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Analysis of the economic and urban impacts of Quito's new airport

Gonzalo Orellana

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Abstract. The paper tries to understand the economic and urban effects Quito's new airport and related infrastructure is generating, and identify lost opportunities. The new airport is improving air connectivity for both passengers and freight, due to the arrival of new airlines, increase in existing operations and a shift to bigger planes. The airline's adaptations are also contributing to increases in the number of international visitors, local residents travelling abroad, foreigners living in the city, exports growth and diversification, along with generating several employment opportunities helping to consolidate it as a sub-centre of economic activity. Nevertheless, there have also been some missed opportunities. The economic impact

which could have been amplified if the Export Processing Zone had been developed as initially planned, resulting in more jobs for local dwellers. The new airport is also increasing the lure of Tumbaco valley as a residential area, a rise that has not been fully addressed by the local government in terms of land price and use, creating opportunities for speculation and fragmenting rural communities. This situation could have been avoided with an appropriate mechanism of land value capture. The new roads constructed to connect the eastern valley & the Central Business District are designed largely for use by private cars, and could prove insufficient for future demand without creating a public transport alternative.

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List of acronyms.

CBD Central Business District

LAC Latin America and the Caribbean

PSP Private Sector Participation

AZ Administrative Zone

CAGR Compound Annual Growth Rate

ACI Airport Council International

INEC Instituto Ecuatoriano de Estadísticas y Censos

BRT Bus Rapid Transit

CEM Contribución Especial por Mejoras – Betterment Tax

EPZ Export Processing Zone

FDI Foreign Direct Investment

1. Introduction

Quito is a city with a complex topography located in a valley at 2,800 metres over sea level. The city can be characterised as a monocentric city, with a Central Business District (CBD) or “Hipercentro” as it is known locally, that accounts for 38% of the jobs in the city (Quito’s Mobility Survey, 2012).

During the past 30 years the city has expanded to the eastern valleys situated at lower altitude levels, changing the traditional elongated shape of the city. This extension of the urban limits has increased mobility needs and created significant transport challenges that are yet to be addressed.

Quito’s new airport started its operations in February 2013 and is having several economic impacts in the city. The impacts are a result of the improvements in air connectivity for both people and cargo, and by changes in the surrounding area, such as: land use, land price and increase in population. The new airport has the potential to create an economic sub centre that would reduce

the concentration in the “Hipercentro” and might help reshape the urban structure. Nevertheless, if the increase in mobility needs created by the new airport is not matched with an expansion in the public transport network, then it could also lead to an increase in the use of private cars and its accompanying problems.

The aim of this paper is not just to understand the economic effects that the new infrastructure is producing, but also the opportunities lost by Quito when the airport and related infrastructure were planned and built. It also seeks to contribute with ideas to increase the airport economic potential, the positive impacts in the vicinity and to improve connectivity between the new business district and the rest of the city, given Quito’s challenging topography.

This paper will use secondary data as its main source of information, acknowledging that due to the recent operation of the new airport, some of its impacts are still unknown or too early to be measured.

2. Literature review

2.1 The role of infrastructure in economic development

According to Kessides (1993) infrastructure contributes to economic growth and development by reducing inputs costs; through increasing competitiveness, and also by rising quality of life. In the following paragraphs these elements are explored.

The most evident contribution of infrastructure is the reduction of intermediate inputs costs such as electricity, transport or water. As mentioned by Kessides (1993, p.10): *“If enterprises are unable to realise the benefit of efficient generation of infrastructure services, either because the services are absolutely unavailable or provided so unreliably as to be virtually unavailable, the firm is forced to seek higher cost alternatives which may have unfavourable impacts on profits and the level of production”*.

These extra costs are not equally distributed, being particularly burdening to small and medium enterprises or the informal sector.

The next important role of infrastructure is the boost in competitiveness by increasing the capacity of countries to engage in international trade, an element particularly relevant in the case of airports. In recent decades the significant increase in trade had created interlinked industries highly dependent on efficient logistics and high quality infrastructure. The lack of such infrastructure would pose serious limitations on the capacity of countries and cities to successfully trade its goods and services in international markets.

