

The DA region lies within the precincts of multiple municipalities such as eThekweni, KwaDukuza and Ndwedwe, and as such depends on the collective efforts of each in ensuring that favourable and conducive policies are adopted to aid the rapid development of the strategy. Table 5.1 provides the background and context for each of the municipalities and notes why they are considered as an important stakeholder for the DA.

Table 5. 1 KwaDukuza and Ndwedwe Municipality profiles

<p><i>KwaDukuza</i></p>	<p>KwaDukuza Municipality forms part of the iLembe District Municipality area (DC29), lying on the east coast of KwaZulu-Natal, between the eThekweni Metro and the Tugela River mouth. The KwaDukuza Municipal area of jurisdiction is approximately 734.971km² in extent. It occupies a coastal and inland stretch approximately 52.3 km in length and 23 km in width. A variety of clustered and ad hoc settlements and small towns exist I the area and are linked with a well-developed network of roads and rail infrastructure. It is situated along the eThekweni-iLembe-uMhlathuze corridor, less than 50km outside of the King Shaka International Airport and the Special Economic Zones, part of the aerotropolis development.</p> <p>The KwaDukuza area benefits heavily from the agricultural sector for economic growth, which contributes approximately 23% to the local economy. The Durban Aerotropolis as described by the municipality has the potential of providing a solution for the challenges regarding logistics, exports, tourism and spatial development within the municipality and therefore stands a chance in making significant economic contributions to both the province and the country. The aerotropolis is also considered as one of the opportunities for creating a highly competitive operating environment that will attract a wide range of investors, operators, users and tenants. It is expected to provide economic benefits for the area of KwaDukuza and its surroundings. The municipality is considered an important stakeholder as it plays a key role in terms of policy development and its positioning.</p>
<p><i>Ndwedwe</i></p>	<p>Ndwedwe Local Municipality borders the KwaDukuza Municipality in the east and the Maphumulo Municipality in the north. In the south, Ndwedwe abuts the eThekweni Municipality and, in the west, the uMshwathi Municipality. In broad terms the municipality is situated parallel with and approximately 20km inland from the KwaZulu-Natal coast. Ndwedwe Municipality is 1153km² in extent and accommodates a population of 140 820 people (Stats SA, 2011). Overall settlement densities are approximately 145 people per km². 68% of Ndwedwe consists of tribal authority land and the remainder is made up of commercial farmlands located in the north-east of the municipality. While much of the north-eastern part of Ndwedwe forms part of the coastal flats which mainly lie in KwaDukuza, most of the area consists of tribal authority land, ranging from topographically fragmented to steep and dramatic.</p> <p>Within the regional context, much of the Ndwedwe Municipality represents the former KwaZulu homeland, consisting of traditional settlement areas which, while located in relative close proximity to major urban and economic developments such as King Shaka International Airport, Dube TradePort and Special Economic Zones, have remained substantially underdeveloped, disadvantaged and poor.</p>

Source: eThekweni Municipality (2017) and Ndwedwe Municipality Report (2017)

5.3.4 Dube TradePort Corporation

The DTP Corporation derived from an act passed by the KZN legislature (*KwaZulu-Natal Dube TradePort Corporation Act, 2010*) on 21 October 2010, which categorised it as a provincial entity. The creation of the entity was aimed at ensuring economic growth in the province, attracting long-term investment and facilitating exports and imports (Department of Trade and Industry, 2012). Considering these aims, the organisation was mandated to take the lead role of facilitating the DA project, which was considered to be one of the leading investment projects in the country. Its role is understood as being the main agent responsible for planning, controlling and implementing the various initiatives associated with the DA strategy. As determined by the KZN government, the DTP is responsible for the formulation of integrated regional spatial planning and the development of the DA with the goal of optimising the recently completed KSIA, which it considers as of strategic importance to the province.

Since December 2018, the airport has recorded remarkable growth levels in international and domestic passenger volume numbers, which grew by 13% and 6% respectively, and it has retained its position as the fastest growing airport in South Africa (Luthuli and Houghton, 2019). Another notable trend is the significant increase in cargo tonnage throughput volumes, due to the rising passenger volumes and the new airline services on new international routes (Airports Company South Africa, 2016). In line with the objectives of the EDTEA, which are primarily limited to economic development, the DTP plays the practical role of ensuring that economic goals are realised through the adoption of projects in which results can be quantitatively measured and realised.

In line with the objectives of the study, the participants from the DTP defined the DA from a rather detailed and scholastic viewpoint as they clearly understand the dynamics of the concept. From their perspective, an aerotropolis features component such as purpose-built freight-oriented development, a logistics gateway and spatial planning around a ‘green field’ and developments centred on the nexus of the airport.

5.3.5 Aerotropolis Institute Africa (AIA)

The establishment of the AIA in UKZN was strategically undertaken in order provide the necessary skills set and capabilities to run an effective aerotropolis. UKZN is the largest academic institution in the province, offering a wide variety of programmes ranging from business, science and agriculture. Because of its reputation for its accredited and relevant programmes, it has been considered the leading candidate in setting up an institute tasked with offering educational and research-oriented solutions beneficial for the broader DA. There are projections that the DA bring about the increased scope of tasks and services within the airport region and this will require a skill set which currently does not exist in the province (Banai, 2017:358). In order to ensure that the correct skills are provided for, the creation of the AIA was considered a justifiable and necessary investment, amounting to millions of Rands over a period of ten years (EDTEA, 2016). Some of the programmes and research initiatives to be offered by the institute include route development, airport city planning, aviation economics and smart city concepts and planning as determined by demand.

As recognised by Abel and Deitz (2009), universities play a significant role in contributing to the economic success of a region through their ability to deepen knowledge and skills and advance human capital. A region with higher levels of human capital tends to show greater levels and volume of economic activity and also rapid economic growth. Thus, there is always a need to ensure that, for any economically related initiative such as the DA, plans are put in place to improve the human capital element. The involvement of UKZN has seen a rise in the number of researchers who have individually focused on different initiatives as far as the DA is concerned and have influenced the aerial and spatial design, logistics and mobility planning among other factors considered as critical for an aerotropolis development.

5.3.6 Commerce and industry

The aerotropolis concept tends to mainly capitalise on the strategical planning and implementing of spatial and institutional interventions to improve connectivity around the aerotropolis region for the purposes of facilitating trade, the efficient movement of passengers, cargo, workers and residents and advancing social and economic improvements (Mokhele and Geyer, 2018:500). The goal of any aerotropolis establishment is to ensure that it accumulates positive results for the airport

and for its diverse pool of users and stakeholders, including businesses and the surrounding communities, who are also classified as being the primary target market of the development.

As highlighted in a report authored by the Malaysia Airport Holdings (2013), it is important that in studies of this nature the expectations and experiences of the consumers or the users of facilities be considered as there is a correlation between customer satisfaction and profitability. It was also the intention of the researcher to reflect the perspective of the active users of the aerotropolis, determining how they view the aerotropolis development: whether it has had associated economic benefits and if it has resulted in any efficiencies. It is also critical to point out that these stakeholders are the beneficiaries of the various initiatives implemented as part of the aerotropolis strategy and that therefore they are able to provide a detailed insight into the extent of the success of these initiatives. The insights from these stakeholders will be highlighted fully in Chapters 7 and 8.

5.4 Durban Aerotropolis Conceptualised

When reflecting on the strides that South Africa has made over the past 20 years there is evidence of an increasing local and international demand of various goods and services placing considerable pressure on the existing transportation infrastructure such as roads, ports, rail and air networks (Department of Trade and Industry, 2012). Considering this, the government has identified potential projects which can influence and improve the capacity of the existing transportation and logistics platforms. The investment in infrastructural developments was primarily justified by the shifting demand trends prompted by rapid globalisation (Trade and Investment KZN, 2018). KZN also indirectly has been experiencing the shocks of an increasing demand and has thus commissioned various projects such as the expansion of the Durban harbour with the intention of ensuring that there is an increase in container handling capacity in what is considered the busiest port in South Africa (Transnet, 2015). In addition, the development of a new airport (KSIA) in the La Mercy Industrial Development Zone was part of the provincial government's initiative to create a logistics gateway on the East Coast of Southern Africa (AECOM Facilities, 2008).

The DA, as defined by Royal Haskoning DHV (2020), involves the development of regional airport infrastructure to support various economic and social initiatives and meet future demand needs. The infrastructural upgrades include the development of world class terminal facilities and maintenance of runways so that they can accommodate large capacity aircraft and the increasing

number of passengers and cargo handled. With the DA, various developments have already been identified by both the national and provincial government as being essential in ensuring that the objectives of the strategy are achieved. These encompass the upgrade and development of roadways including the N2 highway connection, the eastern bypass for route 102. Furthermore, the focus of the aerotropolis is also on the development of trading zones considered to be manufacturing and logistics hubs, entertainment centres and retail outlets, which is being spearheaded by ACSA and the Dube TradePort (DTP) (eThekweni Municipality, 2018). From a provincial perspective, the aerotropolis is an economic initiative that seeks to provide a response to a growing demand for aeronautical services and to the economic and social challenges faced by the province (EDTEA, 2017).

5.5 Durban Aerotropolis master plan (DAMP)

Given that the Durban aerotropolis concept has already been adopted at both national and provincial level, it was therefore essential for the researcher to investigate how the objectives as indicated in the master plan are aligned to the infrastructure, policies and concepts adopted. The Durban aerotropolis masterplan has identified KSIA as the nucleus of economic activities and developments (Luthuli and Houghton, 2019). Located approximately 35 km north of the city of Durban, it has been considered a strategic and critical infrastructural development, serving as a catalyst for economic growth in the province of KZN and South Africa as a whole. The 2 000-ha site, with a runway length of 3 700 m (accommodating the latest wide-bodied aircraft) and with runway and taxi areas of 400 000 m², can initially handle 7,5 million passengers with provision for an extension to 45 million passengers per annum (ACSA, 2017). In addition to the 100 000 m² building, there is also a 15 500 m² cargo handling platform for handling 150 000 tonnes of cargo per annum, a 60 m high control tower, a multi-storey parkade and a variety airport ancillary building. The terminal building at the airport is approximately 103 000 m² and is serviced by an air conditioning plant with chiller cooling duty capacity of 9MW, providing cooling to the terminal building. All other buildings on-site are serviced by separate decentralised air-conditioning systems.

The KSIA also has a significant amount of lighting in the terminal building, and in more than 30 other buildings on site, equivalent to an excess of 60 000 square meters in total. Access to the complex is principally by means of a three-level interchange from the nearby N2 roadway. The

airport currently handles an excess of five million passengers annually and this has been growing (EDTEA, 2017). The general trend in terms of visitor numbers tends to mirror Durban city's tourism profile and the airport tends to host more domestic visitors than it does international tourists. The airport is considered to be an engine to driving economic growth and development in the province in the coming years, actively promoting resort development and tourism, as well as stimulating passenger and cargo growth, particularly the perishables sector and other low-weight, high-value manufacturing activities. Figure 5.1 presents a pictorial view of the airport development as provided for in the master plan and confirms its location within a green field.

Figure 5. 1 King Shaka International Airport aerial view



Source: ACSA (2015)

As noted from other aerotropolis developments the success of the Durban aerotropolis depends on the existence and efficiency of supporting infrastructure which allows for enhanced transportation and connectivity. Therefore, the DAMP has provided for the various logistics and mobility initiatives and infrastructure including airfields, social amenities, network, and connectivity platforms that need to be implemented in the long term. In understanding the

Durban aerotropolis it is important for these initiatives to be individually explored as they potentially affect and inform the success of the strategy.

5.5.1 The New Mount Edgecombe 4 Level Interchange

From a logistics and transportation perspective, one of the significant developments associated with the DA was the construction of the new Mount Edgecombe Interchange which was championed by the Department of Transport, SANRAL and the eThekweni Municipality at a cost of R1.1 billion. The development involved the expansion of the existing major roadways (N2 and M41), directing traffic into and out of the KSIA and the broader DA region (ISOCARP, 2016). The geographical positioning of the DA region attracts traffic from the North and South and therefore during peak periods there are delays in traffic movements due to the volumes of traffic flow from the minor to the major routes. This development has resulted in the widening of the already existing road traffic lanes and an increase in the number of lanes from 3 to 5, including a busway and taxiway. This has resulted in an increase in traffic volume capacity, improvement in travel reliability and convenience and a reduction in the overall travel time. For instance, there has been evidence of improved travel time from the major areas such as the Durban Metropolitan (35 km away), Pietermaritzburg (75km away), Amanzimtoti (45km away) and Richard Bay (180 km away), which are the major contributors of traffic out and into the DA region.

Creating a sustainable airport city requires the implementation of strategies and initiatives that will not only solve the existing challenges but also provide future solutions for challenges that are yet to be experienced (Emas, 2015). The development of the Mount Edgecombe interchange is considered as one of the developments with long term impacts and able to contribute to economic and social benefits. These include, for instance, an improvement in travel reliability, a reduction in road accident fatalities and a capacity for an increase in freight movements. Some of the short-term benefits that have also been highlighted include its ability to create employment for the KZN population. The interchange as an innovation has been identified as one of the solutions to the traffic challenges of the region and it will ensure that future increases in traffic volumes resulting from the economic activities of the DA development are properly managed (Luthuli and Houghton, 2019). As displayed in Figure 5.2, the development includes the latest innovation in road engineering and has been planned so

that it can address the current and future needs of the aerotropolis, including improved connectivity, integration, and responsiveness.

Figure 5. 2 Mount Edgecombe interchange



Source: Rangongo (2018)

The study findings have identified the Mount Edgecombe interchange as one of the most essential developments and it is already providing a reliable link between the DA and other strategic areas such as Umhlanga, Cornubia, Durban Port and Springfield, where there is a high concentration of economic activities (eThekweni Municipality, 2019). In addition, it has also increased the capacity and amount of freight movements accessing the DA region on an hourly basis. Evidence suggests an increase in the number of passengers and cargo accessing the DA, which implies an increase in the number of road users. As reflected in Table 5.1, the number of passenger movements has increased by approximately 12.83% between 2015-2018 and is expected to increase over the coming years which can also result to an increase in the traffic volumes to and from the airport.

Table 5. 2 Passenger volumes for the Durban Aerotropolis

CATEGORY	2015	2016	2017	2018	TOTAL
International	294852	288188	352144	346811	1281995
Domestic	4682035	4632085	4854489	5252153	19420762
Regional	0	0	3990	16672	20662
Total	4976887	4920273	5210623	5615636	20723419

Source: Researcher's own construction

5.5.2 Integrated bus rapid transport network, GO! Durban

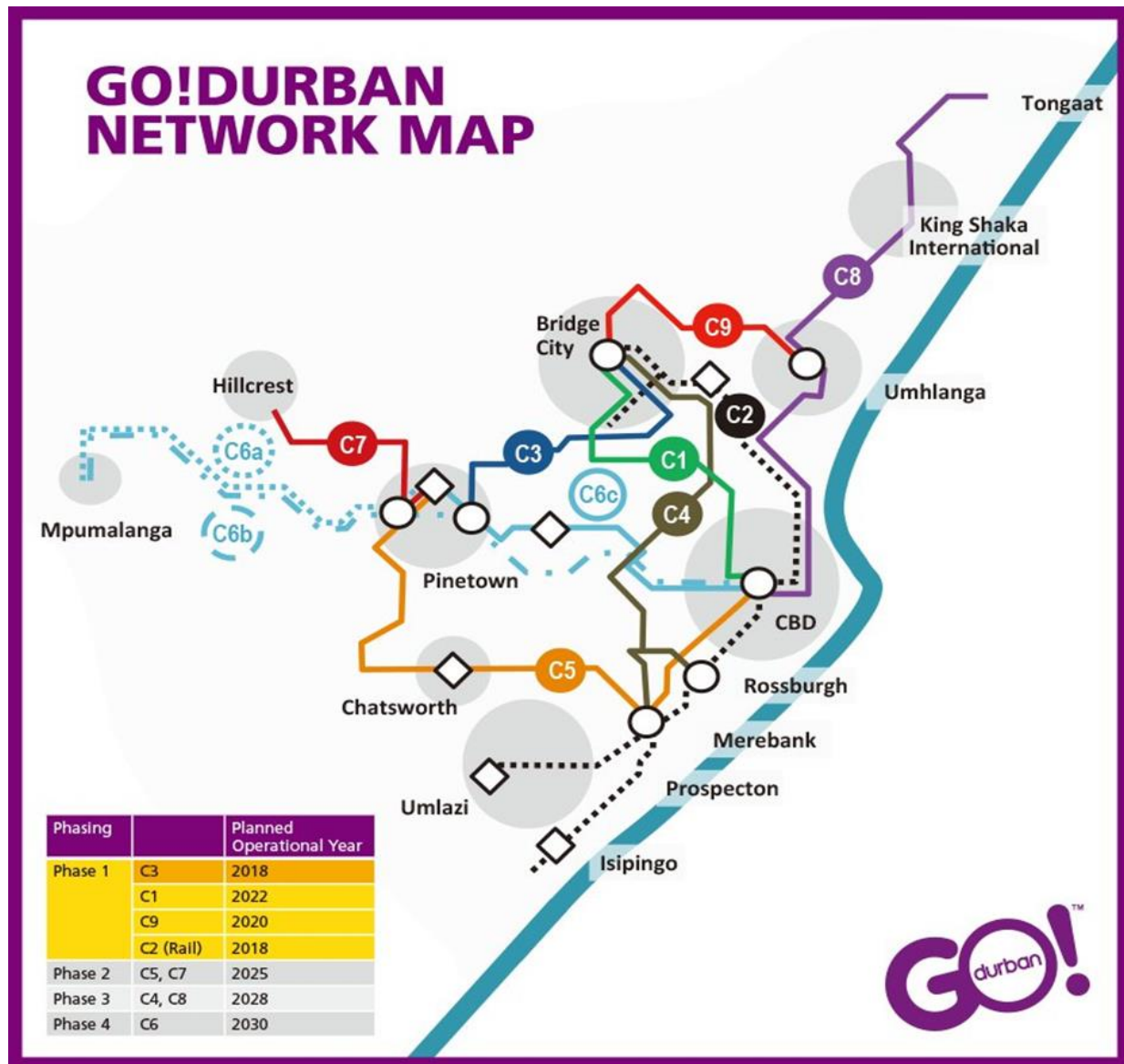
The challenges in the transport systems of Durban have been exacerbated by rapid urbanisation, which has seen an increase in economic activities, the number of passengers travelling from various geographical locations and the demand for logistics, transportation and mobility activities. Addressing these requires aggressive improvements in the transport network system to enhance urban mobility by ensuring that sustainable and reliable transportation infrastructure and facilities are universally available to serve the various stakeholders (Mokhele and Geyer, 2018:500). Providing reliable links that connect strategic areas such as residential areas, business centres, manufacturing hubs and the DA has been an initiative that has laid the emphasis on improving logistics and mobility efficiency for the aerotropolis region. The success of the DA depends on the existence of efficient transport systems that can efficiently move passengers to and from the region. The public transport systems for Durban have largely remained inefficient and expensive because they are dominated by taxi associations (Misago, 2016). Therefore, the involvement of government has been essential particularly in ensuring that more efficient systems are adopted towards improving connectivity.

The eThekweni Municipality together with the National Department of Transport pioneered the Integrated Rapid Transport Network (IRTN), which at its inception in November 2013 was estimated to cost R22 billion (eThekweni Municipality, 2017). The long-term project was

aimed at ensuring a reliable, cost effective and safe transport platform for passengers within the Durban CBD and its surrounding areas. The IRTN is however expected to be completed in December 2030 and involves the construction of infrastructure such as dedicated bus lanes, 25 new railway stations, bicycle and pedestrian pathways and park-and-ride facilities. Additionally, it will see coordinated partnerships of investments in logistics equipment such as a new fleet of buses and rail coaches that will link the eThekweni region and the DA. As much as this has been identified as an expensive initiative, there are benefits that have been cited by the various stakeholders, which include its ability to promote integration within the province. This also has the benefit of ensuring that transport systems and modes are easily accessible, affordable, reliable and safe for all. Aggressively investing in transportation infrastructure is to ensure improved mobility, which results in cost and time advantages essential for a competitive aerotropolis. In addition, it can contribute to the socio-economic landscape of KZN which is characterised by a significantly high population and areas that are geographically dispersed due to the landscape.

As illustrated in Figure 5.3, Go Durban! has been carefully planned and designed, taking into consideration the socio-economic realities of Durban and KZN, including the unique landscape which contributes to the extended distances between geographical locations. From a logistics planning perspective, the aim of the planners was to ensure that the transportation network is optimised and has the potential of achieving its stated goals regarding logistics and mobility success factors. The emphasis was on linking areas and thus the creation of nine transport corridors, connected through the various transport modes covering about 190 km and therefore promoting responsiveness. The DA as one of the strategic areas in the province has been prioritised in the development of the IRTN, which is characterised by transportation networks and modes connecting areas such as Isipingo, Prospecton, Cornubia, Umhlanga and Hillcrest, which are key residential, industrial and commercial hubs. This means that the DA has become easily accessible in relation to these areas and thus can attract more passengers and cargo, improving its level of competitiveness.

Figure 5. 3 Durban Integrated Rapid Transport Network design



Source: eThekweni Municipality, 2018

What remains to be seen are the real impacts of the IRTN as these can only be measured upon completing of the phases and at a point in which users are able to provide an evaluation of the factors such as availability, affordability, efficiency, convenience and sustainability. The investments associated with IRTN aim to ensure mobility, including the speed and convenience of travel and logistics excellence concerned with ensuring that the movement of travellers and products to and from the DA region satisfies the 7 Rights criteria (time, place, product, condition, cost, customer and quantity).

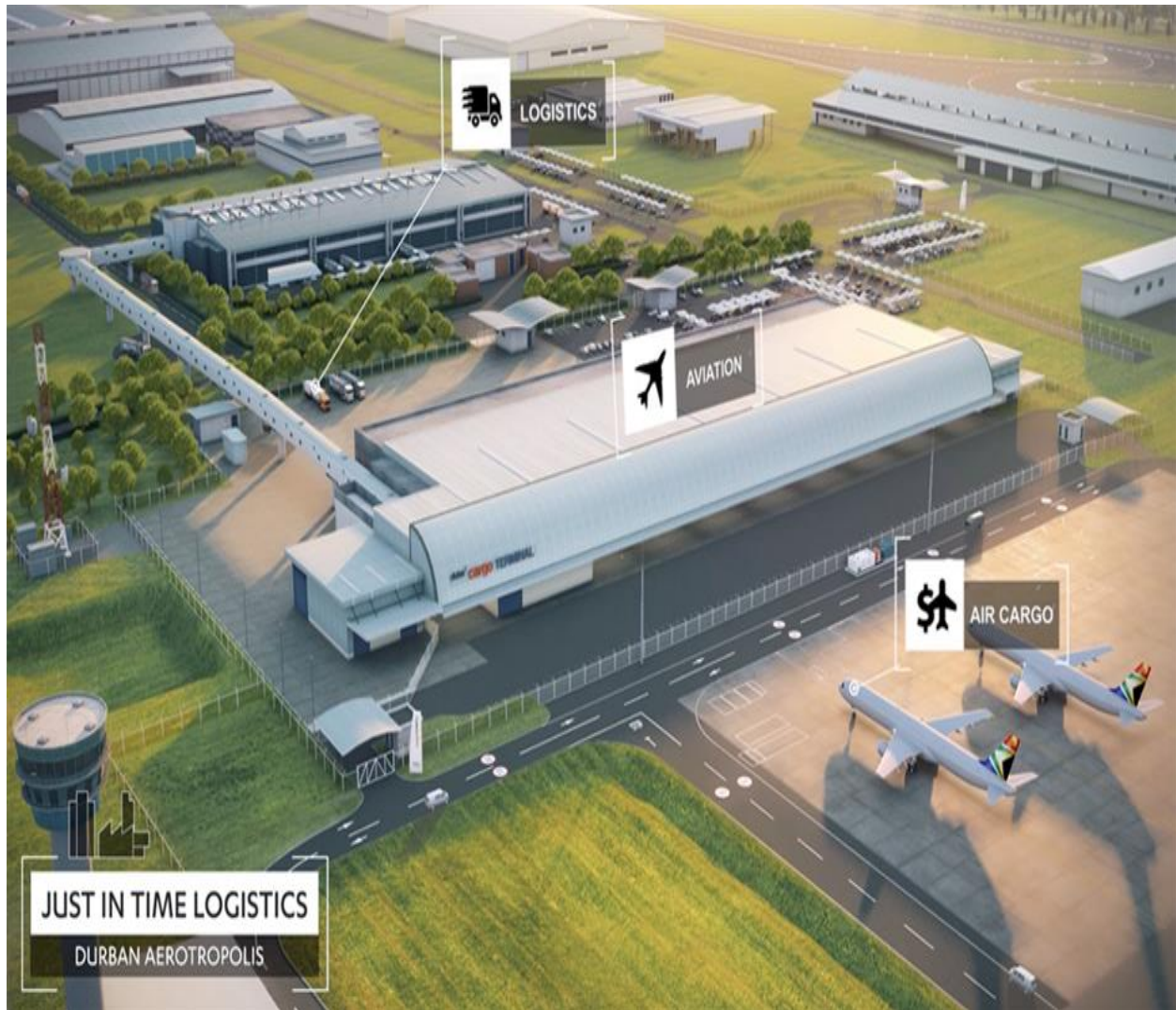
5.5.3 Just-in-Time logistics

The DA will propel Durban to become the most connected and the premium logistics city in Africa. However achieving this in a rapidly changing environment requires novel concepts and strategies to be adopted. One of the concepts that has been identified and adopted in planning for DA is the Just in Time logistics (JIT-L) philosophy. As defined by Peneda and Macario (2011), this involves the adoption of a series of logistics and mobility processes primarily aimed at increasing the speed to market, operational efficiency and cost effectiveness of an aerotropolis region. The concept is closely linked to the Just in Time philosophy, which advocates for the elimination of any forms of waste in the form of inventory and thus prioritises delivery of supplies as and when needed.

Designing the DA using the JIT-L framework has the advantage of propelling it towards achieving its critical success factors, especially from a logistics and mobility perspective (Geoconcept, 2018) Notably, the design of the logistics infrastructure has been informed by JIT-L with the intention of ensuring that speed, rapid delivery and efficiency is attained in customer services, order processing, inventory management and transportation management. As indicated in the study findings, the use of JIT-L philosophy has the advantage of identifying and removing waste within the value chain as it seeks to ensure that efforts are diverted to increasing the processing and transit speed for goods and customers (Greis and Kasarda, 1998).

Becoming a logistics gateway means that the tools and processes adopted should create competitive advantage for all the stakeholders and thus should incorporate principles that are responsive and agile, such as JIT-L. The role of logistics for an aerotropolis has been understood as providing a link between manufacturers and consumers through a gateway in which the manufacturers can access local and international markets that are separated by time and distance (Morphet and Bottini, 2013). As highlighted in Figure 5.4, the JIT-L framework has influenced the placement and structural designs of the various facilities within the DA.

Figure 5. 4 Just in Time logistics for the Durban Aerotropolis



Source: Dube TradePort (2019)

From a logistics perspective, it should be highlighted that the facilities have been placed to ensure that the 7 Rights of logistics (place, time, quantity, condition, product, customer and price) are consistently achieved. For instance, as displayed, the operations follow a modular design structure which emphasises reducing the time it takes for logistics providers to pick supplies from the cargo charters and distribute them to their customers. The various logistics strategies that are either in the process or have been adopted for the DA are informed by the JIT-L philosophy. This has influenced customer service, order processing and transportation

management and many other variables and advantages as will be discussed in the following section.

5.6 Benefits of the Durban Aerotropolis

The DAMP has incorporated a diversity of logistics and mobility developments that are collectively aimed at ensuring that it is considered a competitive region. There is, however, more work that still needs to be done to ensure that all the planned developments are successfully implemented and that they achieve their intended benefits. It can be concluded that successful attempts have indeed been made in this regard, as noted in the infrastructural developments discussed in section 5.4 above. There are also a variety of benefits that can be potentially derived, and these include the economic and social related variables such as customer service, order processing, transportation excellence among others..

- **Customer Service**

Customer service in the context of the DA requires one to be able to individually consider the various products and services that it offers, its intended target audience and the regions that it affects and interacts with (Kasarda, 2019). The nature of the services and products offered include real estate, passenger and cargo logistics and transportation, and entertainment and tourism, among others. The adoption of JIT-L for the DA has been aimed at ensuring that it positively influences customer service and thus functions as a competitive region. Customer service includes a consideration of the cost of air fares, access time, airport access modes, airport facilities and shopping areas, the amount of time it takes for customers to be processed and the ambiance of the airport city, among other factors (Nyilenda, 2017).

The increase in the economic activities has resulted in an increased emphasis on customer service to ensure the achievement of sustained growth and competitiveness. From a customer service perspective, a variety of interventions have been considered, including the adoption of virtual systems for ticketing, parking, and cargo handling to improve the management of passengers and cargo. Some of the infrastructural developments that have been adopted for the DA with the aim of improving its overall customer service are summarised in Table 5.3.

Table 5. 3 Review of the Durban Aerotropolis infrastructural developments

INFRASTRUCTURAL DEVELOPMENT	COMPLETED	WORK IN PROGRESS	FUTURE PROJECT
Airfield Developments			
Runway expansion and improvements		Yes	
Taxiway improvements		Yes	
Lane Capacity extension and terminal area	Yes		
Ground and air navigation aids		Yes	
Passenger terminal improvements		Yes	
Cargo terminal facilities upgrades	Yes		
Social Amenities			
Road and rail improvements		Yes	
Water, recreation and leisure facilities			Yes
Housing and community resources			Yes
Economic centres and real estate		Yes	
Networks and Connectivity			
Wireless and sensor devices		Yes	
Surveillance platforms		Yes	
WIFI connectivity		Yes	

- **Order Processing**

Order processing involves all the activities that are associated with loading, verification, decoding and encoding of the information pertaining to a customer order (Institute of Transport and Logistics, 2004). From a JIT-L approach, there needs to be accuracy in ensuring that this information is properly handled to avoid any disruptions. For instance, the growth in the number of passengers has resulted in the introduction of self-service check-in services and faster systems of processing and handling passenger cargo, ticketing and luggage handling. Some notable developments are the warehouses and transportation terminals that are in strategic positions, allowing for small batches of cargo to be moved frequently and reliably. The active users such as the clearing agents and handlers, comprising the South African Cargo

Services, Calthol Clearing and Freight Agents, Natco International Transporters and Bidvest among others, are attracted by a conducive environment that enables them to execute their operations successfully and process their customers' orders. The increasing number of handlers can be considered as an indicator of customer satisfaction in how the operations are conducted.

- **Transportation and Cargo Management**

Transportation infrastructure is essential for the DA as it is responsible for facilitating the movement of both passengers and cargo. It has been further identified as being instrumental in improving the connectivity, accessibility and responsiveness of the airport city (Halkias, 2014). In order to ensure that transportation infrastructure continuously adds value to the DA, the application of the JIT-L framework in the planning has been consistently applied as in other international airport cities. As determined in literature 85% of the DA users access it for domestic and international travel purposes while only 15% use it for air cargo and freight related activities (ACSA, 2020). Given these distributions, the priority remains to grow the volume of air cargo users as compared to passengers as it contributes more revenue for the DA region. An improved transportation management system has been at the centre of the DA development and this has involved the combined efforts of the municipality (GO Durban Shuttle services), Department of Transport (expansion of the carriage ways), Department of Economic Development (supporting start up transportation innovations such as park-and-ride among others) and the private sector. From an economic perspective, these initiatives have the potential of increasing sales and the level of business conducted within the DA.

- **Growth in commerce**

The emergence the DA has attracted a diverse range of businesses. For instance, at the time of this study, approximately 60 different organisations had located in the airport city region and this number is projected to increase significantly in the coming three to five years (Dube Trade Port, 2019). Evidence further suggests that the number of airlines using the airport city has doubled over the past five years, which can be interpreted as a show of confidence by airlines in the DA. It has also attracted more passengers, as illustrated by an increase in the passenger volumes between 2015 and 2018: international passengers increased from 294 852 to 346 811, while domestic volumes increased from 4 682 035 to 5 252 153 (Luthuli and Houghton, 2019).

In addition, there is evidence of an increase in the number of flights (international, regional and domestic) particularly for the year 2017 which has been steadily maintained over the years. Table 5.4 shows the volume of flights (arrivals and departures) that have been recorded for the Durban aerotropolis, as much as these numbers are high for the KSIA they remain low in comparison to other leading aerotropolis regions assessed in the study.

Table 5. 4 Flight volumes to KSIA

Arrivals			
Year	International	Regional	Domestic
2017/2018	1,329	201	22,825
2018/2019	1,216	298	21,765
2019/2020	1,247	325	21,699
2020/2021	124	0	5,741
Departures			
2017/2018	1,317	201	22,838
2018/2019	1,216	289	21,762
2019/2020	1,248	325	21,767
2020/2020	109	0	5,764

Source: Researcher's own construction.

The DA is directly or indirectly linked to approximately 700 local, regional and global destinations, which are mainly characterised by the movement of cargo (55%) and passengers (45%). Imports and exports have become the backbone of the KZN economy, which makes cargo management a major priority for the DA (Trade and Investment KZN, 2018). In the context of competitiveness, a region with a lower cost of doing business and with reliable and efficient order processing systems becomes the preferred gateway for imports and exports (Kasarda, 2018). Evidence suggests that there is a growing market for cargo as the DA region is actively involved in importing and exporting various commodities. Some of these commodities include seafood (which accounts for 19%), car parts and equipment (16%), processed and raw tobacco (12%), fruits and fresh produce (19%) and computer parts and accessories (14%) (Transparency Market Research, 2018). In order to ensure that the region becomes the preferred gateway for exporters and importers, the adoption of JIT-L practices

aimed at positively influencing cargo handling and management has been considered by planners and developers.

5.7 Conclusion

The chapter has provided a detailed description of the aerotropolis strategy and the processes that have been adopted in implementing it. The chapter findings suggest that the DA is viewed by stakeholders as a multi-disciplinary concept which has an impact on economic growth, directly influencing regional accessibility and connectivity. This is primarily as a result of the fact that it involves infrastructural developments and innovations in terms of logistics due to the emphasis on improving the speed in which passengers and cargo are distributed. While the adoption of the aerotropolis strategies in various regions has been based on conceptual frameworks offered by consultants such as John Kasarda and other academicians, its implementation in KZN has followed a customised path conducive to the local political, economic, social and environmental climate. This chapter has attempted to examine closely the efforts that have been made in ensuring that the DA strategy transitions from idealised to reality.

The DAMP has provided a diversity of infrastructural developments, strategies and novel concepts prioritised for adoption in the DA over the coming 30 years. Most of the strategies have been successfully adopted by different global aerotropolis regions and thus were flagged for the DA (Nyilenda, 2017). There has been an increased emphasis among various corporations in the public and private sector on ensuring that innovative systems and processes are implemented so they can successfully conduct their core businesses. As discussed in the chap, logistics mobility and related infrastructure have been prioritised in planning for the DA as evidenced in the nature of the infrastructural developments and concepts adopted such as the Mount Edgecombe interchange, integrated bus rapid transport and JIT-L, among other developments. Although what needs to be highlighted are the real socio-economic impacts of the strategy and how the related logistics systems and infrastructure will address the contextual realities. This will be addressed chapters 7 and 8.

CHAPTER 6: RESEARCH METHODS AND APPROACHES

“The research question and study context should dictate the choice of the appropriate research methods to be used” (Arizon and Cameron, 2010:104).

6.1 Introduction

The previous chapters have defined the conceptual overview of the aerotropolis concept from a variety of perspectives. The collective efforts of researchers, town planners and consultants have been closely assessed and a common context for the strategy has been determined, with an emphasis on how it has been supported by logistics and supply chain management strategies, tools and infrastructure. This chapter provides a further expansion of the theoretical assertions of the aerotropolis concept through providing a detailed outline of the methodology and research methods that will be implemented and adopted in conducting the investigation.

The chapter further expands on the research design adopted, including the study site and target population, which is critical in achieving the intended study objectives. The various strategies that have been adopted in selecting the study participants will also be critically explored in order to enforce the validity of the study findings. Some of the other important contents of the chapter include the data analysis approaches used, both qualitative and quantitative. There is an emphasis on ensuring that the methods described are in the context of the attributes of the study and relevant to the environment in which the study was conducted. Lastly the ethical considerations and implications of the study are described, with an emphasis on how the participants in the research study were selected and how the analysis of the data was conducted. It is the aim of this chapter to clarify the research design road map as following it influences whether the objectives of the study are attained or not.

6.2 Statement of the problem and objectives

6.2.1 Research problem

As outlined in Chapter 1, it is important that the statement of the research problem be articulated in this chapter as it outlines the study focus and thus can be reflected in the research questions and objectives of the study. Supporting an aerotropolis strategy requires major investment in planning, designing and locating 21st century multi-modal logistics infrastructure and facilities. There is a need for state-of-the-art infrastructure to connect road, rail, port and air transport modes, in order to attract manufacturing and distribution enterprises that require speed, connectivity and the

capability to move people and products (International Transport Forum, 2017). In order to improve and enhance its competitive advantage, South Africa has identified the aerotropolis strategy as one of the key strategies to be adopted in major urban locations due to its ability to contribute to economic development and at the same time attract foreign investment. However, questions have been raised by policy makers, consultants and researchers regarding the impacts of adopting the aerotropolis strategy and how it can be successfully adopted in the South African context to address the prevailing developmental challenges. This study therefore addresses some of the concerns related to the aerotropolis concept through exploring the planning and implementation of logistics systems, infrastructure and novel concepts and how these can directly result in socio-economic benefits within the DA. In an attempt to respond to the main problems of the study, the following research questions will be answered:

- What is the aerotropolis strategy and how does it improve regional competitiveness and optimise socio-economic benefits?
- What are the key decisions and factors considered for airport, urban and business site planning in the development of an aerotropolis?
- What are the logistics and mobility planning strategies adopted in ensuring that the objectives and goals of the aerotropolis strategy are achieved?
- How do spatial and connectivity elements influence the implementation of logistics infrastructure, strategies and novel concepts during aerotropolis planning?
- What are the key logistics competitive factors associated with the adoption of the aerotropolis strategy?
- How does the diamond model of competitiveness influence the decisions implemented during aerotropolis integrated planning?

6.2.2 Research objectives

The main aim of the study is to investigate how planners can *optimise socio-economic benefits through the adoption of competitive logistics infrastructure and novel concepts for the Durban Aerotropolis*.

In order to ensure that the main aim of the study is achieved, the research objectives are as follows;

- To describe the aerotropolis strategy and how it is dependent, influenced and informed by general knowledge and conventions related to airport, urban and business site planning
- To illustrate how socio-economic factors, demographic realities, and spatial and functional elements form the basis of an aerotropolis logistics planning strategy
- To explore the logistics strategies, novel concepts and infrastructural developments that are being considered in planning and implementing the DA
- To determine and assess the logistics success factors derived from integrated logistics planning contributing to the competitiveness of the DA as informed by the diamond model of competitiveness
- To ascertain whether Porter's diamond model of competitiveness influences the decisions adopted and implemented for the DA integrated planning.

6.3 Research methods

Research methods is the term which collectively refers to the tools and techniques that are used in gathering information. Without due consideration of the research methods implemented, the quality of information collected may be compromised (McInroy, 2016:88). The selection of the research approach adopted for the study depends on its substantive purpose; this encompasses the intent of the study and displays the reason why the study is being conducted, including its rationale and objectives (Johnson and Onwuegbuzie, 2004:15). The research methods or approaches adopted are often informed by the research design and thus aim to ensure that the objectives and problems of the research study are addressed. For the purposes of achieving the research objectives this study has utilised both qualitative and quantitative data collection research approaches for the purposes of ensuring the various elements of the study are sufficiently addressed through triangulation.

6.3.1 Qualitative research approach

The qualitative research method has the aim of ensuring that a social phenomenon is clearly understood and therefore the methods employed generate an output of words rather than of numbers (Patton and Cochran, 2002:2). The main emphasis is on the quality of certain data entities and their significance, which cannot be quantified through volume, frequency and amount, and the intention is to gain an understanding of a research problem from the perspective of the population or subjects involved (Leech and Onwuegbuzie, 2007:558). Qualitative methods have the goal of determining the underlying reasons and motivations for certain actions and thereby providing insights into setting the problem and generating ideas and / or determining a hypothesis. This is considered a qualitative research study as it seeks to provide a description and evaluation of the Durban aerotropolis including determining the strategies that have been adopted. Achieving this required conducting in-depth interviews and focus group sessions with experts in airport operations planning together with government representatives responsible for planning and policy formulation. This was for the purpose of ensuring that the aerotropolis strategy is understood from a local context (South Africa) and determined the KSFs of the strategy. In addition the various sets of data sets that have been considered are based on generating opinions and perceptions by various individuals on the Durban aerotropolis development.

6.3.2 Quantitative research approach

A quantitative research study, on the other hand, places emphasis on quantitative measurements and the analysis of relationships that exist between different variables (Cooper and Schindler, 2008:213). As the term suggests, it is concerned with the quantification of variables and involves the use of investigation techniques that seem to determine questions such as how many, how long among many other determinants. The difference between the two approaches is that the qualitative method is associated with intensive design⁴⁵ while quantitative methods are associated with extensive designs⁴⁶ (Limb and Dwyer, 2001). Providing an assessment of the Durban aerotropolis development together with its adopted logistics strategies has been achieved through the use of quantitative data which has provided measurements of the impacts of the aerotropolis strategy and

⁴⁵ Intensive research designs involve a combination of processes that can be applied in specific situations. Studies that utilize this method often involve the examination of individual cases with the objective of developing an in-depth description of the fundamental properties governing the relationships and interactions of participants (Dillon, 2008:2)

⁴⁶ Extensive designs are designed to reveal the patterns and characteristics that exist across a pool of individuals, generalization is often arrived at through statistically analyzing numerical data.

how it contributes to the competitiveness of the region specifically pertaining to the socio-economic benefits. A measurement of the economic viability of the strategy in relation to the benefits it generates, and its competitive advantage will thus be emphasised. The other methods adopted include an extensive review of secondary information and mapping, as well as the conducting of a descriptive survey, qualitative interviews and observations.

6.3.3 Mixed methods approach

Mixed methods are considered as being ideal in instances where triangulation is the main objective; this involves the use of multiple approaches (qualitative and quantitative) in measuring and analysing a phenomenon (Babbie and Mouton, 2001:275). The various methods used are implemented separately in order to ensure that the results of the methods do not influence each other; however, the results of each are closely analysed at the end of the study to check for any corroborations (Greene, 2008:10). The nature and scope of this study allows for both descriptive and philosophical data to be explored, which implies a mixed methods research approach. Both qualitative and quantitative research approaches were used sequentially, concurrently, and iteratively with the aim of ensuring that they individually focused on specific study objectives.

