

Measuring the Concept of Aerotropolis Planning: (A Case Study of Atlanta Aerotropolis)

AUTHOR -MRINAL VAIDYA

Research Scholar, Dept. of urban planning, UTD, CSVTU, Bhilai.

Abstract - Today's world aviation, one of the major focused in global context in economic era is emerging with new concept in 21st century by John Kasarda, to create cluster of aviation linked business development and connecting the world with driving business location. Aerotropolis is a layout of infrastructure, economy centers in the airport. This unique green field plan requires a careful development approach but there is no existing legislation to having public policy particularly for planning and siting of an aerotropolis which covers adequate provision and any irreversible surrounding area & haphazard growth. This paper is dedicated to discuss and show case the recent aerotropolis concept and to prepare sensitive analysis and land use analysis of aerotropolis and also to identify the issues and land use management perceptible plan for long term.

Key Words: aerotropolis, airport city, urban form, urban sustainability.

1. INTRODUCTION:

Airport, with the infrastructure capacity in place, is now poised to enter a new and challenging an "international age" to create network linkage for enterprise at local, regional and global level for self-sustainable and economic development is regarded as the twenty first century's now urban development paradigm. Airport become a powerful source of business model to provide a polycentric metropolitan region with linked mixed-use centres', multimodal corridor, multifunctional district is a new urban form of future market planning with local and global advantage. Aerotropolis planning is not only urban planning; it is also economic planning based on business logic. Aerotropolis and smart urban growth model's to evolving associability, location & in terms of economic of evolved speed, scale and scope in providing benefits to users, investor, tenant, business and region. Re-densification around airports and planned cluster development outwards to sprawl & other haphazard development that detracts from the airport area functionality, sustainability and image.

Aerotropolis is a very dynamic and forward-looking concept, which not only leads to development of an eco-system but also connects businesses, civilizations, and regions across the globe. This phenomenon has led to development of new concept in airports as airport cities to aerotropolis. This trend is now referred to as Aerotropolis a dissent as a major influence on future city development. The earlier run suitable land has now become a major economic development area.

1.1 TOWARDS A SUSTAINABLE AIRPORT CITY FORM & AEROTROPOLIS PLANNING:

The city airport's transformation to airport city has received attention mainly limited to the space-economic, logistics, and transportation infrastructure at a sub-regional node of a polycentric metropolitan region with a cluster of aviation-related industry, business, and commerce. The airport city that is an aerotropolis, however, must be regarded as part of the larger metropolitan region. Discussions of urban sustainability commonly invoke the regional city building blocks and the strengths and vulnerabilities of the aerotropolis as a sustainable urban form of the future are suggested with regional-city building blocks. The challenge is to incorporate features of a sustainable urban form into the airport city district, which consists of structures with large footprints, such as industrial, manufacturing, warehousing, particularly in existing land area surrounding airport terminal buildings. Recall that airports and their ancillary facilities are allocated to the regional city's district in order to sustain the pedestrian-friendly regional-city centre at any scale from village to town to region.

The Lynch-type elements that define the legibility or image of the city form operate at any scale from building to district to region. The elements relevance and the structure of their connections that determine the image of the city is suggested in the discussion of place-making with node vs. place distinction in the airport city literature. Following Lynch, the aviation-centric CBD is symbolically determined not by node alone (i.e. main terminal facility, however prominent), but by the strength of the nodal connections with paths, edges, and the district as a whole. However, the view from the road in

surrounding land-use with dilapidated structures signifies the challenges of inequality and poverty in the sprawling city (Kasarda and Lindsay).

The transformation of the airport city to the regional city provides a pathway toward a sustainable aerotropolis in the twenty-first century. However, the transformation needs the notion of the twenty first century not only as an urban century and an aviation era, as Kasarda and Lindsay characterized, but also as an ecological era. a transit-oriented development argue that mixed housing types that cater to a diverse population, mixed-use center that contains retail, office, and commercial spaces within a walking distance of housing are features of a sustainable urbanism whether or not the center is also a rail-transit or bus rapid-transit stop. Arguably, the regional-city building blocks similarly render a sustainable urban form whether or not air transportation is the dominant mode of a multi-modal aerotropolis of the future.