As infrastructure has direct effects on production costs and hence profitability, it could also become an incentive to economic diversification. The production and export of certain goods becomes possible only when key infrastructure is in place.

The other significant effect of infrastructure in development is related with welfare and comprises three effects explained by Kessides (1993, p.18): *“First, infrastructure has a basic consumption value, and as such affects the utility that persons realise from their existing income; second, infrastructure affects labour productivity and access to employment, and thus the capacity to earn future income; and third, it affects real wealth”*.

Regarding the first effect, infrastructure services are a means to acquire goods and services. In the case of airports, the impact would manifest basically in lower flight costs and higher access to the benefits generated by travel. Infrastructure also increases the capacity of people to engage in income generating activities and improves labour productivity. The direct and indirect capacity of airports to create jobs will be addressed later in this section, but it is important to highlight that by supporting the development of new industries and the creation of trade, airports contribute to generate employment opportunities and potentially to poverty alleviation. It is important to consider that the contributions of infrastructure to economic growth, as Kessides (1993, p.2) mentions *“derive not from the mere existence or creation of the physical facilities but from their operation and the value of the services it generates”*. This highlights the relevance of the operation model behind infrastructure and how it links with the productive sector.

2.2 The role of airports in economic development

Airports play a significant role in the world economy, as connectors of people, enablers of international value chains and economies of speed, and trade gateways for landlocked cities. Kasarda (2013, p.1) explains that: *“the increasingly turbulent, fast-paced, globally networked economy has made speed, agility and connectivity the competitive mantra. Airports have become magnets for time-critical manufacturing and distribution, entertainment, tourism, and corporate offices, among others, that require speedy, long-distance connectivity.”*

Kasarda (2013, p.3) takes the role of airports to a higher level when he proposes the concept of *aerotropolis*, which are urban areas build around them. This *aerotropolis* involves two elements: *“Its spatial elements consist of aviation-oriented businesses and people that cluster near the airport and outward along connecting transport corridors, generating observable form. Its functional elements include the spatial elements as well as businesses and business people who may be widely dispersed throughout the metropolitan area or cluster at points some distance from the airport but nonetheless are highly dependent upon it for time-critical access to their global suppliers, customers or enterprise partners.”*

Airports' positive effects

Authors, such as Kasarda or Button and Taylor have conceptualised the economic impacts that airports generate:

Direct or primary: effects coming from the direct and immediate benefits for the region of the creation or expansion of airport services. These effects are associated basically with the building, expansion and operation of the airport capacity. Indirect or secondary: effects associated with the employment, income and tax revenues the airports generate such as: taxis, travel agencies or hotels. Induced or tertiary: effects related with the business revenues generated by the expenditures of those directly and indirectly employed as a result of air service. *"Tertiary effects stem from the stimulus enjoyed by a local economy as the result of firms and individuals having international air transport services at their disposal"*, Button and Taylor (2000, p. 214). Catalytic or perpetuity: effects that include the employment and economic activity generated by firms located around the airports. If new business is done *"in a sufficient number, airport service development can lead to the crossing of important thresholds in terms of economies of scale, scope and density"*,

In an analysis done by Button (2002) regarding the role of airports, especially those that are considered as hubs of major airlines, the conclusion is that air passenger traffic has a positive effect on employment in the surrounding areas. In terms of direct employment, there is an often quoted and industry accepted figure of 1,000 jobs per 1 million passengers using the airport. Although according to Robertson (1996, p. 82), this number *"masks wide variation in employment in different airports. More jobs than this average can be achieved by factors such as airlines establishing bases, maintenance facilities, freight operations and airport related uses being allowed on-site"*. Regarding indirect employment opportunities Robertson (1996, p. 82) suggests *"indirect jobs are generated typically in firms supplying goods and services to the various airport activities. These jobs can amount to an additional 10-20% of on-airport employment"*. Of course this percentage differs considerably between airports. In a study done for Schiphol by Hakfoort (2001, p. 595), he explains how the additional employment rate for Amsterdam airport is 100%. One important feature of the jobs created by airports is that a significant share of employees live in the vicinity. In the case of UK airports for example, between 80% and 90% of employees live within 30 minutes' drive, according to Robertson (1996).