6.4 Research design

Developing a research design is one the most important processes when conducting research, since this provides a framework for planning the research and at the same time ensures the existence of a road map to be used in accurately answering the research questions and fulfilling the objectives (Burns and Grove, 2003). As previously outlined, the initial steps for any research requires the identification of the research problem, which then enables the development of the research objectives and questions. When these have been determined, the researcher is at liberty to select the data sets that are relevant for the study and the methods that will be incorporated in collecting, managing and analysing the data (Bernard, 2010). As discussed by McCombes (2019), the questions that are answered by the research design for any study must include defining the type of data, timeline and location of the study, sources of data and participants, hypotheses, study variables and data management (collecting and analysis). Developing an appropriate research design would mean that the priorities and practicalities of the study are also clearly understood, which implies a consideration of the time it will take to complete the study, the accessibility of data and the availability of the research skills (Baxter, Hughes and Tight, 2004). Designing the

study requires a rigorous process that considers the feasibility of the research methods suggested for each of the research objectives and questions, and, if these fail the feasibility test, then either methods or questions / objectives are further refined (Cooper and Schindler, 2008).

Research is scientific and is considered to represent the search for achieving understanding of a phenomenon; research contributes to the body of knowledge through the application of scientific methods in order to ensure that research questions are answered and objectives achieved (Caparlar and Donmez, 2016). Science refers to an organised and systematic body of knowledge in any area of inquiry, often referred to as a ‘paradigm of epistemic activity’ (McBurney, 2001). As illustrated by McBurney (2001), what makes science a reliable avenue in contributing to the body of knowledge is the fact that it is empirical,⁴⁷ objective, self-correcting,⁴⁸ progressive, tentative,⁴⁹ parsimonious⁵⁰ and concerned with theory. It is, however, noted by Medawar (2013:44) that the distinction between science and non-science is testability; if any hypothesis cannot be tested then it ceases to be science but can rather be classified as philosophy.

It is therefore without doubt that any researcher who is interested in contributing to the body of knowledge should ensure that sound research methods, as approved by both science and philosophy, are adopted. There is a plethora of methods that can be considered in ensuring that the study objectives are attained, and these will be individually discussed as part of the scientific and philosophical framework of the study. Research, whether scientific or philosophical, can be classified in several ways, usually influenced by the data collection techniques (observational or experimental) as informed by causality (descriptive or analytical), the relationship with time (retrospective or prospective) and other variables and the mediums that are applied (social descriptive research) (Caparlar and Donmez, 2016).

⁴⁷ ‘Empirical’ as a characteristic of science refers to the systematic process in which data is collected and analyzed using direct or indirect observations; this means that science relies on experience and observations in arriving at conclusions rather than depending on logic and common sense (Jasti and Kodali, 2004).

⁴⁸ ‘Self-correcting’ as one of the characteristics of science refers to its continuous evolution as new information is discovered which nullifies previously held knowledge; this also can be considered as its willingness to allow new information and evidence to correct any previously held beliefs (Caparlar and Donmez, 2016).

⁴⁹ ‘Tentative’ means that scientific conclusions are not considered fixed or certain but rather provisional.

⁵⁰ ‘Parsimonious’ as a characteristic of science refers to the principle by which science tends to select the easiest and simplest explanation for any phenomena; this implies that the simpler options will always be preferred in comparison to the complex ones (Wiid and Diggins, 2015).

6.4.1 Exploratory research design

An exploratory research design as described by Richey and Klein (2005:30) comprises factors and methods that are concerned with the selection of participants for the research and how data is collected and synthesised for the purposes of achieving the research goals. In ensuring that the primary and secondary objectives of the study were achieved, an exploratory research design was followed. This approach is mainly considered by researchers when some facts are known regarding a phenomenon but at the same time there remains a need for more information to be discovered in order to assist in the development of a sound conceptual framework (Silverman, 2007:89). This approach implies a subject in which there would have been a limited number of similar problems or situations addressed in the past by other researchers (Sekaran, 2003:119). Exploratory studies are also important in cases where there is a need for the researcher to get a good understanding of the subject of interest so that more knowledge frameworks can be built through establishing theories and relevant conceptual or theoretical frameworks (Cooper and Schindler, 2008:139).

Given the scope of the study, which aimed at identifying the potential of gaining socio-economic benefits through competitive logistics systems, infrastructure and novel concepts within the DA, an exploratory design is deemed appropriate since this subject has not been fully explored by researchers especially within the geographical context. As outlined by Burns and Grove (2005:574), an exploratory research design is suitable in a study where the intention is to gain new insights and increase the knowledge base as far as the phenomenon is concerned. It has to be categorically stated that the DA is a new concept that has been adopted and that there is therefore a strong motivation for research to be conducted in order to determine the infrastructure and logistics systems to be adopted in order to realise the full socio-economic benefits of the concept.

6.4.2 Descriptive research design

A descriptive research design is one that provides an analysis and examination of the situation in its current state; it embodies the identification of attributes of a phenomenon based on observations and / or the correlation between one or more variables (Williams, 2007:67). A descriptive study as highlighted by Loeb et al. (2017:1) can also be easily considered for a mixed methods study in the form of a quantitative descriptive analysis which identifies patterns and trends in the data that can be used in answering the questions pertaining to who, what, where and to what extent. In addition, a descriptive study can be considered in scenarios which involve the exploration of an

undocumented problem, playing the role of identifying the hidden patterns in the data sets, and also where there is a need to diagnose real world needs that require policy intervention (Silverman, 2007).

Descriptive studies are designed to learn more about and to explore a specific problem, providing an account of the characteristics affecting or influencing the problem. Such studies are typically structured and have a set of stated hypothesis or investigative questions which they are investigating (Cooper and Schindler, 1998:147). Given the scope of this study and the nature of the objectives, it can be easily classified as descriptive because part of its intention is to ensure that it provides a satisfactory description of the aerotropolis strategy and its socio-economic impacts, a field that has not been widely explored by researchers. One of the challenges posed by this research study is its dependence on observations; these have been relied upon in providing an accurate account of the logistics strategies, novel concepts and infrastructural developments. On the other hand, interrogating the competitive advantage of the aerotropolis strategy has required the analysis of trends and patterns from the data sets provided by various stakeholders who provided an assessment of the DA. Considering these factors, a descriptive study has been considered to be an appropriate approach. Terre Blanche, Durrheim and Painter (2006:44) state that descriptive studies have the aim of accurately describing the phenomenon using various data collection tools.

6.4.3 Case study research design

The study also implements the case study research design approach. This approach selects a confined geographical area to be the subject of the study, which allows for the investigation of a problem to be conducted through an in-depth analysis of selected events and their relationships within a controlled or specific geographical setting (Zainal, 2007:2). The case study approach is considered to be one of many accepted approaches when conducting social research as it encompasses experimentation and observations for a given context in order to address a research problem (Schell, 2000:15). Researchers such as Yin (2000) are considered as some of the pioneers of the case study research technique and describe the technique as one that seeks to examine a phenomenon in its real-life context. One other reason for adopting the case study technique is when there is a deliberate need to capture contextual attributes in the belief that they are important to the research problem being investigated (Zainal, 2007:4).

The area of interest being investigated in this study is limited to the logistics infrastructure systems and the associated socio-economic benefits in the context of the DA. An aerotropolis encompasses a development that is both terrestrially and aerially located within the broader associated linked confines of an airport (Mokhele, 2016:93). For the study objectives to be achieved, data and findings were confined to the DA, which forms the geographical context of the study even though some of the impacts extend beyond these defined geographical boundaries. Thus, a case study approach is identified as being ideal since there is an intention to understand the contextual and geographical nexus of the DA, which is currently under development at the heart of the KSIA airport.

From a geographical context, this study was conducted at the KSIA that is located within the eThekweni Municipality in the province of KZN, South Africa. The airport is managed by the Airports Company South Africa (ACSA) and is the focal point of the DA that is managed by Dube TradePort Private Limited. The KSIA was officially commissioned in 2010 and constructed at a cost of R6.8 billion; it is the major airport in KZN and serves the city of Durban, South Africa. The DA has been identified as the upcoming premier business and trade hub serving Sub-Saharan Africa. The KZN provincial government has been the main stakeholder driving aerotropolis planning with the assistance of landowners, municipalities and state entities (Dube TradePort, 2013).

From a contextual context the DA is the main case considered in this study as it is considered the only aerotropolis in the region in which most of its developments are either at an infant stage or are yet to be commissioned. Some of the factors associated with this case include its freight-oriented focus, which is primarily driven by its competitive strategy of becoming a world class cargo facility. Also, the fact that it is constructed within a ‘greenfield’⁵¹ site and has available land space with enough room for planning and expansion for future developments makes it an ideal case to investigate the study objectives. The research problem and objectives presented in this

⁵¹ A ‘greenfield’ is often referred to as land that is underdeveloped or not utilised in an urban or rural setting, often being reserved for agricultural purposes, landscape design, or left to naturally evolve; these areas of land are usually considered to be ideal sites for urban development as they allow for proper planning and implementation (Das and Ara, 2014:2)

study were interrogated using the DA as a case study and this means that all the data collected and analysed will be an accurate and true representation of the aerotropolis.

6.5 Research strategy

For any study, it is important for a research strategy to be adopted as it provides the steps that needed during the data collection and analysis process. The research strategy is considered a roadmap outlining the overall plans for undertaking the research agenda or objectives (Ambe, 2012:173). For the purposes of ensuring that the objectives of the study are achieved, a step-by-step process is followed, providing the sequence of thoughts and efforts taken in order for the research to be conducted systematically and ensuring that all the tasks can be properly scheduled for quality results to be obtained. As indicated by Hinkelman and Witschel (2014:19), a research strategy would outline the goals and procedures to be involved in order to get the results and identify the set of techniques that need to be adopted in following the procedures. There are a variety of research strategies that can be used for a study and these are adopted based on the scope, goals, form and type of research questions, including the control needed over behavioural events, as illustrated in Table 6.1.

Table 6. 1 Study research approaches

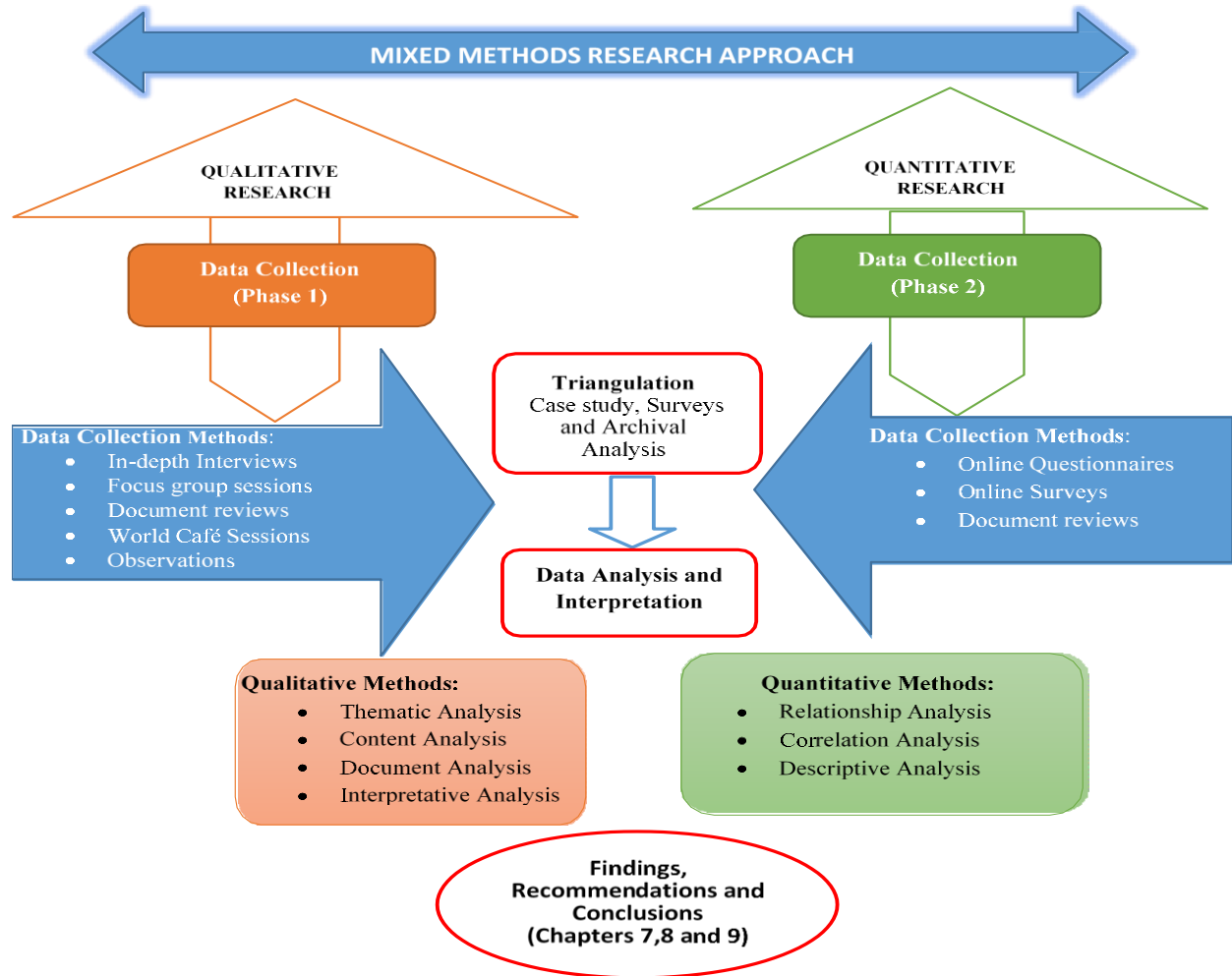
STRATEGY	OBJECTIVE	FORM OF RESEARCH QUESTIONS	REQUIRED CONTROL OVER BEHAVIORAL EVENTS
Experiments	Test hypotheses	How and why	Yes
Surveys	Find patterns in data	Who, what, where, how many and how much	No
Archival analysis	Study existing trends	Who, what, where, how many and how much	No
History	Identify past events	How and why	No
Case study	Study characteristics of a real-life instance	How and why	No

Source: Ambe (2012:173)

It is important to note that the strategy adopted is influenced by the study objectives and, for any study, multiple research strategies can be adopted in order to achieve different objectives. thus, this study made use of surveys, archival analysis, history and case study strategies as described in

turn in the sub-sections below. The research approaches implemented are further summarised in Figure 6.1.

Figure 6. 1 Research Study Road Map



Source: Researcher's own construction

6.5.1 Surveys

Surveys are often well suited for descriptive and exploratory studies and are an essential approach in a research environment in which individual people are the units of analysis; they allow the researcher to be able to generalise the findings derived from a smaller population to the bigger population, although this must be achieved through ensuring that sampling is correctly implemented (Babbie and Mouton, 2001:232). Survey research is best described by its ability to offer a quantitative description of the characteristics and attributes of a specific population;

furthermore, the information or data used is collected from people, which makes it subjective (Glasow, 2005:1). This makes surveys ideal for this research study since the approach allows for the utilisation of a few individuals who are well informed about the development of the DA and whose input and analysis can be generalised to the Durban regional population. Moreover, surveys are also considered to be essential in the measurement of attitude and orientations in a bigger population. The method is a positive aspect of the study since its use included determining the view of the users regarding the development, which is primarily based on their individual experiences. One of the advantages of the use of this approach is its inclusivity of the types and number of variables that can be studied in a single survey.

6.5.2 Archival Analysis

Archival analysis involves the practice of deriving meaning from and interpreting documents or information stored in archives these usually include source documents that are collected and securely stored for future use and can be in the form of recordings, journals, letters, newspapers, speeches and contracts (Allen, 2017:12). Archival analysis can be used in studies where what needs to be understood are the social phenomena or practices of the past, the changes that have occurred within a population set over time and, most importantly, the genesis of a strategy or study subject (Leurs and Prabhakar, 2018:250). For instance, it should be noted that the adoption and implementation of the DA strategy has followed a long process which also involves much of documentation. For the research objectives to be sufficiently achieved, it was necessary to consider documentation that included legal documents, legislative provisions, speeches and recordings explaining the strategy. It should be noted that archival data and analysis is regarded only as having a secondary role in qualitative studies since it is initially collected for a different set of objectives.

6.5.3 Case study

The case study research approach emphasises what is being studied (the case), which becomes the subject and standard of analysis. The approach has been widely used by social scientists and is considered as mainly being concerned with the intensive investigation of a single unit and with attempts to understand how multiple social systems affect a subject (Harrison et al, 2017:14). There are a myriad of case study types as discussed by Babbie and Mouton (2001), who recognise individual case study (which involves the account of an individual population unit), community studies, social group studies, studies of organisations and institutions, and studies of countries and

nations. For this research study, it should be recognised that, as much as the subject of study is the aerotropolis concept, the main determinant of the analysis is the DA region. This therefore implies that the study is driven by a business case with the intention of determining events, roles and relationships taking within this geographical area.

6.6 Population and sample

The population of any study represents a limited set of objects that have common characteristics with respect to the research problem or objectives being investigated. The single individuals or objects of a population are referred to as population elements; when the population elements are similar to each other, they are referred to as being homogenous but, when they vary from each other, they are heterogeneous (Babbie and Mouton, 2001:34). As defined by Alvi, Hafeez and Munawar (2014:10), a population relates to subjects or individuals who meet a certain specified criterion determined by the research study and who can be considered in the data collection process. In determining and selecting the population elements and subjects for this study, it was essential for the study site to be identified first; this consisted of an area demarcated as an aerotropolis. Therefore, the population elements and subjects were selected according to their knowledge and exposure to the aerotropolis region. In further understanding factors around the population elements of the study, questions that needed to be investigated included the study site and the sampling strategies as described in the next sub-section.

6.6.1 Target population

The study areas to be considered in this research encompass regions in South Africa that have either been transformed or are in the process of being transformed into aerotropoli. The airport establishments that were earmarked as suitable sites for the aerotropolis strategy adoption include the three major airports managed by ACSA, namely, the KSIA, the ORIA and the CTIA. These airports are characterised by a hype of business and economic activity, with a high volume of domestic and international passenger and cargo movements (ACSA, 2016). Recently, many businesses in manufacturing and transportation have been attracted to airport regions, which has resulted in a greater emphasis on logistics strategies, concepts and infrastructure adoption by airport management authorities in order to advance their competitive advantage. The airports, however, have different characteristics and competencies and therefore have incorporated various

strategies and approaches in planning for an aerotropolis. Each airport will be discussed in turn below.

- **OR Tambo International Airport**

The ORIA is the biggest and busiest airport in Africa, estimated to facilitate and process an average of 20 million passengers per annum (ACSA, 2016). It is in the City of Ekurhuleni and in 2015 it became the first aerotropolis in Africa. This was after the city management approved the aerotropolis master plan, which was later adopted in an investor forum. The development during its initial adoption was to involve a total of 25 catalytic projects to be delivered in the next 25 years in order to drive economic development. These projects involved the development of clusters that will play a critical role in promoting and growing manufacturing, logistics and e-commerce hubs, research and development hubs among many others. The airport lies within a SEZ and was therefore been identified as a potential area to support economic development and growth. The development of an aerotropolis in this region aimed to transform the airport into a terminal city with a combination of rail, road and air networks that support economic development.

- **Cape Town International Airport**

The CTIA is the third largest airport in Africa, processing over ten million passengers on an annual basis. The City of Cape Town in consultation with ACSA and other stakeholders is presently exploring options regarding the development of an aerotropolis. It has been indicated that the airport has the potential to become the driver of economic development in the Western Cape and therefore collective efforts are needed to increase the capacity of the airport, leading to plans for an aerotropolis being highlighted (Accelerate Cape Town, 2017). No actions have yet been taken as all the ideas are currently at conception stage, but there is optimism that the airport is to be transformed into an airport city pending the success of the strategy in the other areas.

- **King Shaka International Airport**

As one of the biggest airports in South Africa, the KSIA has an annual passenger capacity of over 7.5 million passengers and a runway length of 3.5 km. The aerotropolis master plan was approved by stakeholders, including the KZN Department of Transport and Economic Development Tourism and Environmental Affairs (EDTEA), ACSA, Dube TradePort Private Limited and the eThekweni and KwaDukuza municipalities. The adoption of the aerotropolis strategy for the areas

surrounding the airport is set to foster investments through coordinated spatial planning, integrated multi-modal transport networks and infrastructural engineering developments.

6.6.2 Study site

Based on an exploration of the three main airports identified above (namely, the ORTI, the CTIA and the KSIA), this research study selected the newly commissioned DA within the KSIA precinct as the main study site. The DA has been used as the primary case study since it presents an opportunity to assess and identify the planning and implementation policies adopted, as far as logistics infrastructure and concepts are concerned. The researcher ensured that all the primary data collected was relevant to the DA. In order to achieve this, permission was requested from the stakeholders who are tasked with the implementation of the strategy. The CEO of Dube TradePort granted the researcher permission to use the development in the study. The development of an aerotropolis involves multiple stakeholders located within the study site and responsible for various tasks and activities regarding which the researcher was also interested in getting information. Therefore, further request letters were sent to the various stakeholders, who responded positively. In order to substantiate the data collected from the study site, supplementary secondary data was considered, referring to other developed global aerotropolis regions in order to provide a justification for some of the decisions adopted for the DA.

6.6.3 Sampling methods

As indicated earlier, a mixed methods research approach was adopted for this study. This means that both qualitative and quantitative data collection, analysis and sampling techniques were used interchangeably throughout the study. The sampling techniques adopted by any researcher should reflect the research objectives and questions and can be categorised as probability and non-probability sampling. Probability sampling techniques are used in quantitative studies, involving the selection of many population units from the selected population set; this may be conducted in a random manner whereby every population unit has an equal chance of selection (Teddlie and Yu, 2007:77). This aims to ensure that the sample drawn is an accurate representation of the population of the study. On the other hand, non-probability sampling techniques are mainly used during qualitative studies and represent the set of techniques where the sample targets have an equal chance of being selected (Cooper and Schindler; 2008:455). These methods are further classified into various other techniques, including simple random sampling, systematic random

sampling, stratified random sampling, cluster sampling, quota sampling, purposive sampling, convenience sampling and snowball sampling, some of which have been applied in the study as discussed below.

6.6.4 Sampling techniques applied

In line with the objectives of the study, cluster sampling was applied, particularly for the focus group and World Café sessions. Cluster sampling can be defined as the method in which the population is divided into subgroups and a sample is drawn from each population subgroup (Bareiro and Albandoz, 2001:8). This sampling strategy was deemed appropriate as it ensured that important information and data would be drawn from the different stakeholders in the aerotropolis development such as the business community and government agencies. The cluster sampling technique ensures that the sampling unit consists of a group of population elements instead of referring to a single population unit only (Ahmed, 2009:2). The key benefits associated with the method, besides its ability to accurately capture data, are its cost effectiveness and the fact that the data collection takes less time. The implementation of cluster sampling has been aided by the categorisation of the businesses that operate within the radius of the KSIA, information that has been easily accessible from the airport management.

For the in-depth interviews, purposive sampling was applied. In this method of sampling the participants are arbitrarily selected in order to conform to a specific criterion. Purposive sampling primarily ensures that settings, persons or events are selected based on the important information that they might provide in line with the research objectives and questions. As outlined by Palys (2008:697), the use of a purposive sample shows that the researcher considers sampling as a series of strategic choices about whom, where and how the research data will be sought, as reflected by the objectives. The idea behind this sampling method captures the notion that the position of a person and who they are within in the group is important; research participants are not created equal and a particular participant may be articulate and better informed than one randomly selected individual. For purposive sampling to be applied stakeholder sampling was also used, which is particularly important when conducting evaluation research and policy analysis. It is the approach whereby participants are selected based on their ability to meet a predetermined criterion of importance (Palinkas et al, 2015:3). For instance, the selection of consultants who have played an active role in the development of an aerotropolis would be classified as stakeholder sampling.

Stakeholders and organisations involved in the DA development were purposively sampled in order to understand how the planning and implementation of logistics infrastructure among other activities were handled.

The success of the study requires the use of snowball sampling, which allows subsequent participants to be referred to by current sample elements (Gilbert 2001:1). This can also be described as a technique that involves identifying classes of interest through sampling people who know people who generally share the same characteristics. The aerotropolis is considered a novel strategy in the country and therefore there is a limited number of individuals who are informed about it and in a position to respond to the study questions. Therefore, the use of the referral sampling technique was ideal in order to accurately identify all stakeholders and individuals who have been actively involved in formulating and planning the strategy (Ahmed, 2009:10). The network of consultants, businesses and policy makers involved in the aerotropolis strategy was identified mostly through the referrals.

In the case of quantitative data collection, which mainly involved the distribution of questionnaires to various stakeholders especially businesses, random sampling was considered. This is the technique which gives an equal chance for each population sample element to be selected (Bowen, 2009:28). This is one of the methods that is considered important in drawing conclusions especially when the study population is large. The researcher mainly relied on the email addresses provided by the various organisations and individual contacts that had been collected during the the study. These included attendance registers of conferences attended, and the contact details of various business employees received during the preliminary investigations of the study, which amounted to 400 contacts. One of the challenges is that not many individuals are aware of the DA, which means that the questions had to be generalised as much as possible to allow participants to offer their views.

6.6.5 Sample size

The sample is a sub-set of the study population and emphasis is laid on ensuring that it representative of the population and that the findings derived can be easily generalised (Sekaran, 2003:265). The sample size is described as the number of the observations or participants that should be included in a statistical sample. The higher the sample size, the more reliable, accurate

and representative are the results. While researchers can emphasise the selecting of the sample size, the nature of the study also plays a critical role since some studies have a limited number of participants which already limits the number of participants. In any research study, a criterion for selecting participants should be determined, with a sample frame provides a list of all the elements or attributes from which the sample is drawn (Turner, 2003:3). This allows the researchers to select the population sets that will be essential for the study objectives and questions. For this research study, the researcher considered the following population groups as influenced by the study objectives:

- Consulting firms that are mainly involved in airport, logistics, town and urban planning, including Dube TradePort Company and Royal HaskoningDHV, and that have played a crucial role in drafting of the master plan and other conceptual planning initiatives. It was determined that a total of 30 individuals among these firms have been involved with the DA.
- Government departments and representatives who are mainly involved in policy formulation and infrastructural funding, including the KZN Department of Economic Development and Tourism mainly its Aerotropolis cluster team, the Department of Transport and eThekweni Municipality. As per the records of these departments accessed by the researcher, ten individuals have been involved in the DA development.
- Business community, local and international businesses who are the beneficiaries of the aerotropolis strategy (AgriZone, Logistics and Courier firms, day-to-day users).
- Academics and researchers from the University of KwaZulu-Natal (UKZN) who have been spearheading the initiation of the Aerotropolis Institute Africa (AIA).

6.7 Data collection

Both primary and secondary data played an essential role in this study. Primary data represents sources that are collected first-hand by the researcher on the subject of interest through conducting interviews, observations, focus groups and questionnaires, among other methods, as determined by the study (Friese, 2019). Secondary data sources comprise already existing data which is accessed through extensive search of literature and company reports and documents (Sekaran, 2003:219). Secondary data is usually information that is readily available as it would have been used for other research purposes. The approach followed in collecting data is always influenced by the research objectives. For instance, it should be noted that the researcher's intention to

understand the aerotropolis strategy required interaction with the various stakeholders which could only be achieved through a dependence on qualitative techniques. On the other hand, descriptive techniques were also adopted in order to ensure that the strategy is also understood from the perspective of the various business users and various other informants of the strategy. Information gathering was critical in this study and the various methods for gathering the necessary information are each discussed below.

6.7.1 Secondary data review

The review of secondary data involves the rigorous collation, synthesis and analysis of data from a pool of available information as provided by the different sources in order to gain an understanding of a phenomenon (Gilbert, 2001:43). For the purposes of this study, the use of various forms of literature as produced by different stakeholders such as company documents, strategy master plans, annual reports, budget reviews and other research outputs were considered. This survey was undertaken in order to ensure that the researcher achieved specific objectives such as offering a description of the aerotropolis concept and outlining the factors that have informed its implementation and adoption in different regions. Therefore, the emphasis was directed at assessing the plans adopted by the various airport regions before implementing the strategy; this required the review of reports made available electronically or physically by the provincial governments, municipalities, government departments and consulting companies. In addition, in a bid to further understand the aerotropolis concept especially from an infrastructural development perspective, a review of specific benchmark cases was conducted. This involved an intensive analysis of secondary information available pertaining the Schiphol, Dubai, Ekurhuleni and Memphis Aerotropolis developments.

Secondary data often involves document analysis, which involves taking a systematic approach to understanding and interpreting documents (Bowen, 2009:29). The documents that can be reviewed include reports, newspapers, formal studies, meeting minutes and other forms of written communication. Document analysis is an essential and valid research strategy approach for policy formulation as it allows the researcher to analyse the content of a document multiple times and thereby discover emerging patterns and trends (Bundell, 2010:1). Document analysis is usually

successfully adopted in any research study when it is combined with triangulation⁵² so that the findings will be accurate and credible. Because many published documents provide details on the aerotropolis concept, the research therefore emphasised providing a clear discussion of the concept based on the available public documents from the government departments and steering committees⁵³ involved. Included also were reports that have been published and white papers available to the public. The review included personal documents such as meeting minutes, organisational posts on social media platforms and newspaper and incident reports.

One of the main reasons why this research study considered the use of document analysis as a data collection technique is because it is an efficient and effective way of gathering data as documents are easily accessible and available. Documents are also identified as stable and non-reactive data sources since they can be reviewed multiple times and cannot be influenced by either the researcher or the research process (Bowen, 2009:35). They might, however, be prone to manipulation as researchers may incorrectly interpret the content of the documents. Conducting a literature review is important for any research study as it informs the researcher of the various trends regarding the subject and thereby informs the direction of the research including the data collection methods and the conceptual framework adopted (O’Leary, 2004). The literature review allowed for an evaluation and compilation of facts and opinions of various researchers relating to the aerotropolis strategy and how it has been successfully implemented in other regions.

Following O’Leary (2004:234), the document analysis involved following the essential steps detailed in Table 6.2.

⁵² According to Holtzhausen (2001:10), triangulation involves the combination of both qualitative and quantitative research methodologies in order to strengthen the research design with the intention of ensuring that multiple approaches are taken, as a single method cannot be accurately referred to in solving a research problem.

⁵³ These are the committees that have been set up to decide on the priorities and scope of the aerotropolis concept. The KZN Department of Economic Development and Tourism has set up different committees to prioritise the different areas affecting the aerotropolis concept such as infrastructure development, logistics and policy planning.

Table 6. 2 Essential steps in document analysis

STEP	DESCRIPTION	APPLICATION
1. Creating of a list for texts and subjects to be explored	This is the step in which the researcher provides a description of the key terms and texts that are needed from any document. This helps with focus and narrows the search criteria.	Some of the texts and subjects explored included; Durban Aerotropolis strategy, airport city model, logistics and mobility infrastructure, socio-economic benefits of airport developments, challenges of an aerotropolis, airport city planning.
2. Develop an organisation and management scheme	This stage is aimed at ensuring that the researcher understands the ideas being sought for and how these can be arranged for proper analysis.	The researcher was guided by the theoretical framework of the study in organising the data sets as reflected in Chapter 6.
3. Assess authenticity of documents	This is the scheming process that verifies the credibility and the originality of the documents under review. The intention is to eliminate any information that does not originate from the targeted population sets.	Validity of the documents were assessed through verifying authors and origins as well as the date of publication and organisation of origin or publisher credentials. The documents were accessed from reliable platforms (company websites etc).
4. Explore content	Exploring content involves a careful study of the content of the documents. This should follow a rigorous process that allows for the researcher to go through each document multiple times in order to determine areas of interest and importance.	Summary of the key points was made from multiple readings of the documents. Multiple interpreters assisted during this process.

Source: O' Leary (2004:234)

6.7.2 Primary data collection

Primary data is the information actually collected by the researcher with the intention of solving the research problems or questions at hand (Hox and Boeijie, 2005). It often results in the emergence of new information and data pertaining to a research problem or question, thus contributing to the already available secondary data. Primary data collection is often associated with empirical research or investigations and thus involves the observation of events in order to determine facts and thereby derive inferences and constructs (Patton and Cochran, 2002). In order to ensure that the primary data collected is relevant, reliable and valid, researchers tend to focus their attention on the mediums used in data collection which influence the nature of the data collected. These methods have their individual strengths and weaknesses; for instance, the empirical investigation involved conducting in-depth interviews, administering questionnaires and running focus group sessions, among other methods.

6.7.2.1 Qualitative data collection: In-depth interviews

To strengthen the qualitative data elements for this study, in-depth interviews were conducted as they are a proven and efficient method of data collection (Limb and Dwyer, 2001:75). In-depth interviews are considered as both empirical and theoretical in that they involve gathering information on a topic and are used in developing and testing theories (Cavana, Delahaye and Sekaran, 2001:138). They are also useful if the researcher wants to provide context for the outcome data which can offer clarity on the questions relating to why, when and how. For example, the use of in-depth interviews was mainly applied in order to gain an in-depth perspective on the DA strategy relating to the reasons behind its adoption, the decisions taken pre- and post-implementation and how they have been implemented. Interviews have attracted much attention in qualitative studies and more especially in those focusing on a specific geographic context as the interviews provide an appropriate environment in which processes can be thoroughly investigated. This method of data collection ensures that intensive and insightful conversations are conducted with a defined number of selected participants in order to understand their perspectives regarding the subject under investigation. This is particularly useful if the researcher wants to identify and understand the perspectives and views of these participants in order to derive inferences and conclusions (Boyce and Neale, 2006:3).

In facilitating in-depth interviews, various approaches such as structured, unstructured and semi-structured one-on-one or group sessions can be considered. The chosen approach is, however, determined by the type of data and quality that the researcher requires. For example, some of the approaches allow for participants to be open about questions as they are individually questioned while others will value group opinions in group interactions (Dworkin, 2012). Group interviews are a more powerful instrument and tool due to their ability to allow researchers to extract narrative data, thus allowing for the participants' views to be investigated in greater depth and, at the same time, allows for the researchers to arrive at a conclusion faster.

As mentioned, in-depth interviews can be classified as either structured or unstructured. Structured interviews are structured around a set of predetermined questions requiring a direct response, usually of the yes or no type. On the other hand, the interviewee in an unstructured interview exercises greater freedom in responding to questions while the interviewer is motivated to follow up and probe the responses presented (Limb and Dwyer, 2001:23). In conducting in-depth interviews for this study, the process, as informed by Boyce and Neale (2006), comprised the typical stages applied in any research, including planning, the development of instruments, the collection and analysis of data and the dissemination of findings. Planning for an in-depth interview involves determining the sampling strategy to be used, defining and identifying the stakeholders to be involved, whose ideas and beliefs are considered as important for the study. Furthermore, the planning involves the type of information needed from each participant, the list of participants and, lastly, an emphasis on ensuring that the interview sessions uphold ethical research standards (Sandelowski, 2000). These aspects are discussed in turn below.

- **Number of in-depth interviews**

For qualitative studies, the sample size is usually smaller since the researcher aims to achieve an in-depth understanding of a phenomenon. This approach often includes questions relating to how and why from the participants viewpoint, without attempting to generalise these findings (Dworkin, 2012). The question of how many in-depth interviews are adequate for a research study depends on the quality of data needed, the nature and scope of the study and the amount of useful information provided by each of the participants (Ritchie et al, 2013). The sample size selected for in-depth interviews should ensure that a thorough analysis of the research questions and objectives is provided for, optimising the collection of enough data to identify patterns and trends. For this

study, in-depth interviews were conducted with specialists in aerotropolis planning and implementation, such as consultants, town planners, government officials, policy makers and academic theorists, all of whom are respected as key informants of the DA strategy as described in Section 5.6.1 of this study.

The list of individuals who have been involved in developing the DA strategy at a national and regional level as provided by EDTEA comprised a total of 20 individuals from different organisations. A total of 12 in-depth interviews were successfully scheduled and conducted with (N=12) participants from different organisations such as Dube TradePort (N=5), eThekweni Municipality (N=1), KZN Department of Transport (N=1), Department of Economic Development and Tourism (N=2) and private consultants and academicians (N=3). This represents approximately 60% of the individuals who were involved in the initial stages of the DA development. The researcher tried to ensure that all the relevant stakeholders were interviewed but some were not available to participate for various reasons. The number of participants interviewed per organisation was determined by the number of individuals within the organisation who had been directly involved in the aerotropolis strategy. The aim was to derive information from as many people possible who had been directly or indirectly involved in the aerotropolis development, based on the list provided from the pilot study,⁵⁴ when all the relevant population sets identified were sampled.

- **Research instrument: Interview guide**

One of the steps considered essential when conducting in-depth interviews involves the development of an interview protocol, which includes a set of the rules and procedures that should be applied during the interview sessions to allow for consistency during the data collection. As highlighted by (Sandelowski, 2000), researchers need to ensure that proper and adequate planning is conducted before conducting the interviews; this would involve identifying the questions to be asked, their order of priority and at which stage they will be asked during the interview session.

⁵⁴ A pilot project/study involves a small-scale preliminary study that is aimed at assessing the feasibility of the intended study in terms of cost and relevance before the main study is conducted. In this event the researcher before initiating the study conducted a series of one on one sessions with representatives from Dube TradePort Pvt Ltd and eThekweni Municipality in order to determine the extent and their level of involvement on the Durban aerotropolis development. This further allowed the researcher an opportunity to determine the organisations and individuals that need to be approached in order fulfil the intended research objectives.

An interview guide is developed, providing a list of the questions and issues that should be addressed during interactions with the participants; the planning and development of these questions is important as it determines the extent in which the research objectives will be achieved. As suggested by Knight (2013:1), interview guides contribute to the relevance of the data and information collected as far as the research objectives are concerned. In order to ensure that this is achieved, the researcher ensures that only a few essential questions are included in order to allow the participants to address all the elements of the research topic in-depth without time constraints. One of the objectives of the interview guide, especially for qualitative studies, is to ensure increased flexibility during interactions and the encouraging of thematic and topic-centred discussions (Edwards and Holland, 2013:2). This means that it is characterised by open-ended questions to allow both the respondent and the researcher an opportunity to further interrogate and probe issues considered as essential to the research study.

The interview guide for this research study was carefully designed to ensure that all the information required regarding the DA development was obtained during the interview sessions. The instrument was pre-tested with two participating organisations in order to determine whether the questions were relevant and able to achieve the study objectives. Pre-testing is also considered as one of the ways in which the reliability and validity of the study is determined (Ambe, 2012: 170). This step further allowed for improvements to be made in the use of words and the inclusion of other sub-sections. The planned duration of each of the interview sessions was sixty (60) minutes, with seven sections (see also Appendix C):

- i. Introduction
- ii. Individual profile
- iii. Organisational profile
- iv. Socio-economic needs, demographic realities and spatial and functional elements
- v. Logistics strategies, novel concepts and infrastructural developments
- vi. Factor and demand conditions, firm strategies and supporting industries
- vii. Conclusion

6.7.2.2 Qualitative data collection: World Café technique

The use of different qualitative data collection methods other than traditional ones was considered by the researcher especially after discovering that the subject under consideration is new so that

there might be a lack of information and of participants. One of the challenges relating to this study was the lack of participants informed about the strategy in terms of defining it and identifying its impacts. The reality is that most of the participants could relate to the strategy impacts and not to the strategy itself. This therefore meant that the researcher needed to consider a dialogue-based data collection method, which was essential in ensuring that participants clearly understood the concept through the inputs of others. The World Café as one such technique is used mainly to harness group intelligence through ensuring that the brilliance of individual thinkers is channelled into a coherent and informative message that addresses the issues under discussion (Schieffer, Isaacs and Gyllenpalm, 2014:1). The approach is considered appropriate and useful in creating constructive and meaningful dialogue around a set of questions. From the perspective of the researcher, the method is ideal when one is interested in exploring a subject by obtaining multiple views and ensuring that everyone participating makes a contribution to the discussion. As described by FSG (2008), the method is designed to ensure the creation of a safe and welcoming environment in which people with multiple ideas and perceptions with regard to a subject are encouraged to engage in several rounds of small group discussions. At the same time, the method encourages the bringing together of the knowledge, expertise and personal experience of various individuals through encouraging productive and rich conversations that contribute to the study objectives (Koen, 2018:6).

The World Café technique was preferred for this research study because it encourages systems thinking.⁵⁵ Ideally it allows many individuals or parties to see a bigger picture and not to focus only on their own part and at the same time it attempts to address problems from a cause and effect viewpoint (Aronson, 2000:1). As highlighted by Schieffer, Isaacs and Gyllenpalm (2014:3), there are various beliefs that guide the World Café philosophy, including the idea that everyone has their own interpretation of a subject as informed or influenced by their own mental models constructed within their conceptual reality. Therefore, for a subject to be broadly explored, the sharing of viewpoints is necessary in order to ensure that one can understand a problem or subject not only from a singular viewpoint but also from other different viewpoints; in addition, it tends to foster collective thinking as it moves beyond the sharing of world views to creating a context of collective

⁵⁵ Systems thinking is considered as one of the main tools of systems analysis; it relates to the manner in which one is able to view systems from a broader perspective, encompassing the consideration of structures, patterns and cycles in systems instead of viewing only one event within the system (Authenticity Consulting, 2008:485)

action (Dillon, 2008). The other notable advantages that were derived from adopting the World Café approach relate to the idea that the conversations generated by participants tend to explore their individual capabilities and thus maximises a collective wisdom, allowing also for individuals to think and innovate as a collective, thereby opening up new visions and solutions to problems (Dilshad and Latiff, 2013).

- **World Café technique sessions**

There are several stakeholders from different organisations who have been actively involved in the planning and development of the DA strategy. It has been the priority of all the stakeholders to interact frequently through formal and informal arrangements in order to enable them to share strategies and policies affecting the implementation of the aerotropolis. The World Café technique was enabled by the frequently conducted aerotropolis master class seminars, conferences and stakeholder meetings which usually brought together individuals who had different contributions to make to the strategy development. In addition, the researcher made use of events conducted around the province with financial, construction and real estate experts in which issues relating to the DA were discussed. The researcher attended four formally organised ⁵⁶events during the data collection process in which the World Café process of data collection was utilised. It was during these events that the researcher targeted delegates and requested them in groups of between three and five persons to discuss questions as provided at their tables, mainly during tea and lunch breaks. Although this was an informal setting, important research questions were identified, which have been crucial in achieving the research objectives. A total of eight informal discussions were conducted. These findings are displayed and interpreted later together with those of the focus group sessions.