1.2 MEASURING THE AEROTROPOLIS PLANNING:

1.2.1 Need for measuring aerotropolis planning:

Cities are constantly evolving and at any point of time exhibit their unique character through their urban structure, which can be mapped and measured. Cities have a hidden structure which is to be understood only through analyzing the data, more particularly the land use and population distribution. It became evident in today's context to monitor and manage the special expansion of cities which is more complex now.

1.2.2 Approaches to measuring aerotropolis planning:

Various measure of urban form is developed by researchers, which also include the methods of diagnosis sprawl in an airport city. The indicators broadly represent key aerotropolis characteristics and mainly attempt to study the four aspects;

- i. Resident population distribution over the area measured by density distribution;
- ii. Distribution of area of commercial and recreational activities, services, employment etc.; within the city in relation to the place of residence; measured by diversity.
- iii. composition, mixed land use ,accessibility, size and shape;
- iv. Land use distribution and management also important to restricted haphazard growth and sprawl.

S.No.	Researcher	Research articles	Reviews
1.	Sankaran (March 30,2016)	Eco-innovations in designing eco- city, eco-town, and aerotropolis.	A recent conceptualization aerotropolis to build smart cities with sharp focus of eco innovation and green economy.
2.	Reza banai (Dec.15,2016)	The aerotropolis: urban sustainability perspective from the regional city	The regional city, which are increasing regarded as principle of a durable urbanism, information a multi- criteria frame work towards of urban sustainability assessment of aerotropolis built form.
3.	E- Dineth, J- Perero	A novel approach for planning an aero-city in negombo-katunvayakeperi urban region	Negombo-katunaykeperi urban region to analysis changes of land use as well as development of airport and their impact, needs, short comes are facing, so ultimately requires rapprochement between the airport master plan & strategies.
4.	Abdel El Makhoulfi&Karel David's ,2013	Air, money & space ; How Amsterdam airport transformed the regions.	The main analytical levels: air (development in aviation sector), money (economic performance), space (airport spatial expansion and

			urban planning). Analysis the change of urban form of the airport city, and its effect and consequence on special and economic development in the surrounding area.		misago,2016	African cities	mandatory inclusive socio economic development needs to overcome these popular and intuition cognitions blocks
5.	DebanjeeChaterjee	Environmental guidelines for urban planning and siting of an aerotropolis Durgapur, west Bengal.	It has been made to prepare environmental guidelines for doing sensitivity analysis's and land use suitability analysis for Durgapur aerotropolis	9.	Rose bridge	Rise of the aerotropolis	The rise of aerotropolis is threat to vast tracts of farmland or wildlife habitats as developers seek out green felid development
6.	C.S. Bhuneshwar	Aerotropolis and changing paradigms of global competitiveness and agglomeration economies: a case study of Durgapur and emerging issues.	The aerotropolis with its hi tech amenities is expected to usher in changing paradigms of global competitiveness agglomeration impact for the region.	10.	Aanalagrawal (Nov.-2018)	Developing a successful aerotropolis by using a hybrid model under information uncertainty.	The study about multiple criteria decision making model was applied to explore the key factors for successfully implemented aerotropolis and also particularly from the view point of the long term public policy planning.
7.	PalakAgrawal, Jay Dalal ,2013	Planning proposal for refurbishment and up-gradation of airport in surat, Gujarat.	Surat is the fourth fastest growing city in the world,& its gross domestic is highest in India. In the upgraded surat airport is envisaged to offer direct air connectivity to global destination.	11.	Aanalagrawal (Nov.-2018)	Aerotropolis: the new age of urbanism	Development of eco airport city in Ahmadabad as a major steps towards of climate change and its substantial scope to supply urban airport base development
8.	Jean Pierre	Migration and socio economic development in	Aerotropolis project to successes or at least be for the	12.	M.A Berawi, P. Miraj, A D Adhitya	Improving regional development through aerotropolis	The airport as a city has great role in significant influence in

