

South Africa Airside Capacity Enhancement Study for Air Traffic Navigation Services

Task 7 Report: Development Impacts



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LIST OF ACRONYMS

ACES.....	Airside Capacity Enhancement Study
ACSA	Airports Company South Africa
ADS-B.....	Automatic Dependent Surveillance-Broadcast
AFP.....	Airspace Flow Program
AFT	Airspace Flow Tool
ATCC	Air Traffic Control Centre
ATNS	Air Traffic and Navigation Services
CAT.....	Category
CTOT	Calculated Take Off Time
FACT.....	Cape Town International Airport
FALE.....	King Shaka International Airport
FAOR	O. R. Tambo International Airport
GDP.....	Ground Delay Program
PBN	Performance-Based Navigation
PRT.....	Pilot Reaction Time
RET	Rapid Exit Taxiway
RNP	Required Navigation Performance
SA.....	South Africa
USTDA.....	U.S. Trade and Development Agency
VFR	Visual Flight Rules

1 Introduction

Demand for air transport has increased steadily over the past years with passenger and freight traffic growing by 45% and 80%, respectively. While South Africa has one of the more sophisticated aviation sectors in Africa, the African aviation industry is still lagging behind those of the rest of the world. Over the period 2010–2015, Africa will be the third fastest growing region in the world in terms of international traffic. There will be an average growth rate of 6.1%, compared to the global average of 5.8%, and 7.9% and 6.9% for the Middle East and Asia Pacific, respectively, while Europe, Latin America and North America are projected to record lower international passenger growth of 5.0%, 5.8% and 4.9%, respectively.¹

The reasons for this growth are robust economic activity, demographic boom, increasing urbanization, and emergence of a middle class. Air transportation plays a vital role in the country's growth process by accelerating convergence of goods and persons. The contribution of air transport far exceeds that of road transportation sevenfold. Growth in air transportation directly influences economic growth through creation of direct and indirect jobs in the industry and other auxiliary sectors such as tourism and other service sectors. Expansion in air transportation creates market opportunities for local entrepreneurs by creating regional and global economic centres. In 2010, the aviation industry in Africa supported about 7 million jobs (including 257,000 direct jobs) through travel and tourism which translated into R617 billion of the continent's Gross Domestic Product (GDP). Forecasts indicate that the aviation industry's impact on African economies is set to grow. Over the next 20 years, implied job creation by the industry is projected at 879,000.

So as to remain the leading aviation country in Africa, Air Traffic and Navigation Services (ATNS) and Airports Company South Africa (ACSA) have adopted various strategies of ensuring that capacity remains ahead of demand at each study airport: O.R. Tambo International Airport (FAOR), King Shaka International Airport (FALE), and Cape Town International Airport (FACT). The South African Airside Enhanced Capacity Enhancement study is a key tactic of these strategies.

Previous reports in this series have recommended deploying several capacity-enhancing initiatives. The experience within South Africa and throughout the world is that such deployments engender positive and negative impacts in the surrounding areas. This report conducts a qualitative assessment of those impacts, categorising them as follows:

- Infrastructure—Addition or modification of airport infrastructure, such as taxiways, apron areas, runway exists or other airside pavement enhancements
- Human Capacity Building—Creation of jobs or enhancement of skills

¹ African Development Bank Group. *Africa's Aviation Industry: Challenges and Opportunities*. <http://www.afdb.org/en/blogs/afdb-championing-inclusive-growth-across-africa/post/africas-aviation-industry-challenges-and-opportunities-10025/>

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- Technology Transfer and Productivity Enhancement—Sharing or introduction of new systems or processes that enhance the productivity of the aviation stakeholders
 - Market-Oriented Reforms—Institutional, legal, regulatory, standard, and procurement practices
 - Economic—Direct and indirect jobs, income streams, and tax revenue collections at the local and national levels
 - Others—General impacts

2 Development Impacts

Several candidate airside capacity enhancements for the three study airports were evaluated and selected by the study team. The implementation of the enhancements described in the Task 6 report, *Specifications and Recommendations*, (Appendix A), will lead to development impacts that cover a broad range of categories. These development impact factors may provide USTDA and interested parties with a broader view of the potential effects on South Africa's development strategy and potential for future procurement of goods and services in support of the airside capacity enhancements. The study team assesses that the following potential development impacts are likely to result for each of the categories described in Section 1.