Another relevant aspect of airports as employment generators is the wide variety of jobs it can create. Following Robertson's (1996, p. 83) analysis for UK airports, he established that: *"Airports support different types of jobs across more industrial sectors than almost any other single economic activity, covering construction, air freight, hotels, transport and maintenance, as well as attracted*

industries such as electronics, pharmaceuticals, information technology and finance. Airport operations also provide a good spread of job opportunities, with a mix of full-time, part-time and seasonal employment. These jobs are neither predominantly low-skilled nor highly trained and offer opportunities for local employment".

Airports also make cities and regions more attractive both for business location and as a place of residence. Halpern et al. (2011, p. 1145) highlights the positive impacts due to improvements in *"regional economic competitiveness as a result of an airport ability to promote export activities including tourism, enhance business operations and productivity, and influence company location and investment decision"*. Other authors like Sellner and Nagl (2010) also mention the impacts it can have on Research & Development (R&D) and education.

Robertson (1996, p. 87) concludes that *"International transport links are one of the critical factors that influence the international recognition of a city"*. An evidence of the lure that airports can have on firms can be seen in Tomkins et al. (1998, p. 243) who cited a survey done by the Commission of European Communities and highlighted that *"proximity to an airport is frequently cited as critical or important factor in the location decision of firms"*. Following the same idea Button and Taylor (2000, p. 214-215) mention an analysis done by Ernst & Young regarding the location decision of 57 companies in Europe and found out that *"the air transportation network was the third most important factor in the decision process. The study concluded, however, that air services were much more important for service sector companies"*.

According to Wei (2008) an increase in operational capacity creates direct benefits like smoother operations: greater punctuality of flights and less congestion, and indirect benefits derived from the airline's adaptation to the new facilities. Jorge and de Rus (2004, p. 313) also identify the benefits of increasing capacity for both passengers and cargo: *"reductions in travel, access and waiting time; improvement in service reliability and predictability; reduction in operating costs and finally, increases in traffic"*.

Airports provide valuable services to the local population, facilitating holidays, studies and business in other locations. Halpern et al. (2011, p. 1145) compile the *"impacts relating to regional accessibility and social development as a result of an airport's ability to secure access to regions, provide residents with opportunities to travel (e.g. work or leisure, to maintain contact with friends or relatives or to access services such as health and education) and influence resident location and retention"*.

In terms of cargo, air travel represents a growing and already significant role in the world economy, according to Kasarda (2013, p. 7-8) *"air cargo and air express are*

the preferred modes of international shipping for higher value to weight transactions in microelectronics, medical instruments, smart phones, digitized auto parts, optic and small precision manufacturing equipment, along with high value perishable such as seafood, fresh cut flowers and biomed."

In recent years airports have also evolved into major commercial hubs by concentrating stores attracted by the number of potential consumers, airport users' income level, time spent while waiting for their flights, and specially the duty-free status within airports. According to the webpage *Statista*, in 2016 the expected duty-free sales worldwide would be \$65bn and they expect to reach the \$80bn mark by 2020. To evidence its role as shopping hubs, it can be observed how in 2014 airports such as Incheon (\$2bn) or Dubai (\$1.9bn) posted record sales (*The Travel Retail Business* magazine).

Larger airports do not limit themselves to offer just commercial spaces. As mentioned by Kasarda (2014, p.12) *"passenger terminals are becoming urban social realms in addition to commercial realms, as they increasingly offer leisure, entertainment, cultural, and recreation venues"*. The aim of maximising airports' economic performance is the result of a change in management. In the last couple of decades many countries in Latin America, Asia and Europe have allowed the participation of private companies in the operation, management and construction of airports, attracting managerial skills and resources - \$32bn between 1993 and 2008 (Serebrisky, 2012).

Airport externalities and limitations

Airports are of course not immune to criticism; the most common being related with the externalities they generate, such as pollution caused by aircrafts emissions, aircraft noise and airport access congestion. The severity of the externalities will of course depend on several factors as listed by, Nero and Black (1998): land use with respect to the approach and departure flight paths, type of aircraft, wind direction, acoustic insulation of properties surrounding the airport, time of the day when flights occur and number of aircrafts in operation. There are other relevant aspects such as its contribution to urban sprawl or its elitism due to its focus on high income users.