	Nov. 2018	conceptual design	shaping the layout and structure of the city
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2.0 CASE STUDY:

Hartsfield-Jackson Atlanta International Airport

Hartsfield Atlanta International Airport, when Eastern Airlines introduces flights to Mexico and Montego Bay, the Airport's first international service. Construction begins on the world's largest terminal complex. This \$500 million project would be the largest construction project in the South. The following pages trace the evolution of Atlanta Hartsfield-Jackson International Airport from its beginnings as a dirt racetrack in 1909 to the world's busiest airport today.

- From Racetrack To Major Air Hub: 1909-1948
- The Temporary Terminal: 1948-1961
- Airport For The Jet Age: 1961-1980
- Midfield Terminal: 1980-Today

2.1 OVERVIEW OF THE AEROTROPOLIS CORE:

The Core, at the heart of the Aerotropolis, is critically important to the livelihood of the Aerotropolis Atlanta, and as such, investments here are most likely to produce the biggest ripple effect in the broader focus areas and areas of influence.

VISION: "The aerotropolis Atlanta Cids are committed to creating an economically strong, safe, attractive and vibrant community surrounding the world's most-traveled passenger airport. We are a catalyst for infrastructure enhancement through new investments, project planning, resource management and Partnership development. We seek to raise the collective value of our community's commercial properties while making the Cids a destination for new businesses, residents and visitors." (Aerotropolis Atlanta CIDs Mission Statement)

2.2 TWO DISTRICTS, ONE APPROACH:

The Aerotropolis Atlanta Community Improvement Districts is a combination of the two Airport Area CIDs: Airport West (Fulton County) and Airport South (Clayton County). Representing the commercial property owners in the western and northern area surrounding Atlanta Hartsfield-Jackson Atlanta International Airport in South Fulton County, Airport West CID was formed in 2014. In 2015, the Airport South CID was established and is located south of the airport in Clayton County. Combined, the Aerotropolis Atlanta CIDs



encompasses 15 square miles, including more 1,100 unique properties with a total 2016 appraised value of more than \$500 million. The ARC Regional Economic Competitiveness Strategy lists Hartsfield-Jackson Atlanta International Airport as the region's greatest strength in terms of competitiveness. It is true, that no other region in the world can claim the world's busiest airport. Hartsfield-Jackson Atlanta International Airport ranks fourteenth in the United States in terms of cargo hauled. This is an area that the airport is looking to expand upon, which will have an impact on Employment and transportation needs in the southern half of the region.

The four catalyst areas within the Core are:

- **Airport City** (in the College Park/Georgia International Convention Centre Area).
- **Corporate Crescent** (tying together the concentration of corporate offices).
- **International Gateway** (Mountain View, immediately adjacent to International Terminal)
- **Cargo City** (immediately south of the airport, leveraging goals of the Airport for future improvement)
- Each has a unique opportunity to catapult the vision forward. The following section highlights the key recommendations and strategies that guide development of a competitive and efficient Aerotropolis Core.

Key opportunities and assets in close proximity to the airport form the Aerotropolis Core. They include:

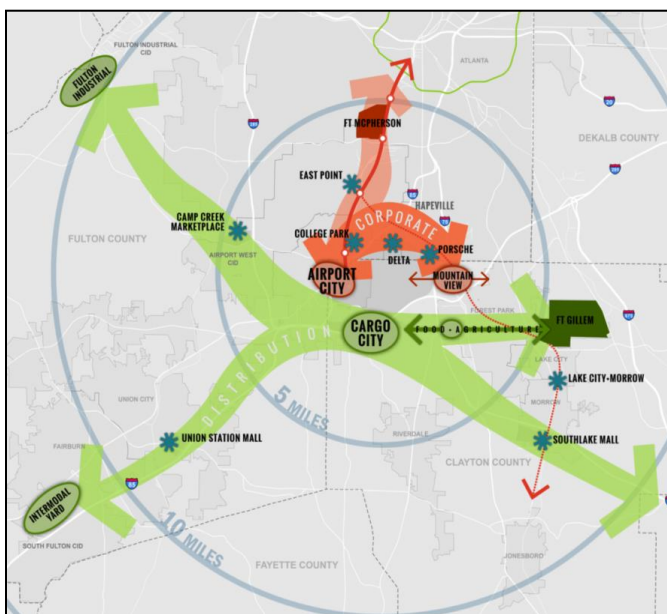
- Historic downtowns of East Point, College Park, and Hapeville.
 - Redevelopment opportunities in College Park and Mountain View.