For the Word Café to be successfully implemented, defined steps were followed that included clarifying the context, creating a hospitable environment and exploring questions that matter, encouraging everyone's contribution. In addition, the researcher ensured that the following guidelines laid out by Koen (2018) and Schieffer, Isaacs and Gyllenpalm (2014) are implemented:

⁵⁶ The formally organised events attended by the researcher consist of the Smart Cities and Aerotropolis Master Class organised by the AIA (13-15 March 2019), AIA briefing session organised by UKZN (27 November 2017), Smart Cities Workshop organised by MILE (October 2018) and the KwaZulu Natal International Investment Conference (13 September 2019) organised by the Department of Economic Development, Tourism and Environmental Affairs.

- (i) **Café convenor** - This represents the researcher who is interested mainly in ensuring that the discussions take place, identifies the issues and invites the participants to discussions.
- (ii) **Café host** - This is the individual who is tasked with managing the entire process, not responsible for facilitating but rather for providing the structure and orienting the participants regarding what is expected of them. The conversations taking place within the World Café technique are not controlled by the host and provide only the context of the discussions.
- (iii) **Table host** - This is the individual who remains at the table as the conversation unfolds for different rounds. This person is responsible for welcoming participants during every round and providing the context of the discussions at the table, also being a participant during the discussions.
- (iv) **Participants** - These are the members (delegates) who move between tables to exchange ideas about the subject under discussion. They essentially move across the tables, gaining different insights and sharing their perspectives and understanding.
- (v) **Design team** - This is the team responsible for ensuring that the entire Café dialogue is effectively planned and implemented; it therefore includes the Café convenor and hosts. Given that the technique primarily generates qualitative insights, important for this study, and that it explores mainly the perceptions of different stakeholders with regard to the concept, it is therefore essential that it is accurately conducted so that the results are accurate.

In order to ensure that the relevant data is collected from these sessions, the researcher prepared a set of questions essential in ensuring that the study objectives were attained. Administering the World Café sessions proved to be a challenge as the concept is fairly new to most qualitative studies and they run the risk of being conducted as focus groups. The researcher, however, used the same research guidelines for both the World Café and the focus group sessions, as indicated in the relevant appendices.

6.7.2.3 Qualitative data collection: Focus groups

One can closely compare the world Café technique to the focus group technique, but these methods are different as they follow different steps and processes. A focus involves a discussion on a topic by a small group of participants led by a trained moderator (Cooper and Schindler, 2008:230). Focus groups are essential due to their ability to combine a variety of individuals who share their ideas pertaining to the research subject being explored. This is considered as a type of in-depth

interview which involves the interaction of a group in which participants influence each other through their conversations and interactions; in this setting, the moderator plays the essential role of bringing up suggestions and comments (Freitas et al, 1998:2). The method is designed for instances where little is known regarding a subject and it can aid researchers in generating a hypothesis based on the perceptions of the participants. The selection of participants is controlled by the researcher, who ensures that the only participants included are those who have certain attributes and characteristics can positively contribute to the research objectives. This homogenous group is given the opportunity to reflect on the questions presented by the moderator, thus allowing essential data to be collected. As highlighted by Krueger and Casey (2000:14), focus groups provide a more natural environment than interviews since the participants influence and are influenced by others during the discussions.

For the focus groups to be successfully implemented, the researcher ensured that they were clearly defined, which included identifying the acceptable number of participants as between six and ten participants in order to ensure that they were effective. The planning of the questions was also an essential step, which involved putting together questions relevant to the research objectives. This was further aided by the creation of a question guide, which was used by the moderator in guiding the flow of the discussions. The other important factors included ensuring that a time scale was allocated for each question group and for the entire focus group session, which allowed for all the issues being probed to be adequately discussed and thus ensured that the sessions were not too long. The recording of these sessions was essential as it offered the researcher an opportunity to review the recordings for the purposes of data interpretation and analysis. Focus groups have the advantage of allowing the discussions to focus on specific issues as determined by how competent the participants are with regard to the issue. It primarily thrives on group dynamics and allows richer and insightful responses to be gained than if the participants were approached individually (Ellis and Levy, 2012).

- **Focus groups sessions**

The focus groups were mainly administered in order for the researcher to provide an explanation of some of the trends related to the DA. As previously noted, other qualitative data collection techniques have been utilised in this study, which means that focus groups were intended to provide supplementary data. Focus groups have become a common qualitative data collection tool

but what remains a difficulty among most of the researchers is how to determine the number of focus groups to be conducted (Carlsen and Glenton, 2011:12). The advantage of using a qualitative methods lies in its ability to explore a phenomenon in-depth; therefore the sample size selected should take into consideration that too few and too many groups can lower the quality of the data (Gibson and Brown, 2001). Recommendations have been made regarding sample size with quantity balanced against quality; reducing the hours of taped and transcribed conversations affects the richness and depth of the data. Accordingly, the researcher made use of five focus group sessions, conducted during the various aerotropolis planning meetings organised by various institutions. Despite the efforts made by the researcher to conduct more focus groups sessions to increase the qualitative data available, the main challenge was finding participants as there are currently few individuals who are directly involved with the aerotropolis concept.

6.7.2.4 Qualitative data collection: Observations

Observations are considered as one of the most reliable methods by means of which a researcher can study participant behaviour or understand the activities taking place in selected study sites. This approach is closely related to that of epistemological studies, which emphasise the investigation of conditions in the context through answering questions on why things are the way they are (Ahmed, 2009). This research approach requires the researcher to be physically present in the study setting in order to understand how specific activities are conducted and to take note of these trends. The intention of conducting site observations for this study was to understand the DA strategy specifically from a structural perspective in terms of infrastructural developments, type of organisations and their activities. Some of the advantages attached to this method are that the researcher is able to capture the context of the environment in which business and people interact; it aids inductive reasoning and also allows the researcher to discover things that cannot be revealed during interview sessions (Allen, 2017). Unstructured observations involve the study of behaviours or processes without any clearly specified variables being targeted and this usually occurs in studies where the researcher is not aware of all the processes (Babbie and Mouton, 2001).

For the purposes of this study, observations were conducted through site visits to the DA region. Various sites were visited in order to establish the amount of work that had been done and what type of business was currently located in the airport city region. The visits also extended to the KSIA as it is an essential component of the DA development. As provided by representatives from

Dube TradePort, which currently is responsible for the management for the SEZs and the aerotropolis regions, approximately 60 businesses, including manufactures and distributors, are currently located within the region. The researcher observed the operations of approximately 36 businesses, which represents 60% of the DA occupants.

6.7.2.5 Quantitative data collection: Online questionnaires

Questionnaires are one of the preferred methods widely used by researchers for collecting quantitative data due to their ability to capture various elements of the research project. Questionnaires are described as a compilation of a written set of pre-formulated questions presented as a form on which respondents record their answers as required by the researcher (Sekaran, 2003:236). They can be administered through online platforms, including Lime Survey, Survey Monkey or Google Forms, where participants are forwarded a link and can capture their responses (self-administered). Alternatively, they can be administered by the interviewer, with the researcher present to oversee and facilitate the process. The advantages of questionnaires are that they allow for an objective standardised approach to be implemented in collecting data and also that they are a quick and easy way to collect data from a large group of participants (Mathers, Fox and Hunn, 2007:19).

The quantitative elements of this study include describing, explaining and evaluating the DA strategy. For all these objectives to be achieved, questionnaires were considered the preferred methodology for data collection as they provide a better platform for information gathering as compared to focus groups, World Café technique and in-depth interviews. Bird (2009:1307) notes that questionnaires are a preferred tool that can be used for social and economic science research, in which the aim is to get access to information from the participating respondents on a variety of socially and economically related characteristics so as to determine their views, attitudes and beliefs on the topic under review.

To ensure success with this research study, the researcher made sure that the questionnaires were properly designed and administered in order to enhance the data quality and the time taken in the collection process. This was achieved through pre-testing the instrument with selected individuals to determine if the questions were clearly understood and if they addressed the study objectives. This process resulted in the adjustment in some of the questions as it was noted that they were not

properly structured. The researcher opted for a self-completed questionnaire distributed through Google Forms rather than face-to-face and telephonic questionnaires as these require more effort and consume time (Mathers, Fox and Hunn, 2007:18). In addition, because the questionnaires were to be self-administered, the researcher ensured that the terms used were easily understood by the participants.

In conducting the data collection, contact lists provided by the various participating stakeholders such as companies, government organisations and municipalities were used. From these lists 400 email addresses were collected and emails were sent to individuals over a period of five weeks. Of these emails, 20 bounced back due to an error in the address or having been discontinued, which brought the number to 380 emails / participants. Due to the nature of the platform, the researcher could not track which participants had completed the questionnaire but made efforts to ensure that the response rate was improved by sending reminders. After a period of five weeks, 150 responses had been received, accounting for 40% response rate, and despite a further extension to improve the response rate, this did not yield any results. There were replies that were rejected as they did not contain any responses, and one of the challenges noted with the research approach is that the DA concept is new and easily understood only by its developers at this stage.

- **Questionnaire design**

The design of the research questionnaire emphasised three elements, namely, proper planning and designing of the questions to be asked, determining the question type, wording and sequencing of the questions and, lastly, designing the overall structure of the questionnaire (Burgess, 2002:6). One of the most important factors affecting the data quality relates to the design of questions, which is also influenced by the research aims and objectives. In designing the questionnaire, both open- and closed-ended questions were included in order to ensure a variety of responses for a more objective analysis. Open-ended questions are described as the type of questions in which the researcher does not include any response options to the respondent, thereby allowing respondents to provide their own responses using their own words and expressions; this usually eliminates the possibility of the researcher influencing respondents (Züll, 2016:1). On the other hand, closed-ended questions are a set of questions in which the researcher provides response options to the respondent, allowing them to describe their attributes, beliefs and attitudes (Newberry, O'Leary and Israel, 2017:10).

Closed-ended questions tend to provide a limit to the response options for the respondent while open-ended ones enable the respondent to elaborate their opinions and views without any influence from the researcher (Reja et al, 2003:161). The design of questionnaires was carefully managed as it determined the quality and accuracy of the data collected. The emphasis was on ensuring that the questions were simple and concise so that the respondents could easily respond on their own without any interaction with or aid from the researcher. The questionnaire was also designed around probing the advantages that can potentially be derived from adopting the aerotropolis strategy, thus incorporating a variety of elements and factors, as determined by the objectives.

As displayed in Appendix E, the design of the questionnaire was intended to be simple for the respondent and also to aid the researcher in obtaining accurate information. to achieve this, the strategies promoted by Wiid and Diggines (2015) were considered. These strategies are outlined below:

- **Specification of the information needed and content for questions**

The objective of the questionnaire was to ensure that the benefits associated with the DA strategy were clearly defined. Therefore, the questions included by the researcher required responses on the economic and social benefits associated with the strategy as perceived by the stakeholders who are directly affected by the strategy. The information needed was mainly driven by the theme of the questionnaire, which was entitled- *An analysis of the economic and social benefits associated with the Durban Aerotropolis*. This title already prepared the respondents for the type of information required of them. The questionnaire was therefore divided into categories aimed at providing background information on the participant's organisation and its exposure to the aerotropolis strategy. Some of the questions requested information on the location, size and operations of the respondent's organisation. Another category looked specifically at the aerotropolis strategy and whether the respondents could relate to it. The final category was interested in gaining the perceptions of the respondent regarding socio-economic developments associated with airport developments.

- **Determination of the questionnaire type and method of administration**

This was a self-administered questionnaire to be managed using Google Surveys, in which the researcher used the platform to load the survey questions, distribute them to the respondents

through an online link and to collect data. The researcher had ensured that the format used was user-friendly to allow respondents to navigate easily from one question to another and to allow them to understand what was required of them in the different question categories. The questionnaire included both open- and closed-ended questions and was divided into different sections according to the intended objectives.

- **Determination of the content for the individual questions**

For this study, closed- and open-ended questions were interchangeably used in the different sections at the discretion of the researcher, depending on the type of information sought. The first questions appearing in the ‘background information’ category were specifically designed to gain some insight into which organisations are affected by the aerotropolis. Thus, the questions investigated the activities of the organisation, organisational location within the DA region, whether the organisation ever makes use of the KSIA and for what purposes. These questions among others allowed the researcher to determine the profiles of the organisations. The second category included questions that were aimed at determining the understanding of the aerotropolis strategy by participants, with questions that required them to indicate if they were aware of the DA development and to provide a description of what they consider to be an aerotropolis. Also, in this section, questions relating to some of the important pillars of the study were introduced, including the role of logistics and mobility infrastructure for the development of an aerotropolis. The respondents were also requested to identify the benefits associated with the DA, which were categorised into economic and social.

- **Determine the phrasing and sequencing of the questions**

For good data quality the researcher ensured that each question measured the concept which it had been designed to measure and that ambiguity was avoided so that each question would mean the same to every respondent (Harrison et al, 2017). In other words, the questionnaire avoided the use of any jargon, vague or imprecise terms that could result in the participants not clearly understanding the question. Some of the approaches incorporated in the phrasing of the questions ensured that they were properly defined, and that long and complex questions were avoided. In addition, determining how the questionnaire was to be measured influenced the design of the

response options offered in closed-ended questions. Ordinal,⁵⁷ nominal⁵⁸ and interval measurement scales were incorporated into the different question categories, which implies that the data collected will be displayed using different formats. The other scales used include the scalar / Likert scale, ordered, unordered and partial.

6.8 Data analysis

Data analysis is described as the process by which the researcher intends meaningfully to arrange both primary and secondary data collected during the research study (Bernard, 2010:123). The analysis approach followed needs to be in line with ensuring that the objectives of the study are achieved. During data analysis, raw data is reduced to a manageable size so that it can easily be understood and interpreted in order to achieve the research objectives. From a qualitative research perspective, this would include the development of summaries and themes, while, from a quantitative perspective, this would include the identification of patterns and the application of statistical relationships and inferences (Seale, 1999:470). Given that this is a mixed method study in which both qualitative and quantitative data has been collected, a variety of data analysis methods have been employed, relevant to the various data sets collected in the form of in-depth interviews, focus groups, the World Café technique, observations, document analysis and questionnaires. These data analysis alternatives are explained below:

6.8.1 Qualitative analysis

Eighty percent of the raw data collected in this study is qualitative and was made available in the form of interview and focus group transcripts, observation schedules, field notes, recordings and scribed notes from the World Café sessions and from photographs. This therefore implies that most of the research objectives of the study have been achieved using qualitative data sets, which has motivated the researcher to apply proven qualitative data analysis and interpretation techniques since these can determine the credibility and accuracy of the information collected (Ibrahim, 2012:39). The data collected represents the opinions, beliefs and behaviours of individuals regarding the social context of the phenomenon being tested. Thus, the interpretation techniques

⁵⁷ Ordinal scales are informed by the concept of order and thus the response options are arranged according to their order of importance (Musvoto and Gouws, 2010:429).

⁵⁸ Nominal scales are considered the most basic scale in measurement; referred to as categorical or dichotomous scales, they usually involve a scenario in which there are two natural categories of measurement, for instance, questions relating to gender or yes-or-no scenarios (Brown, 2011).

adopted should apply to the large data sets that are collected in a verbal or narrative format. The researcher considered the use of familiar methods and techniques and those that are applicable to the available data sets. Therefore, for the focus groups, in-depth interviews and World Café sessions, the process of recording the discussions and later transcribing them was adopted. This was made easy by the use various software programs available for text, audio and video sources, which provided a platform for organising data in a shorter time and more accurately (Greene, 2008). The qualitative data analysis approaches including hermeneutics or descriptive analysis, narrative and content analysis have been used for this study. Each is discussed below:

- **Hermeneutics / interpretative analysis**

Paterson and Higgs (2005) consider the hermeneutical approach to qualitative analysis as both rigorous and credible and one that can be suitably applied in studies in which the researcher is interested in the discovery of practices and or approaches that are associated with the adoption of a strategy or a phenomenon. Since the objectives of this study are aimed at providing an interpretation of the aerotropolis strategy and the various decisions that need to be adopted in support of its planning and implementation from the perspective of various stakeholders, this approach is considered ideal. It has also been referred to as the theory and practice of interpretation, a framework and methodology which considers language, cultural, economic and social contexts in understanding human experiences and accounts (VanLeeuwen, Guo-Brennan and Weeks, 2017:1). The method has been essential in interpreting the various views and opinions shared by the stakeholders (participants) regarding the DA, as reflected during the focus groups, World Café and in-depth interview sessions. Most of the participants already knew each other before the data collection phase as they were drawn from already existing DA planning committees. Thus, the data collection sessions were conversational and were characterised by the use of common terms, phrases and referencing instances with which they were already familiar, particularly in the focus group sessions as they were generally smaller and involved deeper conversations. Hermeneutics analysis in these circumstances assumes the task of providing interpretations and deriving knowledge from discussions and dialogues through ensuring that further questions are asked, and answers sought regarding patterns discovered during conversations.

The processes followed in understanding data with this method include an emphasis on the transcription of conversations, their interpretation and the deriving of meaning hermeneutically

(Van Manen, 2014:12). This study, as informed by Paterson and Higgs (2005:344), has referred to the hermeneutic circle⁵⁹ which ensures that the researcher derives meaning from grasping all the parts of the data. In addition, also implemented were the repeated analysis of data and the asking of further questions in order to test assumptions, with the objective of gaining understanding the experiences of the participants regarding a subject. This process is referred to as the hermeneutic spiral.

It should be further noted that this approach incorporates the creation of themes, described as thematic analysis. Thematic data analysis refers to the process of analysing data according to commonalities, relationships and differences across a data set in order to identify aggregate themes that might be essential in addressing the research objectives (Gibson and Brown, 2009:127). This method was used to categorise and analyse classifications and present themes. This enabled the researcher to understand the patterns and diverse subjects from interpretations, allowing for a wide understanding of subject under review. These data analysis processes are set out in Table 6.3.

⁵⁹ This is the process of understanding data through emphasising that its interpretation needs to take into account the whole and its parts. This means that for any understanding of the parts or components of data reference must be made to the whole and, at the same time, an understanding of the whole can be only achieved by understanding the parts. This means that for any understanding of text, presuppositions are essential (Gilbert, 2001).

Table 6. 3 Hermeneutics data analysis approach process

APPROACH	PROCESS OF ANALYSIS AND ASSUMPTIONS
Hermeneutic Circle	<p>The methodological approach emphasises 4 variables:</p> <ul style="list-style-type: none"> • <i>Whole</i>: the focus is on the interpretation of the study research phenomenon. • <i>Application</i>: The aim is to provide a description and understanding of the Durban Aerotropolis strategy and its contextual impacts. • <i>Parts (of data)</i>: Focus groups, in-depth interviews, World Café sessions, notes and transcripts • <i>Application</i>: The parts of the data sets are integrated to the whole and can only be defined in reference to it; in other words, the parts should mirror the aerotropolis strategy and help determine how it is defined, implemented and its social and economic impacts as determined by the study objectives. On the other hand, the parts illuminate the whole and are relevant when they address the study context.
Hermeneutic Spiral	<p>The methodological approach comprises 5 steps, referred to as spirals, which comprise the construction of texts and assumptions from the literature, emerging dimensions, emergence of themes, creation of models, publication of findings and evaluation of models.</p> <ul style="list-style-type: none"> • <i>Spiral 1: Construction and creation of texts</i> - This involves the searching of literature in order to build assumptions regarding the phenomenon under investigation. Past learning, research and experience allows researchers to gain understanding of a concept and this is further cemented by texts from in-depth interviews, focus groups and transcribed notes. The available data sets allow for the creation of texts which are categorised according to the study objectives influencing them. • <i>Spiral 2: Exploring horizons and dialogue with questions and answers</i> - This involves the process in which the researcher confirms the texts and assumptions as determined in Spiral 1. The data sets (focus group recordings and interview transcripts) are reviewed once again and this time with study objectives in mind, thus determining other trends and patterns that could have been omitted, especially given the volume of the data sets. The most important part of this section is that it reviews the existing text through posing questions as reflected in the objectives. • <i>Spiral 3: Fusion of texts and creating themes</i>- This section emphasises grouping the opinions and perspectives of participants as highlighted in the texts and data sets into common themes. The themes created are mainly categorised in relation to the objectives of the study. • <i>Spiral 4: Fusion of horizon and emergence of models</i> - For this part of the analysis, the researcher focuses on building and deriving meaning from the themes; these themes are also reviewed for their impact on the research questions. Understanding the research study should be achieved at this stage, when themes are meaningfully interpreted. • <i>Spiral 5: Publication of findings and dialoguing</i>- This involves a critical overview of the assumptions, themes and models concerning the research phenomenon. These are further refined by allowing critiques and reflections from the other sources of data. This also seeks to reconcile the differences that exist in the views of participants pertaining to the study variables.

Source: Paterson and Higgs (2005), Van Manen (2014) and VanLeeuwen, Guo-Brennan and Weeks (2017).

- **Narrative analysis**

The data collection for this study included the use of in-depth interviews in which the participants responded to some of the key questions through the narration of events, especially for the questions that had to do with providing a historical account of the aerotropolis strategy adoption process. Narrative analysis became essential for data interpretation as involves a variety of approaches and tools that are applied in understanding and interpreting texts and visuals that have been recorded in the form of stories and narrations (Figgou and Pavlopoulos, 2015). It usually plays the role of uncovering hidden ideologies embedded in stories, with an emphasis on being able to derive meaning from the different experiences and perspectives of the individuals as narrated through their lived experiences. It is an important method that can be used in the study of people and their lives and experiences, thus enabling one to examine their experiences and their surrounding contexts (Ahmed and Rogers, 2017:226). Two narrative analysis approaches, as described by Garcia-Hernandez, Rodriguez-Pichardo and Camacho (1999), have been applied in this study. These are structural narrative analysis⁶⁰ and dialogic or performance analysis.⁶¹

Exploring the events that have taken place ahead of the adoption of the DA has required a review of the stories provided by the pioneers and implementors in which they share their experiences and perceptions. Some of these stories were in response to the questions from the interviewer while others were shared by the participants as add-ons. The analysis of narration requires great creativity and care and thus the researcher followed a framework consisting of three stages as outlined by Larty and Hamilton (2011:231). The stages are briefly detailed below:

- (i) *Stage 1: Structuralist approaches* - This stage of the analysis particularly focuses on determining how the events are linked together within the narration plot. In other words, the main characters are determined, together with their roles and how they tend to influence the events and the role played by the narrator. For this study, it was essential for the interviewer to understand the key players in the DA strategy, their influence, roles and impact on strategy development and implementation. This was achieved during this stage, which then allowed

⁶⁰ This approach describes the narrative as comprising of an abstract, introduction, complication, evaluation, resolution and coda (Garcia-Hernandez et al, 1999).

⁶¹ This is the type of analysis that considers the content of the narrations and interrogates the questions who, what and how during narratives. This approach also reflects on what is told in the story, its content and determines what happens thereafter (effects) (Blix, Hamran and Normann, 2013:268).

for further inquiry. In reviewing these roles, the interviewer provides a transcript with all the necessary information regarding the role players and their influence.

- (ii) *Stage 2: Contextualisation* - This stage plays the particular role of ensuring that all the narrations are within the context of the study research objectives. In other words, all the narrations should have been influenced by the researcher's line of questioning, especially when the experience of the participant was deemed important in achieving the research objectives. These narrations are then organised into meaningful themes and categories, which will be considered in measuring the impact of the narrations on the study objectives.
- (iii) *Stage 3: Further in-depth analysis* - During this stage, the themes and texts as determined in Stages 1 and 2 are analysed in line with the pillars determined in the research study.

- **Computer-assisted qualitative data analysis software**

For the qualitative data analysis approaches discussed above to yield any success, the use of computer assisted software was critical as it can determine the reliability and quality of data. The use of software tools was applied in order to assist the researcher in transcribing in-depth interviews, focus group sessions and the World Café sessions. In addition, essential tasks include facilitating the coding, finding answers and the interpreting of relationships and texts (Frieze, 2019:73). Given that the data generated during the collection stage is in the form of texts and narrations, the computer-assisted analysis method has followed a coding process, which involves pursuing related words and phrases mentioned by the participants and respondents and then combining them in order to realise any connections or trends arising (Hilal and Alabri, 2013:181). The important techniques that were used for the purposes of coding and creating data themes are NVIVO and the Statistical Package for Social Sciences (SPSS).

The Welsh Government (2002) states that the use of statistical packages is essential as it allows for the improvement in the rigours of the analytical steps and provides an analysis that is independent of the researcher's interference. NVIVO as a statistical package was preferred by the researcher because it allows for the successful organisation and categorising of data into themes and patterns and its advantages, as highlighted by Zamawe (2015), include the following:

- (i) It allows for the proper organisation of the data sets such as interview transcripts, surveys, notes of observations and published documents.

- (ii) It facilitates the modelling of visuals such as graphs and clearly demonstrates the relationships between the conceptual and theoretical data.
- (iii) It improves the quality of the research output as it reduces manual tasks and gives the researcher more time to discover tendencies, recognise themes and derive conclusions.

One of the advantages associated with the use of software is its ability to ensure that large amounts of data in the form of transcripts can be easily coded and retrieved as compared to manual processes. There is also the ability for different sets of data located in different files and folders to be accessed easily. Although qualitative data analysis software contributes in these ways to data analysis, it also has disadvantages, including the fact that it is not 100% accurate and only assumes the role of aiding the researcher with analysis, being referred to as data management packages (Hilal and Alibri, 2013).

6.8.2 Quantitative analysis

Quantitative data was collected through questionnaires that were administered both online and face-to-face. The online questionnaires are one of the methods used for the study in which emails were randomly sent to the approximately 400 participants who are considered as users of the DA. Approximately 150 responses were received, which were recorded and analysed using electronic and computerised platforms such as SPSS and Microsoft Excel packages. These are computer packages commonly used in analysing quantitative data sets and often preferred by researchers because of their ability to manipulate volumes of data into relevant descriptive statistics that are important in achieving study objectives. It allows for data to be transformed into statistical tables and charts, plotted into distribution trends and a variety of other descriptive statistics. As acknowledged by Abeyasekera (2005:2), quantitative methods of analysis are of great value in drawing meaningful results from qualitative and quantitative data and they provide a summary of results in numerical terms. The use of Microsoft Excel tools played an instrumental role in ensuring provision for a detailed descriptive analysis, even though most of the objectives required qualitative insights. The components for statistical analysis that have been the priority of the data analysis include descriptive, difference, association and relationship analyses, which are explained in Table 6.4.

Table 6. 4 Components of statistical analysis

TYPE	DESCRIPTION	STATISTICAL COMPONENT
Difference analysis	This is a parametric method which is used in comparing the differences that exist between two groups and is mainly applicable in conditions of normality equal variance and independence (Kim, 2019:540).	Variance analysis and t-test of differences.
Relationship analysis	A system thinking approach that emphasises on identifying the relationships that exist between the different parts of the system and how they contribute to the functionality of the system (Catania and Bieber, 2016:97).	Regression Analysis and Factor Analysis
Correlation analysis	This is the measure that is responsible for determining the existence and strength of the relationship that exists between two quantitative data variables from the data sets. The analysis is based on determining the level of associations which can signify negative or positive correlations (Gogtay and Thatte, 2017:78)	Correlation co-efficient, cross tabulations and Pearson's Correlation. Univariate and Multivariate statistical comparison analysis
Descriptive analysis	This is used to describe the basic features of data in a study particularly pertaining to sample and measures. It is the approach used to explain single variables and the associations between different variables (Babbie and Mouton, 2001:459).	This involves the measures of central tendency, variability and measure of divergence and normality among others.
Inferential statistics	The methodology prioritises drawing findings from a sample with the ultimate purpose of making assertions about the larger population from which the sample would have been drawn (Ong and Puteh, 2017:15).	Standard error and hypothesis testing.

Source: Researcher's own construction

6.9 Quality of the research

One of the most important factors to be considered during any research study relates to the quality of data, its ability to be used in generating knowledge and practically providing real world solutions. Thus every researcher tries to ensure that all the methods used in data collection, analysis and interpretation produce quality research, characterised by meaningful results that have a close resemblance of reality and that can be replicated in other contexts (Hofstee, 2006:179). Maintaining data quality assurance in a research study is usually a challenge as the research process is susceptible to errors which are attributed to the methods applied by the researcher and many other factors linked to the surrounding environment. Although the approaches that are used in enforcing the quality of a qualitative study are different to those of a quantitative study, given that this a mixed method study, various approaches were implemented to enforcing data quality. In order to avoid factors that could distort the quality of the data, the researcher emphasised aspects such as triangulation and crystallisation,⁶² dependability,⁶³ transferability,⁶⁴ reliability,⁶⁵ ethics, data collection technique and data analysis (Chowdhury, 2015:146). The provisions made by the researcher for some of these quality attributes are highlighted in Table 6.5.

- **Triangulation and crystallisation**

Blumberg (2011:504) defines triangulation as the process in which the research design combines several qualitative methods to ensure that the conclusions arrived at are accurate and reflect reality. This offers the researcher an opportunity to approach the subject under investigation from different perspectives in order to identify the differences and the key areas relating to the context being examined (Marks and Yardley, 2004:17). In triangulation, a variety of methods are considered for collecting and analysing data, with the intention of capturing all the perspectives provided by the respondents. For this study, the researcher required high volumes of qualitative data in order for the objectives to be achieved, which has meant the use of various data collection platforms such as focus groups, in-depth interviews,

⁶² Credibility focuses on ensuring that the study measures or tests the concepts in which it is primarily designed for. Some of the questions considered as part of measuring data credibility include testing how congruent the findings are with reality (Patton, 1999:1190). The credibility criterion focuses on measuring if there is any similarity between the responses.

⁶³ Dependability as a data quality attribute asserts that if similar techniques in the same context and under the same conditions are repeated, then similar results should be arrived at (Shenton, 2004:69).

⁶⁴ This is mainly concerned with whether the findings of the study can be applied to other similar circumstances (Shenton, 2004:70). This will also consider the extent to which the findings can be applied to other settings and groups (Noble and Smith, 2015:34).

⁶⁵ Reliability is the measurement that gives an emphasis to the accuracy, precision and consistency of the data and information used for the study it is a key concept to trustworthiness (Cooper and Schindler, 2008:352).

World Café sessions and observations so as to have access to various views. This also allowed the researcher to test the validity of the data as it was tested using various methods (Carter et al, 2014:1). Crystallisation is the method applied by researchers in order to validate the study results using a variety of data analysis and collection methods (Gilbert, 2001). The process also encourages the researcher to suspend reading and examining the data and rather to reflect on the data to determine themes and patterns and to gain a thorough understanding of the subjects being probed (Greene, 2008).

Table 6. 5 Provisions for data quality

QUALITY ATTRIBUTE	PROVISIONS INCORPORATED BY RESEARCHER
Credibility	<p>The use of proven and credible research methods including:</p> <ul style="list-style-type: none"> • Careful selection of participants considered to be informants of the DA strategy was executed using purposive sampling methods and snowballing, which improved the quality of the data collected. • Method triangulation considered the use of multiple data collection approaches such as in-depth interviews, questionnaires, focus groups and questionnaires. • Iterative questioning took place during the data collection dialogues. • The responses of the participants were compared and measured by the researchers to establish whether they are a representation of reality.
Transferability	<p>There are numerous research studies investigating aerotropolis developments that have been conducted around the globe. Some of these methods were applied and at the same time it was shown that the approaches can be applied to another similar study area successfully. Attaining transferability has been further achieved through:</p> <ul style="list-style-type: none"> • Conducting reviews of case studies in order to determine context • Detailed description of the study subject to allow comparisons to be made.
Dependability	<p>The research design and its implementation are in line with similar studies exploring the aerotropolis strategy. Dependability describes the stability of findings over time, which the researcher has achieved through:</p> <ul style="list-style-type: none"> • The evaluation of data by both the participants and the researcher to ensure that all the interpretations are in line with the data collected. • The researcher also availed the raw data files to the study supervisors to ensure that these were a representation of the findings and conclusions. • The data collected has been analysed more than once in order to ensure that the interpretations are accurate.
Reliability	<p>The reliability of any study is identified through the evaluation of the appropriateness of the research methods conducted and the integrity of the findings (Noble and Smith, 2015:36). The strategies that were used in ensuring the reliability of the study included:</p> <ul style="list-style-type: none"> • The use of computerised software such as NVIVO and Excel to collect and analyse data and improve data quality. • The use of the mixed method research approach (20% quantitative and 80% qualitative).

Source: Researcher's own construction.

6.10 Ethical considerations

Ethics in research is important as it contributes to the quality of the study, critically informing the approach taken throughout, from collecting data from the subjects to how the data is analysed and published (Fouka and Mantzorou, 2011:3). Ethics focuses on defining what is right and wrong and in the context of scientific research there are three aspects that every researcher should incorporate in decision making, namely, society, the environment and systems or processes. This implies that every study should be executed in an ethical manner. For this research this approach included the following processes:

- *Application for ethical clearance:* For this research to be considered acceptable, an ethical clearance application was submitted for consideration to the UKZN Research Ethics Committee. The ethical clearance is evidence that the methods used for data collection, analysis and presentation were morally and ethically acceptable as per the research standards of the university. The ethical clearance was approved on 14 November 2018 (*Protocol Number: HSS/0422/018D*) (see Appendix A) and gave the researcher the right to proceed with the research study.
- *Informed Consent:* One of the ethical requirements when conducting studies involving people is to ensure that they give their consent to participating. An informed consent letter relates to the idea of voluntary participation in a research study (McGivern, 2006:28). It is a document that is distributed to the participants of the study requesting their consent to participate in the study. This implies that they knowingly and voluntarily agree to be part of a study without their rights being infringed. The researcher ensured that the study description was clearly provided so that all the participants were aware of the study context and objectives before participation. This study made use of qualitative data collection methods and therefore an informed consent form was also attached to all the interview guides and questionnaires, which allowed the participants to understand the terms of the study and volunteer on their own terms. A copy of the informed consent form is attached as Appendix B.
- *Respect for anonymity and confidentiality:* The researcher ensured that all responses provided by the participants will be kept confidential and anonymity will be maintained. This implies that the display of data during analysis and interpretation is not linked to the identity of the participants. At the same time, all the confidential and private information will be kept safe by the researcher. Confidentiality in research relates to the management

of private information by the researcher, given that during the data collection sessions some of the information provided is considered confidential and, to protect the participants, should be kept as such.

- *Scientific honesty*: The researcher has the ethical responsibility to ensure that the findings and contents of the study are competent, accurate and honest. From a research perspective, the manipulation of data, fabrication and falsification, plagiarism and irresponsible collaboration are considered unethical practices. The researcher in conducting this study has ensured that the standards of honesty are upheld.

6.11 Conclusion

This chapter has provided an overview of the objectives of the study and how these will be achieved through the implementation of various research techniques. The aim was to emphasise the key strategies that will be implemented in gathering, interpreting and analysing the data. Various approaches have been adopted, including the case study technique, which has enabled the researcher to be able to understand and investigate the aerotropolis concept using the DA. A mixed methods research design, including qualitative and quantitative data collection and analysis techniques, was applied with the intention of ensuring that all the study questions and objectives are adequately addressed. The chapter also detailed the exploratory research design in which qualitative elements of the study involved conducting in-depth interviews and focus group sessions with a sample of executives, consultants and government officials who have been actively involved in the planning and implementation of the strategy. The quantitative constructs of the study were determined by collecting data through online questionnaires with the intention of determining the logistics success factors of the strategy and the resultant economic benefits. The next chapter presents the qualitative analysis of the findings.

CHAPTER 7: QUALITATIVE DATA ANALYSIS

“Qualitative research for the aerotropolis strategy is employed to support researchers and policy makers in generating deep and nuanced findings that can inform practice” (Lester, Cho and Lockmiller, 2020).

7.1 Introduction

The previous chapters provided a detailed background of the aerotropolis strategy from a literature perspective and also have discussed the frameworks that have been adopted in the various aerotropolis regions. The aerotropolis strategy as a new phenomenon has been successfully adopted in primarily developed cities such as Memphis, Schiphol and Hong Kong among many others and has also been the subject of adoption in developing regions such as Durban, KZN. For this chapter the emphasis will be on ensuring that the stakeholder perspectives are taken into account in defining the aerotropolis strategy and how it has contributed to regional socio-economic developments. There has been a significant growth in the demand of aeronautical services across the globe and these have also influence socio-economic growth. Evidence suggests that within the next decade commercial passenger traffic globally is likely to increase from 5.4 billion to approximately 14 billion; cargo volumes are expected to triple and new commercial and cargo aircrafts to be introduced to the market (Kasarda, 2016:9). This implies that airports will be considered as business magnets and catalysts for economic development.

Although the impacts of an aerotropolis can vary from place to place this chapter will critically explore the impacts of the Durban aerotropolis from a socio-economic context. As highlighted in chapter 4 various qualitative methods have been employed in collecting data including in-depth interviews, focus group sessions and world café sessions. In addition, the process of document and thematic analysis has been incorporated in making sense of the findings. For a study investigating a novel strategy and concept that is in its initial stages of adoption, it is important to gain an understanding of its nature through reference to documents, which are a convenient way to gain access to the data and to interact with participants who are better informed. The content of this chapter is informed by the study objectives and the research questions and highlights all the qualitative research data collected.

Chapters 7 and 8 of the research have been structured to ensure that they provide the necessary qualitative and quantitative findings to be considered in responding to the study objectives, which include the following:

- To describe the aerotropolis strategy and how it is dependent, influenced and informed by general knowledge and conventions related to airport, urban and business site planning
- To illustrate how socio-economic factors, demographic realities, and spatial and functional elements form the basis of an aerotropolis logistics planning strategy
- To explore the logistics strategies, novel concepts and infrastructural developments that are being considered in planning and implementing the DA
- To determine and assess the logistics success factors derived from integrated logistics planning contributing to the competitiveness of the DA as informed by the diamond model of competitiveness
- To ascertain whether Porter's diamond model of competitiveness influences the decisions adopted and implemented for the DA integrated planning.

Achieving these objectives requires the use of various data sources and methods of analysis, as summarised in Table 7.1. The findings presented in the next two chapters have been organised so that conclusions are derived for each of the study objectives, with Chapter 7 mainly focusing on the qualitative elements and Chapter 8 on the quantitative elements.

Table 7. 1 Summary of research methods

OBJECTIVE	DATA NEEDS	ANALYSIS METHOD
To describe the aerotropolis strategy in relation to how it can support, sustain and improve regional competitiveness, and optimise on socio-economic benefits of KZN.	Quantitative and qualitative data collected from the various stakeholders relating to how they define the DA and consider its socio-economic impacts.	Descriptive statistics, content analysis and thematic analysis
To illustrate how socio-economic needs, demographic realities, spatial and functional elements form the basis of an aerotropolis logistics planning strategy.	Qualitative data collected from planners and policy makers on the factors considered in developing the DA master plan.	Thematic analysis and content analysis
Explore the logistics strategies, novel concepts and infrastructural developments that can be adopted in planning for the Durban Aerotropolis.	Qualitative and quantitative data collected from planners and users on their perceptions of the DA development.	Factor analysis, descriptive statistical analysis and content analysis.
To determine and assess the logistics success factors derived from integrated logistics planning contributing to the competitiveness of the Durban Aerotropolis as informed by the diamond model of competitiveness.	Quantitative and qualitative data collected from businesses and policy makers on the successes of the logistics strategies adopted for the aerotropolis development.	Descriptive statistics, factor analysis and thematic analysis.
To ascertain whether Porter's diamond model of competitiveness influences the decisions adopted and implemented for the Durban Aerotropolis Integrated Planning.	Qualitative data collected from various regions which have implemented the aerotropolis strategy in order to determine the policies and strategies adopted.	Content analysis, document analysis and thematic analysis.

Source: Researcher's own construction

7.2 Research Participants

It is evident that defining the DA requires the interaction and involvement of various government and private organs within the province who have different but related expectations pertaining to what the strategy is, what it should achieve and how it should be holistically integrated. The stakeholders that have been influential in the findings of the study include the KZN EDTEA, UKZN, eThekwini, KwaDukuza and Ndwedwe Municipalities, AIA, Accenture Pvt Ltd, ACSA and the DTP Corporation among many other contributors as indicated in Table 7.2. Participants from these different organisations have been instrumental in gathering data deemed essential in easily understanding the objectives of the study particularly based on assessing the DA.

The discussions in this section have been derived from the in-depth interview sessions together with the focus group and World Café recordings. A total of twelve (12) in-depth interviews and a series of focus group sessions, amounting to approximately 25 hours and 40 hours respectively of recording time, were analysed in order to better understand the views of the participants regarding the aerotropolis concept. The focus groups were conducted over multiple sessions and targeted different population groups. The researcher mainly utilised platforms organised for conferences and special meetings where the relevant professionals and stakeholders of the aerotropolis concept were easily accessible. The profiles of the participants and sessions are recorded in Table 7.2, which also details the individual profiles and the time which they individually contributed towards the study.

Table 7. 2 Study Participants

	PROFILE	ORGANISATION	RECORDED TIME	DATE OF SESSION
Participant A	CEO and Executive [Male]	Dube TradePort	3 hrs 35 mins	05-11-2018
Participant B	Senior Executive [Male]	Dube TradePort	1 hr 20 mins	05-11-2018
Participant C	Divisional Manager [Female]	Dube TradePort	1 hr 10 mins	05-11-2018
Participant D	Project Manager [Male]	eThekweni Municipality	3 hrs 10 mins	31-10-2018
Participant E	IT Manager [Male]	Dube TradePort	2 hrs 45 mins	05-11-2018
Participant F	Project Manager [Female]	Dube TradePort	2 hrs 20 mins	14-05-2019
Participant G	Regional Executive [Male]	Hatch Consulting	3 hrs 30 mins	13-03-2019
Participant H	Senior Researcher [Female]	University of Cape Town	2 hrs 10 mins	14-03-2019
Participant I	Executive Director [Male]	Independent Consultant	2 hrs 30 mins	15-03-2019
Participant J	Researcher [Male]	University of KwaZulu-Natal	45 minutes	15-03-2019
Participant K	IT Manager [Male]	Airports South Africa	1 hr 10 mins	14-03-2019
Participant L	Planners [1 Male, 1 Female]	Department of Economic Development	2 hrs	16-10-2018
FOCUS GROUP AND WORLD CAFÉ SESSIONS				
Session	Location / Event	Participants (6-10 people)	Recorded Time	Date
One	Westville, KZN	Academics	2 hrs 30 mins	19-20 January 2018
Two	Municipal Institute of Learning Conference, KZN	Policy makers and researchers	6 hrs 25 mins	18-19 October 2018
Three	Musgrave, KZN	Researchers, Consultants and Policy makers	8 hrs 20 mins	13-15 March 2019
Four	KZN Investment Conference, Durban	Businesses, policy makers, etc	6 hrs 30 mins	13-14 September 2019

Source: Researcher's own construction

7.2 Stakeholder insights: In-depth interviews

This section of the study presents the various contributions collected from the participants from DTP, who were requested to discuss the fundamentals of the planning for an aerotropolis. In addition, the findings of this section are informed by the various studies that have been conducted in various settings discussing the role of planning for an aerotropolis. The in-depth interviews were recorded, transcribed, and later analysed using thematic and content analysis techniques. The findings have been presented in categories essential for answering the research questions and objectives:

7.2.1 Why is aerotropolis planning essential?

It is evident that there have been consistent patterns of failure in public sector policies and project implementation initiatives, more especially those involving big capital projects (Fotaki, 2010:703). This is the view presented by various critics and researchers, who refer to the practical obstacles intrinsic to the conception and implementation of many of these projects (Lahmann, Keiser and Parlitz, 2016:5). Various factors have been suggested for these failures, with economists relating these to the lack of incentives that should induce individuals to be more successful, while political scientists seem to place the blame on the various political and government groups or red tape involved in delivering these projects (Holgeid and Thompson, 2013:15). These factors have therefore collectively led to a clear disconnect between what is primarily planned and what takes place, a case of embarking on implementation based on bias and faulty logic (Graham, 2004:1).