2.1 Infrastructure

The implementation of the proposed enhancements appearing in Table 1 contributes to the development and improvement of the physical and financial infrastructure at each airport. The infrastructure enhancements allow for incremental growth in domestic and international air traffic. The enhancements will also result in more efficient use of existing infrastructure, and provide more time before ATNS and ACSA need to begin expansion of physical infrastructure. The additional capacity provided by these enhancements will also generate additional revenue for ATNS and ACSA through user fees from increased demand. Specifically, the enhancements described under the Runway/Taxiway Utilisation efficiency group will require new physical infrastructure to build new Rapid Exit Taxiways (RET), provide additional parallel taxiways and add pavement to extend existing taxiways. As capacity is increased to keep pace with growing demand, it is inevitable that the infrastructure around the three airports will need to be developed in time. New or improved infrastructure should make the airports more appealing to current and new customers, thereby encouraging growth.

2.2 Human Capacity Building

Implementation of the proposed enhancements has a varied impact on human capacity building within ATNS and ACSA, and on the outside workforce. For example, construction of new RETs and taxiways requires a workforce capable of advanced design and construction techniques. While deployment of many of the enhancements will not result in hiring additional workers, they may require additional training of ATNS and ACSA staff for successful implementation and continued maintenance. Specialized training and internship programmes may be designed to train local area residents in adjacent communities to enhance the overall workforce. As demand increases, ATNS and ACSA may need to increase their labour force to accommodate the additional growth; this is certainly the case with the placement of supervisory staff in the Air Traffic Control Centres (ATCC). While the core of the new staff will likely be drawn from the ranks of existing ATNS and ACSA personnel, it can be expected that the required talent pool will also be drawn from the general South African public. The recommendation to implement more Performance-Based Navigation (PBN) procedures is in line with ATNS's strategy to develop its own PBN procedure design capability; the potential for staff development in this arena is significant. With the acquisition of new technologies, it is recommended that ATNS and ACSA enter into agreements with suppliers to engage in human capacity building through training and knowledge transferring

programmes. Human capacity building is especially important to address historical racial imbalances while creating a pipeline of qualified and competent talent. Similarly, attracting and, crucially, retaining highly skilled workers are necessary.

2.3 Technology Transfer and Productivity Enhancement

Implementation of the proposed enhancements requires the use of key technologies that will help ATNS and ACSA improve operational efficiency. Upgrades or procurement of new technologies and the related skill sets for operating the technologies are necessary. Specifically, ATNS will need to procure performance-based technologies, such as Required Navigation Performance (RNP) and Automatic Dependent Surveillance – Broadcast (ADS-B), and traffic flow management tools such as Airport Flow Tool (AFT) improvements, Metron Harmony, and pre-departure sequencing tools. Some of these technologies are already available in South Africa, but will require improvements in order to implement the proposed enhancements. It is expected that the enhancements will improve productivity of ATNS, ACSA and stakeholder workforces.

2.4 Market-Oriented Reforms

The growth of South Africa’s three major airports will require that ATNS and ACSA maintain a strong regulatory framework and increase involvement from all affected stakeholders. The expected increase in operational capacity should assure that South African, American, and other foreign carriers have the opportunity to provide greater and more attractive flight options. As ACSA and ATNS personnel develop their skill sets, the companies will be better able to grow their non-regulated market-oriented businesses in the rest of Africa and globally. An additional benefit of this is that revenue from non-regulated businesses helps to reduce user fees paid by ATNS and ACSA stakeholders.