- Corporate HQs on airport’s northern edge.
- Proposed Cargo City on airport’s south side.
- The Airport City on the airport’s east side.
- Transportation corridors including: the MARTA rail line and I-75, I-85, and Camp Creek Pkwy corridors.

2.3 AIRPORT INVESTMENT AREA:

The Airport Investment Area represents the Hartsfield-Jackson International Airport and the surround area. It is one of the major economic and transportation hubs of the region, as well as one of the main economic generators in the southeast. Development within this area will be more specialized than in other areas due to the proximity to the airport, subsequent economic potential, and land use restrictions.

This area will see increased job growth in the form of class -



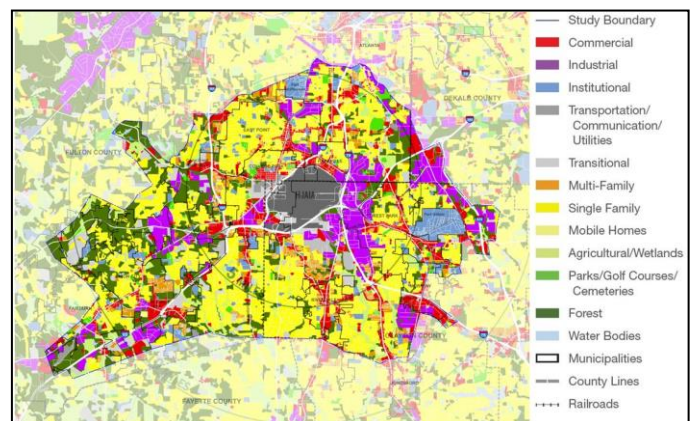
A office and industrial logistics space. While additional residential development in this area is allowed, it is only appropriate in certain locations. In doing so, there will be a need to resolve conflicts between airport activities and surrounding land uses. In 2015, ARC coordinated a planning effort with regional partners and stakeholders within the Airport Investment Area. The Aerotropolis Blueprint embodies a public-private vision for advancing the priorities of the partnership that has formed through the Atlanta Aerotropolis Alliance.

2.4 ANALYSIS:

2.4.1 AIRPORT CITY EXISTING CONDITIONS:

Existing land use within the Aerotropolis area, while the largest percentage of land is housing, a large percentage is industrial (13 percent) and commercial (11 percent). These industrial and commercial areas are largely concentrated along key corridors.

Existing land area:



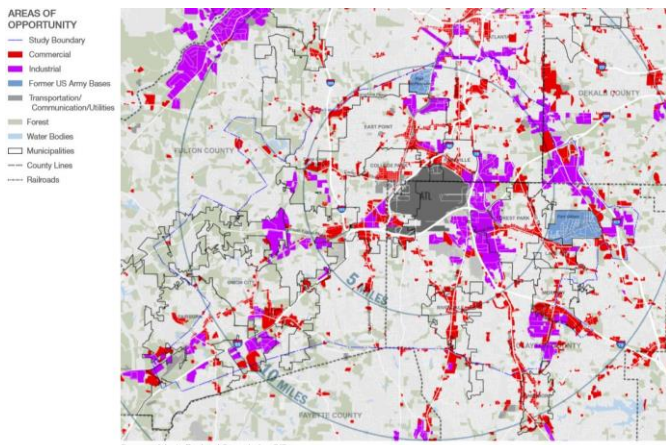
- Residential-38%
- Commercial-11%
- Industrial-13%
- Institutional-5%
- Transportation/communication/Utilities- 7%
- Forest- 16%
- Park/ golf/ cemetery- 16%
- Agriculture/ wetland -2%
- Transitional-5%