The findings reveal that there is a need to emphasise planning for the DA with the plans informing the design of the various processes. Van de Walle (2016:11) notes that sometimes the failure of projects in the public sector may be attributed to the manner in which the processes are initially designed and planned, a manner he calls “failure by design”, which implies the adoption of initiatives that cannot competently solve the problem. An example would be one region or country being benchmarked against another without taking into consideration the underlying contextual differences.

The additional arguments presented by participants relating to planning for the aerotropolis highlight the above factors. This knowledge will ensure that failures are avoided and at the

same time the chances of success improved. The motivations for planning as identified by the various participants are presented in Table 7.3:

Table 7. 3 Summary of stakeholder perceptions

PARTICIPANT	REASONS FOR DURBAN AEROTROPOLIS PLANNING
A	<ul style="list-style-type: none"> • Allows for consolidated efforts by the various stakeholders • Ensures that both short and long-term opportunities are equally explored • Enhances opportunities and optimises results • Enables significant improvements in terms of systems and processes
B	<ul style="list-style-type: none"> • Significant developments require planning from the various partners and stakeholders for increased success • Improves connectivity through allowing for the joint efforts in considering the various types of transport infrastructure and networks • Encourages ownership and stakeholder participation • Promotes integration.
C	<ul style="list-style-type: none"> • Allows for strategic issues including sustainability and socio-economic development to be considered • Opens for wider discussions regarding certain issues and how they can affect other stakeholders (Gauteng E-Toll as an example) • Ensures improved strategy success and adoption • Provides a roadmap and allows for monitoring and control.

Source: Researcher's own construction

7.2.2 What factors have informed aerotropolis planning?

The World Bank has weighed in on the argument pertaining to the failure of sound policies to achieve their intended results in developing countries such as South Africa. One of the key factors mentioned is the overemphasis on best practices at the expense of the commitment and cooperation requisite for success (Signe, 2017). It is evident from the qualitative data collected that efforts have been made to ensure that the DA is correctly planned for, with consideration of all the variables and factors that might affect its ability to deliver on its intended goals. Upon review of the data, several statements which reflect on the factors that are taken into consideration when planning for an aerotropolis have been identified, including the following:

Participant B: *“Planning for the Durban Aerotropolis has been influenced by various factors such as the geographical location and the socio-economic dynamics.”*

As identified by one of the participants, it is evident that the geographical positioning of the DA has played an essential role in determining the nature of planning. Its positioning is aligned to different municipalities meaning that they need to be involved in the the plans from their inception as they can directly influence the outcomes of the strategy. In addition, the geographical positioning also includes other attributes such as the nature and size of the land and its proximity to other facilities.

Participant C: *“If one has to successfully plan for a strategy factors such as capital investments and funding must be discussed at inception as they determine the nature of the plan.”*

Without any doubt, the availability of capital and investments plays an important role in determining the extent of planning involved. The aerotropolis development involves a variety of infrastructural developments designed to facilitate the various activities. It is the availability of capital that will determine whether bullet trains, dual carriageways, advanced shuttle services other 21st century developments are considered.

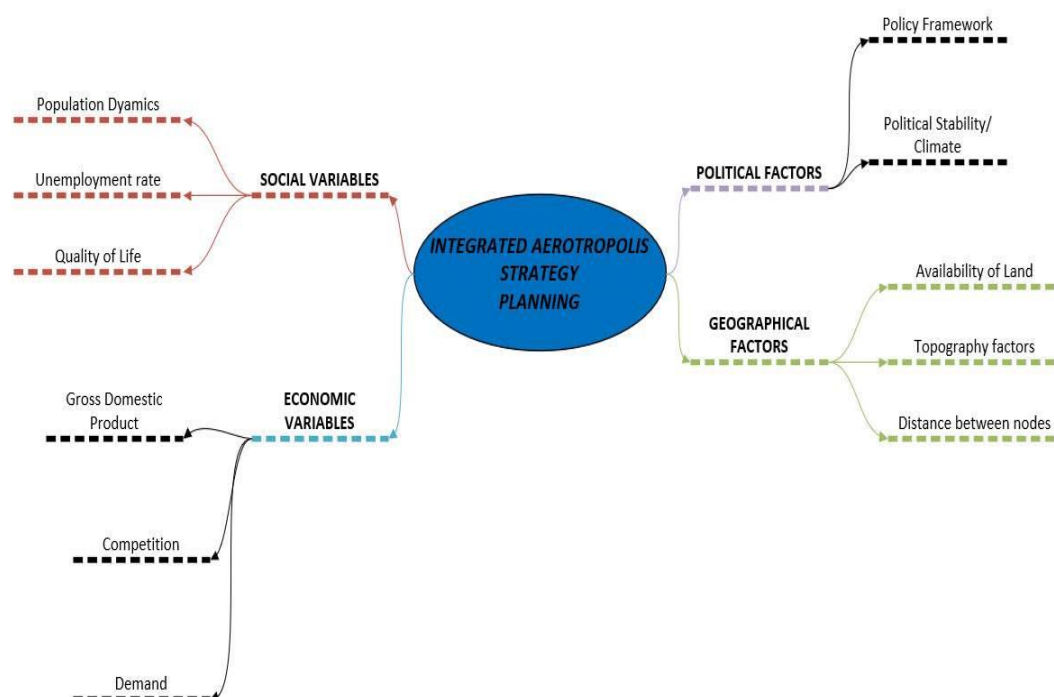
Participant E: *“I am personally considering the political climate as one of the factors.”*

The political climate can be characterised as the measure of the mood of the political society, which can be stable or unstable. This climate determines the nature of policies adopted by the national and provincial government. At a national level, the South African government through National Treasury has prioritised a shift to an outcomes-oriented monitoring and evaluation approach centred on results-based planning and management. This approach focuses on the life

cycle process, integrating strategy, resources, measurements, people and processes in order to improve decision making (National Treasury, 2018). The articulation of projected outcomes and results ensures that there is a basis for planning and tends to provide an outline of the steps to be taken to deliver on the intended goals and priorities.

In summary, the discussions identified factors that have influenced the planning of the DA and these have been categorised into themes and sub-themes, as illustrated in Figure 7.1:

Figure 7. 1 Factors instrumental in the Durban Aerotropolis planning



Source: Researcher's own construction

7.2.3 The role of benchmarking in aerotropolis planning

Needless to say many of the concepts or initiatives that have been flagged for adoption in developing countries are considered to be either a replication of what has been successfully adopted in a developed economy or alien inventions being tested in local conditions (Bogetic and Fedderke, 2005:2). This practice has been the source of failure among various projects and concepts as they lack the originality and authenticity which can be achieved only through a proper analysis of the prevailing local conditions and realities (Foster, 2008:7). The 21st century has seen new terms such as 'smart cities', 'the fourth industrial revolution' and 'green buildings', which have been recurring themes among many developers and policy makers. In

order to keep up with the growing euphoria, the KZN provincial government has considered the adoption of these concepts as it hopes not to lag behind in comparison to other rival regions (Bogetic and Fedderke, 2005:3). Benchmarking against other regions has been the source of implementation challenges as a result of the contrasting socio-economic, environmental and spatial factors between developed and underdeveloped regions.

The evidence provided by the participants suggests that planning for the DA was informed by the various regions in which comparative studies were conducted, which include Memphis, Dubai and Amsterdam. It is these areas that some of the planners visited during the benchmarking tours sponsored by the Department of Economic Development. While the planning efforts were dependent on benchmarking techniques, a further analysis was also conducted in order to determine the suitability of the methods within the South African context. One of the tools used was the value chain problem-solving approach, as it first attempts to understand the context in which the organisation is operating before suggesting any solutions to the underlying problems (Nkurayiya, 2011).

As articulated in Porter's value chain model, the competitive advantage for an organisation should be derived from the analysis of its competitive strength, which only can be realised when all the systems and processes are actively planned and coordinated in order to ensure that the end result is a product or service that customers are willing to buy and which takes into account different attributes of the external and internal environment (Manduku, 2017:35). The discussions revealed the importance of benchmarking for the strategy planning and revealed the role of consultants, including Kasarda, in the framework development.

7.2.4 Other issues affecting aerotropolis planning.

Planning from the inception included the participation of various stakeholders with different expertise and interests. The success of an aerotropolis is determined by the level and scale of co-ordination by various organisations and, in this case, would specifically involve the government agencies responsible for transport planning, social amenities, land development and real estate, together with private institutions as potential funding and investment partners. Some of the insights quoted verbatim relating to planning as discussed by the participants are as follows:

Participant C: *"It also goes without mention that in order to build the Durban Aerotropolis it is mandatory for the planning to be conducted in constant regard to the prevailing*

environment, which tends to influence compliance and regulations through the various economic, social and environmental variables.”

Participant F: *“As one of the initiatives being driven by the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs there has always been a need for the other stakeholders to be brought in so as to ensure that there is efficiency in terms of planning.”*

Participant D: *“The formation of the Durban Aerotropolis Management Unit (DAMU) was meant to ensure that all the planning initiatives are properly coordinated, and stakeholder engagement emphasised for the successful implementation of the strategy.”*

The above statements provide evidence that the KZN IAS requires the involvement of extensive planning efforts involving multiple stakeholders. The aerotropolis strategy, as previously mentioned, is a government-driven initiative and therefore there is a widespread expectation that government departments would be involved in the planning stages; such departments included the KZN provincial government organs together with the national government with its various supporting institutions (Dube TradePort, 2013). The reason for this is that the development of the strategy involves various facets in the domain of various parties and institutions.

Planning, however, has been primarily influenced by the regional environment, especially how various public and private institutions interact. Malaysia can be used as a case in point: its economic growth story can be viewed as a narrative of structural transformation from a predominantly agricultural economy to a more industrialised and knowledge-based economy, a move that was successfully achieved through the involvement of the government and a rigorous planning processes (Nkurayija, 2011:10). Considering the above, it can be concluded that a planning framework document on how implementation is to be initiated is essential and this will be discussed later in the chapter.

As informed by the theoretical framework of the study, it is also worth investigating the planning initiatives that have been put in place to ensure that the implementation of the aerotropolis strategy is a success since planning is considered fundamental in adopting any policy. This requires a review of the master plan, which is the purpose of the following section.

7.3 Stakeholder insights: Focus group and World Café sessions

In order to ensure that the aerotropolis initiative is properly planned for and executed, the development of a master plan is considered to be the first crucial step towards planning. The aerotropolis, as previously defined from a national and provincial government perspective, is envisaged as part of the plan to create a modern airport city around the newly established KSIA (highlighted in Figure 7.2), with the intention of improving economic prospects. For the successful adoption of the strategy, a combination of synergised operations by the various stakeholders, including the surrounding municipalities, government departments, consultants, investors and academics, are emphasised in order to ensure that all the intended results are sufficiently achieved. The master plan, involving all the active stakeholders of the aerotropolis, was to ensure that a planning and investment blueprint is provided for. Hatch Consulting Engineers was appointed by the provincial government of KZN to spearhead the drafting of the blueprint, which was distributed for comments in October 2016.

The contents of the master plan document offered an account of the strategies and principles to be implemented, together with the various projects, programmes and infrastructural developments that would be considered in the implementation of the DA strategy. Drawing on the qualitative discussions with the key stakeholders involved in planning for the aerotropolis strategy, this section of the study is used to highlight and discuss questions related to the master plan. These are arranged in themes derived from the data, representing the holistic aims and objectives of the aerotropolis strategy, and discussed below.

7.4.1 Growth and connectivity vs Durban Aerotropolis

The data presented in this section has been extracted by means of an analysis and transcription process applied to the in-depth interviews, World Café and focus group sessions, using the thematic method to present the findings in themes and categories. It became apparent that the interviewees associated the aerotropolis concept with terms such as ‘growth’ and ‘connectivity’. This led the researcher to examine the efforts that have been adopted in order to ensure that the DA experiences growth and that it is also connected to both international and local markets.

Growth, as reflected in the interactions with the interviewees, has been understood from dual viewpoints, firstly as physical growth in terms of infrastructural scope and, secondly, as an increase in the level of activities and business conducted within the nexus of the airport. Below

are some of the contributions provided by participants⁶⁶ regarding their practical or theoretical definitions of growth in the context of the aerotropolis.

Participant B: *“As an institution we consider the aerotropolis strategy as offering a potential for the KSIA and its surrounding areas to be developed into a world class airport city with modern and smart infrastructure capable of handling an increase in passenger and cargo volumes and through its ability to attract more businesses and manufactures.”*

In explaining this statement, it should be highlighted that growth can be quantitatively referred to as related to the increase in passenger and cargo volumes. In order to substantiate this, quantitative evidence has been derived from organisations such as ACSA, which will be discussed in Chapter 8 (quantitative analysis).

Participant D: *“As a department we are mandated to ensure that we identify and introduce strategies that positively contribute to economic growth, one of which is the Durban Aerotropolis which will over the next years ensure that economic growth is centred around the KSIA.....”*

Economic growth is considered the primary output of the strategy, and holistically investigating the contributions of the DA to the provincial and national GDP. The key activities that can be closely associated with the advancing of economic growth through the strategy include the creation of SEZs, all located within the confines of the demarcated aerotropolis region. Although it was a challenge to measure GDP growth at the time of the interviews, strategies were employed to identify the impact of the SEZs in terms of their contribution to economic growth variables. To provide an illustration of the economic variables:

Participant F: *“There are surely advantages associated with channelling funds and investment to the development of the DA which can effectively result to more manufacturing organisations locating closer to the airport which has the potential of increasing economic activities and a growth to the employment opportunities.”*

In addition to various contributions relating to the growth objective of the aerotropolis, there were other statements which highlighted the following:

⁶⁶ The participant are the individuals from various organisations who have been specifically included in the sample to be involved in the study due to their exposure to the aerotropolis concept.

Participant C: *“Our view as an organisation is that the creation of an aerotropolis within the vicinities of eThekweni Municipality has resulted in multiplier effects to the economy which include the creation of employment and a growth in the regional economy which has also seen an increase in the amount of traffic within that region.”*

Participant D: *“There is bound to be an increase in demand of various goods and services due to the adoption of the Durban Aerotropolis strategy which can create new demand and increase capacity for the already existing demand.”*

From a conceptual viewpoint various models can be applied to explain growth, as evidenced from the insights offered by the key stakeholders interviewed. For instance, some have described economic growth as being informed by economic theories and models, such as the production function for goods and services, in which aggregate output is considered a key factor for production inputs (Fedderke and Simkins, 2009:4). Because of the nature of the aerotropolis strategy, growth has also been discussed referring to the neoclassical production function, which looks at both the ability and capacity to produce (supply) and the ability to influence consumption (demand) (Raisova and Durcova, 2014:185).

Since connectivity was one of the variables which the researcher was interested in probing, interviewees were asked to provide their viewpoint on connectivity in relation to the aerotropolis strategy, especially in connection with international and domestic channels. Connectivity is understood to include meanings such as access, ease of movement, reduced time to reach a destination and open and visible networks between nodes. However, some participants seemed to place an emphasis on describing it as the extent or ability of the airport to attract passengers from different destinations, for instance:

Participant D: *“Global connectivity in this case would entail the establishment of direct flights from Durban to London, Dubai, Moscow.”*

At the same time, the introduction of more domestic flights was also identified as a common factor resembling domestic connectivity as it allows passengers to move freely between local destinations with connections between Durban and Cape Town, Johannesburg, Port Elizabeth, Polokwane and other regional centres.

The discussions around connectivity were also based on the acknowledgment of the existence of a logistics network, characterised by the concentrated movement of supplies between

different regions. In this regard, the existence of the DA is a strategy aimed at positioning KZN within the reach of major international and domestic hubs. From the discussions, it was also revealed that the Air Connectivity Index (ACI)⁶⁷ is also considered to be an influential attribute, since areas or countries with a high score are considered having good connections with other regions, which translates to improved economic activity, as previously described.

In addition to the in-depth stakeholder interviews, further insights can be derived from the focus group sessions on the relationship between economic growth and infrastructural developments. The researcher identified 16 vocal participants from the sessions and their responses were coded and closely analysed to identify the key terms or variables which they associate with growth, as illustrated in Table 7.4. It is evident that all the participants understand growth in the context of the aerotropolis as influenced by its contribution to employment, passenger and cargo volumes, industry presence, and infrastructural investments among many other factors, although they tend to differ on the impacts of the variables. From a close analysis of the growth variables identified, 81.25% of the participants appear to consider growth as related to GDP and the demand for goods and services. This is an expected outcome given that all public and private initiatives aim at contributing positively to the GDP. Of the participants 31.25% consider the size of the airport as a growth attribute, which implies that the size of the airport (in terms of its capacity in handling passenger volumes and cargo and the size of the infrastructure and land space) informs growth.

In the discussions, competition was also identified as one of the key factors associated with growth; this is mainly because of its ability to encourage innovation and constant business reengineering of the value chain. Competition from the context of the aerotropolis has seen the introduction of new cargo and passenger liners servicing different routes and also an increase in the number of businesses located within the airport precinct. For the KZN provincial economy, which is mainly driven by manufacturing, participants are justified in identifying growth in relation to cargo volumes (the higher the cargo, the higher the growth) as it may be associated with an increase in demand and supply. Although participants were indifferent regarding the impact of supply of goods and services on growth, the arguments presented involve the possibility that an oversupply in the market might result in negative growth due to the level of losses sustained.

⁶⁷ ACI represents the percentage of the theoretical maximum global push or pull factors; zero indicates that the country has no connections and 100% that there are strong connections to other countries within the region.

Table 7. 4 Economic growth and the Durban Aerotropolis

Focus Group Code	Growth attributes									
	Structural infrastructural developments ⁶⁸	Size of the airport ⁶⁹	Economic contribution (GDP) ⁷⁰	Physical Structures ⁷¹	Demand of goods and services ⁷²	Supply of goods and services ⁷³	Employment ⁷⁴	Competition ⁷⁵	Cargo volumes ⁷⁶	Passenger volumes ⁷⁷
1	✓	✓	✓	✓	✓		✓	✓	✓	✓
2	✓						✓		✓	
3	✓	✓	✓	✓			✓		✓	
4		✓	✓			✓	✓	✓	✓	✓
5	✓		✓	✓	✓	✓	✓		✓	✓
6			✓		✓	✓	✓		✓	✓
7	✓		✓		✓		✓	✓	✓	✓
8	✓		✓		✓		✓	✓	✓	✓
9	✓		✓		✓		✓	✓	✓	
10	✓		✓		✓	✓	✓		✓	✓
11	✓		✓		✓	✓	✓		✓	
12	✓		✓	✓	✓	✓	✓		✓	
13	✓		✓	✓	✓		✓		✓	✓
14	✓		✓	✓	✓	✓	✓		✓	✓
15		✓			✓		✓	✓	✓	✓
16		✓			✓	✓	✓	✓	✓	✓
TOTAL	12	5	13	6	13	8	16	7	16	11
PERCENTAGE	75%	31.25%	81.25%	50%	81.25%	50%	100%	43.75%	100%	68.75%

⁶⁸ Structural and infrastructural developments - these are inclusive of all buildings and supporting structures, such as electricity grids and water processing plants, that are considered as important.

⁶⁹ Size of the airport - this relates to the area covered by the airport, which is usually stated in square metres (m²). This description also includes the expansion plans that are considered in extending its aerial coverage.

⁷⁰ Economic contribution - this is considered to be the representation of gross change in economic activity associated with the aerotropolis strategy in the existing regional and national economy.

⁷¹ Physical Structures - this relates to an arrangement and organisation of material structures, which include commercial and domestic buildings and shopping malls.

⁷² Demand for goods and services - this relates to an economic principle which implies the desire for consumers to purchase goods and services and their ability and willingness to pay for them.

⁷³ Supply for goods and services - the term relates to the number of goods and services that are made available to consumers by the respective producers (suppliers).

⁷⁴ Employment - the attribute relates to the number of people within the region that are contracted to an organisation to perform work for compensation.

⁷⁵ Competition - relates to the rivalry between individuals or groups arising when two or more parties strive for something that they cannot all obtain at the same time.

⁷⁶ Cargo volumes - the total quantity of goods that are processed in the airport region.

⁷⁷ Passenger volumes - the total number of people (domestic and international) that actively use the aerotropolis region for both business and leisure purposes.

7.3.2 Maximising airport development

The DA master plan also focuses on the initiatives and activities related to the development of an airport city. This encompasses all the efforts aimed at efficiency and improved performance within the aerotropolis region, through ensuring a seamless movement of passengers and cargo within the aerotropolis. As noted from a statement from one of the focus groups:

Focus Group 2: *“The development of an airport city requires coordinated planning and consideration of multiple stakeholders who will individually focus on factors such as the growth of air transport demand, the availability of required capital, environmental factors and transport system integrity and feasibility.”*

Development in the context of an airport city focuses on ensuring that systems, policies and infrastructure are in place to facilitate the conduct of business activities as desired by the users. Users such as airlines, logistics cargo handlers and passengers would collectively consider as essential the runway, taxiway and terminal building developments that have an influence on their operational requirements, while passengers and tourists would consider other facilities. Development from an airport city perspective needs both planners and developers to respond swiftly and adapt to changes in the business environment, providing the appropriate services for passengers, cargo handlers and carriers and at the same time ensuring that this is done in a profitable manner. In line with maximising airport development, the researcher was interested in determining the efforts that have been made in ensuring that the area around the KSIA (namely, the DA) is well developed.

The importance of development in this context is illustrated by the following comment:

Participant C: *“It is important to ensure that the design and development of an airport city especially with how things are turning up to be in the twenty-first century should collectively take into account the extent of the changes in route structure, hubbing, privatisation, computerisation, congestion among many other factors.”*

This implies that what is essential is the adoption of context specific developmental initiatives that are closely related to the goals and competitive advantage of the region. From the interaction with the participants and the site observations conducted, it can be concluded that the master plan extends from short- to long-term developmental plans, which mostly include infrastructural developments that can be categorised into airfield developments, social amenities and network and connectivity infrastructure, as displayed in Table 7.5.

Table 7. 5 Infrastructural developments for an airport city

Attribute	Participant A	Participant B	Participant C	Participant D	Participant E	Participant F	Participant G
Airfield developments:							
Runway expansion and improvements	Y	N	N	Y	Y	Y	Y
Taxiway improvements	Y	Y	Y	Y	Y	Y	Y
Lane capacity extension in terminal area	N	Y	Y	Y	N	Y	N
Air and ground navigation aids	Y	N	N	Y	N	Y	N
Passenger Terminal improvements	Y	Y	Y	Y	Y	Y	Y
Cargo terminal facilities	Y	Y	Y	Y	Y	Y	Y
Social Amenities:							
Road and rail networks improvements	Y	Y	Y	Y	Y	Y	Y
Water, recreational and leisure facilities	Y	N	N	N	N	Y	Y
Housing and Community resources	N	N	N	N	N	Y	Y
Economics and Real Estate	Y	Y	Y	N	Y	Y	N
Networks and Connectivity:							
Wireless and sensor services	Y	Y	Y	Y	Y	Y	Y
Surveillance platforms	Y	Y	Y	Y	Y	Y	Y

Source: Researcher's own compilation

It is evident from Table 7.5 that stakeholders have different views regarding what constitutes development in the context of the DA. This can be attributed to how each stakeholder defines and understands the strategy as highlighted by the various definitions offered by researchers and participants in the previous chapters. The infrastructural developments considered by almost all the participants as forming part of the DA development include taxiway and passenger terminal improvements since the universally acceptable primary function of an airport is to act as a logistics hub. On the other hand, some participants believe that the aerotropolis should be characterised by airfield developments, which are also essential in ensuring that its primary function is properly achieved. The interactions have also indicated the presence of other factors that are not prioritised by participants as part of the aerotropolis development. Such factors include, for instance, social amenities, particularly those involving housing developments, entertainment and recreational facilities. This is because the concept has been understood from an economic development perspective, which implies a bias towards variables directly contributing to GDP leading to the exclusion of social amenities. In addition, development has been understood as related to other factors such as the adoption of sustainable practices and innovations, which are considered key elements in the development of a smart city. The following statements were made by participants responding to questions on the nature of the DA development:

Participant C: *“It’s all about developing and presenting the physical facilities of the airport city, airspace infrastructure, and vicinity land uses, at present and in the future.”*

Participant E: *“Estimating the environmental effects of facility construction and operation and providing proactive solutions.”*

Participant D: *“Forecasting future air transportation demands to determine the required capacity for each facility at each time phase and for the broader aerotropolis region.”*

According to the Stanley and Stanley (2004), development is best described as a process that creates growth and progress and leads to what is instinctively viewed as positive change. Therefore, development can only be mentioned when it can be related to growth or to an improvement. The fact that the different individuals interviewed in this study have different expectations of the airport city has influenced how they discuss the developments that should come with it. For instance, businesses in logistics and commerce are biased towards infrastructural developments that have a positive impact on their operational efficiency. On the

other hand, not many of the participants are primarily concerned with developments categorised as social amenities mainly because few of them consider the DA as a liveable space for residential and other social purposes.

7.3.3 Creating a competitive regional development

This section of the study was aimed at highlighting the views of the participants whether they consider the DA as uniquely placed in a globally competitive region. It should be mentioned that in all the interviews, global competitiveness has been consistently referred to as one of the motivating factors behind the development of the DA. Considering this, the master plan has prioritised achieving this objective within the contextual realities of KZN, which implies the selection of a unique location. Unique placement refers to how a facility is positioned geographically, politically, economically and socially, accruing certain advantages that cannot be attained by another location (Airport Authority Hong Kong, 2005). For the DA, unique placement can be attributed to the assessment of global economic trends, regional resources, environment for competitors and partners, availability of human capital and the potential for industry and trade, as these directly contribute to positioning a region as competitive.

The interest of the researcher in reviewing and interrogating the master plan was also to determine the various initiatives considered as actively involved in contributing to global competitiveness for the DA. One of the questions presented during the data collection sessions focused on how the DA strategy enhances global and local competitiveness. Some of the responses are captured below:

Focus Group 3: *“Through its ability to facilitate an increase in productivity resulting from the efficient production systems and supporting institutions for instance the establishment of SEZs.”*

Focus Group 2: *“The aerotropolis emphasises on environmental sustainability though ensuring that it adopts smart and sustainable initiatives that can influence how international and local markets position it.”*

Focus Group 4: *“Increased investment on technology and capital which are the key factors of production.”*

Competitiveness is understood to be the result of a combination of multiple internal and external factors and conditions, ranging from improved regulations, infrastructure and availability of supporting businesses. As highlighted in the statements above, competitiveness

can be attained through improvement in the productive capacity, adoption of sustainable practices and the creation of an investor friendly atmosphere. On the other hand, a myriad of other factors have been identified from the statements provided by the participants, which have been summarised in turn with key terms associated with competitiveness:

[Focus Group 2]: *'Sectoral specialisation and an emphasis on the regional competitive advantages such as and manufacturing of specific technological components'* [**Industry arrangements, Partnerships and specialisation**].

[Focus Group 4]: *'Spread and quality of new soft and hard infrastructure through the adoption of smart concepts to aid logistics, manufacturing and mobility'* [**Infrastructure, Technological Innovations, Smart Concepts**].

[Focus Group 3]: *'Efforts on the adoption of better and improved air connectivity systems and platforms'* [**Connectivity systems and platforms**].

[Focus Group 4]: *'The adoption of multi-modal logistics and mobility systems to ensure that the region is characterised by fast, flexible and responsive systems'* [**Logistics efficiency**].

[Focus Group 2]: *'Considered a region offering businesses and people access to speedy connectivity to different nodes within acceptable time-lines'* [**Agile platforms and responsiveness**].

The competitiveness of an aerotropolis region requires the adoption of disruptive technologies⁷⁸ that are meant to improve the way products and services are rendered. In addition, the creation of investment opportunities, infrastructure, the topography and availability of land to expand are important variables that can contribute to local and regional competitiveness. Thus, there have been coordinated efforts by the different stakeholders in order to ensure that the DA is recognised as a competitive destination globally and locally through drafting supporting policies, adopting enabling infrastructure and fostering key partnerships.

⁷⁸ Disruptive technology as alluded by Christensen (2000) is a form of technological innovation that upon its introduction transforms the way in which people perform tasks or services and shakes up the existing industry or creates a new form of industry.

7.3.4 Guiding and informing urban development

The impact of the DA should be measured based on how it contributes to the regional economy and how it influences development for specific geographical locations. From the focus group findings, one of the most important factors highlighted is that the DA strategy has been adopted to influence the regional economy of KZN and the surrounding areas. Instead of only focusing on the developments restricted to the airport as in the previous section, this part of the study highlights the various sections of the master plan, assessing and putting into context all the developmental initiatives and processes within the aerotropolis study area, which crosses into three municipalities (eThekweni, Ndwedwe and Kwadukuza).

According to the previous findings, there is a correlation between development (that encompasses the airport region and the adjacent areas) and competitiveness. For instance, for a region to be identified as competitive, a supporting environment with enabling infrastructure and developments is a necessity. The aerotropolis region is strategically located in what has been described as a green-field and so private developers together with the provincial government have spearheaded developmental initiatives aimed at ensuring that the area becomes a competitive force from a national and global viewpoint.

The DA has brought about several developments considered as essential to attaining its intended objectives. The developments associated with the area are concentrated on land use that increases the capacity and quality of passenger travel and facilitates people movements. As highlighted in Table 7.6, the aerotropolis development was responsible for various developments which have facilitated its ability to achieve its intended objectives. Although some of these have not been implemented, they have been planned for and therefore highlighted in the master plan.

Table 7. 6 Checklist for the Durban Aerotropolis infrastructure

DEVELOPMENT / INFRASTRUCTURE	YES	NO
Streets and highways	✓	
Intermodal freight hubs	✓	
Public transit	✓	
Bicycle and pedestrian facilities		✓
Hotel and entertainment districts		✓
Convention centres and exhibition halls		✓
Retail outlets		✓
Mixed use commercial and or residential	✓	
Research / technology parks	✓	
Business parks	✓	
Sports and entertainment complexes		✓
Distribution centres and e-fulfilment centres	✓	
Warehousing districts	✓	
Industrial business parks and Just-in-Time manufacturing	✓	
Logistics parks	✓	
Parking applications and kiosks	✓	
Lighting	✓	
Waste management services	✓	
Energy monitoring	✓	
Surveillance cameras	✓	
Broadband infrastructure (3G and 4G)	✓	
Transportation and congestion sensors		✓
Bus rapid transport systems		✓

Source: Researcher's own construction

From the interaction with the various stakeholders, it is evident that they all associated the DA with the adoption of new developments, in line with the empirical evidence from the other regions used as benchmarks. One other important insight is that participants across all focus group sessions seem to agree that their view of the feasibility of the developments considered in an airport region was based entirely on how the regions against which they benchmark have successfully implemented the strategy, with references to Dubai, Memphis, Amsterdam, Hong Kong and Beijing as examples.

7.3.5 Integrate the study area with the broader urban environment

Integration is widely described in different spheres as resembling the close alignment and coordination of various systems through the use and implementation of shared management information systems and various other infrastructural developments and smart systems. In the case of the DA, integration is seen as involving the creation of processes aligning the demarcated aerotropolis region with its surrounding environment. The urban environment as understood by the researcher presents two main processes. These are the dynamics of agglomeration and / or polarisation of an associated nexus of locations, land uses and human interactions. This implies that the efforts involved in promoting integration are intended to ensure that the geographical, infrastructural and human elements are all successfully incorporated.

Interestingly, the researcher noted that the term integration was referred to more than once by all the participants, mostly linked with its role in determining the success of the strategy. The term was also referred to in different contexts. For instance, it was stated:

‘Participant L: “When an aerotropolis is fully integrated through automated smart city concepts it does not only result to improved operational infrastructure and levels of service but result to greater transparency and visibility for the multiple users.”

Integration from their viewpoint refers to how the different technological systems within the aerotropolis co-exist and inform each other. In this way the aerotropolis is seen as a process in which different elements depend on each other through the installation of technological innovations. A further reference to the important role that technology is considered to play in integration is as follows:

Participant G: *“The adoption of the Durban Aerotropolis has also resulted to an increase in the use of advanced technology and solutions that are collectively aimed at ensuring that greater efficiency is attained and there is an improvement in operational productivity, passenger experience and integration.”*

The DA region aerial view in Figure 7.2 shows its extensive geographical area so for the success of the strategy and in order to ensure that the different areas are closely integrated coordinated efforts have been adopted. The fact that the aerotropolis region passes through three municipalities, namely, eThekweni, Ndwedwe and KwaDukuza, each with its own established economy means that it is important for the strategy to address the contextual realities of these areas. From a conceptual and technical viewpoint, it is a mammoth task to ensure that there are active logistics and mobility connections reaching to the surrounding Durban areas such as Cornubia, Verulam, Amanzimnyama and La Mercy among others. Integration in this regard requires the ability of the different stakeholders to plan and work together, making sustainable decisions that will have an impact on the broader aerotropolis strategy. These decisions have included joint plans in real estate developments, transportation networks and the formation of strategic partnerships.

This brings another perspective of integration which encompasses policy alignment between the different areas within the aerotropolis study area, as indicated below.

Participant H: *“The Durban Aerotropolis strategy should play a key role in integrating the surrounding rural territories (Ndwedwe among others) into regional and international networks and thereby creating sustainable urban-rural links.”*

The creation of an urban environment also relates to the adoption of smart concepts that can ensure integration, as expressed as follows:

Participant A: *“Smart cities technology brings the Durban Aerotropolis within reach which means that more emphasis shifts into the designing or adopting technological platforms and initiatives.”*

LEGEND

- Industrial Reserve
- Industrial Zoning
- Water Use Zone
- Water Use Effluent / Sewer Flow
- High Potential for water
- Wetland
- Forest
- Open Space
- Residential - 1st Zone
- Residential - 2nd Zone
- Residential - 3rd Zone
- Residential - 4th Zone
- Residential - 5th Zone
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- Residential - 99th Zone
- Residential - 100th Zone

DURBAN TRADEPORT, HOME TO KING SHAKA INTERNATIONAL AIRPORT

VERULAM

INYANINGA

TONGAAT

AWANTIMNYAMA

USHURELA

COMPENSATION

WESTBROEK

ZIMBALI

BALLITO

LA MERCY

UMHLOTI

SIBAYA

GATEWAY

UMHLANGA

CORNUBIA

MT. MORELAND

DURBAN CITY

DURBAN TRADEZONE

DURBAN CARGO TERMINAL

DURBAN AGRIZONE

INDIAN OCEAN

14

220

7.4 Logistics and Transportation factors

This section of the study summarises the essential data collected through document analysis and stakeholder interactions to provide an account of the strengths, weaknesses, threats and opportunities of the various elements associated with the Durban aerotropolis. The main questions explored are inclusive of the factors considered to be essential for the development and include logistics, economic development and competitive advantage.

Within different economies, logistics is considered as a core pillar in the value chain, actively involved in aiding manufacturers, distributors and retailers to satisfy their customers from different tiers successfully (Ambe, 2012). In the context of the DA, there are several industries that have either been attracted or are yet to be attracted to the aerotropolis region. Whichever way one looks at it, logistics is one of the success factors for the DA as it determines the speed at which inbound and outbound goods are handled. In addition, the responses from Dube TradePort participants have summarised the role played by logistics in an aerotropolis as ensuring that the right product is delivered at the right time and place and at the least possible cost so that a competitive advantage is attained. Further strengthening this view is the fact that various projects and initiatives have been adopted in support of logistics to date. For instance, among the developments has been a cluster of passenger and cargo transport and movement facilities, comprising surface access and movement strategies aimed at improving the passenger flows and movements. Given the different types of organisation and of passengers that make use of the airport, the existence and adoption of logistics strategies and platforms has provided for unlimited access for passengers and cargo and has at the same time ensured that an environment is created fostering a competitive advantage.

The strategic position of the DA has been used to sell the concept to various stakeholders and is considered as a contributing factor to its competitiveness, as illustrated below:

Participant D: *“The Durban Aerotropolis is to be viewed as Africa’s global manufacturing and air logistics platform which facilitates a variety of globally competitive logistics services and solutions. This has been further necessitated by the various logistics and technological innovations adopted within the region.”*

From both the focus group sessions and the in-depth interview sessions, it can be stated that one of the strengths of the DA lies in its ability to provide a globally competitive logistics

platform. It is therefore essential to note all the findings relating to how the various strategies indicated in the master plan are considered as strengths for the DA. The factors described below have been highlighted as the major strengths:

- There is a state-of-the-art cargo complex, which includes a network of warehouses and storage facilities intended to play a key role in facilitating the rapid handling and movement of cargo and passengers.
- Within the cargo precinct there is also an outsized cargo handling facility with specialised equipment for handling cargo of various sizes efficiently, using equipment such as hoists, cranes and conveyor systems equipped to handle containers and other bulky shipments.
- The development and adoption of refrigeration technology has enabled a significant portion of the DA region to provide refrigerated facilities catering for the cold supply chain, which has been specifically designed for the effective and time sensitive movement of perishable goods to international markets in particular without affecting their quality.
- Dedicated road networks and a fleet provides time sensitive logistics connecting the DA to other local and regional nodes by road. There is evidence of further connections being created in order to improve on the capacity of the airport region, indicated by ACSA.
- Public transportation platforms such as BRT systems (Go Durban) and passenger shuttles that are responsible for the movement of passengers from the surrounding metropolitan regions on a day-to-day basis. This has reduced the transit time and cost of travelling between the DA and its surrounding nodes.
- The existing airport terminals have been further boosted to handle a capacity of 100 000 tonnes of cargo annually, which implies that the handling capacity has increased and thus the potential of accommodating any increases in demand.
- There are trucking and logistics companies within the precinct of the airport region, allowing the efficient movement and expedition of air cargo shipments to and from international destinations, as indicated by Dube TradePort participants.

From its inception, the DA strategy has seen a myriad of efforts considered by its stakeholders and focused on ensuring that a combination of strategies, models and infrastructure are put in place so as to improve its ability to compete globally and directly influence economic development, which are its imminent strengths. It is therefore evident from the developments mentioned that positive steps have been adopted and implemented in order to ensure that the aerotropolis development delivers on its intended objectives, particularly on the logistics front.

This has been motivated by the idea that logistics plays an essential role within a metropolitan city development context, requiring closer attention in terms of planning and the integration of all the stakeholders in the aerotropolis strategy development. A properly managed city logistics network is one that allows for the healthy interaction of urban, regional and international linkages, especially for cities looking at competing in regional and international markets such as Durban. Involvement in the aerotropolis strategy is further characterised by a combination of logistics systems and concepts encompassing effective freight and distribution services.

7.5 Conclusion

This chapter has presented a qualitative research account of the data sets collected through the in-depth interviews, surveys and focus group sessions and analysed using thematic and content analysis methods that involve both manual and electronic data platforms. The objective of the chapter has been to determine how the various role players define the DA and how they conceive it's impacts on the regional and national economy. In addition, sections of the chapter were aimed at determining the various initiatives adopted in planning for the implementation of the aerotropolis. The intention of the chapter was to provide an overview of the DA from a stakeholder perspective and thus the focus here has been on the findings generated from in-depth interviews and focus group sessions.

The qualitative insights have played an essential role in ensuring that the research questions are answered, and objective reached. However, there are questions that still need to be addressed through the application of quantitative methods. The next section, Chapter 8, will analyse the quantitative realities of the DA strategy and provide an assessment of whether it has made any tangible economic contributions in the region. In addition, an account of the benefits that have accumulated as a result of improved logistics competitiveness will also be provided.

CHAPTER 8: DISCUSSION AND ANALYSIS OF QUANTITATIVE DATA

“Smart Logistics involves a combination of innovations in traffic management, structuring and navigating for optimal use which positively influences economic growth” (T Systems, 2018).

8.1 Introduction

The previous chapters have provided a substantial description of the DA, emphasising what the strategy entails and how it has been adopted in various contexts. In addition, a review was conducted of the DAMP, which has been used as a blueprint for implementation. Both the hard and soft infrastructural developments were placed under scrutiny as they are equally essential to the establishment of a fully functional aerotropolis. In Chapter 7, qualitative findings from the various data sources were presented, analysing the stakeholder perspectives relating to the aerotropolis development. This analysis included the planning efforts and strategies adopted to create a globally competitive DA. These strategies include the formation of various planning committees and the adoption of diverse policies, which have created a conducive environment for economic growth and development.

In this chapter, the objective is to provide a summary of the quantitative findings collected from the data sources, such as questionnaires, document and statistical reviews, utilised at different stages during the research study. In order to provide a clear account of the findings, descriptive statistics including frequency distributions, pie and bar charts have been used. The findings address the questions relating to how the DA has influenced regional competitiveness and achieved related socio-economic benefits. there is evidence of measurable economic development and growth as noted in an increase in the demand of aeronautic products and services. This growth has also led to an increasing number of investments affecting the GDP and thereby easing the unemployment rate. An account of stakeholder engagements is crucial in this chapter, especially from the participants in Working Group 3 (WG-3),⁷⁹ which focuses especially on the logistics and economic planning for the aerotropolis.

⁷⁹ Working Group 3 is a steering committee identified in the KZN integrated aerotropolis strategy governance structure which focuses mainly on issues relating to the multi-modal transport and infrastructural developments of the Durban aerotropolis; some of its key functions include prioritising the transport needs of various nodes, identifying nodes and corridors of development linking the airport and the metropolitan city, undertaking transport needs assessment and the formulation of the transport and logistics strategy of the airport city, among many other functions. It is composed of the different public and private entities that have a core focus on logistics planning and development, including the Department of Transport and the Department of Trade and Industry, ACSA, Dube TradePort, eThekweni Municipality and Transnet.

8.2 Data presentation

The presentation of the quantitative data sources will include various approaches effectively used by researchers which are also ideally suited for a study of this nature. Frequency distributions are considered to be an organised method of displaying the quantitative results collected during the data collection stage of any research study; this method provides a tabulation of study variables (independent and dependent) located in each category, which allows for a better interpretation of the research findings (Williams, 2007:60). The use of bar and pie graphs is a method that presents data in an easily understandable manner and used by the researcher in displaying the various relationships within the data sets. The key issues to be explored in this section include a review of the relationship between logistics models and strategies on the one hand and the factors of production (labour, capital, entrepreneurship and land, on the other, factors which are considered to be key to success for any aerotropolis.