Noise is normally the most prominent externality, and the one that receives most attention from airport management; Puschel and Evangelinos (2012, p. 598) justify this because its impacts *"range from relatively short-term annoyance effects like interference with communications and reduced school/work performance to indirect, long-term health effects such as sleep disturbance, hearing impairment, increased risk of hypertension as well as cardiac infarction"*. Several mechanisms have

been developed in order to tackle this problem, such as: noise tax, cap on number of aircrafts, bans during the night time and compensation schemes to dwellers affected by noise.

Several studies have been done to understand the impact that airport externalities play in the residential property market of the surrounding areas. For example in the case of Dusseldorf, Puschel and Evangelinos (2012, p. 603), found that noise led *"to a 1% rent reduction per additional decibel of airport noise"* in properties close to the airport. On the other hand, for the case of Manchester airport, Tomkins (1998, p. 254) found that *"closeness to airport appears to be a more important determinant of residential property prices than airport noise, and that it appears to be a positive rather than a negative attribute in term of net impact"*.

One of the most relevant changes in the air travel industry in the last two decades has been the increasing role that security plays in its operations, as a consequence of the terrorist attack on September 11, 2001. Although those attacks forced the industry to improve the security in both planes and airports considerably, they remain as Charles et al. (2007, p. 1018), defines: *"potential targets for terrorists or other criminal activity"*. The latest attacks on Brussels and Istanbul airports are a tragic evidence of this. The security threat is not limited to terrorist and criminal activity, but also military ones. The proposed concentration of industrial, commercial and office buildings in its vicinity, by authors like Kasarda, could be risky considering that airports are traditional targets during military conflicts.

Another relevant critique of airports comes from the sustainability debate, considering that planes are a transport mode that relies completely on fossil fuels. Charles et al. (2007, p.1017) describes how the role of increasing air travel in the global economy:

"Represents an investment in an unsustainable mode of transport, powered by an unsustainable fuel source, transporting unsustainable components. Thus the increased emphasis on air transport vis-a vis terrestrial forms of bulk transportation, specially shipping, carries with it the threat of focussing too much of our energy on a transport system that may not necessarily survive in its present form".

Finally, it is important to mention that air connectivity is a feature of globalization and an interconnected world economy. In that sense, anything that becomes an obstacle for further globalisation, e.g.: protectionist trade measures like tariffs or other restrictions, limitations to the free flow of people and setbacks on economic integration processes like Brexit, could heavily impact the air travel industry.

The critiques already mentioned contribute to the debate regarding the sensibility of designing an urban area or basing the economic development of a region on the shoulders of airports and air transport. It cannot be assumed that the recent evolution of airports as transport, commercial and business hubs will continue at the same pace; or that the rapid growth in air travel for both passengers and freight observed in the past decades, will remain in the future.

2.3 Urban structure

The emergence of a Central Business District (CBD) in a city can be explained by the existence of economies of agglomeration and communication. The characteristics of a Central Business District are described by Anas et al. (1998) as: being the area with the highest presence of jobs in the city, and having a higher density gradient than other areas of the urban space.

Eberts and McMillen (1999, p. 1457) define agglomeration economies as *“positive externalities that lower the production costs of one establishment as the output of other businesses increases. The externalities result from businesses sharing nonexcludable inputs, such as common labour pool, technical expertise, communication and transportation networks”*. A similar argument can be made about communication economies, Eberts and McMillen (1999, p. 1462) explain how *“firms locate near each other to reduce the cost (both to themselves and their customers) of obtaining information. An important role of communication economies is to increase the rate of technological innovation in urban areas”*.

Agglomeration economies are related to the existence of internal economies of scale in production process. The economies of scale can also be external to firms, in

which case the positive effects of such interactions are known as economies of localization and urbanization, depending if the economies of scale appear in firms of the same industry or across industries.

These externalities can be the outcome of lower transportation costs, the presence of public goods, as suggested by Stiglitz (1977), the durability of existing buildings and the actual size of production facilities. Papageorgiou and Smith (1983) complement this list with the role that spatial inhomogeneities play in the configuration of an urban area. Spatial inhomogeneities refer to the factor diversity in different locations; very often CBDs are located around access to natural resources such as minerals, water or climate or around man-made facilities, such as port, train, airport and other transport hubs.