In 2014, the airport concluded a two-year master planning effort as part of a federal requirement. The main goal of the master plan is, “To provide a framework to support future airport development to meet forecast demand in a safe, cost effective, operationally efficient, and flexible manner.” A number of strategic priorities from the master plan inform the Blueprint process, including:

- Growing air cargo service and capacity
- Medical tourism and healthcare
- Higher education provider
- World-class shopping destination

2.4.2 AREAS OF OPPORTUNITY:

The areas of opportunities reflect a high-level analysis of commercial, industrial, vacant (forested) land, and large-scale institutional uses like Fort McPherson, Fort Gillem, and the Farmers Market. These areas have the ability to be strengthened and enhanced to support a range of economic initiatives providing employment opportunities to the surrounding residential communities.

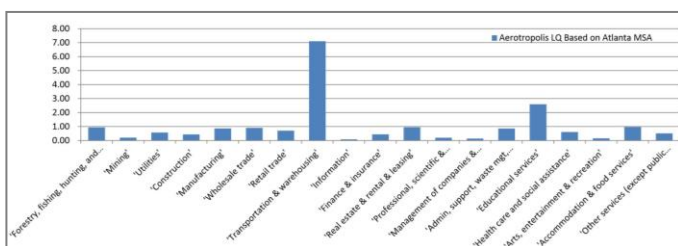


OPPORTUNITY AREA-80.65 SQ MILES.

- Commercial-22%
- Institutional-4%
- Industrial-27%
- Transportation/communications/utilities-14%
- Forest-33%

2.4.3 EMPLOYMENT AND LABOR:

A large concentration of industries within the Aerotropolis is currently focused on transportation and warehousing, administration, educational services and accommodation and food services. While this distribution of industries is largely a result of the airport activities, the surrounding hotel and accommodations businesses draw from both within and outside the area. Within the Aerotropolis, there are two tiers of industry concentration. The first tier is associated with the airport, and the second tier is a result of the historic development of south Atlanta as a more intensive industrial hub with support services and



professions clustering in the area.

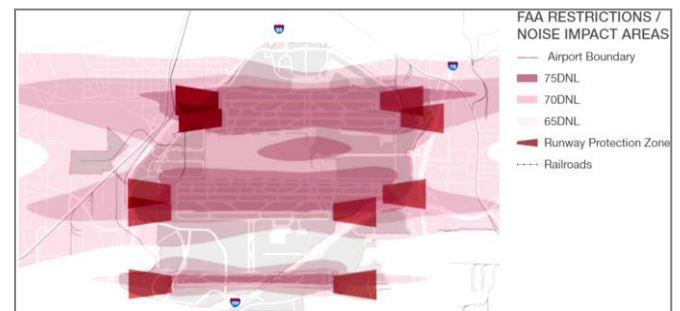
Growth rates and the concentration of industry provide an informed framework for defining economic opportunity for Aerotropolis Atlanta.

2.4.4 WORKER TOTALS AND FLOWS:

TOTALS WORKER	COUNT	SHARE
Employed in the Selection Area	179,480	100%
Employed in the Selection Area but Living Outside	152,193	85%
Employed and Living in the Selection Area	27,287	15%
Living in the Selection Area	100,150	100%
Living in the Selection Area but Employed Outside	72,863	73%
Living and Employed in the Selection Area	27,287	27%

2.4.5 AIRPORT IMPACTS:

In addition to noise and height restrictions, the airport has a variety of environmental impacts that negatively influence the area, including storm water runoff, water quality, and air pollution. The airport has initiated a major sustainability initiative to better mitigate these impacts on surrounding neighborhoods and communities.