This chapter is based on data collected at different stages of the study. Firstly, data was collected through the distribution of online questionnaires to the potential users of the DA such as businesses and passengers. Secondly, data was collected from site observations involving occupants of the SEZs and the KSIA. The key findings highlighted have been categorised into sections, which mainly address the projected impacts of the DA to the economy. Although the responses collected represent individual perceptions regarding the impacts, they offer the researcher insights into how stakeholders view the development in terms of economic growth and development.

8.3 Quantitative research findings

The scope of the analysis of the findings is mainly informed by the various impacts that the aerotropolis strategy has on economic growth and development. It is thus important to offer a distinction between these. Firstly, it should be noted that it is a general sentiment among the policy makers that a positive relationship exists between the logistics systems and models adopted and economic growth.⁸⁰ Secondly, economic development⁸¹ aims to ensure that all

⁸⁰ Economic growth as a concept is associated with the trend in which there is an increase in the productive capacity of a region or a country; this is often evidenced through an increase in the production output (GDP), which influences the growth in demand and the consumption of goods and services (Jakubauskiene, 2011:33). On the other hand, proponents such as Feldman and Storper (2018) consider economic development as focusing mainly on macroeconomic metrics such as aggregate income, employment figures and gross national product.

⁸¹ Economic development tends to place an emphasis mainly on the collective efforts aimed at ensuring the development of capabilities and capacities for various subsets of the economy that effectively increases their chances of attaining economic growth. Economic development focuses on the introduction of disruptive innovations that increase the chance of improving quality of life and increasing productivity (Haakak and Ghodsi, 2015).

efforts have the intention of improving the livelihoods of residents and passengers, meaning that its focus is on continuous improvement.

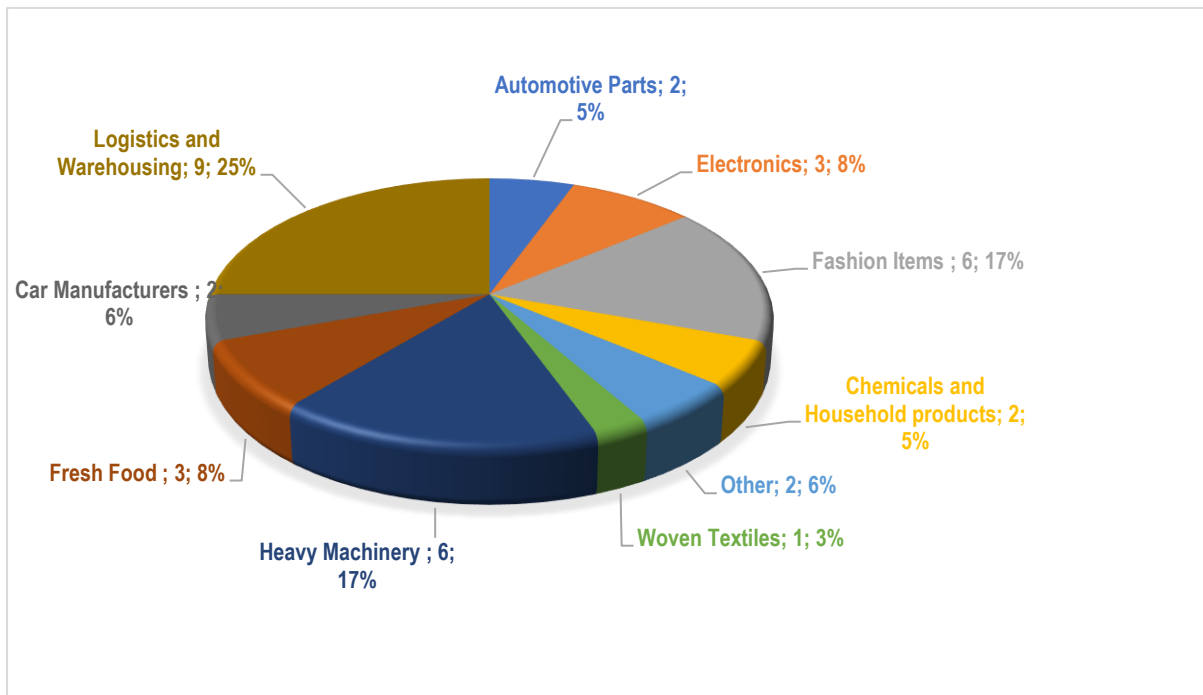
Assessment of economic growth and development in the context of an aerotropolis calls for a discussion of the quantifiable macroeconomic metrics that are specifically related to logistics capital and infrastructure. As highlighted by Sezer and Abasiz (2017:11), logistics is an influential contributor to economic development and growth. From the various discussions and evidence collated, it appears that logistics and transportation initiatives adopted for the DA have been directly linked to economic growth and development through the various multiplier effects. These include its links to the creation of employment and the increase in the gross domestic product through a growth in foreign direct investment. Further illustrating the relationship that exists between economic growth and the logistics system, Chu (2011:88) provides important fundamentals which have provided the framework for the presentation of the findings in this chapter.

8.3.1 Key Issue 1: Evaluating economic growth

As earlier discussed, economic growth in a region is influenced by a combination of factors, one of which is the presence of competing and supporting industries and organisations resulting in an increase in economic activities and a rise in the level of business activities. As outlined in the literature, a competitive aerotropolis is characterised by the existence of various organisations and industries which tend to increase the level of its competitiveness through the creation of a supportive business environment, especially if they are responsible for the provision of complementary goods and services.

The DA is identified as an economic district which houses various businesses with diverse interests. Using a sample of (N=36 businesses) located within the DA precinct, it was revealed that approximately 25% of these businesses specialise in logistics and warehousing activities, 17% in the assembly and production of heavy machinery; electronics, car manufacturers, fresh food producers and automotive parts represent 8%, 6%, 8% and 5% of the businesses respectively. Although there are additional areas within the SEZ precinct that form part of the DA region but are still in the process of development, various local and international businesses have shown a keen interest in occupying these areas upon completion. There is evidence that the aerotropolis region has played an essential role in creating a competitive environment through enabling the interaction of various business clusters, as highlighted in Figure 8.1.

Figure 8. 1 Durban Aerotropolis industry and firm cluster



As displayed in Figure 8.1, the DA has attracted a myriad of businesses from various industries that have actively contributed to the regional GDP through increasing the supply and demand of essential commodities. From a South African context, manufacturing and agriculture are the key contributors to economic growth, as evidenced by the cluster of industries around the aerotropolis region. According to researchers, including (Dasgupta and Singh, 2005), there is a correlation between manufacturing output and GDP, which is considered as the driver of economic growth. It cannot be ignored that the service sector has an equal opportunity to contribute to regional economic growth, mainly because KZN is seen as a viable tourist attraction. Although there are currently not any specific businesses or organisations physically located within the aerotropolis region, this could be because most of them can easily be accessed electronically and thus do not necessarily prioritise place utility unlike businesses producing physical products.

One thriving industry is the logistics and transportation sector, occupying approximately 25% of the development; this is mainly because the aerotropolis is considered primarily to be a logistics platform responsible for managing and regulating air passenger and cargo movements. The existence of more industries focusing on warehousing and transportation could imply an increase in the capacity to handle higher volumes of passengers and cargo at any given time, which implies an increase in economic activity. It should also be understood that the nature of the industries in the DA, for instance, automotive (5%), electronics (3%), fashion items (6%),

car manufacturers (6%) and heavy machinery (17%), require the support of logistics and warehousing businesses to distribute their products successfully to various markets. As alluded to by Porter (1998), the existence of supporting industries contributes to the competitiveness of a region and increases its opportunities for economic growth. Although it is too soon to determine the extent to which the various industries have contributed to the employment rate of the region, it cannot be disputed that some of the major contributors to employment (for instance, the manufacture of heavy machinery and the automotive industry) are labour intensive and require both skilled and semi-skilled labourers.

Further evidence in support of economic growth being contributed by logistics and transportation is provided by the number of airlines actively involved in moving both domestic and international passengers, as illustrated in Figure 8.2. A variety of airlines have been involved in connecting the DA to the different routes, with 20% of these connecting the region to local destinations and 80% to international destinations. The number of airlines has increased year on year since 2010, which implies a growing appetite on the part of businesses due to the projected increase in demand in both passenger and cargo volumes. It should be noted that aircrafts have high fixed and operating costs; therefore, it is risky to consider setting up a route for which the demand is insignificant and there is no potential for growth. The influx of the various airlines, both domestic and international, has bolstered demand for both cargo and passenger movements. The DA has recently attracted British Airways, resulting in connection with Heathrow Airport, and Emirates, connecting Durban to Dubai. These two are key nodes as they have opened the KZN region to attractive international destinations. There are projections that in the next five years the KSIA will attract more airlines, positively influencing economic growth.

8.3.1.1 Conclusion

In response to **Key Issue 1**, which focused on determining whether there is evidence to suggest a relationship between the DA strategy and economic growth, the findings support the following conclusions:

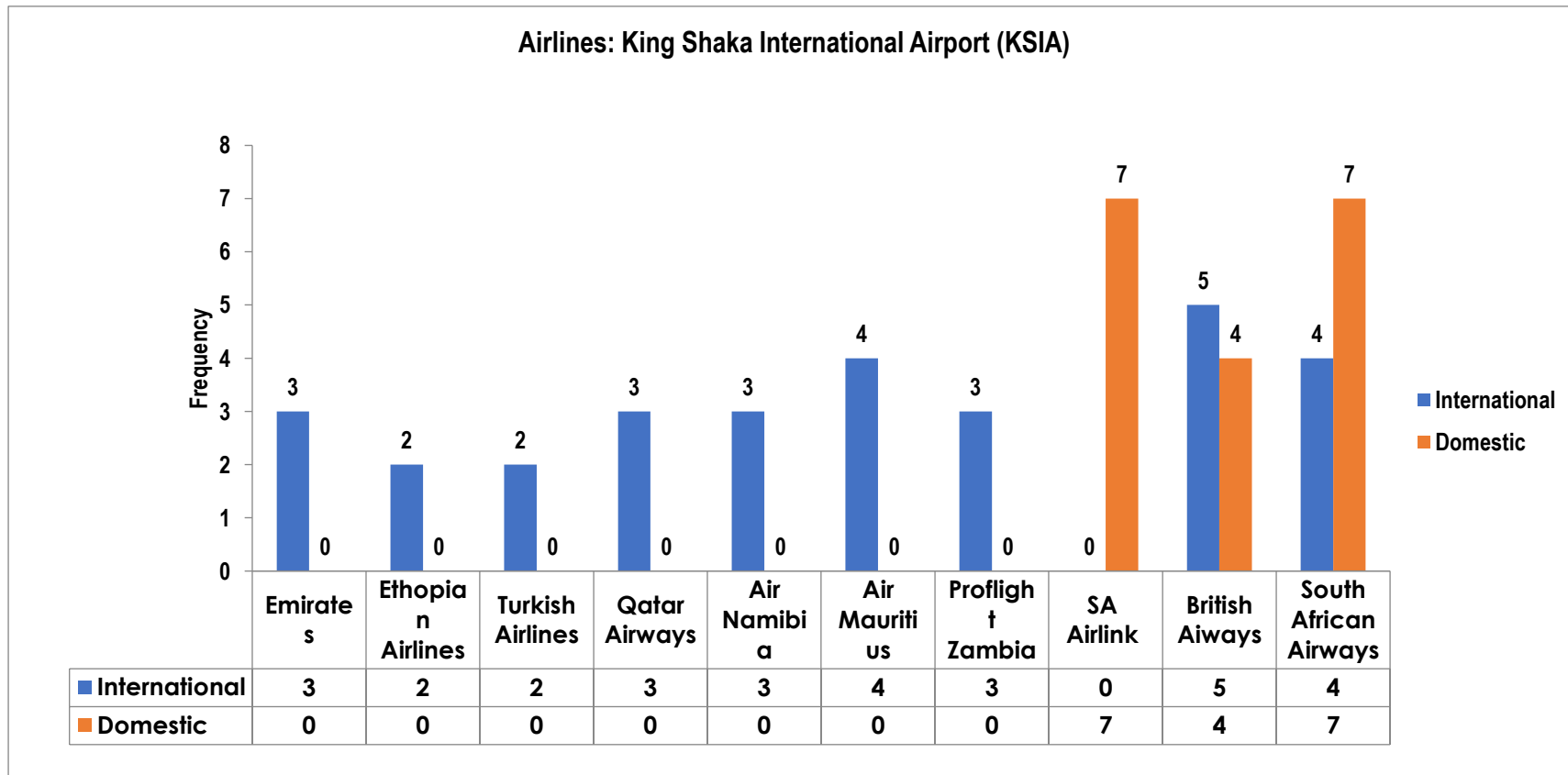
- The emergence of the DA development has seen an increase in the diversity, scale and number of firms and businesses located around its precinct, as highlighted in Figure 8.1. This has had the impact of fostering increased economic activities through the creation of

business clusters with the potential of supporting each other for greater growth prospects and thus increasing influencing regional competitiveness.

- In addition, a cluster of businesses has emerged that were previously not visible in the KZN regional economy and these include producers and distributors of automotive parts, electronics, heavy machinery and car manufacturers, among many others that have primarily been motivated by the infrastructure and incentives associated with the aerotropolis development particularly the SEZs.
- There has been a steady increase in the number of both passenger and cargo airlines, which is an essential factor in determining economic growth. For instance, within a period of four years, airlines such as British Airways, Emirates and Etihad have developed direct routes into Durban, which can be directly accounted for by the existence of the DA. One other variable that has been briefly hinted at is the size of the aircraft that has been attracted to make use of the DA; recently, passenger aircraft not active previously in the region have been evident which signals an increase in passenger volumes.

Therefore, there is enough evidence to support the premise that the DA has made theoretical contributions to economic growth.

Figure 8. 2 Airlines at King Shaka International Airport⁸²



⁸² The epicentre of the Durban aerotropolis is the KSIA, which has attracted a variety of low cost and premium international and domestic flight providers. South African Airways is the leading carrier in terms of the number of its domestic routes, although among all the 10 identified carriers only three are involved in domestic routes while the rest focus on the international routes.

8.3.2 Key Issue 2: Quantifying economic activities

Measuring the extent of economic growth involves determining the real benefits that are attributed to the economy as a result of the DA. One method for doing this involves using real GDP, which accounts for the total value of goods and services that are produced in an economy. This section of the study provides a quantitative account on how the real GDP can be influenced by the aerotropolis development. An analysis of the contributions made by the different categories to the GDP will be conducted, in which both the national and regional out values are considered, as illustrated in Table 8.1:

Table 8. 1 Industry value added GDP

	AGRICULTURE, FORESTRY AND FISHING	MANUFACTURING	TRANSPORT, STORAGE AND COMMUNICATION	GDP AT MARKET PRICES
R million				
2013	71 143	381 173	250 129	2 973 175
2014	75 982	382 498	258 906	3 028 090
2015	71 515	380 781	262 458	3 064 237
2016	64 305	383 903	265 363	3 076 466
2017	77 857	383 189	268 993	3 119 983
2018	74 157	386 884	273 193	3 144 539
% growth (change year-on-year)				
2013	4,5	1,0	2,9	2,5
2014	6,8	0,3	3,5	1,8
2015	-5,9	-0,4	1,4	1,2
2016	10,1	0,8	1,1	0,4
2017	21,1	0,2	1,4	1,4
2018	-4,8	1,0	1,6	0,8

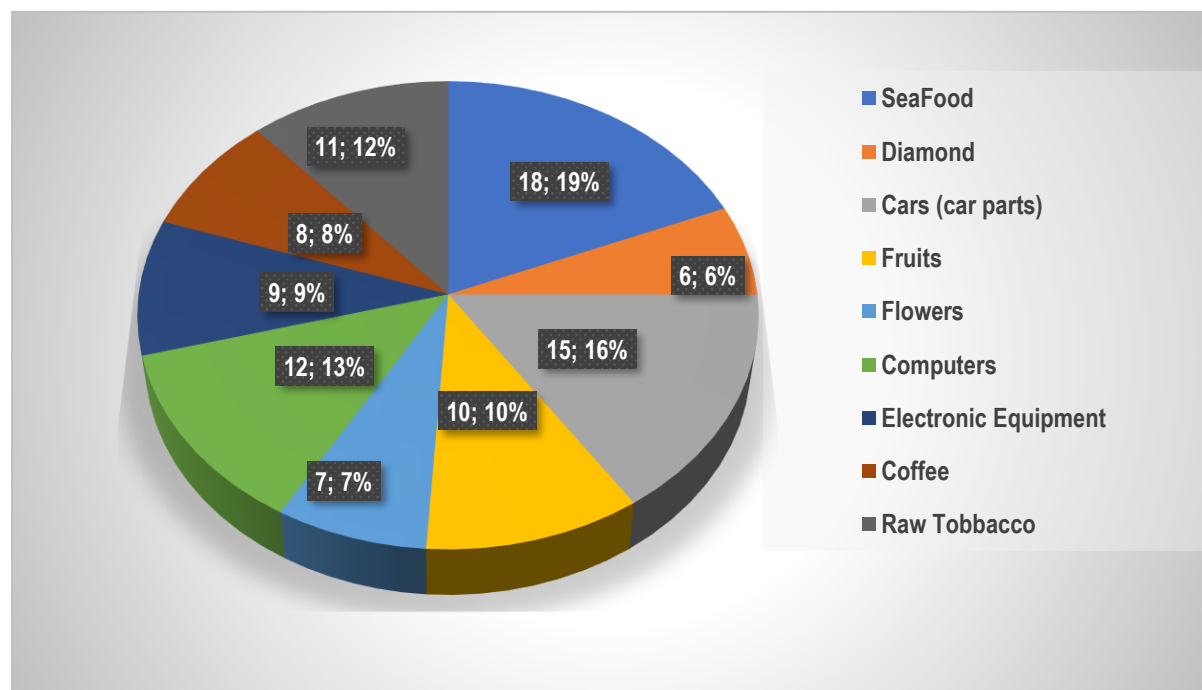
Source: Statistics South Africa (2018)

Evidence suggests that there has been a general growth in the GDP at market prices between 2013 and 2018. The performance of the various sectors should be individually noted since these are also actively represented in the DA development. Thus, the agriculture, forestry and fisheries sector recorded an average growth of approximately 7.08%, the manufacturing sector 0.55% and the transport, storage and communication sector 1.98%. This can be translated as

growth for the national economy and is also a reflection of the activities taking place in various regions including KZN. Within the provincial context, the DA has made significant contributions to the transport and storage sector in which growth has been rising.

The economic performance of the DA should also be examined by means of an analysis of passenger and cargo volumes handled annually by the KSIA, which will help determine the extent and scale of growth associated with the development. Accordingly, a review and analysis of quantitative reports and statistics provided by the logistics companies operating within the airport region was conducted. Public entities and ACSA, which handles the cargo shipments arriving and leaving KSIA, were the key informants of the process. As described by the International Air Transport Association, cargo relates to any form of goods including property that is transported by an aircraft as per the terms of the international postal convention, for example, passenger luggage transported using an airway bill or shipment record (Bogetic and Fedderke, 2005:65). As indicated earlier, the DA is directly and indirectly connected to approximately 700 destinations with large volumes of in-bound and out-bound cargo being handled and passengers moved. Cargo is handled by various agents and handlers such as the South African Cargo Services, Calthol Clearing and Freight Agents, Natco International Transporters and Bidvest. The inbound and outbound shipments have been categorised in Figure 8.3 as determined by the study participants.

Figure 8. 3 Commodities imported and exported



The findings dealt with in this section are the businesses considered to be active users ⁸³of the DA based on the questionnaire responses. The intention of the researcher was to determine the nature of business activities conducted within this region and thereby determine how these individually contribute to economic growth. Firstly, the commodities that are frequently transported and handled in the DA region as either imports or exports were established, as indicated in Figure 8.3. Based on the findings, it is evident that there is a growing market for cargo as the region is actively involved in importing and exporting various commodities from diverse industries. Of the overall shipments conducted, seafood accounts for 19%, car parts and equipment 16%, processed and raw tobacco 12%, fruits 10%, computer parts and accessories 13% and flowers 9%. From a competitive perspective, this implies not only that KZN has become connected to the global markets since local farmers are able to reach them with their flowers and fruits but also that local manufacturers can access the various materials that they need for their production quickly and at a reasonable cost. This is also essential for economic growth as it harnesses competitiveness and the existence of cargo connectivity networks allows local businesses to actively interact with regional and international markets.

8.3.2.1 Demand for aeronautical services and products

An assessment of the economic impacts associated with the DA should also include a review of the demand of aeronautical services and products. This entails looking into the aggregate annual number of individuals who travel to different destinations using the various passenger airlines, as previously highlighted in Figure 8.2. One of the participants alluded to the fact that “numbers are a big deal in the aviation industry” and it is essential to consider that most of the efforts made in developing aeronautical infrastructure are aimed at facilitating the increase in demand. Evidence suggests that the DA has seen an increase in passenger volumes, cargo movements and the numbers of businesses taking up retail and industrial spaces. In addition, the extent and scope of services and products have increased. One can consider the DA as directly responsible for creating demand through the various innovations and infrastructural developments which have encouraged urbanisation and the emergence of a smart city.

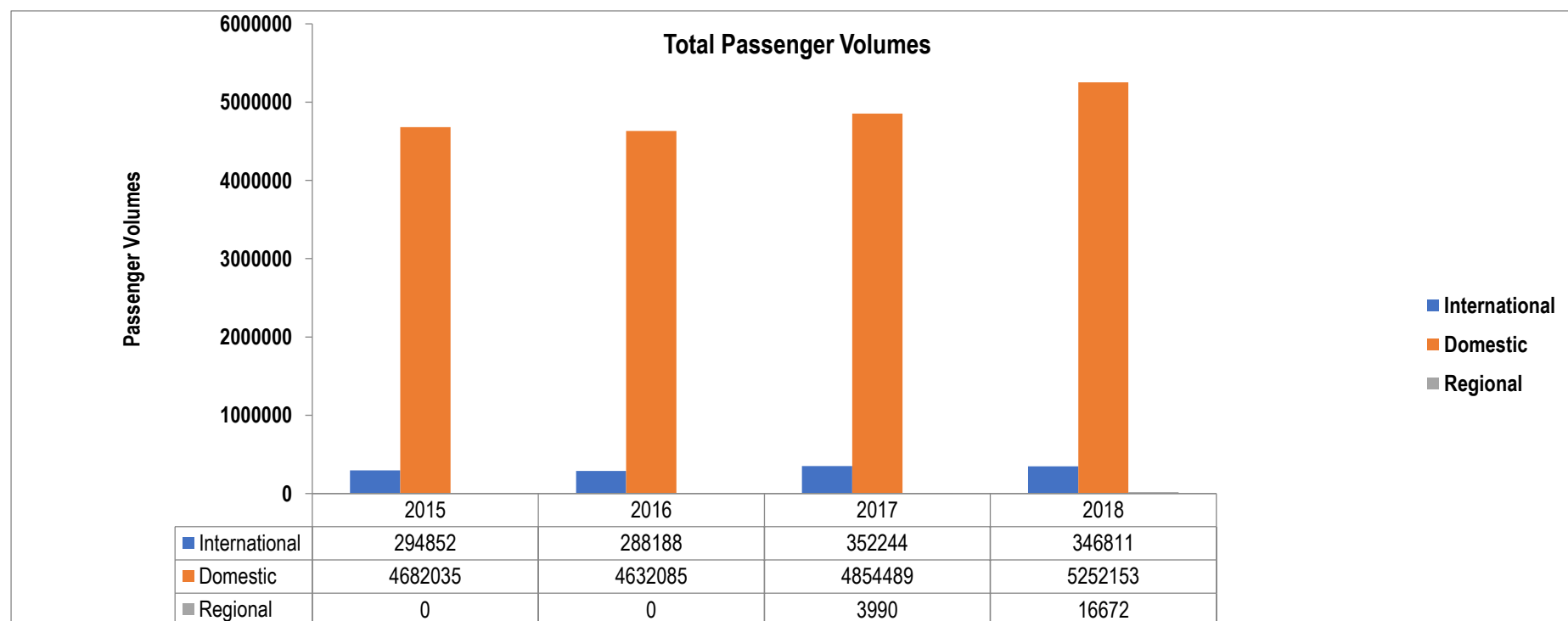
This increase in demand is the result of creating capacity through the implementation of various developments such as expanding transportation networks and infrastructural developments.

⁸³ Active users refer to the businesses or individuals that visit the aerotropolis region or make use of its various services over a given interval for various purposes, mostly business. The term can also be used to refer loosely to the airport passengers who are also representatives of various business interests.

These developments have attracted major airlines that have played a central role in serving regional and international routes. There has been a 60% increase in international arrivals due to the creation of direct flights to Durban and such flights have facilitated an increase in the number of international visitors to KZN, which will further strengthen its tourism industry. Interestingly, 30% of the domestic passenger airlines connect the DA with other local destinations such as Cape Town, Johannesburg and Port Elizabeth while the remaining 70% are shared between regional routes, including Botswana, Zimbabwe and Zambia, and international routes covering various global destinations, such as the United Arab Emirates, France and the Netherlands among many others. There has been a general increase in the demand for airfreight services globally as the overall number of passengers (domestic, regional and international) have increased over time, which has also contributed to an increase in the number of flights coming into the airport.

The DA is a new form of urban development and from its inception there has been a notable increase in the number of flights to and from the airport. This increase resulted from the efforts of the Dube TradePort together with ACSA in developing routes and partnering with the various providers. It is general practice in route development that the introduction of a new route by any airline provider should be justified by forecasted increases in the number of passengers and cargo (demand) to be moved (Gargiulo and Tremiterra, 2015:205). This among other factors is sufficient evidence that there has been an increase in the demand for aeronautical services provided by the aerotropolis. To further emphasise this, Figure 8.4 displays the trends in passenger volumes which have generally been upward. Based on the evidence provided in both Figures 8.3 and 8.4, the increase in the number of passenger flights has also had an impact on the overall number of passengers that has increased significantly between 2015 and 2018. The combined effect of the increase in both passenger flights and passenger volumes (for domestic, regional and international routes) has economic multipliers, which include an increase in the demand of aeronautical services resulting in an increase in the required labour force, which has a positive impact on economic growth.

Figure 8. 4 Durban Aerotropolis passenger volumes ⁸⁴



⁸⁴ Passenger volumes reflect the total number of people who make use of the DA region. As displayed in Figure 8.4, there has been a steady increase in the passenger volumes between 2015 and 2018. In the international transit category between 2015 and 2016 there was a drop of approximately 2.26% ; however, between 2016 and 2017 there was a huge increase in growth amounting to 22.22%, which in 2018 declined by 1.54% to 20.68%. It can therefore be concluded that there has been an increase in the number of international passengers making use of the KSIA, which also means that there has been a steady increase in the number of people making use of the DA. Significant growth has been experienced in the domestic market as the overall number of passengers has surged from 4 682 035 in 2015 to 5 252 153 in 2018, which presents an overall 12.17% growth in domestic passenger movements. Interestingly, various direct and indirect regional flights have been introduced, contributing to the increase in the number of regional passengers. During 2015 and 2016 there were no passengers categorised as regional; this however changed in 2017 as 3990 passengers were recorded, which in 2018 increased to 16 672, representing an increase of 317.8%.

8.3.2.2 Conclusion:

Economic growth results from a combination of multiple factors. Based on the data presented, there is evidence of an increase in the passenger volumes which means that there are more people engaged in the DA region. Furthermore, there is more cargo in the form of commodities and goods processed through exports and imports in the airport region. These factors have increased the number of both passenger and cargo flights, which has a significant impact on economic growth.

Thus, the quantitative evidence suggests the extent of economic growth directly associated with the DA development, which includes an increase in passenger and cargo volumes, demand of aeronautical services and products and the number of businesses and organisations attracted to the region.

8.3.3 Key Issue 3: Durban Aerotropolis users

One of the objectives for the study is to determine how the various communities and users of the DA development understand how they utilise it and how they relate to its socio-economic benefits. There is compelling evidence which suggests an increase in the level of demand and competitiveness emanating from the aerotropolis development due to the growth in the number of passengers and cargo handled, with its implications regarding the supply and demand curve. Also, the KSIA has seen an increase in the level of business activity, a trend which is expected to continue aggressively over the next five years. Thus, it is essential to determine how various stakeholders, especially those considered to be beneficiaries of the strategy, perceive the benefits associated with it and how they currently utilise or intend to do so in the future. It should be noted that this has been rather a difficult and complex issue to investigate due to the dispersion of the population of users, which was also limited. Also, there were a few individuals at the time of the data collection who were not aware of the aerotropolis development given that it is still in its infant stages, which further affected the response rate.

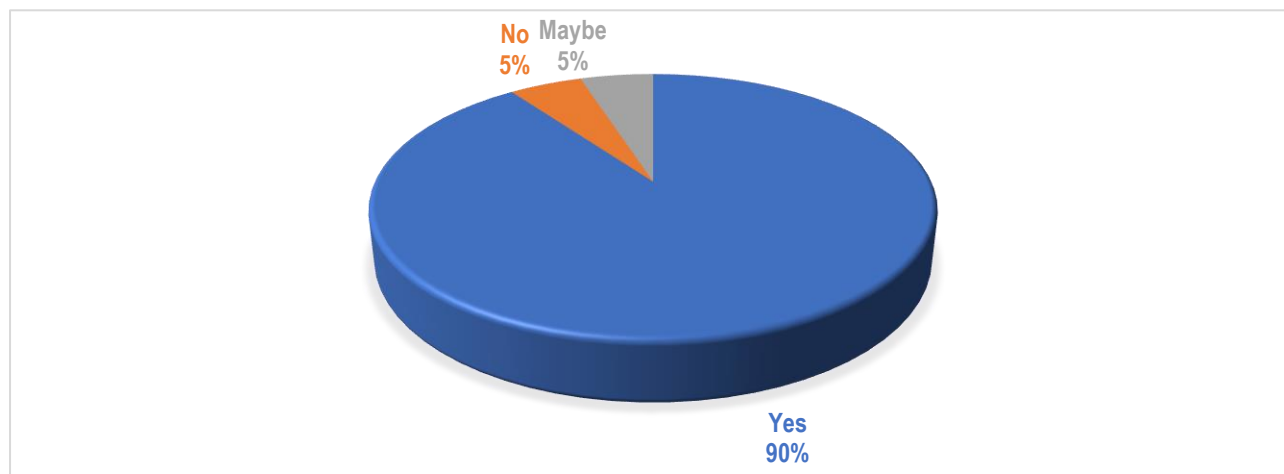
This section presents the summary of the data collected through online surveys randomly distributed to various users of the DA, including passengers and public sector and private sector enterprises, using various contact databases. A total of N=150 participants identified as current and prospective airport users responded to the survey and a summary and analysis of their responses follows.

8.3.3.1 Investigating the level and scale of dependence

The objective of the researcher was to ensure that the DA is understood from the context of the users and so questions evaluating the strategies, policies and developments were asked. Therefore, the key issues in investigating the level and scale of dependence focused on whether users actively use the DA and why they use it, among other questions. One of the questions involved establishing the level and

extent of usage of the DA by the users, which allowed the researcher to test the significance and the validity of the findings, as reflected in Figure 8.5:

Figure 8. 5 Do you make use of the airport city / Durban Aerotropolis?



The term ‘use’ in this context refers to the various activities that individuals or businesses conduct within the airport city. This can include having their facilities located within the region, utilising services or facilities or even transacting with other businesses that are in the same region. Notably 90% (N=135) of the participants indicated that they make use of the services and products that are offered by the airport city, while only 10% (N=15) indicated otherwise with (5% stating NO and 5% MAYBE). This implies that all the participants are influenced by the aerotropolis development in one way or the other and thus can be used as reliable informants for commenting on, evaluating and assessing the strategy. The significance of this question is that it allows the researcher to generalise the study findings as representative of the broader population of the DA users. In addition, because one of the objectives of the strategy is to ensure that it attracts more users, it is essential to determine how those who currently do not use it (prospective customers) perceive it.

It was also essential for the researcher to establish the degree of user dependence⁸⁵ on the DA. This question was aimed at determining the extent to which the participants considered themselves or their organisations to be dependent on the services and products offered by the DA, which combines KSIA and the SEZs. For this to be clearly understood, guidelines were provided to assist the participants in selecting the relevant category, as outlined in Table 8.2.

⁸⁵ Dependence as outlined during the literature review, is considered as one of the factors contributing to the competitiveness of a region, as the more dependent businesses become to a region the more services and products, they require from it. This is further illustrated in Porters Five forces which emphasizes on the existence of supporting businesses. Dependence is described as the state in which one relies on something

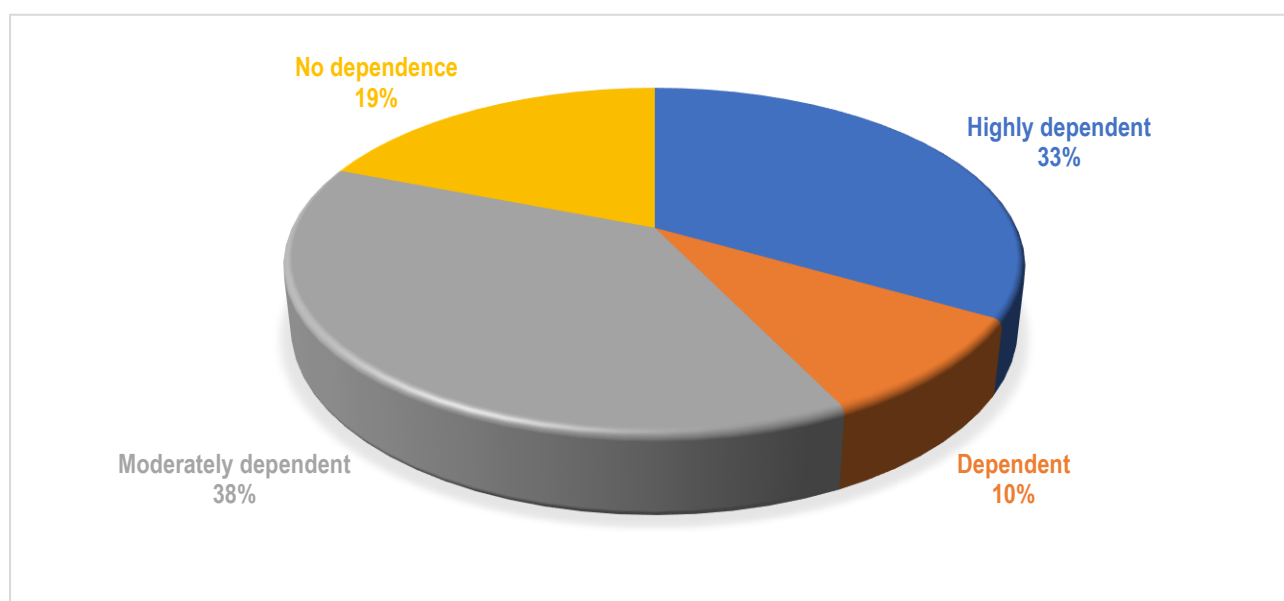
Table 8. 2 Dependence scale

LEVEL	CATEGORY	DESCRIPTION
1	Not Dependent	Does not use the airport at all. Does not sell to or source anything from a business located in the DA. No traceable connections to the DA.
2	Dependent	Makes minimum use of the airport for basic functions mainly passenger travelling. Approximately between (1% and 30%) usage of the airport as a logistics centre (cargo and travel). Minimum traceable operational links between the organisation and the DA.
3	Moderately Dependent	The extent of use of the airport is higher in terms of travelling and cargo (between 30%-60%). Procures some the products and services from businesses located in the DA. Traceable operational links with the DA are moderate and are considered essential. Sells products and services to some businesses in the DA.
4	Highly Dependent	Services and products offered by the DA play a vital role in their operations. Highly dependent on the DA for passenger and cargo transit between (70%-100%) usage. DA generates demand for the organisation which implies financial dependence. Operations are dependent to the DA and thus relationship deemed as critical.

Source: Researcher's own construction

It is evident that the categories provided allowed the respondents to describe the nature of the relationship from a multi-criterion perspective with a specific emphasis on factors such as demand, operational impacts and financial commitments. Notably, the categories also tend to measure the level of socio-economic impact of the DA on the users; for instance, one would expect those who are dependent to also be generating certain economic and social benefits.

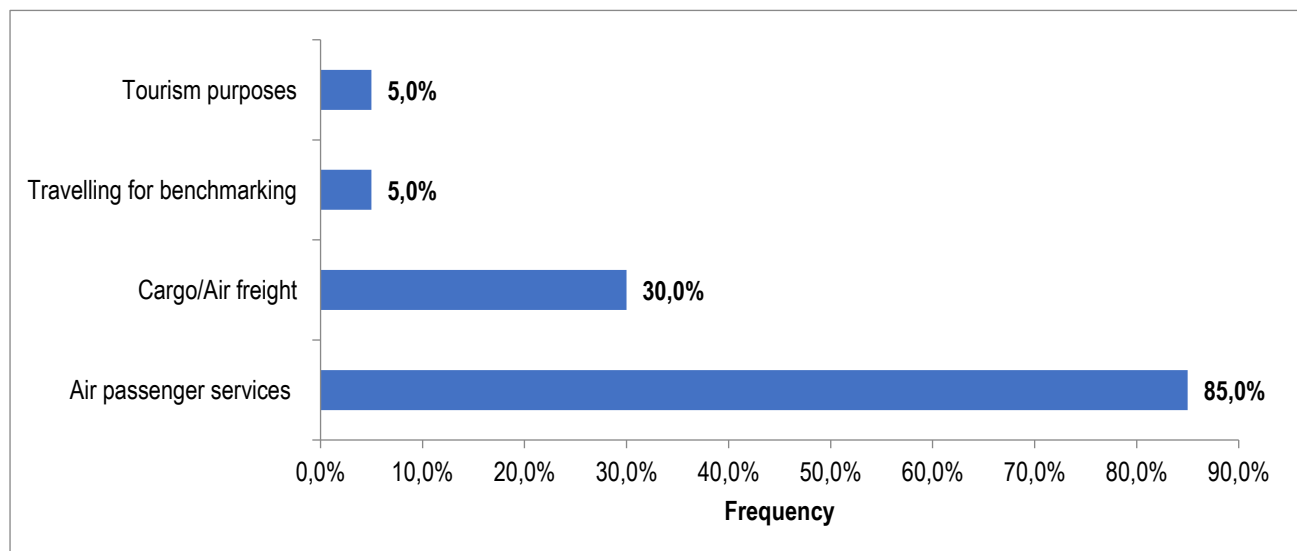
Figure 8. 6 User dependence to the Durban Aerotropolis



As highlighted in Figure 8.6 only 33% (N=50) of the respondents are considered as highly dependent on the DA while 38% (N=57) are moderately dependant. It is evident that approximately 81% (10%+38%+33%) (N=122) of the participants have some level of dependence on the aerotropolis development, which implies that they consider the development as essential in their day-to-day operations, as vividly described in the dependence scale provided in Table 8.2. There are further indications which suggest that more organisations will become increasingly dependent on the DA over the coming years, mainly due to the globalisation of markets. There is, however, evidence of 19% (29) who indicated that they have no dependence to the DA as they cannot provide a link between their operations and the aerotropolis. This also includes the cluster of organisations that either indicated that they do not make use of the DA or that they are not aware of the development.

The issue of dependence can be further investigated by investigating the nature of the interaction between the users (businesses and or individuals) and the DA. It is expected that, as the aerotropolis fully develops, organisations will begin using it for various other activities such as are offered in other modern metropolis areas like Memphis, Dubai and the Songdo Business District, among many others. The findings as presented by the participants suggest that there are a myriad of services and products defining dependence, including travelling, tourism purposes and cargo services, as provided for in Figure 8.7.

Figure 8. 7 Durban Aerotropolis development uses



It is evident that the nature of the dependence on the DA is primarily in the form of air passenger services, which account for 85.0%. This is explained by the fact that many of the individuals travel to other cities within the country using air transportation and associated services. In addition, 30% indicated that they mainly use the DA for cargo or air freight services. These relate to organisations

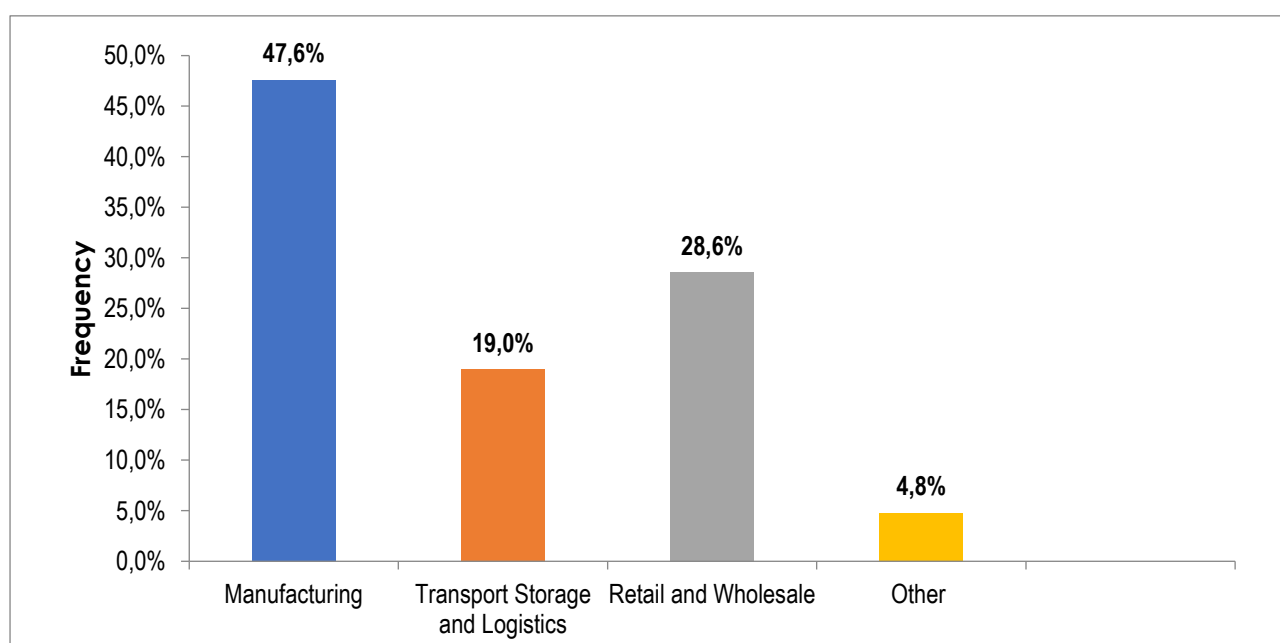
and individuals periodically moving supplies in the form of imports and exports using air cargo services. There are currently no indications of the DA being used for auxiliary purposes other than its primary function of acting as a logistics platform for cargo and passengers.