2.5 Economic

Aviation is a vital part of the South African economy, facilitating the growth of international trade, tourism and international investment, and connecting people across Africa and other parts of the world. Aviation brings about varying impacts on the South African economy.

South Africa’s aviation industry directly impacts the nation’s economy because it is a direct generator of employment and economic activity, particularly in the following areas: airline and airport operations, aircraft maintenance, air traffic management, and in activities directly serving air passengers, such as check-in, baggage handling, on-site retail and catering facilities.

Air transport also has important ‘multiplier’ effects, which mean that its overall contribution to South African employment and GDP is much larger than its direct impact alone. These include employment and activities among suppliers and the air transport industry. Examples include aviation fuel suppliers, construction companies that build airport facilities, suppliers of sub-components used in aircraft; manufacturers of goods sold in airport retail outlets; and a wide variety of activities in the business services sector (such as call centres, information technology and accountancy). For example, over 9.3 million indirect jobs globally are supported through the purchase of goods and services by companies in the air transport industry.

The South African aviation industry induces economic impacts through the spending of those directly or indirectly employed in the air transport sector supports jobs in industries such as retail outlets, companies producing consumer goods and a range of service industries (such as banks and restaurants).

2.6 Others

Significant increases in demand and subsequent capacity enhancements at FAOR, FALE, and FACT will most likely lead to new development opportunities for South Africa, the U.S., and other international developers. South Africa may experience a larger global presence and increases in business and tourism when compared to today's numbers. The increases in aviation passenger traffic to and through FAOR, FALE, and FACT will result in an exponential increase in employment, leading to further social, cultural, and political evolution in nearly all sectors.

The African continent contributes 6% of all worldwide accidents compared to only 3% of all scheduled global commercial traffic.² Furthermore, the accident rate of 7.9 per million departures is the highest of all other continents.² Clearly, there is an opportunity for ATNS and ACSA to play a leadership role by setting the safety standard for all of Africa and to help improve the sub-par safety record of the continent's aviation. As they adopt airport and airspace best practices through the implementation of the recommended airside capacity enhancements, it is to be expected they will influence others in Africa, which will result in safer and more efficient aviation in Africa, to the benefit of all.

² International Civil Aviation Organisation. *2012 Safety Report*. Available at http://www.icao.int/safety/Documents/ICAO_SGAS_2012_final.pdf

3 Potential Benefits

A rise in productivity in firms outside the aviation sector comes through two main channels: through the effects on domestic firms of increased access to foreign markets and increased foreign competition in the home market; and through the freer movement of investment capital and workers between countries. Finally, air transport is a technology-advanced industry heavily involved in the production of high-specification products which drives research and development in a number of areas. This focus on research and innovation across the sector not only leads to more efficient aircraft technology and operational practices — with associated environmental benefits — but also helps build research capacity at universities and skills across society. The benefits to society of research and development spending by the aerospace industry are estimated to be much higher than in manufacturing as a whole — every \$100 million of investment into research eventually generates additional \$70 million in GDP year-after-year³.

³ <http://www.aviationbenefitsbeyondborders.org/economic-growth/overview>

4 Summary and Next Steps

This report assesses the anticipated, aviation-related development impacts of the recommended capacity enhancements. This report reviews the impacts that the implementation of the enhancements may have on South Africa, and evaluates the developmental consequences on ATNS and ACSA, specifically, on the airport communities and all of South Africa.

The airside capacity enhancements evaluated in this report may have additional financial, environmental, cultural socio-economic, and traffic consequences that need to be communicated and addressed in order to eventually measure the benefits and costs of implementation, but those impacts are introduced in Task 3, Economic and Financial Analysis, and Task 5, Preliminary Environmental Assessment.