2.4.6 FAA RESTRICTIONS:

FAA restrictions in the area limit land uses as well as building heights. Building standards also require mitigation of noise from the airport. All of these requirements increase the cost of building around the airport and ultimately impact urban form.

The top three long-term goals of the airport’s sustainability initiative are:

- Managing resources - such as materials, energy and water - efficiently.
- Minimizing our environmental impact through emissions reduction, waste reduction, green

construction, noise mitigation and land use compatibility.

- Strengthening our partners and community.

2.4.7 GROWTH AND DEVELOPMENT:

2.4.7.1 POPULATION GROWTH (Residential Land Use):

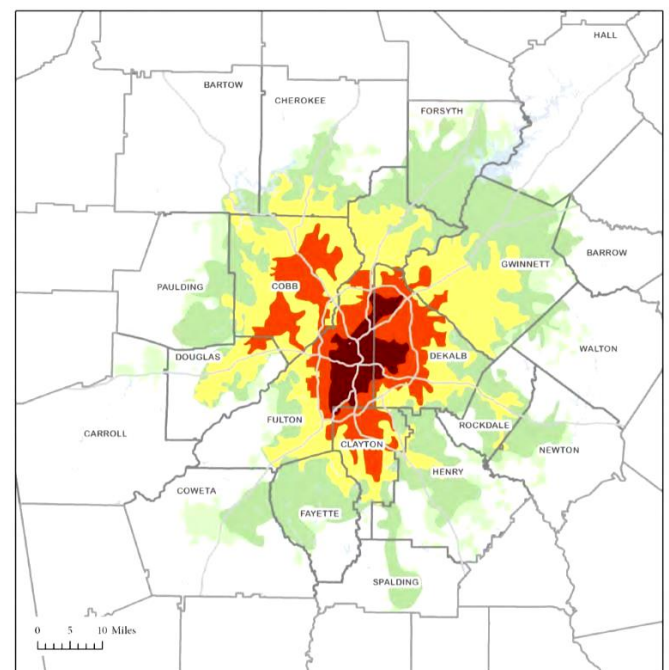
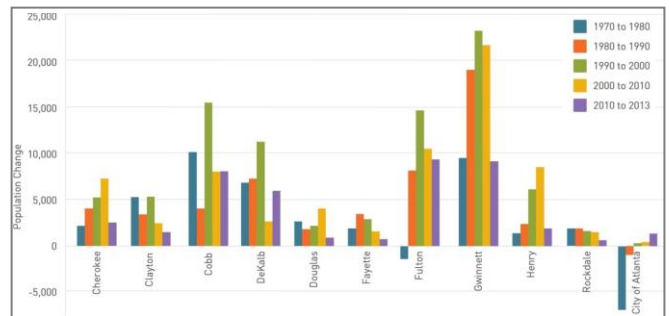
The 10-county Atlanta region added 40,100 new residents between April 1, 2012 and April 1, 2013. This growth is essentially the same experienced during each of the last five years, meaning that growth is still muted when compared to the booming years of the 1990s and early 2000s. As the table shows, the average annual growth since 2010 is less than half of the annual growth experienced between 1990 and 2010.

County	1970	1980	1990	2000	2010	2012	2013	Average Annual Change 2010-2013	Average Annual Change 1990-2010
Atlanta Region	1,500,823	1,896,182	2,557,800	3,429,379	4,107,750	4,179,500	4,219,600	37,283	77,498
Cherokee	77,498	51,699	91,000	141,903	214,346	220,800	223,300	2,985	6,167
Clayton	98,126	150,357	184,100	236,517	259,424	262,300	263,700	1,425	3,766
Cobb	196,793	297,718	453,400	607,751	688,078	699,500	707,500	6,747	11,734
DeKalb	415,387	483,024	553,800	665,865	691,893	700,700	706,700	4,902	6,
Douglas	28,659	54,573	71,700	92,174	132,403	133,900	134,700	766	3,035
Fayette	11,364	29,043	62,800	91,263	106,567	107,500	108,200	544	2,188
Fulton	605,210	589,904	670,800	816,006	920,581	936,100	945,400	8,273	12,489
Gwinnett	72,349	166,808	356,500	588,448	805,321	823,100	832,200	8,960	22,441
Henry	23,724	36,309	59,200	119,341	203,922	209,500	211,200	2,459	7,236
Rockdale	18,152	36,747	54,500	70,111	85,215	86,100	86,700	495	1,536
City of Atlanta	495,039	424,922	415,200	416,474	420,003	421,600	422,800	932	240