The development of an aerotropolis has generally been identified as serving a certain niche of businesses, more especially those with operations and interests that are specifically dependent on aeronautical services. However, various researchers have indicated that for the modern day aerotropolis the emphasis is not primarily on its aeronautical services but its ability to position itself as a viable business district. The conclusions that can be derived from the data displayed is that the use of the DA is currently limited to a few activities mainly because it is in the initial phases of implementation and thus has a limited number of infrastructural developments.

8.3.3.2 User profiles

The relationship between the users and the DA can also be illustrated based on the various activities that users are engaged in in order to determine how these activities can be supported by the aerotropolis. One of the most important variables of the study has been to establish the type of industries to which the participants belong in order to determine whether these require the support of the DA or not. In addition, the geographical positioning has been prioritised because it allows for the researcher to project also whether the DA can potentially impact the way users currently conduct business now and how they will do so in the future. The findings regarding the question of industrial categorisation are illustrated in Figure 8.8:

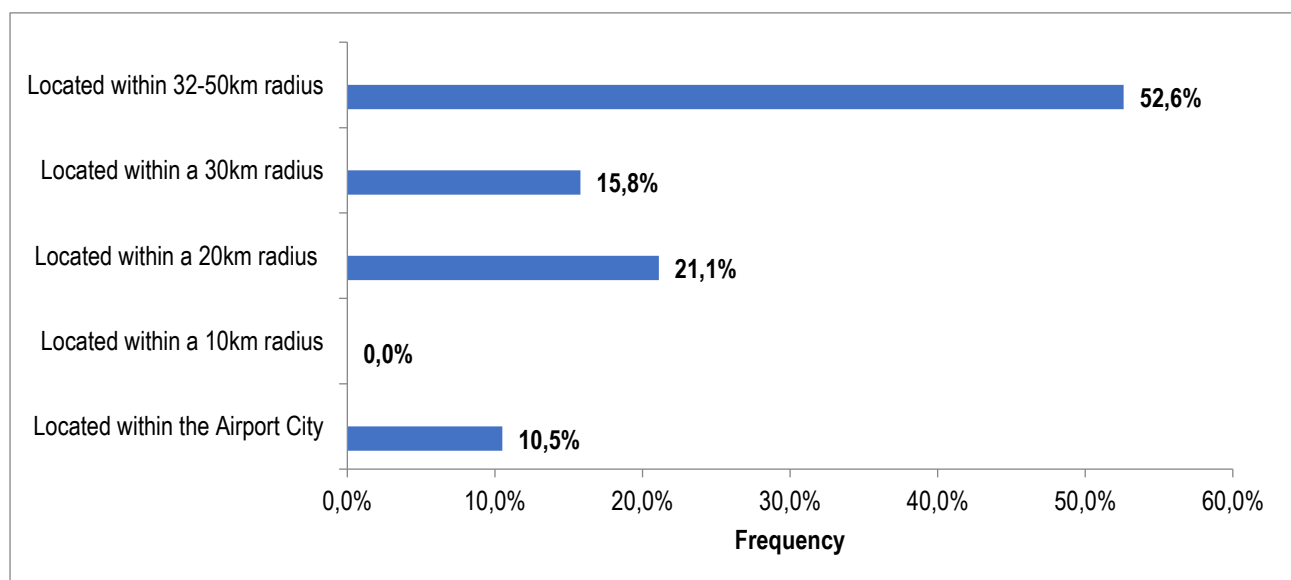
Figure 8. 8 User industry profiles



A significant portion of the participants are in the manufacturing sector, which accounts for 47.6% (N=72), while 28.6% (N=43) and 19.0% (N=29) are in retail and warehousing and transport storage and the logistics sector respectively. This information is essential as it will also allow the type of industries and businesses that prioritise or depend on the DA development to be determined. It also should be clearly highlighted that the existence of the Dube TradePort SEZ, which is a development within the aerotropolis that has attracted a substantial number of manufacturing organisations through the various incentives that come with locating within this region.

The other relevant set of information for the study is the positioning of the various organisations within the radius of the DA. Determining this allows for a mapping which further clarifies the linkages that exist between the aerotropolis development and the various organisations. There tends to be a relationship between the positioning of an organisation and its dependence on a facility. From a strategic and locational viewpoint, Losch's central place theory assumes that organisations tend to opt for locations which offer them opportunities of maximising their profits and this is also achieved through nested market areas as presented by Porter (Liou et al, 2018:1090). To determine the locational profiles, the participating organisations were provided with a set of questions regarding their location, as indicated in Figure 8.9:

Figure 8. 9 Proximity to the Durban Aerotropolis

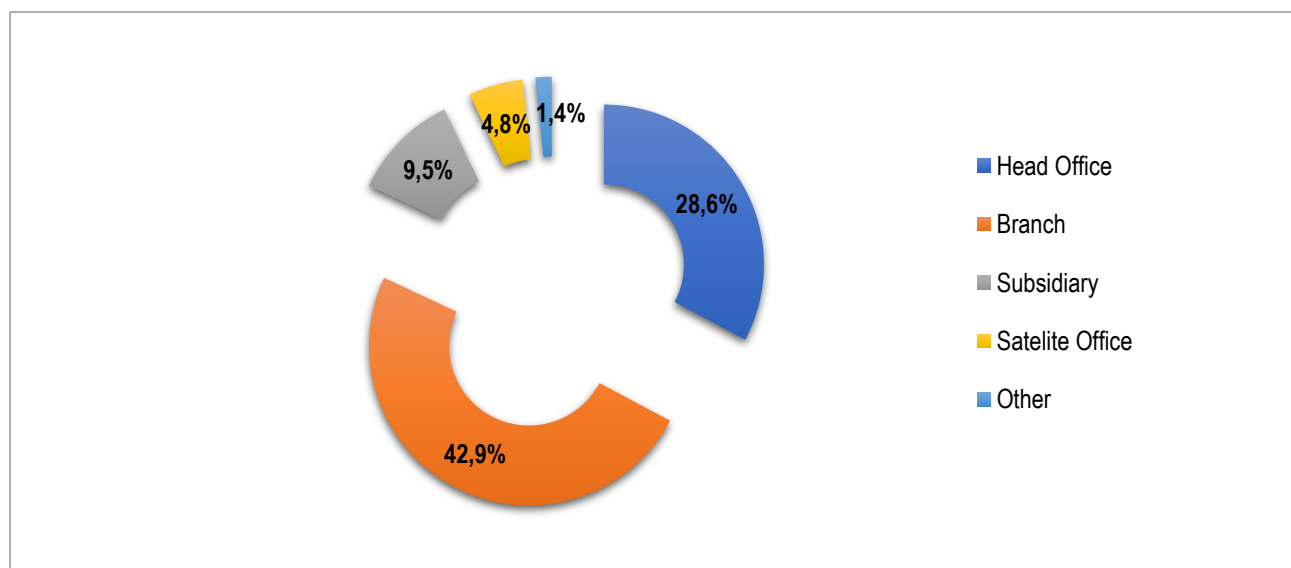


As illustrated in Figure 8.9, it is evident that most of the organisations are located outside of the DA region and only 10.5% (N=16) are located within the airport, which can easily be justified by the fact that it is considered a fairly new development still in the phases of construction and has slowly been attracting various businesses. It is of significance to indicate that 21.1% (N=31) and 15.8% (N=24) of the businesses are located within a 20km and 30 km radius respectively. The areas included in this

radius comprise the Durban North business district, which has been an attraction to most service sector businesses and thus offers potential competition to the DA. Of the participants, 52.6% (N=79) indicated that their location is within a 32-50km radius, which includes the businesses in the Durban CBD. Given this information, it appears that the aerotropolis development potentially attracts businesses spread over extensive geographical locations. For the aerotropolis concept to be deemed as competitive there is a need for it to attract more businesses and at the same time it should be accessible to all businesses and individuals despite their geographic location.

In investigating the question of location, it was also important for the study to consider the discussion of the nature of the type of businesses involved in the study, since one of the goals of the research was to determine whether there are any economic growth and development prospects. Within the South African economy, KZN has mainly been classified as one of the leading provinces in terms of agricultural productivity and manufacturing output. Therefore, from a research perspective it was important for the researcher to also determine the nature of the organisations involved, since the nature and the status of the organisation is associated with various benefits to the local economy. Therefore Figure 8.10 distinguishes the nature and status of the participating organisations.

Figure 8. 10 User organisational status

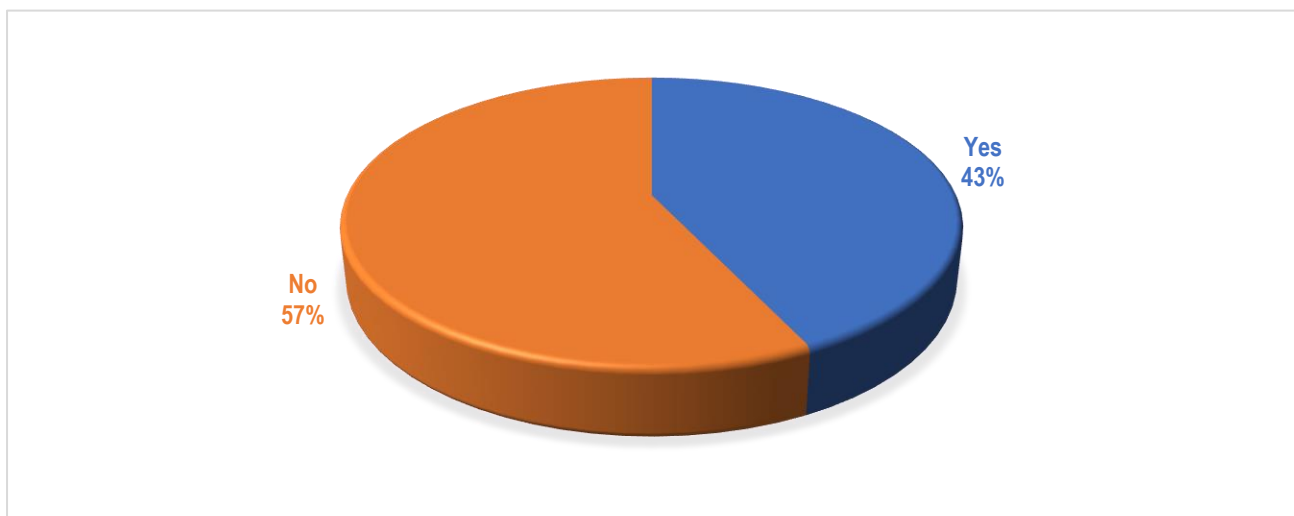


In order to determine the economic contribution of the individual organisations and the relevance of the aerotropolis development to them, they need to be categorised into head offices and branch, subsidiary and satellite offices. This type of data permits the determination of the extent and nature of business activities carried out by these organisations, with the expectation that head offices have a larger scope of responsibility as compared to the other categories; branches and satellite offices, on the other hand, are considered to be primarily responsible for operational activities, which usually include

the actual manufacturing. In this regard, 28.6% (N=43) are classified as head offices, 42.9% (N=64) are branches, 9.5% (N=15) are subsidiaries and 4.8% (N=7) are classified as satellite offices. As much as the DA is primarily aimed at attracting businesses irrespective of their nature and form, it is primarily targeted at attracting businesses that will increase the extent of economic activity and thus make substantive contributions to regional economic growth and development.

Competitiveness as earlier discussed is enhanced by the other supporting firms. Businesses will strategically select locations after having considered several factors, one of which includes the existence of supporting firms within the identified geographical area. In order to determine whether the DA can be strategically perceived as fostering competitiveness among businesses, questions were presented to participants with the intention of identifying how organisations generally interact from a business-to-business context. There are certainly advantages associated with locating closer to your suppliers and customers and therefore most organisations emphasise on this to improve their supply chains.

Figure 8. 11 Related supporting industries and rivalry

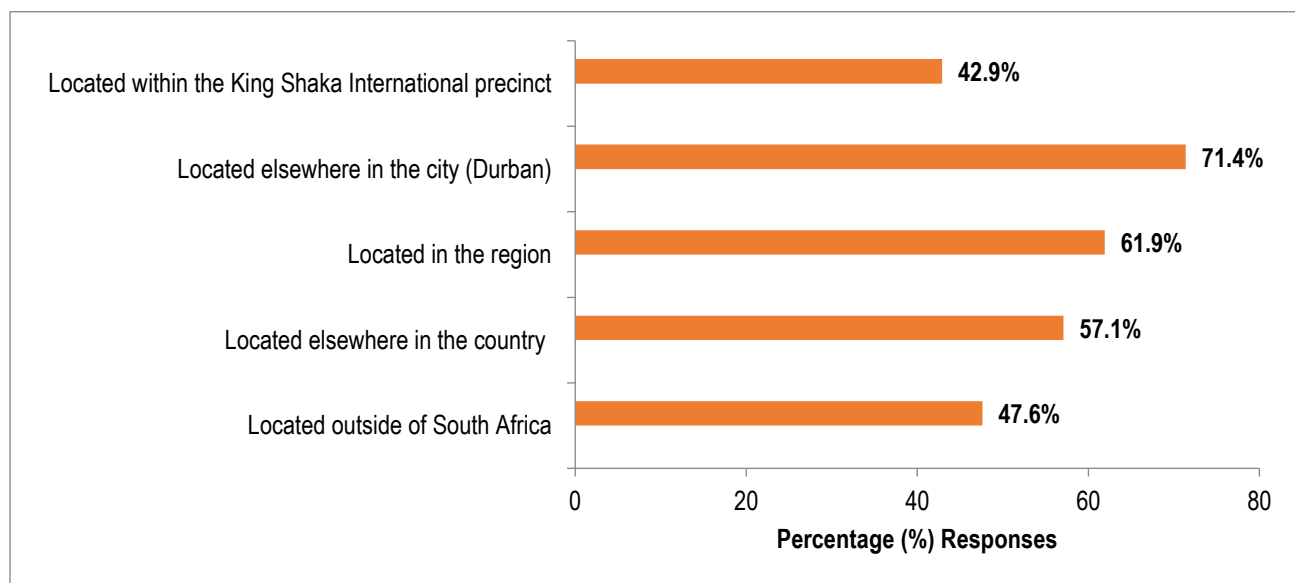


When questioned on how organisations interact with other business located within the DA as highlighted in Figure 8.11, it is evident that only 43% (N=54) of the businesses conduct business with organisations that are located within the aerotropolis while 57% (N=71) stated otherwise. The objective as outlined in the master plan is to ensure that the percentage of business to business interactions increases as it influences the extent of economic activity and competitiveness. Although it should also be acknowledged that various other factors tend to attract a firm to a location, including the trade-offs relating to transportation costs, prospects for expansion, existence of road networks and systems and cost of land and premises among many others. The objective of the DA development is

to create a conducive environment which will ensure that in addition to the ‘drawing effects’,⁸⁶ organisations are kept in the DA region because of inertia.⁸⁷

The aerotropolis is considered an economic strategy thriving on increased demand for aeronautical services and products. An understanding of the market therefore is essential, allowing one to determine the influence that it has on the regional, national and international economic context and to establish how demand is generated. In addition to the previous discussion, aimed at determining whether the participating organisations conduct any business with other organisations located within the DA, it is of paramount importance to consider the geographical dispersion of these market partners, who can either be suppliers or customers.

Figure 8. 12 How would you describe the location of your market partners?



As previously outlined, the nature of the market, which focuses on how organisations interact with each other, is one of the factors that should be prioritised in the analysis of an aerotropolis since it is one of the contributing factors in creating a competitive advantage. Figure 8.12 outlines the location of the market partners of the participating organisations, which implies a description of their customers and suppliers. For this question it should be noted that the participants were given an option to select any of the categories that apply when classifying their business interactions. Of the responses recorded, 42.9% (N=54) actively conduct business with entities that are located within the DA region (the KSIA

⁸⁶ These are also referred to as the pull factors, the set of variables or factors that attract an organisation to locate in an area.

⁸⁷ This is a very important industry locational factor. Inertia implies that, when a firm selects a location in which it decides to establish its operations, there are a myriad of factors that it takes into account and that subsequently will keep it there for a long term period; these factors include the relationships and networks it would have created with surrounding stakeholders (customers, suppliers and governing authorities) and the nature of the market, among many other factors. It is considered important for any location, especially an aerotropolis development, to be an environment with an abundance of pull factors (Tuero et al, 2017).

precinct). Most of the businesses indicated that they conduct their business with entities that are located outside of the aerotropolis region. Most notably, 71.4% (N=89) indicated that their customers or suppliers are located in the Durban CBD and 61.9% (N=77) work closely with businesses across the region (broader KZN), while 47.6% (N=60) conduct business with organisations outside of South Africa. In hindsight it is evident that business have become globalised, as illustrated by the dispersion of their markets. The findings illustrate the opportunities that exist for the DA in providing reliable and efficient linkages, especially given that most businesses have indicated their participation in regional and international markets. However, there are further steps that need to be taken in order to ensure that more businesses select the DA as their location.

8.3.3.3 Conclusion

The key issues that have been probed in this section relate to how users of the DA perceive it and how they consider the development as being influential in their operations. This has been illustrated by investigating the nature of relationships characterised by the extent of business conducted and the geographical location of the user within the DA. An analysis of the data collected in responding to the key issue is summarised in Table 8.3

Table 8. 3 Summary of user profiles

KEY ISSUE 3: Investigating the degree and level of usage of the Durban Aerotropolis by the User groups.		
QUESTION	FINDINGS	
	Descriptive Analysis	Key Findings
Does your organisation make use of the Durban Aerotropolis?	90%, YES	Active usage of aerotropolis development
Describe your dependence to the Durban Aerotropolis?	Highly dependent, 33% Moderately dependent, 38%	There is a level of user dependence on the Durban Aerotropolis development
What purpose does your organisation use King Shaka International Airport?	Air passenger services, 85% Cargo / Airfreight, 30%	Mainly considered for passenger and cargo services.
How best can you describe the location of your company within the radius of the Durban Aerotropolis?	Located within the Airport City, 10.5% Located within a 20km radius, 21.1%	Most users are not located within the Durban Aerotropolis region but in the surrounding locations.
Do you interact with other companies or organisations located within the radius of the Aerotropolis?	Yes, 43%	The degree of interaction with organisations located in the Durban Aerotropolis is currently moderate.

Source: Researcher's own construction

8.3.4 Key Issue 4: Determining the role of logistics and mobility

Logistics is considered to be critical in supporting the DA development and thus this section of the study focuses on determining how the various user groups consider the efforts to improve logistics efficiency by policy makers and planners. This discussion has been informed by the framework provided by the World Bank through its logistics performance index,⁸⁸ which suggests the factors to be considered when determining the competitiveness of a region logistically. These factors are, among other activities, efficiency in the clearance of imports and exports, logistics infrastructure of a recommended quality, exceptional logistics service providers and, lastly, ease of tracking and tracing shipments.

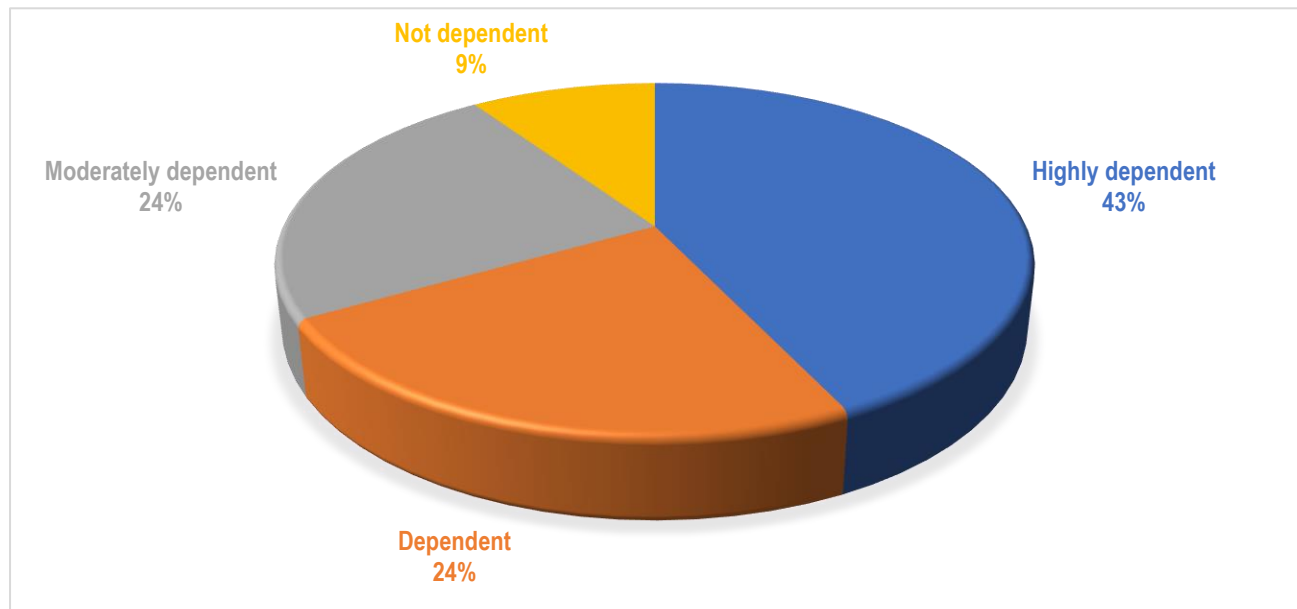
For one to be able to understand the user perceptions on the role played by logistics in the DA, it is important to begin with an assessment of the infrastructure available, which has also been described in previous chapters. Logistics capital is considered to include all the sets of infrastructural innovations, such as active transport networks, highways, public transport platforms and other forms of developments, that are involved in the facilitation of the movement of goods and services from the point of origin to the point of consumption (Scott and Storper, 2015: 12). Different stakeholders in the study have been actively involved in planning and implementing the strategy, more especially those from Working Group 3, which oversees and is responsible for all the multi-modal transport and infrastructure associated with the airport city. Investing in logistics models and facilities has an influence on the demand for goods and services at any given time. Logistics should also be viewed in terms of how it influences economic development and contributes to economic growth.

After an account of logistics from a qualitative perspective, it is essential that further analysis be conducted that introduces descriptive quantitative insights into the study. The user groups, using online surveys, provided important information on how they perceive and understand the role played by logistics in an aerotropolis development and how the various initiatives and concepts adopted contribute to their value chain. The objectives also included determining the importance of the impact of the DA logistics initiatives on the operations of the user groups. In the previous section it was found that there seems to be a substantial level of dependence between the user groups and the DA and thus

⁸⁸ This is a survey conducted on an annual basis with key areas that reflect both international and domestic variables pertaining to the logistics environment in which the participating organisations operate. Respondents are given the opportunity to provide qualitative and quantitative assessments regarding the time and costs associated with their supply chains, the challenges related to imports and exports transactions, among many other factors. These are then summarized and consolidated into a matrix that includes the important variables considered in logistics planning (Arvis et al, 2014).

there is a need for this relationship to be further investigated from a logistics viewpoint, as indicated in Figure 8.13.

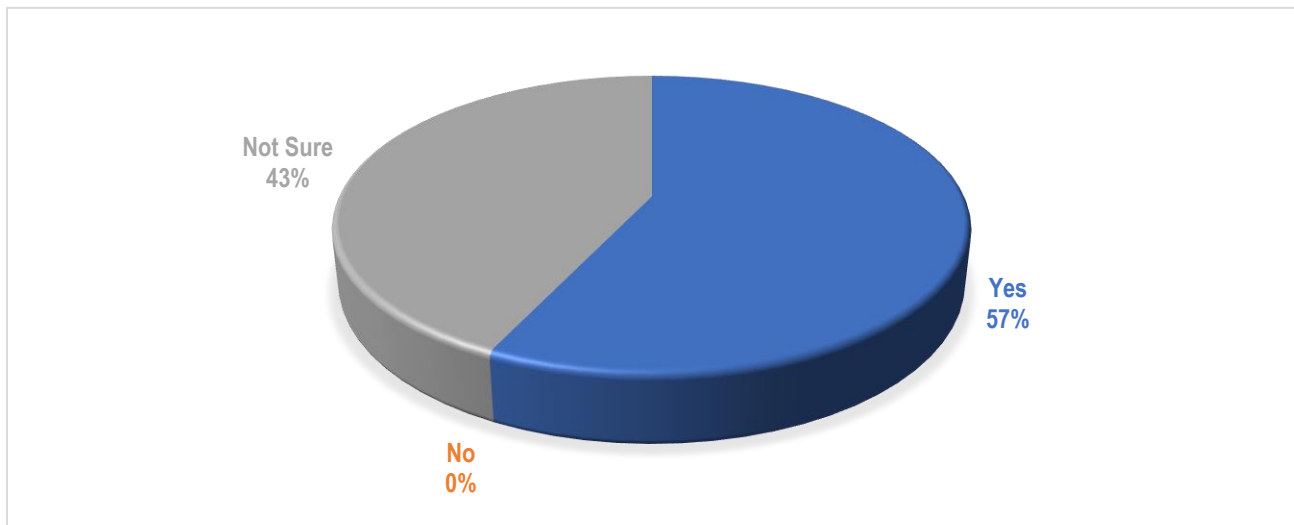
Figure 8. 13 User dependence on logistics and mobility



Among the respondents, 43% (N=65) indicated that they are ‘highly dependent’ on airport logistics, meaning that their operations are primarily influenced by the various activities that are conducted in the DA. In addition, 24% (N=36) indicated that they are ‘dependent’. Thus, 67% (N=101) of the responding organisations prioritise airport logistics. In principle, the airport city includes an integrated logistics system in which a series of processes such as passengers, cargo and air carriers, among other supply chain elements, are connected to each other in order to facilitate their efficient and effective movement. The findings therefore indicate that a segment of organisations consider the logistics developments associated with the DA as crucial, which implies the need for further improvements to be considered and implemented to attract more similar organisations. In addition, 24% (36) of respondents indicated that they are ‘moderately dependent’ and 9% (13) ‘not dependent’, which indicates that not all the organisations consider the logistics developments significant.

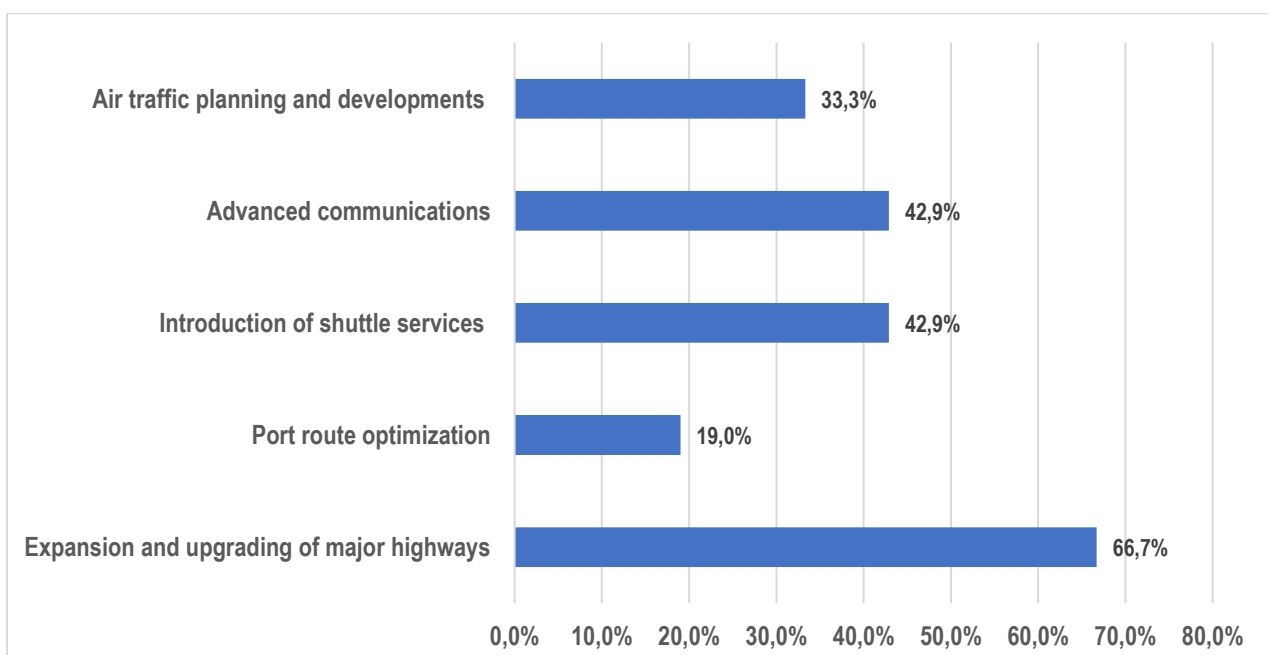
Infrastructure plays a critical role for an aerotropolis development as it influences a wide range of factors that improve connectivity and efficiency. As highlighted in the DA master plan, plans for logistics infrastructural and mobility developments have either been adopted or are in the process of adoption. Although not all the respondents were fully aware of the contents of the master plan, the researcher managed to determine to what extent they consider the developments as an essential contribution to their competitive advantage.

Figure 8. 14 User benefit from aerotropolis infrastructure



As displayed in Figure 8.14, 57% (N=72) of the participants indicated that any logistics and mobility infrastructural developments positively impact their businesses while 43% (N=54) were not sure whether any benefits will be incurred by their organisations. This can be attributed mainly to the fact that many are not fully aware of the contents of the DA master plan which defines the key developments. To determine the importance of logistics among the various businesses, the researcher provided questions which investigated the logistics capital infrastructure required for an aerotropolis and asked how these can support their business goals and the broader economy. The findings in Figure 8.15 identify the various sets of infrastructures that are priority in aerotropolis developments and that are also favoured by business.

Figure 8. 15 Evaluating aerotropolis logistics and mobility infrastructure



It is evident from Figure 8.15 that 66.7% (N=84) of the respondents consider the expansion and upgrading of major highways as the most important and essential infrastructural upgrade that has a positive impact in supporting their business growth. This can be explained partly by the fact that most of the business activities in the province depend on road transit connections that are reliable, flexible and efficient. Any form of development in this regard is considered a priority and it results in multiple benefits associated with efficiency and improved transit time. On the other hand, the investment in advanced communications and the introduction of shuttle services is identified as essential by 42.9% (N=54) of the respondents; 33.3% (N=41) identified air traffic planning and developments as essential while port route optimisation was prioritised by 19.0% (N=24). As much as these findings indicate that most participants consider improvements to roadways as their top priority for the DA, this could be informed by the nature and type of business in which the organisation is involved. For instance, those involved in the manufacturing and logistics sector depend on road transportation for most of their operational requirements. The DA targets various businesses with a diverse set of needs; therefore, it is commendable that most of the logistics infrastructural needs favoured by a range of businesses have been included in the master plan.

The DA is mainly considered to be a logistics platform primarily based on aeronautical services. Therefore, the priority for planners will be on the adoption and implementation of innovative logistics models and infrastructure. As much as the master plan includes a variety of such needs, it can be determined based on the findings that not all users consider these initiatives as essential, mainly because this is influenced by their line of business. Without doubt most of the users consider logistics as playing an essential role in the aerotropolis development and as a major determinant of competitive advantage. Logistics for such a development will assume the role of connectivity, thus ensuring that there is the seamless movement of passengers and cargo within the aerotropolis development.

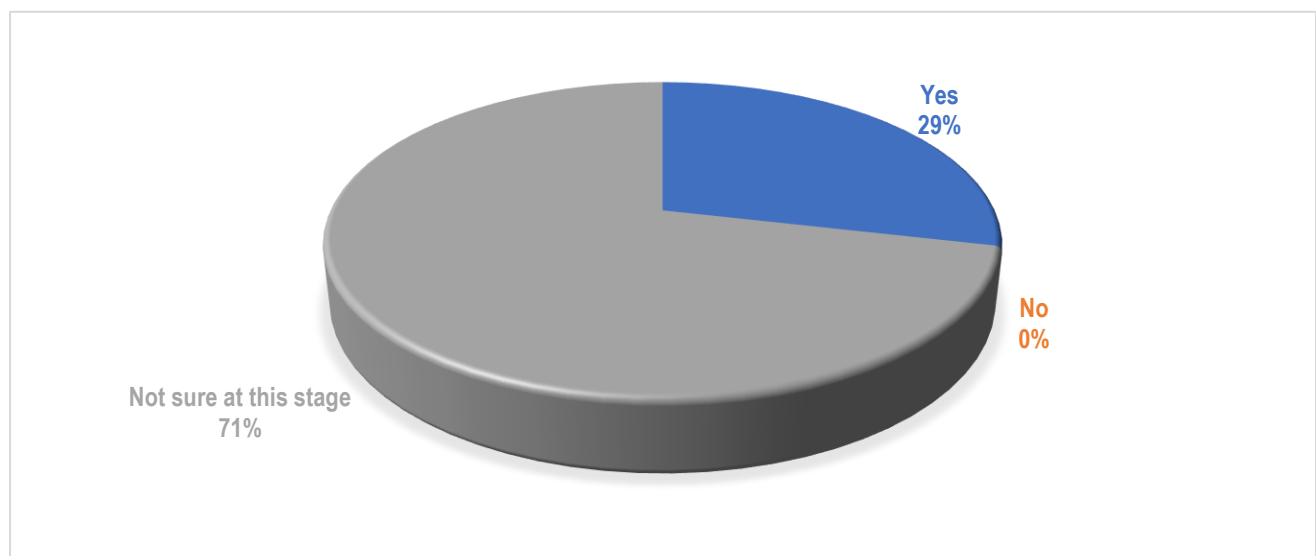
8.3.5 Key Issue 5: Economic (growth + development) for an aerotropolis

Economic development and growth remain the single focus of most government initiatives, especially in developing countries including South Africa. However, it should be acknowledged that, despite concepts such as the DA being adopted in order to influence economic trends, there are still challenges for determining its exact impact. For instance, when one compares the benefits as highlighted by the strategy developers (consultants and government agents) to those as viewed by the user groups (businesses and passengers), there are notable differences. This is the case although there are agreed common benefits, for instance, the fact that investing in highway and high-speed railway systems can generate benefits by lowering firms' inventories among other factors (Shirley and Winston, 2004).

Also, investments in telecommunications can generate improved connectivity and access to information, thus strengthening competitive advantage (Madden and Savage, 2000). On the other hand, better logistics systems can attract foreign direct investment, which is regarded as an important engine for both economic growth and development.

While factors for evaluating the DA by various proponents were presented in the previous chapters, this section of the analysis aims to verify whether the user groups consider it to be related to economic development and growth. Continuation the previous narrative in which the relationship between the DA and its associated logistics and infrastructural developments was explored, this section will describe the impact of these various developments on economic growth and development. One of the questions presented to the participants specifically required their opinion as to whether the DA has any economic impact on the regional economy, as illustrated in Figure 8.16. It should, however, be highlighted that this relationship was considered only in terms of the user perceptions and as such no quantitative tests or models were used, which means that the findings might be subjective and inconsistent.

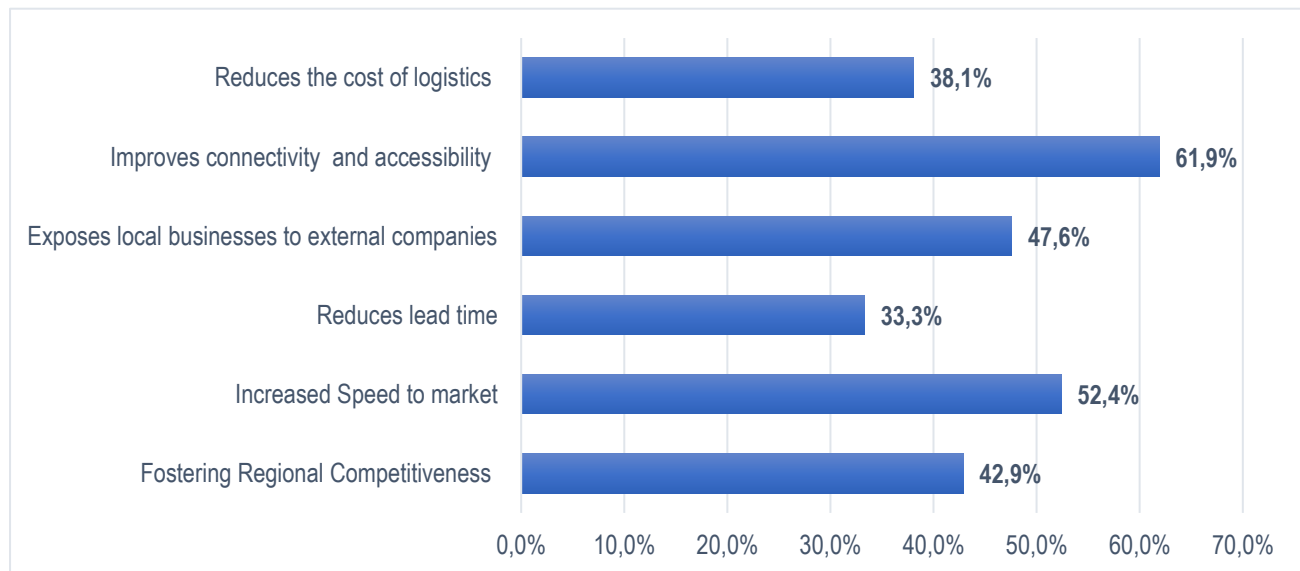
Figure 8. 16 Impacts of the Durban Aerotropolis on regional competitiveness



It is interesting to note that only 29% (N=44) of the respondents are of the view that the developments associated with the DA will positively affect the regional economy while 71% (N=81) are not sure about its economic impacts. One reason that can explain the high percentage of participants who are categorised as 'not sure' is lack of information and know-how regarding the development. In addition, there is a high chance that these participants are not able to refer to any evidence that suggests the contribution of the DA to the broader economy. However, those considering the DA as associated with economic benefits could be relying on the visible impacts that it currently has or will have in the future

on their business activities. For instance, if one's business has resulted in an increase in demand, the DA will invite a positive economic rating. To articulate the economic benefits associated with the DAMP, the views of the users on what exactly they characterise to be the supposed benefits of an aerotropolis development should be considered, as highlighted in Figure 8.17.

Figure 8. 17 Benefits associated with aerotropolis developments



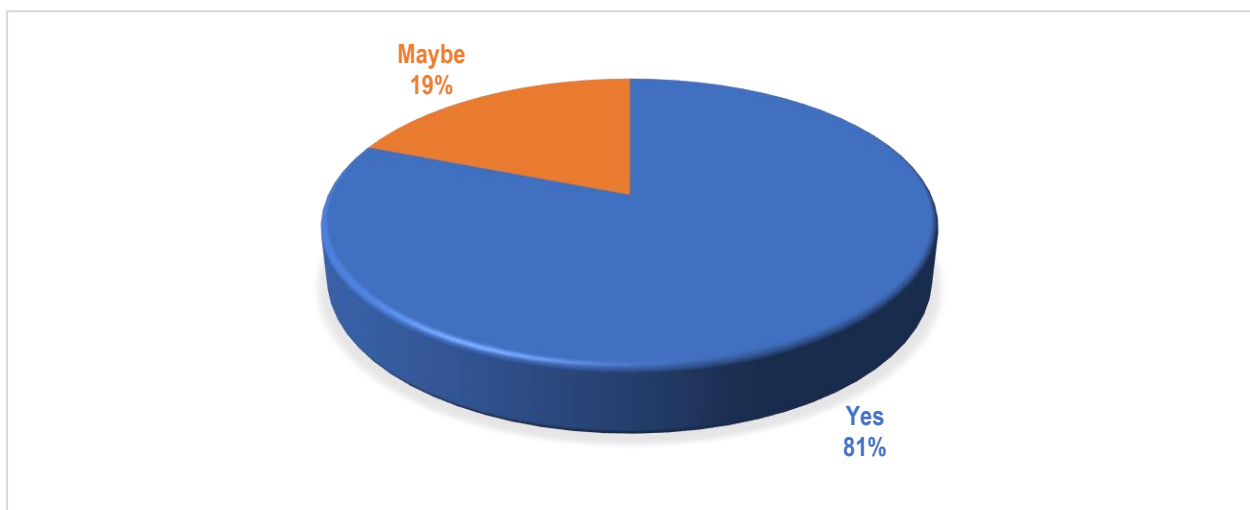
There are various factors that organisations have associated with the aerotropolis strategy based on their assumptions of the foreseen benefits as informed by similar developments. As presented in Figure 8.17, the benefits have been categorised into six themes. Of these the contribution of the strategy in reducing the costs of logistics has been highlighted by 38.1% (N=57) of the total respondents. Costs of logistics include all the overall costs associated with the inbound and outbound movement and storage of certain supplies or products. On the other hand, 61.9% (N=93) of the respondents indicated that improvements in connectivity and accessibility is one of the benefits, supposedly because it is seen as bringing businesses closer to other regional and global nodes. This can further explain the 47.6% (N=71) of the businesses which consider one of the benefits of the development that it has allowed local businesses to be exposed to global ones.

Another benefit highlighted relates to the improvement in speed to market as suggested by 52.4% (N=79) of the respondents, a benefit which is associated with the time in which a product takes to be launched into a market. This might primarily be linked with how the aerotropolis strategy allows an organisation to reach international markets faster and thereby reduce the time taken in developing concepts and products.

If one also looks at this from a supplier viewpoint, especially since most of the businesses in KZN import some of their raw materials, developing an aerotropolis can have the impact of reducing the lead time, as identified by 33.33% (N=50) of the participants. It can also be noted that 42.9% (N=64) of the respondents suggested that the aerotropolis development can easily be associated with benefits relating to its ability in fostering international competitiveness. This can be achieved through the adoption of various models, infrastructure and strategies, as highlighted in the DAMP, which tend to ensure that the local markets are integrated to the international markets. Furthermore, 47.6% (N=71) of the respondents consider it one of the benefits of the strategy that it allows local companies to easily access external companies.

It is evident that that an aerotropolis development is associated with globalisation given its ability to integrate regional and international markets. Figure 8.18 descriptively displays the proportion of businesses that consider the aerotropolis developments as gateways to international markets. This is confirmed by 81% (N=122) of the respondents who strongly suggest that there is a positive relationship between an aerotropolis development and improved access to global markets. Although 19% (N=28) of the participating businesses could not entirely agree on the possibility of the aerotropolis being associated with an improvement in the access to global markets.