The Task 8 report, Implementation Plan, will suggest a plan for implementation of the proposed enhancements. Implementation will include a comprehensive joint road map for ATNS and ACSA and a prioritisation of the enhancements based on ATNS and ACSA goals. The collection of reports will hopefully encourage consensus for collaboration among ATNS, ACSA, and other stakeholders in implementing the proposed enhancements and developing strategies for meeting future demand requirements.

Appendix A Recommended Airside Capacity Enhancements

Table 1 lists the recommended South Africa airside capacity enhancements.

Table 1: Recommended Enhancements

Efficiency Group	Capacity Enhancement Category	Impact Area	Candidate Capacity Enhancement Initiative
Runway/Taxiway Utilisation Focus for Greater Throughput	Minimum required separation on final approach	Airspace	<ul style="list-style-type: none"> • Apply Minimum Authorised Separation on Final • Reduce Minimum Separation
	Low Visibility Procedure operations	Airspace	Review Low-Visibility Operations
	Addition of RETs	Airside	<ul style="list-style-type: none"> • Add RETs to RWY03L/21R (FAOR) • Add RETs to 03R/21L, refine Echo, and add additional RET (FAOR) • Add RETs (Rwy24) for direct access to Alpha & Bravo apron gates (FALE) • Realignment of Runway Exits (FACT)
	Near-term Implementation of Master Plan	Airside	<ul style="list-style-type: none"> • Add extended taxiway pavement at the end of RWY03L (FAOR) • Near term implementation of Master Plan improvements (FAOR)
Airfield Operational Efficiencies	Pilot Reaction Time (PRT)	Airspace	Readiness for Imminent Departure (Improved Pilot Reaction Times)
	Increase Holding Point areas and frequency	Airfield	<ul style="list-style-type: none"> • Multiple Departure Line-up Queues • Multiple Intermediate Departure Holding Points • Add CAT I hold lines and allow CAT I holds pre-departure • Parallel By-Pass Taxiway (FACT)
	Intersection Departures	Airspace	Intersection Departures
Efficient Runway & Arrival/Departure Capacity Utilisation	Departure Sequencing	Airspace	Departure Sequencing
	Performance Based Navigation	Airspace	<ul style="list-style-type: none"> • Performance-Based Standard Instrument Departure • Performance-Based Navigation

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Efficiency Group	Capacity Enhancement Category	Impact Area	Candidate Capacity Enhancement Initiative
Efficiency & Predictability in Taxiway Utilisation	Standard Taxi Routes	Airfield	Standard (Coded) Taxi Routes
Balancing of Arrival/Departure Demand	Arrival/ Departure Balancing	Airfield	<ul style="list-style-type: none"> • Arrival/Departure Balancing • Increase mix ops/arrivals on RWY03L/21R (FAOR)
Updates to Airport Flow Tool for Better Airport/Airspace Management	Airspace Review and Redesign	Airspace	<ul style="list-style-type: none"> • Airspace Review and Redesign • Modify Airport Flow Tool (AFT) to do better airspace management, GDPs, AFPs
Efficiencies Based on Conditional Clearances	Conditional Clearances	Airspace	Conditional Clearances
Peak Demand/Non-Std. Ops. Performance Limits & Traffic Management	Limiting Operations During Periods of Day	Airspace	<ul style="list-style-type: none"> • Limit Operations during Peak Periods • Limit Operations of Non-Standard Performance • Tower Coordinator • Traffic Management Coordination
	Utilisation of remote gates (FALE)	Airfield	<ul style="list-style-type: none"> • Utilise remote gates (FALE)
Airfield & Airspace Slot Optimisation	Slot Optimisation and CTOT Compliance	Airspace	<ul style="list-style-type: none"> • Slot Optimisation • CTOT
Traffic Management Coordination	Supervisory staff in ATCC (Traffic Management Coordination)	Airspace	Supervisory staff in ATCC
Airspace/Airport Demand Prediction Awareness	VFR traffic included in traffic demand predictions	Airspace	Use historical VFR demand predictions, or restrict VFR traffic