2.4.7.2 ATLANTA URBANIZED AREA GROWTH:

The Atlanta region’s urbanized area is just over 2,680 square miles, which is the second largest urbanized area in the United States. While this seems large, the region has expanded at its lowest rate since the 1960s. Also areas identified in past regional plans such as the Dog River

Watershed and Arabian Mountain has been successfully protected from urban development.



2.4.7.3 10-County Population Growth per Year, by Decade:

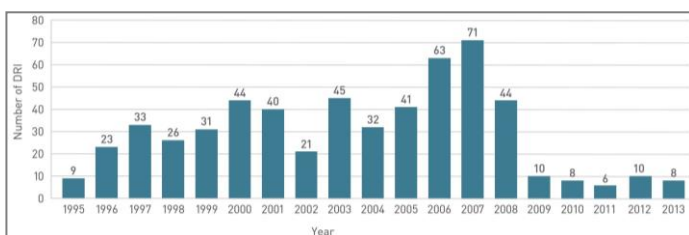
Population Growth Through The Decades The 1990s were booming, as the 10-county Atlanta region added more than 900,000 new residents during the decade, by far the largest net gain in population when compared to other decades spanning back to the 1930s. On a percentage basis, however, the 1950s had the largest gains, growing by some 38 percent between 1950 and 1960.

2.4.7.4 Building Permits Are an Indicator of Population Growth:

Given that residential building permit activity is still at all-time lows, it is not surprising that population growth is sluggish. Permits are on the rise, but again, just rising slowly. There were almost 11,000 residential units permitted in 2012, 4,500 more than in 2011. But, considering the region averaged around 35,000 new residential units each year since 1980, permit activity is still way down.

2.4.7.5 DEVELOPMENTS OF REGIONAL IMPACT:

Under the Georgia Planning Act, development projects that



are likely to have an impact beyond their local jurisdiction are subject to review by the applicable Regional Commission (RC) as Developments of Regional Impact (DRI). This review is intended to improve communication among governments and to provide a means of identifying and assessing potential impacts of large-scale developments before conflicts relating to them arise.

Total Number DRI Reviews per Year, 1995–2013:

4.0 SWOT:

4.1 STRENGTHS:

- An airport is central place in the Network Society.
- Attracting and retaining a wide range of aviation-related business to airport periphery.
- Raising the parent city’s profile and enhancing its reputation as an ideal place live, work, and do business.
- The airport metropolises become an economic generator that is a gateway to international destination and the global market that link regions on global scale.
- Sustainable development of the aviation node in the airport city core is fundamental to fuel its activities, and allow its expansion outwards, into an airport corridor or aerotropolis model.

2.5.2 WEAKNESS:

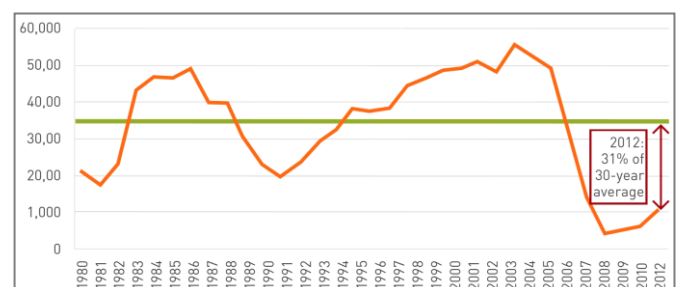
- Investment in long term benefits of risk reduction is overshadowed by opportunity costs of short term projects with immediate gains.
- With limited access points to the airport by road, traffic incidence on key connecting roads can have a dramatic impact on access to the airport for air passenger.
- Changes in the intensity of land use and infrastructure may occur very quickly a consequence of the external environment (e.g.; fuel cost, economic performance; etc.)
- Aerotropolis the most carbon-intensive mode of transport, and aviation one of the fastest-growing sources of greenhouse gas emissions.