Figure 8. 18 Aerotropolis and global competitiveness

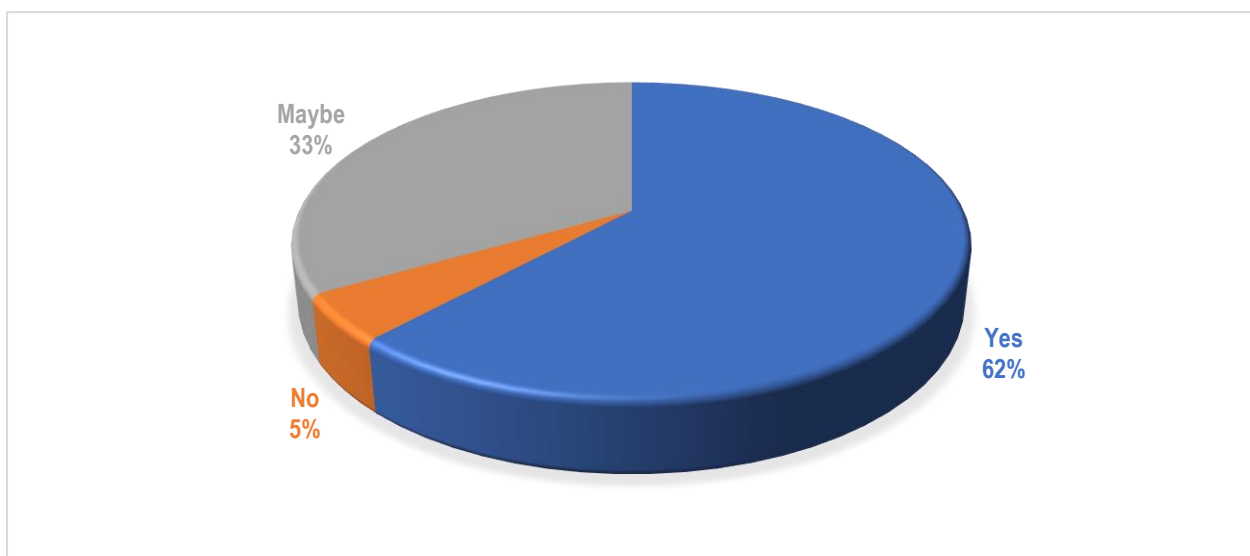


In further exploring the question of economic growth, the employment rate must be considered for analysis since it is often accounted as directly responsive to economic growth. Unemployment is one of the biggest challenges affecting the KZN regional economy and as such the expectations are high for the DA to reduce this high rate. This is because the concept has been associated with leveraging the regional economy into economic development and growth due to the scope of its

activities and developments, which include manufacturing among other activities (Accelerate Cape Town, 2017).

Organisations in their capacity as employers and as active contributors to the labour market are in a better position to provide accurate insights regarding the contribution of the DA to the challenges of unemployment in the region. The researcher's intention was to get projections from the organisations on the number of employees that they have hired (permanent and contractual) since the inception of the DA and thereby determine if the strategy has had any significant impact. Nevertheless, it should be acknowledged that the findings, instead of providing real data, merely indicated the overall projections of the organisations regarding impact on employment, which is influenced by a variety of factors. Figure 8.19 provides a summary of the responses of the participants on how they view the influence of the DA on unemployment.

Figure 8. 19 Impact to unemployment

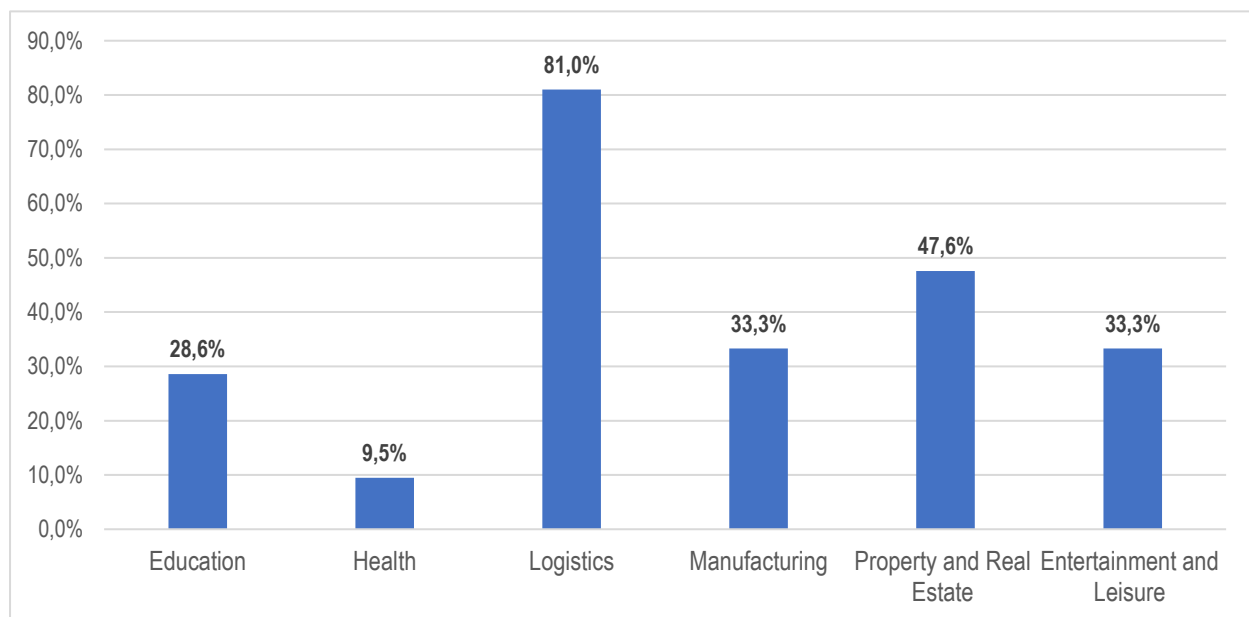


As highlighted, 62% (N=93) of the businesses acknowledge that the DA has a positive impact on easing the prevailing levels of unemployment due to its ability to increase the workforce. This can be attributed to the fact that the DA leads to an increase in the levels of demand for goods and services located within the aerotropolis region and results in the increased scale and magnitude of economic and aeronautical activities. This increase in demand and supply effectively creates the need for a larger labour force in order to match the required capacity. Also, one can look at this from an investment point of view in which the higher levels of investments in infrastructure committed by government and the private sector have the potential of increasing both short- and long-term employment. It can be observed that 33% (N=50) of the respondents were not particularly sure of the relationship that currently exists between unemployment and the DA,

which can be attributed to a lack of evidence within their organisations for an increase in their labour force due to the DA. However, 5% (N=7) of the businesses do not consider the developments associated with the DA as having any form of impact on the levels of unemployment. These findings further indicate contrasting views among stakeholders regarding the projected and actual impacts of the aerotropolis development, which at this stage has been subjective.

In any economy there are sectors that are significant contributors to economic growth and development. For the DA, the study should therefore consider the impact that it currently has on various sectors. This will also allow for conclusions to be derived as to why some businesses associate the aerotropolis concept with economic development while others do not and as to the contrasting viewpoints regarding its contribution to the labour market. The various sectors that are positively affected by the aerotropolis development have been included in Figure 8.20.

Figure 8. 20 Industry influence of the Durban Aerotropolis



Among the various sectors in the economy, most respondents are of the view that it is the logistics sector that stand the greatest chance of benefiting from the aerotropolis development as suggested by 81% (N=122). Logistics tends to be considered the leading beneficiary purely because the airport is considered as a significant logistics hub and this is further evidenced in the different data sets collected that suggest that most of the developments adopted for the aerotropolis are of a logistics nature. On the other hand, the property and real estate sector is also identified by 47.6% (N=60) of the participants as a potential beneficiary, while the entertainment and leisure and

manufacturing sectors have been identified by 33.3% (N=42) of the respondents. There is no doubt that the findings suggest that almost all the sectors are bound to benefit from the DA, although to varying degrees.

In the data presented on the contributions of the DA to the economy, several factors were identified describing this relationship. However, the researcher acknowledges that determining and measuring the nature of the relationship has been dependent on the type of organisation which participated in the study. While this has exposed the study to bias and inconsistencies, given that various organisations use different scales and measurements for economic performance, this does allow for a diversity of responses. Table 8.4 provides a summary of the findings with regard to the key issues raised with the various organisations regarding the relationship between the DA and economic development.

Table 8. 4 The Durban Aerotropolis vs economic (growth + development)

KEY ISSUE 5: MEASURING THE DURBAN AEROTROPOLIS AGAINST ECONOMIC (GROWTH + DEVELOPMENT).	
MAIN QUESTION	ANALYSIS
Will the Durban Aerotropolis have a positive impact to the regional economy?	0% (N=0), NO 29% (N=44), YES 71% (N=106) Not sure at this stage
Description of the key economic benefits	61.9%, (N=93) Improves connectivity and accessibility 52.4% (N=79) Increased speed to market. 42.9, (N=64) Fostering regional competitiveness
Do aerotropolis developments improve the access to global markets?	81%, (N=122) Yes 19%, (N=28) Maybe
Is the Durban Aerotropolis a viable solution to easing the growing unemployment rate in the region?	62%, (N=93) Yes 33%, (N=49) Maybe
Which sectors stand to benefit from the Durban Aerotropolis?	81%, (N=122) Logistics 47.6%, (N=71) Property and real estate 33.3%, (N=49) Manufacturing

Source: Researcher's own construction

From the descriptive statistics presented in Table 8.4 it can be concluded that:

- The impacts of the DA are not yet clearly understood at this stage by organisations.
- Variables that result in economic growth and development include its ability to improve connectivity and speed to market.
- The DA has resulted in an improvement in accessing global markets, which means an expansion in market coverage.
- The DA is considered to be a solution to the unemployment challenges faced in the region.
- There are various sectors that will particularly be positively affected by the aerotropolis development. These include the logistics, manufacturing and property, and real estate sectors among many others, which implies the potential for growth.

In addition to the findings relating to the DA and economic development and growth, it is essential to focus on the various attempts being made to ensure that this becomes a reality. According to the observations, it was determined that the implementing of developments for the DA has varied based on strategic importance. Concurring with the findings of the previous sections, most of the participants described development in reference to logistics related infrastructure and concepts. As highlighted in Table 8.5, there are indications that the progress of implementation has been limited in the initial stages to developments categorised as logistics platforms. For instance, development involving streets and highways, intermodal platforms, warehousing districts and parking kiosks are approximately at 45.0%, 40.0% and 46.0% completion respectively, while developments involving residential placements, waste management and energy monitoring are 20.0%, 30.0% and 30.0% respectively. This might be an indication of the priority of the DA, which has been primarily described as optimising its logistics abilities. The implementation and adoption of the various developments has been biased towards logistics, mobility and connectivity activities, which they consider to be the main elements determining the success of an aerotropolis region. As suggested by Harrison and Van Hoek (2008:22), all the developments within the aerotropolis study area should address the question of quality of service, speed, dependability, cost and flexibility as these contribute to a logistics competitive advantage.

Table 8. 5 Checklist for the Durban Aerotropolis development

DEVELOPMENT / ELEMENT	% INTEGRATED	YES	NO
Streets and highways	45.0%	✓	
Intermodal freight hubs	40.0%	✓	
Public transit	32.0%	✓	
Bicycle and pedestrian facilities			✓
Hotel and entertainment districts			✓
Convention centres and exhibition halls			✓
Retail outlets			✓
Mixed use commercial and or residential	20.0%	✓	
Research / technology parks	32.0%	✓	
Business parks	20.0%	✓	
Sports and entertainment complexes			✓
Distribution centres and e-fulfilment centres	31.0%	✓	
Warehousing districts	46.0%	✓	
Industrial business parks and Just-in-Time manufacturing	41.0%	✓	
Logistics parks	42.0%	✓	
Parking applications and kiosks	50.0%	✓	
Lighting	50.0%	✓	
Waste management services	30.0%	✓	
Energy monitoring	30.0%	✓	
Surveillance cameras	30.0%	✓	
Broadband infrastructure (3G and 4G)	20.0%	✓	
Transportation and congestion sensors			✓
Bus rapid transport systems			✓
TOTAL (variables)		16	5
	32.88%	69.57%	30.43%

Source: Researcher's own construction

% integrated- provides a percentage measure to completion.

YES- adopted

NO- not yet adopted

The results summarised in the column indicating the per cent integrated offer a quantitative assessment of the work that has been done as far as each development is concerned, with 100% representing fully integrated and completed. As per these indications there still remains more work to be done with an average of about 32.88% of the identified developments having been completed to date, meaning that over the coming years 69.57% of the developments will have to be completed

in order for the DA to be fully operational and functional. The master plan provides a holistic view of all the developments that should be adopted within a 50-year timeline, which means that there is still more work that needs to be done in ensuring that the study area is fully integrated. This also has budgetary implications and for the suggested developments to be implemented investments should be made by public and private partners.

8.4 Conclusion

Since the adoption of the DA in 2010, industries have been set up in different economic zones situated around the KSIA and this has resulted in an increase in the number of both domestic and international passenger and cargo volumes. The region is already a hub for various organisations, facilitating the creation of improved logistics platforms and linkages between various geographic nodes. The primary goal is to ensure that the DA is strategically positioned and is transformed into a competitive global logistics gateway acting as a seamless road, rail, air and sea platform (Dube TradePort, 2013). The objective of this chapter has been to provide an account of the quantitative impacts of the DA as perceived by its active users, such as passengers and businesses, who have identified its impacts in terms of economic growth and social development. Evidence suggests that there is a measurable extent of economic development and growth, as noted in the increase in the demand of aeronautic products and services. This has been highlighted by the number of businesses that have located in the industrial region aligned to the airport and thus making a significant contribution to employment. At the same time, the DA has seen an increase in cargo and passenger volumes, which is further substantiated by the number of domestic and international airlines using the establishment. In line with the objectives of the chapter, evidence has been provided highlighting some of the projected benefits associated with the aerotropolis developments. The next chapter summarises the findings of the study and considers both the qualitative and quantitative insights achieved, providing conclusions for the study and recommendations for future research.

CHAPTER 9: FINDINGS AND CONCLUSIONS

“Triangulation of data is a reliable way in which a researcher allows for a research phenomenon to be examined using alternative frameworks, models, data collection and analysis methods to derive relevant conclusions and recommendations” (Heale and Forbes, 2013).

9.1 Introduction

The research study has aimed at providing a holistic description of the DA strategy, including an evaluation and assessment of the various logistics strategies, infrastructure and concepts that have been considered during its planning and implementation phase. In order to achieve this, the study has drawn important lessons and insights from aerotropolis regions such as Memphis, Schiphol-Amsterdam, Dubai and Hong Kong which have been considered essential benchmarks. The key issues interrogated include a reflection on how the DA has impacted the socio-economic context of KZN. In addition, the researcher has conducted an extensive review of literature to understand the genesis of the aerotropolis strategy from a global context and to establish why it has been gaining popularity among planners and developers in developing regions.

The previous chapters explained the DA strategy conceptually and practically, and evidence was provided regarding its perceived and real socio-economic benefits. It should be emphasised that the chapters presented arguments on whether the DA is to be considered as a viable strategy in which opportunities for economic growth, social development and competitive advantages for the KZN Durban region can be created. Extensive information regarding the DA strategy has been generated and it is therefore important for the key insights and contributions of these findings to be closely matched with the research objectives. For this chapter, the aim is to provide a reflection of the study objectives and questions in relation to the qualitative and quantitative data findings highlighted in Chapters 7 and 8. In any research study, the conclusion plays the role of ensuring that the researcher's thoughts are summarised, the implications of the findings conveyed and a final account given of the issues raised in the study findings (Ahmed and Rogers, 2017:230). Also, recommendations and areas for future research will be identified to inform planners on how to manage future aerotropolis developments, which are on the increase in the country and the region.

9.2 Research intention

In 2010, the area in which the KSIA is located was commissioned as part of the DA development. This is a city model in which all the facilities, developments and activities are centred around and influenced by the existence of a functional airport (Accenture, 2017). Given that this is considered

an urban renewal project, the DA has required coordinated planning and thus calls for a much deeper introspection on matters pertaining to logistics and transportation, real estate, entertainment and sustainability planning, which when ignored could result in failure (Adhya, Plowright and Stevens, 2014). The intention of this research study was to provide an evaluation of the DA strategy and to determine how it enhances regional competitiveness, economic growth and social development. Achieving the study objectives has required the adoption of a series of steps and processes, including determining what the aerotropolis strategy entails, how it can be adopted in the South African context and the various strategies and policies to be considered. The main aim of the study can be summarised as determining how planners can optimise socio-economic benefits through the adoption of competitive logistics infrastructure and novel concepts for the DA. As part of achieving the study aim, the following objectives were drafted:

- To describe the aerotropolis strategy and how it is dependent, influenced and informed by general knowledge and conventions related to airport, urban and business site planning
- To illustrate how socio-economic factors, demographic realities, and spatial and functional elements form the basis of an aerotropolis logistics planning strategy
- To explore the logistics strategies, novel concepts and infrastructural developments that are being considered in planning and implementing the DA
- To determine and assess the logistics success factors derived from integrated logistics planning contributing to the competitiveness of the DA as informed by the diamond model of competitiveness
- To ascertain whether Porter's diamond model of competitiveness influences the decisions adopted and implemented for the DA integrated planning.

9.3 Summary of sample profiles

As indicated in the previous sections (Chapters 6, 7 and 8), the research findings of the study are based on a diverse population sample of participants that have made significant and valuable contributions. For the findings to be considered appropriate, it is essential for the profiles of the participants to be summarised, including characteristics which might have influenced the outcomes of the study. This has also been done in order to determine the appropriateness of the findings and conclusions as far as the research objectives are concerned (Babbie and Mouton, 2001). For this study, factors such as the level of education, organisation of current employment, exposure to the DA development, province of residence and exposure in airport planning were considered in the selection of study participants. The researcher was mainly interested in

participants with an understanding of the aerotropolis strategy, which meant the involvement of experts from government departments, consulting firms, state-owned enterprises and municipal officials among many others.

During the data collection process, in-depth interviews, observations, focus groups, World Café sessions and online questionnaires were administered among the various population groups sampled. From a population of 30 experts spread across the province and directly involved in the DA development, the research findings represent a 40% response rate, which is considered appropriate as it covers the various planning areas. On the other hand, from a sample of 60 businesses located in the DA region, the findings represent a 60% response rate. Lastly, the study summarises the findings of 150 (40% response rate) active users of the DA who were randomly selected as they are attached to the various companies that make use of the airport. The consideration of the various populations through a mixed methods approach and triangulation has been aimed at ensuring that the study objectives are adequately responded to.

9.3.1 Objective 1: The Durban Aerotropolis in context

Objective 1: To describe the aerotropolis strategy in context to how it can support, sustain and improve regional competitiveness, and optimise on socio-economic benefits for the regional economy.

This research objective was achieved using a mixed methods data collection approach in which qualitative insights and findings as presented in Chapters 2, 3 and 7 were explored, and this primarily defined and offered a critical analysis of the DA development. By contrast, Chapter 8 provided the quantitative data for a reflection on the impacts of the DA on the socio-economic environment. In summary, this research objective was achieved through asking questions related to defining the aerotropolis strategy and to identifying and assessing its socio-economic impacts as discussed below:

9.3.1.1 What is the Durban Aerotropolis?

The DA is a conception of the KZN provincial government and was adopted as one of its GEAR initiatives. As noted in the research findings, it represents a spatial arrangement in which the development of a regional airport (the KSIA) has informed the nature and planning of the land use, infrastructural developments and socio-economic activities within its surroundings. Another view has been that it is as a geographical greenfield in which the land-use has been specifically designed for aeronautic and non-aeronautic developments housing organisations such as Dube

TradePort Pty Ltd, Dube City, Agrizone, Cargo Terminals and other related airport developments, with the long term objective of creating a sustainable city (Royal HaskoningDHV, 2020). The DA has also been identified as an economic development strategy characterised by 21st century mobility and transportation infrastructural innovations. These developments, as identified by Appold and Kasarda (2012), are aimed at ensuring that it delivers on KSFs such as improved connectivity, seamlessness, responsiveness and competitiveness. Some of the terms that have been used in defining the DA include geographical positioning, spatial design, distance factor and economic linkages, as illustrated in Figure 9.1.

Figure 9. 1 Durban Aerotropolis Aerial View



Source: Dube TradePort (2020)

As outlined in Figure 9.1, the DA is characterised by real estate developments, commercial facilities and social amenities that are easily linked to the airport through logistics and transportation networks such as rail and roads. One of the most significant factors about the DA is that it forms part of an urban development corridor which easily connects economic urban centres such as Cornubia, Verulam, Tongaat and KwaDukuza, which are key contributors to the regional economy.

One of the notable trends in understanding the aerotropolis strategy is the fact that its definition has been informed by the stakeholders who are the implementing agents. For instance, as defined by EDTEA (a government department focused on economic development), it represents an

economic growth initiative that is centred on the KSIA development. On the other hand, eThekweni Municipality considers it to be an emerging city of the future focused on promoting sustainable development and also enabling urban connectivity and mobility. Dube TradePort considers the DA as a developmental strategy characterised by purpose-built freight-oriented infrastructure, logistics gateways and connections which are implemented in a green field and centred around the nexus of KSIA. From a regional perspective the DA is an economic development initiative aimed at competitively positioning the region.

9.3.1.2 How does the Durban Aerotropolis optimise socio-economic benefits for KZN?

The provincial government of KZN through public-private partnerships has pledged billions of Rands towards the establishment of the DA (EDTEA, 2017). Some of the developments have already been commissioned, including the construction of the-state-of -the-art KSIA, which cost R6.8 billion. Concerns have been raised by different stakeholders regarding the aerotropolis development and whether the amount of money invested is justifiable. In answering this question, the researcher used the available data to project the real socio-economic impacts of the DA. This was, however, one of the most challenging tasks given the diversity of participants' perceptions regarding the aerotropolis development, all influenced by individual and organisational biases.

As expected, planners, policy makers, consultants and municipalities as the primary implementing agents present an ideal account of the impacts of the DA. It was therefore essential for the benefits to be determined by referring to objective data sources such descriptive statistics and other performance indicators rather than to subjective accounts based on participant judgement. As defined by (ESCAP, 2014), socio-economic factors relate to societal behaviours or characteristics such as wealth, education level, size of the family and population density that are influenced by economic growth and development. Based on the research findings, it is evident that the DA has been projected as an ideal strategy which presents opportunities for KZN to improve on its social and economic profile. This has been identified by stakeholders who describe the strategy from a socio-economic context as highlighted in the following statements:

- The strategy has mainly emphasised the importance of regional airports as centres of economic development and thus instrumental in contributing towards sustainable growth and improved transport systems and efficiencies.
- The eThekweni Municipality views the aerotropolis development as offering a solution to existing challenges in logistics and transportation, export efficiencies, tourism and spatial development within the region.

- The DA tends to capitalise on the strategic planning and spatial and institutional interventions to improve connectivity around the aerotropolis region for the purposes of facilitating trade, moving passengers, cargo, workers and residents efficiently and advancing social and economic improvements.
- From an academic view, the strategy has been associated with various processes and initiatives undertaken to influence desirable economic and social outcomes. For instance, its ability to integrate the airport and its surrounding environment through its emphasis on global supply chains and logistics to improve regional and global competitiveness has been highlighted.

The debates around the socio-economic benefits of the DA are still inconclusive, given that what has been emphasised mainly relates to future projections in the DAMP and not to real benefits. This is because the development is in its initial stages and thus most of the impacts have not been fully realised, presenting a challenge in providing accurate assessments. However, some notable socio-economic changes that have been observed in the region that can be associated with the development. These are summarised below:

- **Employment:** The DA has created new opportunities for local and international businesses who have set up operations in the SEZs leading to job opportunities. There is evidence which suggests that the level of business has increased especially in the aeronautical services, which has also contributed to job creation. Also, the infrastructural developments have seen the creation of temporary employment, which has provided necessary relief in reducing the number of people dependent on social services. The provincial government has projected the creation of about 750 000 opportunities in the manufacturing and services sector, which will be a major boost for the region as it is currently battling with a rising level of unemployment. It, however, remains to be seen how many jobs in total will be created as a result of the DA.
- **Education:** It should be stated that the emergence of the DA has resulted in the creation of the AIA at UKZN, aimed at providing advisory frameworks for the education and training of the required personnel for the aerotropolis development. For instance, there have been coordinated attempts between the various institutions and government to train unemployed youth in various trades that will be essential in supporting sustainable cities. It should be acknowledged that reducing unemployment has the impact of equipping more youth to access education due to the increase in disposable income.
- **Income:** The increase in disposable income which is a direct result of creating employment opportunities can result in an improvement of quality of life and health. The employment

prospects resulting from the aerotropolis are also viewed as a strategy to help KZN achieve its SDGs through driving improvements in food security and nutrition, youth empowerment and employment creation, among others. From an economic perspective, an increase in GDP also results in multiplier effects, including a rise in disposable income and an improvement in the standard of living (Emas, 2015).

- **Housing:** One of the advantages of the DA is the amount of land set aside for real estate developments, which will ensure that there is the provision of decent housing. The creation of a sustainable aerotropolis city requires an emphasis on low-medium cost housing developments which can also address the housing challenges in KZN (eThekweni Municipality, 2017). However, currently no housing projects have been initiated, giving rise to the emergence of informal settlements fuelled by the creation of new job opportunities.

KZN as a region is characterised by unique socio-economic conditions, including high levels of unemployment (22.3% as at 2019), inequality and high costs of doing business. Therefore, developmental initiatives such as the DA have been aimed at ensuring that these factors are addressed. This will contribute to the economic targets such as increasing the average trade growth rate, which stood at an average of 2.2% in 2019 and it is planned to create 2.1 million new jobs (Trade and Investment KZN, 2018). There remains much to be achieved from a socio-economic perspective. This requires the adoption and implementation of the right policies and infrastructure and ensuring that the DA reduces the gap between the poor and rich instead of widening it.

9.3.1.3 How does the Durban Aerotropolis improve regional competitiveness for KZN?

Regional competitiveness as one of the expected outcomes associated with the DA becomes one of the most important variables to be accurately measured and determined (Zhang, 2003:125). It has been considered to be one of the key mediums through which sustained growth can be achieved in order to lift people out of poverty through sustained improvements in health, education and nutrition especially in LCDs (World Bank, 2016). As noted from the research findings, regional competitiveness from the context of the DA is understood as involving the following:

- the ability of the DA and KZN to outperform other provinces such as Gauteng and Western Cape among many others over time in terms of efficiency, cost of doing business, scope and nature of developments, innovation and economic prospects
- a strategic variable in which significantly high and desirable results are achieved in the regional economy of KZN, most importantly at the levels of production output, increased demand, higher GDP and other socio-economic multipliers

- the degree to which the DA, using fair market conditions, successfully produces and markets its products and services to national (South Africa), regional (SADC) and international markets, holding a significant market share over time.

The questions relating to the measurement of regional competitiveness have been contentious because of the lack of consensus on the standard metrics to be used. There seems to be a vague understanding among policy makers and planners as they consider the DA, together with its associated infrastructural developments, as surety for regional competitiveness (Zhou, 2011). The notion that economic growth is a consequence of purposeful infrastructure has been derived mainly from regions that have been used as benchmarks, such as Memphis, Schiphol-Amsterdam and Hong Kong, and which the DA has largely emulated. Therefore, the assumptions that have been made, especially in projecting the expected outcomes of the DA, have been informed by the available evidence from these regions. For instance, reference has been made by numerous stakeholders to how the Memphis Aerotropolis development has contributed close to \$28 billion to the region's economy together with 220 000 jobs, among many other factors.

The general conclusion from the findings is that the success of the DA requires the adoption of relevant policies, strategies and concepts and an emphasis on the implementation of productive infrastructural projects as opposed to overinvesting without conducting a cost-benefit analysis (Shen and Liu, 2003:488). Notably, however, during the period in which the study was conducted, evaluation of the DA was primarily based on the DAMP and what it seeks to achieve rather than on real economic and social impacts because most of the developments are still at their initial phases. The quantitative evidence that was presented in responding to the research question includes highlighting the immediate economic results that have already been realised as a result of adopting the strategy.

As observed, the emergence of the DA has resulted in the creation of a business district also referred to as a SEZ, which at the time of the study had approximately 60 businesses in diverse industries and specialities. Of note is that 25% of the occupants have competence in logistics, warehousing and transportation, while there is also significant representation of manufacturers of food, machinery, cars, electronics and automotive parts. Most of the businesses located in this region were first time entrants in the province or had expanded their operations from other geographical locations. The impacts of the DA on the KZN economy have also been measured using the extent and level of economic activities for instance:

- Since the inception of the strategy, the region has seen an approximately 100% increase in the number of domestic and international flights. In other words, the region has become more connected to the globe, which has opened new markets for the local businesses.
- There has also been an increase in the passenger and cargo volumes between 2015 and 2018, international passengers increasing by 22.22%, domestic passengers by 12.7% and regional (SADC countries) passengers by 317.8%.
- The region has also seen an increase in the various commodities imported and exported to other parts of the globe. On average, the cargo that is handled through the DA comprises 18.19% seafood, 12.13% computer equipment, 10.10% fruits and fresh produce and 7.7% flowers. These volumes have been increasing from year to year and the projections also indicate an increase in the number of markets from which or to which these are being imported.
- There has been an increase in the demand and supply of commodities with both local and international markets. Notably, AgriZone (one of the regions in the DA) has doubled its production capacity and become actively involved in supplying fresh produce to the international market. Many of the companies located within the aerotropolis region have seen an increase in demand, including the logistics providers.

Regarding regional competitiveness, positive outcomes have emerged as a result of the DA's its ability to attract various businesses and passengers and at the same time to create the competitive market environment which is favoured by most businesses. In summary, the researcher has been able to define the DA and to provide an account of its impacts on regional competitiveness and the socio-economic context.

9.3.2 Objective 2: Durban Aerotropolis logistics strategy development

Objective 2: To illustrate how socio-economic needs, demographic realities, spatial and functional elements inform the aerotropolis logistics planning strategy.

Planning for the DA has required the efforts of various stakeholders who are actively involved in the adoption and implementation of policies, securing investments and identifying infrastructural initiatives, among many other activities (Bubalo, 2011:8). One of these areas of activity has been logistics and mobility planning, which has to ensure that movements around the airport city are properly regulated and relevant infrastructure is adopted. It serves as a mechanism that integrates the various partners, stakeholders and participants in different geographical regions and promotes improved accessibility for the aerotropolis region (Callanan, 2016).

A successful aerotropolis is identified by its ability to provide fast, flexible, reliable and responsive services for its target market and this can be achieved through the adoption of advanced information technology and highspeed transportation, which are fundamental in creating a successful logistics system (Du and Bergqvist, 2010:1). Logistics strategy development and planning requires significant financial resources as it involves the adoption of 21st century infrastructure and innovations; therefore, the priority is for this to be correctly executed (Chapman and Georgoulas, 2010). The research findings have provided some of the influential factors to be considered in logistics and mobility planning for the DA. The data sets have highlighted the realities that have informed logistics strategy planning. These have been incorporated into the study framework and include the following:

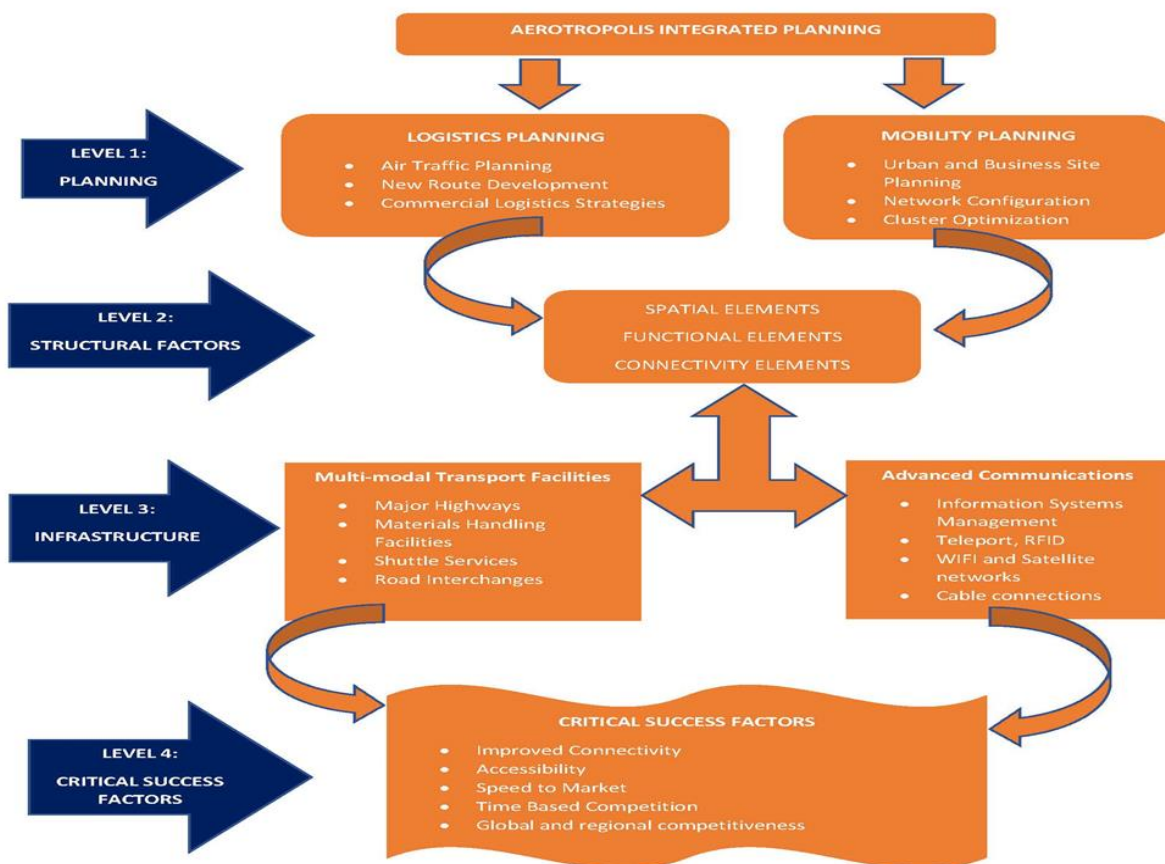
- **Socio-economic needs:** One of the objectives of the DA is to be considered a regional economic powerhouse attracting a range of businesses and clients through its economic activities. Achieving this means that the level and extent of logistics planning and investment is driven by the creation of jobs, strengthening of manufacturing and production capability and ensuring that the region is identified as a globally competitive (Chu, 2012:100). Improvements to the economy also tend to contribute to various social attributes, including sustainable development, improvements in the quality of life and a decrease in the cost of doing business. As earlier mentioned, KZN has adopted the strategy with the intention of ensuring that it creates sustained socio-economic benefits and therefore logistics strategy planning has been aimed at ensuring that this becomes a reality.
- **Demographic realities:** Given the seismic changes in demographics, it is essential for aerotropolis planning to take these into account, more especially in setting up a logistics strategy. The population of KZN has grown significantly over time and has been characterised by high levels of youth unemployment and a growing number of households that are led by the youth (Department of Trade and Industry, 2012). The positioning of the DA development in a territory bordering on underdeveloped rural municipalities where the aged comprise a large part of the population has informed the planning framework. Planners and developers have considered the strategy to be one able to overturn some of the legacy demographic challenges of the region. This has influenced the adoption of purposeful logistics strategies which address challenges including unemployment, inequality and inefficient logistics and mobility systems. Population dynamics have been one of the factors determining aerotropolis planning since all the planned initiatives must consider the age of the users, their involvement in the economy and their quality of life, thus addressing context specific challenges.

- **Spatial and functional elements:** Planning for an aerotropolis is challenging because it involves altering natural boundaries in order to fit human needs and desires and this is often realised through the construction of various infrastructural developments (Hanly, 2015). For aerotropolis developers and planners, the priority has been the identification and selection of areas with the appropriate environment for aviation, residential and commercial developments. This has resulted in the development of viable airport cities spreading towards other urban boundaries through strategic transport corridors (Bagaeen, 2007). The DAMP through its various steering committees identified the key spatial and functional elements that need to be considered in logistics and mobility planning. These have been categorised as follows:
 - (i) **Land use and Urban Form** - This is the variable that primarily focuses on the policies, concepts and strategies that determine and rationalise the use of land and patterns of the aerotropolis region. The basis of logistics strategy planning is the geographical landscape, which determines the nature and form of developments to be adopted. One of the advantages in planning for the DA has been the availability of vacant land (green field), which has meant that developments follow a planned pattern.
 - (ii) **Transportation Facilities** - Transportation is concerned with addressing inadequate roadway capacity, poor user safety and insufficient pedestrian and bicycle facilities (BARCELOC, 2015). Regions such as KZN that are characterised by underdeveloped rural communities generally have poor transportation networks. The emergence of the aerotropolis strategy provides the necessary intervention in ensuring that these regions are provided with functional transportation networks. In planning for the logistics strategy, the state of the transportation infrastructure is considered, with underdeveloped areas requiring more investments than developed urban centres.
 - (iii) **Physical infrastructure and the surrounding environment** - One of the determining factors in setting up a logistics strategy for an aerotropolis is the physical infrastructure and surrounding environment. Policies, strategies and concepts need to be adopted that promote sustainable practices that are environmentally friendly and coexist with already existing infrastructure. It is essential to point out that the DA occupies a 'greenfield', which implies the need for further environmental protection policies to be adopted with only environmentally viable logistics practices being considered.
 - (iv) **Economics and real estate** - This variable is aimed at ensuring that there is an improvement in the economic climate of the airport city through ensuring sustained growth for targeted industries. Therefore, logistics strategy development is driven by the economic goals of the airport city. Thus, for instance, the DA aims to become the leading logistics

gateway to Africa and has adopted logistics strategies that are aimed at ensuring that this goal is translated into a reality.

In addition, the role of benchmarking was important in this study as it has contributed towards the study framework. The logistics planning and strategy development has been based on model regions such as Memphis, Hong Kong and Dubai. As indicated by the findings, the logistics planning for the DA shares similar features with developments such as Hong Kong, Amsterdam-Schiphol and Dubai as these have been the key regions that have informed its development. As highlighted in Figure 9.2, logistics strategy planning for the DA has incorporated a detailed logistics and mobility plan (Level 1) in constant relation to a myriad of internal and external conditions (Level 2) which inform the adoption of various infrastructure (Level 3). Of importance is the fact that logistics and mobility planning is also influenced by the KSFs which are highlighted in Level 4. The success of the DA requires the careful planning and implementation of the various decision areas categorised as levels in the framework.

Figure 9. 2 Durban Aerotropolis planning levels



Source: Researcher's own construction

9.3.3 Objective 3: Durban Aerotropolis logistics and mobility infrastructure

Objective 3: *To explore the logistics strategies, novel concepts and infrastructural developments that can be adopted in planning for the Durban Aerotropolis.*

The 21st century has seen increased opportunities for new and innovative ways of achieving economic growth and development. One of these has been the establishment of the DA. In supporting the initiative, the KZN government has committed to investments in infrastructure to the tune of R1 trillion through public-private partnerships over the coming years 20 years (EDTEA, 2017). As a long-term strategy, this has been cited as involving a series of strategies, concepts and infrastructural developments aimed at enabling improved logistics and mobility in the region. Notable, the study findings reveal that some of the planned developments have already been commissioned while others are still in the planning stages.

For this research objective, the aim was to provide a critical reflection on the individual developments and to determine how they contribute to the success of the DA. Therefore, the study investigations involved site visits and observations during which the logistics and mobility infrastructural developments were carefully studied. The adoption of these developments has, however, been informed by a criterion that has been consistently applied by planners and policy makers and this is that they are considered as context specific, aligned to the competitive priorities of KZN and beyond reasonable doubt able to contribute to regional competitiveness. The framework applied in the adoption process as highlighted in the DAMP has ensured that they are:

- **Comprehensive:** Infrastructural developments should be adopted that are sustainable and are considered to be safe, efficient and effective for the DA region and its stakeholders. Also considered is the ability of the adopted logistics and mobility systems and techniques to serve the diverse needs of the various users for commercial and non-commercial purposes.
- **Competent:** The initiatives and infrastructural developments considered should holistically contribute towards achieving high levels of responsiveness, connectivity and reliability among other critical success factors. Ideally, logistics innovations have been aimed at ensuring that the DA is comparable with the other successful airport cities in the globe.
- **Cooperation:** Planning for the various infrastructural developments also calls for private and public partnerships to be considered in order to improve the level of success and to ensure that all available resources are utilised. For instance, developing the DA logistics strategy has required the participation of agencies including ACSA, the South African National Roads Agency (SANRAL), the Department of Transport, the Department of Economic Development

and the eThekweni Municipality among many other private organisations. This has further enabled improved integration in strategy development.

- **Championed:** Each of the developments highlighted in the DAMP are individually championed by certain organisations who have a proven competitive advantage regarding the activity. For instance, from a logistics perspective, most of the infrastructural developments have been spearheaded by the Logistics Working Group, which comprises the eThekweni Municipality, the Department of Transport and Dube TradePort. This is considered as an effective approach, giving better results and allowing for project ownership and accountability.
- **Continuous Improvement:** This is a philosophy in which all the adopted infrastructure is continuously improved in order to allow for improved efficiency. This implies that flexible and agile infrastructural developments and concepts that can easily be adjusted are considered in order to accommodate for any future environmental changes. For an environment with a degree of uncertainty and easily affected by economic, technological and consumer changes, the emphasis should be on identifying better ways to manage these adjustments successfully.

As per the research findings, it is evident that logistics and mobility-related infrastructure for an aerotropolis drives economic and social development and has thus resulted in the KZN provincial government opting for gargantuan infrastructural projects and development strategies. A number of these flagged strategies have been mainly replicated from other aerotropolis regions because of their success rate. Furthermore, a systematic approach has been applied in which these strategies have been adopted in reference to the critical success factors of the DA. For instance, becoming ‘Africa’s most connected Airport City’ has been associated with improved connectivity, speed to market, responsiveness and accessibility among other features which will only be achieved when the relevant infrastructure is put in place.

9.3.4 Objective 4 and 5: Durban Aerotropolis CFSs in context

To ascertain whether Porter’s diamond model of competitiveness influences the decisions adopted and implemented for the Durban Aerotropolis Integrated Planning.

The adoption of the DA strategy has been motivated by transforming KZN into a competitive region. As highlighted in the findings, competitiveness is the state in which a region is positioned ahead of other similar regions for instance the DA being preferred ahead of Cape Town or Ekurhuleni Aerotropolis developments (Buthelezi, 2017). Ideally, every aerotropolis is designed to be unique and retain a competitive advantage over its rivalries but practically this requires a combination of strategic planning and luck. The direction in which the research has followed has

avoided the question on whether the DA is presently a competitive region but rather on what are the current initiatives that have been adopted in making it a competitive region. From a logistics perspective the design followed, and the infrastructural developments adopted for the DA have been primarily aimed at ensuring that the critical success factors including improved connectivity, accessibility, responsiveness, improved speed to market and TBC are associated with the region.