Eberts and McMillen (1999, p. 1487) also highlight the role of infrastructure in the creation of agglomeration economies: *“a) as an unpaid factor of production, b) enhancing productivity of other inputs, c) attracting inputs from elsewhere; and d) stimulating demand for construction of infrastructure and other services”*. Some of these impacts are very relevant for an airport analysis.

When cities grow, dispersion becomes an important force contributing to shape the physical form of any urban area. Dispersion occurs for many reasons, including high transportation costs into the city centre, excessive congestion or high land prices. As described by Anas et al. (1998, p. 1455) *“Our theoretical review suggests that urban subcenters, like cities themselves, are formed from the tension between agglomerative and dispersive forces. Both sets of forces entail strong externalities – external economies producing the agglomerative tendencies, and congestion or nuisance externalities limiting the size and density of the agglomeration achieved”*.

3. Quito's new airport

3.1 Project background and context

A new airport for Quito was part of the public debate for a long period. In the late 1960's, several areas outside the city were identified as potential locations to build it and in the Plan Quito of 1980 the current location was defined (Bayon, 2014). The need to relocate the old airport, built in the 1950s, increased with the continuous city growth which ended up surrounding the airfield, making its operation more dangerous and amplifying the negative impacts of pollution and noise.

During the 1990's, a decentralization process started in Ecuador, which translated into local governments in the two biggest cities (Quito and Guayaquil) receiving the mandate to manage its airports. Both cities decided to transfer the airport operations into private hands. In the case of Quito, this process included building a completely new airport due to the restrictions that the old one posed: terminal size, runway length, security concerns due to its proximity to populated areas and the impact of its externalities.

The decision of transferring airport management and operations into private hands was a common policy in several cities in Latin America and the Caribbean (LAC). Actually, with the exception of Brazil, most countries in the region opted for Private Sector Participation (PSP). According to Serebrisky (2012, p. 5) "LAC was a pioneer in introducing PSP in the airport sector", this led to significant levels of investment in this sector during the period 1993-2008. Using data from the World Bank's Private Participation in Infrastructure, Serebrisky (2012, p. 5) points out that "LAC region accounted for 30% of world investment commitments in the airport sector". Ecuador played a relevant role in that investment, and a significant part of it can be attributed to Quito's new airport, as can be seen in table 3.1.

It is also important to consider Ecuador's economic situation during the concession process. In 1999-2000 Ecuador faced what was probably the deepest economic crisis in recent history, with GDP contracting 5%, inflation reaching 91%, and public debt over GDP reaching 85%, according to Ecuador's Central Bank. This crisis had several impacts on Ecuador's economy, the most significant being the adoption of the U.S. Dollar in replacement of the Sucre (local currency for 116 years) as the official currency in order to tame inflation and avoid rapid devaluation. It was under this complex economic scenario that

Quito's local government decided to look for a private partner to develop one of the most ambitious infrastructure projects at the time.

The mechanism chosen was a "Swiss challenge" scheme, where a private bidder proposed a price for building the infrastructure and other actors could make a challenge and propose a better offer. The bid attracted only one actor that in the end received the concession in 2003. The winning consortium Quiport included companies such as: AECON, HAS Development Corporation, ADC and AG-CCR, which obtained funding from: Inter-American Development Bank, Deutsche Bank, OPIC and the Canadian Commercial Corporation (Ortiz, 2013).

The process suffered several critiques at the time of the concession, with voices arguing that the project was not a good deal for the city. A special investigation by the General Attorney was opened, finding no wrongdoing.

Table 3.1. Private investment Commitments to Airport Sector in LAC Region (1993-2008). Source: Serebrisky (2012)

Country	Investments (US\$ Millions)	Share Of Total (%)
Mexico	3223.9	33.9
Argentina	2375.4	25.0
Colombia	1224.3	12.9
Ecuador	665.0	7.0
Peru	430.0	4.5
Dominican Republic	350.0	3.7
Chile	345.0	3.7
Uruguay	195.0	2.0
Jamaica	175.0	1.8
Costa Rica	161.0	1.7
Venezuela	134.0	1.4
Honduras	120.0	1.3
Bolivia	116.3	1.2

ing. Nevertheless, the deal was renegotiated by a new city mayor elected into office in 2009, which resulted in an almost complete paralysis of the construction for around 18 months (Ortiz, 2013). Under the new arrangement, the annual dividends paid by the private operator to the local government, increased. The initial conditions of the agreement were improved under the renegotiation in 2010, proving the legitimacy of some of the critiques. Nevertheless it is important to consider that in 2003 when the deal was signed, there was little international appetite for investing in Ecuador and the local government had few options to build a brand new airport.