2.5.3 OPPORTUNITY:

- Aerotropolis planning is not only urban planning; it is also economic planning based on business logic.
- Airport city and aerotropolis will build on evolving economies of speed, scale, and scope in providing benefits to tenants, users, investor, business and the region
- The future growth of this concept will be led by newer 'Greenfield' airports, employing strategic infrastructure and urban planning and unencumbered by earlier surrounding development.
- A primary interrelationship in the role of infrastructure for the new airport is with land use. A better understanding of how changes in the transportation networks influence the type of and the rate of change in, land use activity patterns in the region is required.

2.5.4 THREATS:

- The rise of the aerotropolis is also a threat to vast tracts of farmland or wildlife habitats as developers seek out Greenfield (undeveloped) sites.
- Political influenced is a threat of airport city development.



5.0 RECOMMENDATION:

The airport area's market potential over the near-term, mid-term, and long-term, as well as general guidance concerning the most likely opportunities for investment and reinvestment. Today's context to monitor and manage the special expansion of cities which is more complex now, so Understanding the spatial organization of an airport to airport city allows planner to:

- Decide the course of action for future development.
- Frame strategies that are integral to existing spatial structure and land use management.
- Influence the evolution of existing structure in manner consistent with planning objective.
- To assess various impacts on its surroundings and need for land use management system near airports.

5.1 INDUSTRIAL:

The Aerotropolis area has seen the highest levels of net absorption, occupancy rates, and rent growth in the greater region since 2000. Sites with proximity to the airport and major transportation thoroughfares should be preserved for industrial development. By clustering industrial uses, the area can capitalize on nearby skilled labor.

5.2 RESIDENTIAL

Forecasted study area population growth will drive short-term demand for residential. New housing should be considered in a variety of types and price points that factor the shifting preferences and evolving demographics of the area. Housing that provides access and proximity to jobs and services is key to the success of the CIDs area.

5.3 RETAIL

Retail opportunities will follow new rooftops and jobs. High visibility locations with access to commuters will strengthen the case for new retail; this also helps to offset lower average incomes in the study area. Mixed-use opportunities should be located in prime locations with access to jobs, housing, and visitors to enhance the region.

5.4 OFFICE

Office development needs to be able to adapt to shifting employee/employer preferences. Opportunities for new office space will be driven by available properties with superior access and visibility, as well as proximity and access to

employee amenities such as trails, parks, shopping, and dining.

6.0 CONCLUSION:

The airport -metropolis becomes an economic generator that is a gateway to international destinations and markets that link regions on global scale. This in turn required specific industry clustering and infrastructure so, land use constraints are summarized as haphazard and fragmented development pattern, coupled with the poor visual quality prevalent along major arterials. The resulting negative public perceptions is further attribution to functional obsolescence, disinvestment in commercial areas, unproductive and vacant land holdings and the derelict condition of a number of multifamily complexes. Airport operated are now increasingly reliant on non-aeronautical revenue.

The study concluded that the measure of aerotropolis or airport city planning characteristics (related to density distribution, transportation network, land use planning). With the steadily increasing air transport demand and the development of airport related industries, the aerotropolis could be an airport strategy trend for stimulating new investment, creating employment and generating new business opportunities. So, there is high possibility that deterrent to achieve sustainable urban development will be at work.

This paper suggest that such analysis can be very informative and useful for understanding the assess various impact on its surrounding the airport and airport area development is planned, high life style development but without considering planning. This reason there should be land use management planning for long term development of area in close context of airports cities.

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