What has also been noted on the critical success factors is the emphasis on integrated logistics planning which relates to various stakeholders collaboratively adopting policies and plans in order to increase their chances of logistics and mobility success. Successfully delivering all the strategies highlighted in the DAMP has involved a degree of collaboration by the different agencies including Dube TradePort Pvt Ltd, KZN Department of Transport, KZN Department of Economic Development, Tourism and Environmental Affairs, Investment Development Corporation, eThekweni Municipality, Tongaat Hulletts and Airports Company South Africa among others. From a policy perspective it is the norm for a multi-disciplinary approach to be adopted especially for initiatives with socio-economic impacts. This further explains the top down approach that has been adopted in which all the strategies and policies have been informed by the National Development Plan (NDP) a source document used by the KZN EDTEA.

9.3.4.1 Porter's Diamond Model of Competitiveness and the Durban Aerotropolis

The concept of competitiveness in the context of this study has been applied using Porter's diamond model framework which prioritises the planning for and implementation of soft and hard logistics infrastructure. The DA as a strategy has been designed to ensure that it positions KZN to be a competitive economic region attracting local and international businesses and investors. As illustrated in Figure 9.3 the DA is a spatial design which emphasises on the development of a business and residential district around the precincts of the KSIA. The various facilities around the airport city need to be easily integrated with the surrounding regions and this requires the careful planning of logistics platforms in order to allow for improved accessibility. For instance, some of the key selling points of the DA is that it is 45-minutes from the Durban Harbour, 30 minutes from the Durban city centre, ten minutes from Umhlanga and 5 minutes from Cornubia which are considered as strategic areas which are dependent on the airport city. In ensuring that the region lives up to its desired expectations a cluster of transportation networks and facilities have been set up which further improve the chances of competitiveness.

Figure 9. 3 Durban Aerotropolis integration



Source: Dube TradePort (2019)

In Porter's diamond model, only countries and regions in which demand conditions are functionally positive and where there is evidence of progressive firm strategies and an environment characterised by related and supporting industries deemed as competitive markets (Porter, 1990). In his view, a competitive advantage can be created during the stage in which it is driven by factorial endowments and investments, innovation and national wealth (Frasineau, 2006:3496). The diamond model attempts to explain the competitiveness of regions or nations in the context of their national environments or settings referred to as functional conditions.

The highlights of the arguments presented in the diamond model seek to explore the questions on why certain regions or organisations located in specific nations can maintain a consistent level of innovation and at the same have a competitive dominance over others (Penttinen, 1994). According to Porter (1990) competitiveness is created, maintained and sustained through a highly localised process, in other words the success of an organisation in the global market is as a result of the characteristics of the home base. The home base referring to the environment in which the strategy is set, the product and processes are created (Stanley and Stanley, 2014). Innovation plays an important part in explaining competitiveness and is a direct result of the different determinants in the diamond cluster, only a dynamic cluster with innovative capabilities can sustain long-term competitiveness (Popa, Preda and Boldea, 2010:151).

The competitive advantage of a region is dependent on the growth prospects based on investments aimed at improving the capacity of a country or companies through major infrastructural developments or innovations (Graham, 2004:2). This leads to a series of other discussions on the model that presuppose that growth based on innovation is important. Notably, a competitive advantage is not merely built on adapting and improving technologies but from creating new ones through adopting a continuous improvement approach which makes a direct impact on the development of a region (Frasineau, 2006:3497). Kohler (2004:170), however, points out that the advantages that were once gained as a result of exploiting the global scale of economies or arbitraging the imperfections in the factors of production has since eroded. Instead the successful organisations are the ones that are characterised by an increased sensitivity to the changes in the market and the rising technological changes. This involves rapid responses to the opportunities and threats created by the world market and being able to properly introduce new products rapidly in a globally responsive manner (Graham, 2004:4).

Therefore, the key questions that have been investigated in the study as informed by the Porter's diamond model include examining what places the DA ahead of other similar regions. The development and adoption of sustainable policies which influences the strategies, infrastructure and concepts implemented has played a critical role. As much as these have been informed by other regions it is yet to be determined if all these efforts have been worthwhile.

9.3.4.2 The impact of business factors

Mobility and logistics planning as indicated, are the most important variables that have been prioritised in planning for the DA. This is evidenced by the involvement of different stakeholders and organisations who have assumed various roles and responsibilities including logistics policy making and planning. The goal of the DA is to ensure that there is improved accessibility and ease of movement around the airport region which can only be achieved through the adoption of relevant mobility models, strategies and concepts (Handy, Cao and Mocktarian 2005:430). However what needs to be noted is that planning has been influenced by various business factors especially given that most developments have involved significant financial investments.

Planning has indeed played a critical role in designing an efficient mobility and logistics network and as such specific business factors have been considered as they determine the nature and scope of the infrastructural developments adopted. Notably the steps involved have prioritised on ensuring that an analysis of the environment and prevailing conditions is undertaken which includes an assessment of the geographical, political and demographic and economic variables of

the region. In addition, it has followed a systematic process which has considered the overall objectives of the strategy and the approaches that can be considered in achieving these (Malmborg and Richardson, 2000:4). As highlighted in the study findings the key business factors that have been incorporated in planning include a cost-benefit analysis approach in which the costs of investments have been compared to the projected benefits. The benefits of which include an increase in the overall demand for goods and services which also translates to an increase in revenue in the long term.

In Figure 9.4 designing the DA has applied logical business rules in which the specific areas have been reserved for businesses and infrastructural developments that are expected to generate high revenue and profitability. As noted, trade zones which comprise of warehouses and storage facilities occupy most of the developed areas which can be supported by the fact that the aim of the DA is to become the premier logistics gateway of Southern Africa. The development of logistics and mobility strategies has been informed by the layout of business within the aerotropolis regions.

Figure 9. 4 Durban Aerotropolis Layout Strategy



Source: EDTEA (2018)

One of the notable findings is that the design of a network is one of the critical success factors for an aerotropolis development. This focuses on how the various facilities are clustered within the

aerotropolis region and how they are integrated to the transportation platforms. A myriad of network design approaches have been implemented including the deterministic analytical models, stochastic analytical models, economic models and simulation models all of which have the objective of ensuring that all locational decisions are correctly planned and implemented (Selim and Ozkarahan, 2008:401). Some of the success variables as highlighted in the study findings that have been emphasised in developing the DA are summarised in Table 9.1 these describe the indicators for the DA and how these have been achieved.

Table 9. 1 Durban Aerotropolis strategy critical success factors

SUCCESS FACTORS	INDICATORS	DESCRIPTION
Availability	External connectivity Rail infrastructure Road infrastructure Shared transport Platforms	Road infrastructural expansion projects Reduction in the time it takes to access the airport city Quality of the road infrastructural innovations The number of domestic and international airlines
Affordability	Public transport fares Private transport costs	Reduction in the average cost of travelling to the airport city Subsidised public transport platforms Reduction of private transportation entry barrier Reduction of toll fees and levies
Efficiency	Public transport Private transport	Reduced waiting time Minimum congestion Reduction in commuting time
Convenience	Travel comfort Electronic services Ticketing system Transfers	Ease of payment (availability of multiple payment methods) Flexible commuting times for public transport Convenient and accessible bus stops Minimum waiting time Available park-and-ride facilities Available tracking and tracing services
Sustainability	Environmental impact Safety	Reduction in road fatalities Safety enforcement measures Reduction in pollution and congestion
Public Perception	Customer satisfaction Perception of changes	Increase in the number of satisfied customers and businesses Improved customer interaction platforms

9.4 Conclusion

This chapter has provided a reflection on the research study aims which have been categorised into objectives focusing on the description of the DA strategy, the strategies and policies that should be considered for an aerotropolis and how it can optimise regional socio-economic development. The DA has been described as an economic development strategy that involves the

adoption of purposeful infrastructure and strategies around the precincts of an airport in order to influence regional competitiveness and socio-economic development among many other factors. The study findings have further shown the impact of the DA on employment creation, income generation and improved housing and education, among other socio-economic factors. Moreover, it has resulted in the adoption of purposeful infrastructure that has contributed significantly to economic growth and development, as seen in the increase in the level of demand of various aeronautical goods and services that are traded in the airport region.

Success in the context of the DA has been measured in terms of its ability to provide fast, flexible, reliable and responsive services for its target market. In addition, some of the highlighted critical success factors for the DA include availability, affordability, efficiency, convenience, sustainability and public perception, and the findings have highlighted how these factors have been achieved. This chapter has also provided a review of the factors that have influenced logistics strategy planning for an aerotropolis, which include the demand and factor conditions as advocated in Porter's diamond model of competitiveness.

CHAPTER 10: RECOMMENDATIONS AND CONTRIBUTIONS

“The benefits of conducting a research study on the aerotropolis development are enumerated and include building a knowledge base for professionals and policy makers on how best they can build viable economies through the strategy” (Hendriks, 2013).

10.1 Introduction

This study has sought to provide a holistic description of the newly adopted DA strategy with the goal of understanding how it has created socio-economic benefits through coordinated airport, urban and business site planning. Other focus areas have included a description of the logistics strategies, concepts and infrastructure that have been incorporated in logistics and mobility planning and how these have effectively contributed to the competitiveness of KZN. In line with the research agenda, the previous chapters have indicated how the research objectives have been achieved using a triangulation approach in which qualitative and quantitative data sets were analysed. This study has drawn on insights from the ways in which other aerotropolis regions around the globe have successfully incorporated logistics and mobility innovations in order to ensure that the strategy achieves its intended goals, thereby retaining a global competitive advantage. Provinces in South Africa and other developing nations in Africa have either adopted or are considering adopting the aerotropolis strategy. This chapter presents the recommendations, limitations and areas of future research that need to be considered by policy makers, planners and businesses ahead of adopting this strategy. The research findings have identified a myriad of challenges in both planning and implementation that risk rendering the strategy ineffective in achieving its intended goals. Addressing these and providing recommendations for how they can be addressed in other areas improves the chances of success, more especially in the wake of the rising economic challenges in Africa. In accordance with the research findings, recommendations for policy makers, planners, academicians and the users of the DA are provided in this chapter on how best practices can ensure that the strategy significantly contributes to the socio-economic outlook of a region and at the same time boosts regional competitiveness. The chapter further addresses the implications of the research study and suggests gaps that should be addressed by future research studies.

10.2 Contribution of the study

This research study makes a wide range of contributions to the logistics discipline and provides a framework for how planners can contribute to the success of airport cities through coordinated and strategic planning. The emphasis on logistics and mobility strategy planning during the study provides planners and policy makers with a reference point with regard to the steps and factors to be considered so that optimum results are achieved for an aerotropolis development. This further allows for informed decisions to be made during the process of adopting logistics strategies, concepts and infrastructure which require a critical analysis of various social, economic and environmental variables.

Also important is that this study focuses on addressing context specific decision making so that, although the aerotropolis strategy has been adopted through benchmarking against global aerotropolis regions, the planning has been contextualised within the Durban region. Successful implementation of the strategy has not only replicated the frameworks from other regions but also made significant alterations in which local dynamics and factors were fully acknowledged and represented. Little research literature is available on the aerotropolis from a South African context and therefore this study will contribute to the body of knowledge by defining the DA strategy and exploring how it enhances socio-economic development. The aim of the study has been limited to defining the strategy from a local context and indicating the procedures and processes that need to be followed when evaluating whether the benefits associated with the strategy are a reality or are imagined.

The study has also developed an aerotropolis integrated planning framework, providing steps for the management of logistics and mobility planning for an aerotropolis as well as an account of the infrastructural developments that need to be adopted and what they should aim to achieve. The use of Porter's diamond model of competitiveness has provided a relevant framework in which policy makers and planners should plan and evaluate aerotropolis developments. The research findings have presented weaknesses and gaps relating to the DA strategy, which include the lack of models and methods that can be used in measuring its socio-economic impacts. The study therefore suggests approaches to be adopted to ensure that the impacts of strategies like the aerotropolis can be easily measured. The contributions made by the research to the body of knowledge are both the provision of a logistics and mobility planning framework for the aerotropolis strategy and also the identification of the critical success factors that need to be central to the development of the strategy.

10.2.1 Recommendations for government and policy makers

Policy makers, comprising national and provincial government officials, have been at the forefront in planning and implementing the DA strategy. Reliable benchmarks for this have been the successful strategies recorded in different regions across the globe. Over the past ten years, regions such as Amsterdam-Schiphol, Memphis and Dubai international airports have been revered as representing the ideal aerotropolis region of the future. The challenge among planners, especially in developing countries, has been on how they can adopt the aerotropolis strategy in their respective regions in order to propel socio-economic development. An important challenge identified in the study is the extent to which concepts or strategies can be adopted from foreign regions and expected to achieve the same results. There is a need for policy makers to prioritise contextual realities when enacting policies. It is essential that, despite the success of a policy in another region, a broader analysis be conducted in order to address the questions relating to feasibility, practicality and relevance before it can be flagged for adoption (Jungwirth and Luxford, 2014:3). Economic downturns especially in Africa have seen government planners and policy makers opting for the adoption of aggressive economic development strategies which have been achieved using international frameworks (World Economic Forum, 2008). The alternative approach of policy makers should be to focus on delivering a successful aerotropolis development which is informed by local development frameworks as these have a higher chance of success as compared to international frameworks which do not represent the local reality.

The role of policy makers should be directed towards identifying the socio-economic impacts of the aerotropolis strategy and providing a framework for achieving these successfully. This requires a planning approach that prioritises the local factors and conditions, including the availability of land, labour, capital and human resources among other variables. In this way the framework adopted will incorporate relevant local variables and this will increase the chances of success in addressing the problems and challenges as compared to applying an already existing framework used under different conditions. As identified in the study findings, integration should be emphasised in the initial stages of policy drafting in order to determine the implications for policies and to incorporate the views of various stakeholders. For a region like South Africa which has complex transport dynamics, there is a need for consultation to get buy in from all the affected parties. The DA as an economic development strategy has resulted in social and environmental challenges which would have been initially addressed if the relevant stakeholders had been proactively incorporated.

One of the recommendations to be considered by planners is the smart city framework for policy adoption. This framework incorporates a multi-disciplinary approach and emphasises variables such as the economy, environment, mobility, people, governance and living. Using this framework allows for informed decision making as it addresses questions relating to the impacts of the strategy better. This has the advantage of ensuring that the resources and the tools and techniques required for the policy also reflect the perspectives of the community. Moreover, the time it takes for policies to be adopted, which has resulted in delays in the implementation of the DA strategy, would be addressed through faster decision making processes for infrastructural and economic development projects so as to ensure that projects are delivered as quickly as possible and do not become obsolete.

10.2.2 Recommendations for planners and strategists

As suggested in the literature, there has been a significant growth in the demand of products and services offered in the aerotropolis regions. For instance, in its first year of operation, the Hong Kong Aerotropolis handled approximately 40.7 million passengers and 3.7 million tons of cargo, making it one of the busiest hubs for international passenger traffic and international cargo throughput (Zhang, 2003:125). Aircraft movements and connections between geographical regions have been on the rise, which has further increased the volume of passengers in these regions. Growth has also been evidenced by the increasing level of business since aerotropolis regions have promoted the creation of manufacturing, production and logistics facilities. Similar statistics are also evident for the DA, which has recorded an increase in the number of passenger and cargo airlines since 2015. From a logistics and mobility planning perspective, the challenges facing planners and consultants involves the identification of strategies, concepts and infrastructure that will not only result in significant benefits but that are also cost effective and easily applied.

Addressing these challenges requires the use of a standard framework that can be adjusted to suit contextual conditions. As indicated in the study findings, the success of the DA depends on the adoption of an integrated logistics planning approach, following a top down approach and providing a description of how each of the variables should be planned and adopted. Going beyond the aerotropolis planning frameworks already provided, Table 10.1 sets out an updated framework that can be easily applied by planners, presenting all the questions that need to be explored in developing an effective logistics and mobility strategy.

Table 10. 1 Revised logistics and mobility planning framework

LOGISTICS PLANNING (A)		
Level	Area of Emphasis	Key Issues
0	Scope	What are the prevailing logistics challenges? Can these be solved in the short, medium or long term? Is there capacity to address these?
1a	Logistics Planning	Transport strategy Location strategy Inventory strategy
2a	Environmental Factors	Customers Spatial elements Functional elements Connectivity elements
3a	Concepts, Strategies and Infrastructural developments	Transport decisions Supply networks Major highways Just-in-Time logistics Road interchanges
4a	Success Factors and Benefits	Improved connectivity Accessibility Speed to market Time-based competition Global and regional competitiveness
MOBILITY PLANNING (B)		
Level	Area of Emphasis	Key Questions
0	Scope	What are the prevailing mobility challenges? Can these be solved in the short, medium or long term? Is there potential for success?
1b	Mobility Planning	Analyse mobility situation and develop scenarios Set priorities and measurable targets Built monitoring and assessment into the plan
2b	Environmental Factors	Political and institutional ownership Stakeholder and citizen involvement Funding sources and financial capabilities Customer perceptions
3b	Concepts, Strategies and Infrastructural developments	Information systems Shuttle services Park-and-ride facilities Walking infrastructure Electronic car park management
4b	Success Factors and Benefits	Convenience of movement Reduction in travel time Reduced costs to travel Flexible movement models

Source: Researcher's own construction

Furthermore, recommendations need to be provided on the infrastructural developments to be incorporated in logistics and mobility planning for the DA. What needs to be noted is that most of those highlighted in the DAMP have either not been adopted or have failed to deliver as per their expected benefits as a result of many factors. As much as logistics and mobility infrastructure, concepts and strategies can be suggested, what needs also to be consistently applied are the fundamentals and these require providing solutions that address the immediate needs of the region. For instance, investing in cycling infrastructure is not a priority for the DA as there are no active cycling passengers due to the geographical distances involved and to the perceptions of users, who consider cycling a hobby rather than a mode of transport. The basic issues that need to be addressed by planners and strategists in logistics and mobility planning, as informed by the gaps identified in the study findings, include the following:

- An area-oriented approach to transport and mobility planning needs to be adopted. This would consider the spatial functions of the region which can influence the adoption of robust strategies and infrastructure.
- Planning needs to be categorised into strategies addressing demand-and-supply-related problems. For instance, the growth in the number of cars and passengers has seen an increase in demand which has also sanctioned an increase in the supply of transportation and mobility platforms. A distinction should be made between demand-driven factors and supply-side variables.
- Logistics and mobility planning need to be considered as more than merely road construction but rather as a strategic variable which also addresses economic development, environmental sustainability, travel-time reliability and cost and congestion management.
- Planning should be informed by the logistics and mobility network design for the aerotropolis region. This relates to the linkages and connections between the airport city and other points of interest which are considered as the main sources of passengers and cargo (Cheong, Bhatnagar and Graves, 2004:2). Logistics network configuration is concerned with managing and determining how facilities such as warehouses, production plants, and administrative offices among others are clustered within the aerotropolis region. This has the advantage of ensuring that logistics and mobility solutions provide cost effective and efficient linkages for priority regions.
- Logistics and mobility planning for an aerotropolis is complex as there are many stakeholders and the development involves non-linear changes. As advocated by Abel and Deitz (2009),

dealing with planning uncertainties and complexities requires hedging⁸⁹ and flexing⁹⁰ strategies. Complexity also needs to be addressed by ensuring that flexible and agile strategies and platforms are considered that can easily respond to immediate and slow changes.

Lastly, based on the recommendations provided by Porter's diamond model of competitiveness, logistics and mobility planning for an aerotropolis should ensure that factor and demand conditions, firm strategies and related industries inform the planning framework. Competitiveness in the context of the study has been defined as the practice in which various regions compete with one another over retaining the shares of either domestic or export markets and attracting superior human resources and personnel (Kitson, Martin and Tyler, 2004). Logistics and mobility planning should be viewed as key to contributing to regional competitiveness and socio-economic growth, ensuring that all the decisions made should be economic.

10.2.3 Recommendations for aerotropolis planners

The DA, a strategy involving purposeful infrastructural developments, has fuelled arguments among economists and town planners regarding the strategy's real economic benefits, especially in developing regions. There is often a limited understanding among planners and politicians of how to measure the real benefits associated with mega-projects like the aerotropolis. This gap needs to be accurately addressed as it affects future development initiatives associated with the aerotropolis strategy. Robinson and Torvik (2004:1) argue that most of the mega-projects involving extensive infrastructural developments do not necessarily result in positive results for the economic outlook but can result in negative returns. This implies the need for frameworks that can provide the basis for measuring benefits associated with any aerotropolis developments, using quantitative and qualitative variables. What needs to be emphasised in measuring the performance of such initiatives is defining the performance measures from a logistics and mobility perspective, including measures such as effectiveness, reliability and cost. When determining performance measurements, planners should consider the following criteria:

- Measurements must be meaningful and relevant to the needs of different stakeholders (policy makers, planners, businesses and passengers). They should reflect the intended goals and identify the expected outcomes, for instance connectivity, access and ease of movement.

⁸⁹ Hedging is a risk management strategy in which challenges are understood through gathering as much information as possible about them and then identifying measures by means of which these can be addressed.

⁹⁰ Flexing provides early warning and adaptive strategies regarding any unexpected occurrence.

- The expectations of the stakeholders should be identified and further analysed into dimensions, indicators and measurements of effectiveness, as illustrated in the example in Table 10.2, which focuses on assessing transport systems. This approach enables the expectations to be assessed, using the categories provided. Measuring the individual variables allows one to establish the performance of the strategy and whether it has been a success or otherwise. This can be customised to the different dimensions which constitute the aerotropolis plan.

Table 10. 2 Aerotropolis measurements

DIMENSION	INDICATOR	MEASURE OF EFFECTIVENESS
Transport Systems	Vehicle movements Utilisation (mode split, number of trips, passenger miles) Access or coverage	Economic impact Public health and safety.

- All the costs involved in the adoption process of the infrastructure should be measured. This measurement should be strictly based on the cost benefit analysis, which allows for an assessment to be conducted based on what the initiative costs and all its benefits.

As highlighted in the findings of the study, there are inconsistencies in the methods applied globally when determining the nature and extent of developments and investments for an aerotropolis, especially from a cost benefit perspective (Domingos, Moura and Jones, 2014). Before any financial commitments are made, economic and financial theories suggest a feasibility analysis, allowing for an evaluation of the proposed infrastructural development or strategy using a multi-perspective approach. One of the variables used in determining and projecting the success of any aerotropolis development is the level of demand that is projected from all the revenue streams. The BCG matrix is another framework that can be considered by planners. This matrix allows for breaking down the market share into airport users, the transactions taking place within the catchment area of the airport and the cargo that is handled within the airport in order to identify activities that would easily pay back on the initial investments. This is seen as responsible investing as financing is reserved for activities that have the potential for increased output and market share.

10.3 Limitations of the study

While the research study achieved most of its objectives and research questions, some limitations occurred which hindered the researcher from sufficiently addressing and responding to the research problems. They are as follows:

- **Lack of South African research literature:** Conducting a literature review for this research study was a major challenge as there is little available literature on the existing aerotropolis developments in the country. The only available literature focused on developments in developed countries, but these do not share similar contexts with Durban, KZN. Therefore, most of the discussions and the aerotropolis frameworks in the study have referred to international scenarios.
- **Target area:** The research study focused only on the DA development, with all the data collected and analysed being limited to this area. The development is in the initial stages of its development, which means that the researcher could not access all the required information.
- **Sample size:** There are only a few individuals who have been actively involved in the DA strategy. This presented a challenge as the researcher had to locate all of them. The first phase of data collection took longer than anticipated as it was difficult to locate the participants and most of them kept postponing engagements due to their busy schedules. Although the researcher would have wanted to include a larger sample, there were insufficient possible participants as there are a limited number of individuals who have been involved with the strategy. The research also focused mainly on the developers of the strategy rather than the users.
- **Response rate:** Many of the individuals targeted in this study were company executives, consultants and policy makers who did not have time to sit down for interview sessions and pulled out of the data collection, which affected the response rate. The distribution of questionnaires to potential users also encountered challenges as most of the participants could not relate to the aerotropolis development, which resulted in most of the responses being rejected and excluded from the analysis.
- **Research Approach:** It should be noted that the mixed methods research approach used during the research presented challenges. This was especially the case with the quantitative components as the variables measuring economic development and growth could not be accurately provided.

10.4 Areas of future research

The researcher has identified several areas that should be considered in future research on the DA strategy and these are as follows:

- Despite an increase in the number of studies focusing on economic growth and development, there is a need for an increased emphasis on studies dedicated to describing the impact and influence of logistics infrastructural developments and strategies on socio-economic development in a South African context.
- Future research on evaluating the aerotropolis developments should also include the users as the main target population, which would include passengers, businesses, importers and exporters and the community, among others. This will provide an accurate account of the benefits and disadvantages of the development.
- From a cost benefit analysis perspective, future studies should focus on measuring the success of aerotropolis related developments using objective measures such as financial and economic variables in order to determine whether the strategies are generating revenue.
- It is also suggested that future studies should critique the aerotropolis strategy and provide alternative frameworks rather than relying on those provided by the key proponents of the strategy. More studies should focus on the aerotropolis logistics framework from a regional perspective instead of adopting the ‘one size fits all’ mantra.
- There should be a greater focus on understanding the role of logistics for an aerotropolis development and how relevant innovations can be incorporated, especially in a South African context.

10.5 Conclusion of the study

This mixed methods research study was aimed at providing a description of the aerotropolis strategy and how the logistics strategies, concepts and infrastructure developed during its planning and implementation can result in socio-economic benefits. The use of various planning frameworks, including Porter’s diamond model and integrated logistics and mobility planning, have been adopted in order to evaluate the strategy in relation to economic growth, logistics and mobility developments, socio-economic factors and competitiveness. The aerotropolis strategy has been described as an ideal site for time-sensitive industries such as freight and courier companies, requiring the right combination of logistics models and infrastructure to be set up in order to optimise its benefits. Evidence from the DA suggests the creation of demand for air transport and

at the same time the fostering of the emergence of various industries around the airport city has encouraged new investments, new business opportunities and employment among other economic factors. As viewed by stakeholders, the strategy has had an impact on economic growth and thus directly influenced regional accessibility and connectivity. The intention of this study was to provide a better understanding of the aerotropolis strategy and how it can be applied in the South African context, establishing the logistics and infrastructure required to optimise its projected benefits. To achieve this evidence from other aerotropolis developments across Europe, Asia and America has been used. The study incorporated the exploratory research design in which qualitative elements of the study involved the conducting of in-depth interviews and focus groups sessions with a sample of executives, consultants and government officials who have been actively involved in the planning and implementation of the strategy.

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APPENDIX A: ETHICAL CLEARANCE

Mr Ngonidzahe Kenneth Ngwenya
(210546162) School of
Management, IT & Governance
Westville Campus

Dear Mr Ngwenya,

Protocol Reference Number: HSS/0422/0ISD

Project title: Optimising socio-economic benefits through competitive logistics systems, infrastructure and novel concepts for the Durban Aerotropolis

Approval Notification - Expedited

Application With regards to your response received on 03 July 2018 to our letter of 11 June 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its Implementation. In case you have further queries, please quote the above

reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours

Professor Shenuka Singh (Chair)

/ms

Cc Supervisor: Professor MJ Naude and
Professor H Wissink cc Academic Leader
Research: Professor Isabel Martins
cc School Administrator: Ms Angela Pearce

APPENDIX B: INFORMED CONSENT

Dear Respondent,

Doctor of Philosophy (PhD) Research Project

Researcher: Ngonidzahe Kenneth Ngwenya (074 501 1600)

Supervisor: Professor Micheline Naude (033 260 6757)

Co Supervisor: Professor Henry Wissink

Research Office: Ms P Ximba (031-2603587)

I Ngonidzahe Kenneth Ngwenya registered PhD candidate student in the School of Management, IT and Governance at the University of KwaZulu-Natal. You are invited to participate in a research project entitled: *Optimising Socio-Economic Benefits through Competitive Logistics Systems, Infrastructure and novel concepts for the Durban Aerotropolis*

The findings of the study will provide a framework for the role that collectively needs to be played by airport, urban and town planners, logistics and supply chain consultants together with policy makers and investors in fully implementing a successful aerotropolis strategy. Given that there are emerging economies in Africa that are considering the adoption of similar strategy, the study will also provide an overview of what the aerotropolis strategy entails, its key success factors and the systems and infrastructure that should be adopted in ensuring that its full economic and social benefits are realised.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this research project. Confidentiality and anonymity of records identifying you as a participant will be maintained by the School of Management, IT and Governance, UKZN.

If you have any questions or concerns about participating in this study, please contact researcher of or the project supervisors on the details listed above.

It should take you about 60 minutes/s to complete the interview and focus group sessions. I hope you will be willing to participate in this research through allowing to be interviewed.

Sincerely,

Investigator's signature _____ Date _____

UNIVERSITY OF KWAZULU-NATAL School of Management, IT and Governance

Doctor of Philosophy (PhD) Research Project

Researcher: Ngonidzahe Kenneth Ngwenya (074 501 1600)

Supervisor: Professor Micheline Naude (033 260 6757)

Co Supervisor: Professor Henry Wissink (031 260

Research Office: Ms P Ximba 031-2603587

CONSENT

I _____ (full names of participant)
hereby confirm that I understand the contents of this document and the nature of the research project,
and I consent to participating in the research project. I understand that I am at liberty to withdraw from
the project at any time, should I so desire.

I consent / do not consent to having this interview audio- recorded.

Signature of Participant

Date

APPENDIX C: INTERVIEW GUIDES: IN-DEPTH INTERVIEWS

IN-DEPTH INTERVIEW GUIDE

(Proposed Interview Time: 60 minutes)

Date:

Organisation:

Person Interviewed:

Capacity/Position in organisation:

STRUCTURE OF THE INTERVIEW (GUIDELINES)

SECTION AND DURATION	DESCRIPTION AND QUESTIONS
1. Introduction (5 minutes)	<p>The section of the interview is aimed at ensuring that the purpose of the study is clearly defined to the participants and also the interviewees are informed of the scope and objectives of the study and their role in ensuring that the objectives of the study are met. Also it is in this section that the participants will be informed of the confidentiality of the session and that they are allowed to withdraw from the study at any point in which they see fit.</p> <p>Lastly permission will be sort from the interviewees for the sessions to be recorded.</p>
2. Individual Profile (5 minutes)	<p>Section is primarily aimed at ensuring that the respondents selected are ideal for the research objectives and questions of the study. The intention is to ensure that the interviewee is familiar with the aerotropolis concept more importantly the Durban Aerotropolis. The discussions will be around the following questions;</p>

	<ul style="list-style-type: none"> ▪ The organisation in which they are working for and how it fits into the aerotropolis concept. ▪ Their responsibilities and experience in assuming aerotropolis related tasks and activities. ▪ Their overall understanding of the aerotropolis concept.
3. Organisational Profile (10 minutes)	<p>This section is designed to provide a detailed account of the role of the organisation in which the participants represent plays in the Durban Aerotropolis. Considering that there are multiple role players and stakeholders who are actively involved in the concept it is important to determine the role that each of these stakeholders has assumed. The subjects under discussion will include the following;</p> <ul style="list-style-type: none"> ▪ The roles and responsibilities of the organisation in the development and implementation of the Durban Aerotropolis. ▪ Discussion of the nature of work that has been done that is in line with the aerotropolis development. ▪ The extent of involvement of the organisation as far as the Durban Aerotropolis is concerned. ▪ A discussion of the Durban Aerotropolis concept and what it aims to achieve from the context of the organisation.
4. Level 1: Socio-economic needs, demographic realities and spatial and functional elements. (10 minutes)	<p>This section is aimed at ensuring that it discusses the motivations behind the adoption of the Durban Aerotropolis concept in KwaZulu-Natal, South Africa. The idea is to provide a detailed account of the motivating factors such as the socio-economic needs and also the factors that also determine the extent of its adoption such as demographic realities and spatial and functional elements. The key subjects that will be discussed in detail include;</p> <ul style="list-style-type: none"> ▪ An exploration of the factors behind the adoption of the aerotropolis concept for the Durban region (socio-economic variables). ▪ The demographic realities affecting the implementation of the strategy.

	<ul style="list-style-type: none"> ▪ The spatial and functional elements that have contributed to the form and structure of the development.
5. Level 2: Logistics strategies, novel concepts and infrastructural developments (15 minutes)	<p>This section is primarily concerned with the planning involved in the development of an aerotropolis. The key focus is to ensure that all the logistics strategies, concepts and infrastructural developments are discussed. Considering that the Durban Aerotropolis project involves a series of infrastructural developments, the interviewees will be requested to discuss all of these factors and also include an assessment. Some of the discussion points would include the following;</p> <ul style="list-style-type: none"> ▪ The role played by logistics and what strategies have been adopted and are being planned for in order to facilitate the success of the aerotropolis development. ▪ A comprehensive list of all the infrastructural developments planned for the Durban aerotropolis and how these will contribute towards ensuring that the objectives are attained.
6. Level 3: Factor and Demand conditions, firm strategies and supporting industries. (15 minutes)	<p>It is important to also ensure that the respondents provide an account of the factors that are essential in influencing aerotropolis planning. The objective of the section is to ensure that there is a discussion of the following in the context of the Durban aerotropolis;</p> <ul style="list-style-type: none"> ▪ <i>Factor conditions</i> (physical inputs, natural resources, capital, skills and education) ▪ <i>Demand conditions</i> (the composition and structure of the demanding home and global market) ▪ <i>Firm's strategies</i> (structure and competitive position and the main national variables considered are culture, values and education) ▪ <i>Related supporting industries</i> (cluster of companies that in aggregate would constitute an improved competitive environment).
7. Conclusion	<p>This section will be designed to ensure that all the questions are clarified and that adequate responses are provided.</p>

APPENDIX D: WORLD CAFÉ AND FOCUS GROUP SESSIONS GUIDE

SESSION THEME: OPTIMISING SOCIO-ECONOMIC BENEFITS THROUGH COMPETITIVE LOGISTICS SYSTEMS, INFRASTRUCTURE AND NOVEL CONCEPTS FOR THE DURBAN AEROTROPOLIS

Adopting the “World Café Methodology”, the aim of this session is to gather different views from participants from different backgrounds on their understanding of the aerotropolis strategy and how it can successfully position Durban as a competitive destination. The session will be aimed at ensuring that some of the questions of the study are investigated in greater detail.

Structure of the session:

The participants will be divided into their respective groups with each group having a maximum of 5 participants depending on the number of individuals attending the Aerotropolis Masterclass or the Steering Committee meeting, hosts and scribes will be allocated to each group as informed by the “World Café Methodology”. The researcher will ensure that each group is allocated a time to discuss the following sections that will be displayed in each table, the host is meant to introduce the questions but does not direct or influence the nature of the discussion.

Outline of the discussions

Host 1: Kenneth Ngwenya (Researcher)

Scribe 1: To be allocated by the researcher (Research assistant)

The discussions under Host 1 will focus on the following critical questions:

- How does the aerotropolis strategy improve regional competitiveness and optimise socio-economic benefits?
- What are the key decisions and factors considered for airport, urban and business site planning in the development of an aerotropolis?

- What are the logistics and mobility planning strategies adopted in ensuring that the objectives and goals of the aerotropolis strategy are achieved?

Host 2: Hilary Muguto (Assistant)

Scribe 1: To be allocated by the researcher (Research assistant)

The discussions under Host 2 will focus on the following critical questions:

- What are the key logistics competitive factors associated with adoption of the aerotropolis strategy?
- How do spatial and connectivity elements influence the implementation of logistics infrastructure, strategies and novel concepts during aerotropolis planning?
- How does the diamond model of competitiveness influence the decisions implemented during aerotropolis integrated planning?

The sessions are expected to be completed in 1 hour as this would have allowed all the participants to move across the tables discussing the questions.

APPENDIX E: ONLINE QUESTIONNAIRE

An analysis of the economic and social benefits associated with the Durban Aerotropolis.

King Shaka International airport is strategically located between Africa's busiest port and container terminal and has been commissioned as the nucleus of the Durban aerotropolis (DubeTradeport, 2013). It has been identified as one of the strategic economic areas in the KwaZulu-Natal province and consequently efforts have been underway to transforming it into an economic hub. The aim of this research is to ensure that the emphasis on the logistics planning, infrastructure and systems as a result of the aerotropolis concept derives sustainable economic and social benefits for society and business community of KwaZulu-Natal.

Given that state of the art infrastructure connecting road, rail, port and air facilities is the prerequisite of a successful aerotropolis strategy, it is important to determine how this can be significant for the broader economy. The questions contained in this study are entirely aimed for research purposes and your participation will be greatly appreciated.

Section 1

This section is aimed at providing an overview and background of your organization in the context of the Durban aerotropolis and your location within King Shaka International airport.

What business activities does your organization engage in?

- ☐ Manufacturing
- ☐ Transportation, storage and logistics related activities
- ☐ Retail and wholesale
- ☐ Other

How best can you describe the location of your company or organization within the radius of King Shaka International airport.

- ☐ Located at the airport
- ☐ Located within a 10 km radius
- ☐ Located within a 20km radius
- ☐ Located within a 30 km radius
- ☐ Located between a 30km and 50km radius

How best can you describe your KwaZulu-Natal organizational status?

- ☐ Head Office
- ☐ Branch
- ☐ Subsidiary
- ☐ Satellite Office
- ☐ Other

When did your organization locate to this site?

Why did you locate to this site?

Does your organization make use of King Shaka International airport?

- ☐ Yes
- ☐ No
- ☐ Maybe

For what purpose does your company use King Shaka International airport?

- ☐ Air passenger services
- ☐ Cargo/ air freight
- ☐ Other:

Describe your dependence to King Shaka International Airport.

- ☐ Highly dependent
- ☐ Dependent
- ☐ Moderately dependent
- ☐ No dependence

Do you have any interactions with other companies located within the radius of King Shaka International airport.

- ☐ Yes
- ☐ No

Does your organization make use of services or products from any of the following companies?

- ☐ Located in and around King Shaka International airport
- ☐ Located elsewhere in the city
- ☐ Located in the region
- ☐ Located elsewhere in the country
- ☐ Located outside of South Africa

Section 2: Aerotropolis strategy

For a successful aerotropolis strategy the implementation of logistics strategies affecting airport planning, multi-modal transportation and urban and business site planning need to be adopted. The planning begins at the strategic level where the overall description and objectives of the aerotropolis strategy are determined by all the stakeholders and based on these factors the planning and implementation of the supporting logistics elements is then conducted with due consideration of other influences.

This section of the research is aimed at determining the success areas associated with the implementation of the aerotropolis strategy from the perspective of the organization.

Are you aware of the Durban Aerotropolis development?

- ☐ Yes
- ☐ No

How best can you describe an aerotropolis from the context of your organization?

How best can you categorize your organizational dependence to logistics?

- ☐ Highly dependent
- ☐ Dependent
- ☐ Moderately dependent
- ☐ Not dependent

Are you of the view that your organization will benefit from any logistics and mobility infrastructural developments associated with the Durban aerotropolis?

- ☐ Yes
- ☐ No
- ☐ Not sure

What do you think are the benefits associated with airport cities?

- ☐ Fostering regional competitiveness
- ☐ Increased speed to market
- ☐ Reduces lead time
- ☐ Exposes local businesses to external competition
- ☐ Improves connectivity and accessibility
- ☐ Reduces the cost of logistics

From the view of your organization, which of the following do you consider to be important?

- ☐ Expansion and upgrading of major highways
- ☐ Port route optimisation
- ☐ Introduction of shuttle services to and from the airport
- ☐ Advanced communications
- ☐ Air traffic planning and developments of new routes

Section 3: Socio-economic benefits associated with airport developments

The aerotropolis concept has been identified as being influential in contributing to the overall competitiveness of a region and thereby positioning it ahead of other regions. There has therefore been a growing interest among different countries and regions such as Durban and KwaZulu-Natal towards enhancing their competitiveness and influence within the global market. This section of the research study is aimed at ensuring that the benefits associated with the aerotropolis strategy are explored.

Are you of the view that the Durban aerotropolis will have a positive impact on the regional economy?

- ☐ Yes
- ☐ No
- ☐ No sure at this stage

Are you of the view that aerotropolis developments contribute to an improved access to global markets?

- ☐ Yes
- ☐ No
- ☐ Maybe

Do you think projects such as the Durban aerotropolis are the solution to the growing levels of unemployment?

- ☐ Yes
- ☐ No
- ☐ Maybe

Which sectors of the economy do you think will be positively affected by an aerotropolis development?

- ☐ Education
- ☐ Health
- ☐ Logistics
- ☐ Manufacturing

- Property and Real Estate
- Entertainment and Leisure

In your view what are the key determinants of a successful aerotropolis?

APPENDIX F: TURNITIN REPORT

APPENDIX G: STUDY PERMISSION LETTERS


UNIVERSITY OF
KWAZULU -
NATAL



16 March 2018

TO WHOM IT MAY CONCERN,

PERMISSION TO CONDUCT RESEARCH

Mr Ngonidzahe Kenneth Ngwenya is a registered PhD student at the University of KwaZulu-Natal and is conducting a study on the Durban aerotropolis. His topic is:

"Assessing the planning and implementation of enabling logistics systems, infrastructure and concepts for the Durban aerotropolis".

The study seeks to achieve the following objectives:

- To describe the aerotropolis strategy in relation to how it is dependent and influenced by airport, urban and business site planning.
- To illustrate how spatial and functional elements form the basis of an aerotropolis logistics planning strategy.
- To explore the enabling logistics strategies, concepts and infrastructure that are being considered towards planning and implementing the Durban aerotropolis strategy.
- To ascertain the role of connectivity elements towards ensuring that the goals of the aerotropolis strategy are fully realised.

The focus of his study will be on the implementation phase of the "aerotropolis strategy" and its feasibility in a South African context. Focus will be on the planning, designing, locating and synergising intermodal transportation infrastructure. There are a number of strategies similar to the aerotropolis that are currently adopted but not properly implemented and thus their intended economic benefits are not fully derived. This study therefore seeks to aid decision makers towards properly planning and implementing the

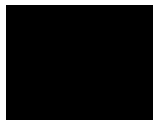
strategy so that the benefits are realised and South African airports are considered as integrated and connected business hubs.

I would appreciate it if you would allow Mr Ngwenya to conduct his study using participants of your organisation. Interviews are expected to take about 45 minutes. An interview guide will be used for this purpose, and should you wish he can provide you with a copy of the interview guide prior to the research taking place.

I am available at any stage to answer any queries or discuss any comments you may have. On behalf of the School of Management, Information Technology and Governance and Mr Ngwenya, I would greatly appreciate it if you would be willing to provide Mr Ngwenya access to your organisation, in order for him to complete his studies.

If you agree to allow Mr Ngwenya to conduct his study at your organisation, please could you sign this letter in the space below?

Yours faithfully



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APPENDIX H: PROOFREADER CONFIRMATION

Caroline Goodier <Goodierc@ukzn.ac.za>

Sep 28, 2020,
5:18 PM

to me, Micheline

Hello, here is the document. Issues that need revisiting are noted in the comments bubbles. Let me know if you have any queries.

What a great feat to have achieved all this, Kenneth! All good wishes as you submit.

Best

Caroline