During the construction phase there were also conflicts with the local communities surrounding the project. Quito's Metropolitan District is divided in 8 Administrative Zones (figure 3.1), Tumbaco being the one where the new airport is located. The Administrative Zone of Tumbaco (AZ Tumbaco) is further divided in 9 *parroquias*. Tababela, the one hosting the airport, has been traditionally a

scarcely populated rural area where most of the dwellers work in the agriculture sector (Ponce, 2011). Some of the issues raised by the community during the construction period were: dust effects on agriculture products during construction period, reduction in water availability and the lack of jobs for local people (Bayon, 2014).

As part of the context, it is also important to understand the physical expansion of Quito in the recent decades. The expansion process observed during the 20th century, started when people moved from the old town and initial CBD, built during the colonial period (16th to 18th centuries) into the north and south edges of the city. The relocation had different characteristics depending on the area; with the northern part of the city being preferred by high income families, and the southern zone appealing to middle and low income families and those migrating from rural areas (Bayon, 2014). The southern part of the city attracted industrial plants and the north concentrated private and public offices that created a new CBD.

Figure 3.1. Quito Administrative Division by Parroquia. Source: Quito Metropolitan District webpage.



3.2 Project characteristics

The main objective of building a new airport outside the city was to take full advantage of a significant increase in airport capacity. Jorge and de Rus (2004, p. 317) summarise the impacts of an increase in airport capacity in three elements:

“Firstly, it enables an increase in the potential passenger and freight capacity. Secondly, it makes it possible to increase flight frequency, benefiting all passengers travelling through the airport. These benefits result from the greater choice of departure time. Thirdly, as departure frequency increases the average size of aircrafts using the airport may change”.

As can be seen in table 3.2, the altitude reduction and the increase in the runway length are considerable improvements in the new airport, which now allows for bigger planes to operate. The new generation planes require longer runways to take-off and land and its operation are better in lower altitude.

The second significant change is the increase in the size of both passenger and freight terminals, reducing the time to board and load the planes and eliminating the limitations that characterized the last years of operations in the old airport, as we will see in the next section of this paper.

The other relevant objective of moving the airport outside of the city was to improve the security conditions. Several aspects of the new airport make it safer, as can be seen in the table 3.3. Probably the most relevant is the space surrounding the runway, which creates an enormous buffer zone between the airport and populated areas, reducing the impact of its externalities. The new airport was also built using the latest available technology which translates into a better capacity to resist natural disasters like earthquakes or fires.

Table 3.2. Features of the new airport. Source: Gestion Magazine No 225 and Quito International Airport webpage.

The altitude of the airport reduced from 2,820 metre over the sea to 2,400.
The length of the runway increased from 3,120 metres to 4,100m.
Space to build a second runway in the future if needed.
Parking spaces increased from 380 to 1,000.
Passenger’s Terminal increased from 28,000 squared metres to 46,000 metres (in the first state).
Freight area grew from 15,000 squared metres to 42,000 squared metres, taking the total annual capacity to 249,53 metric tonnes, a significant increase from the 149, 718 MT of the old airport.
Freight capacity in the new airport allow cross docking from trucks directly into the cold rooms and then the airplanes.
The average time required to process passengers in a plane reduced 30% due to a higher number of counters, security filters and immigrations posts.
There is a special development zone and technological park planned as part of the project (207 hectares).

Table 3.3. Security aspects of the new airport. Source: Gestion Magazine No 225 and Quito International Airport webpage.

The extension of the airport increased significantly from 126 hectares to 1,500.
Structure designed to cope with a 9 degrees in Richter scale earthquake
Capacity to resist a fire of 700 degrees temperature.
Better lighting technology compliant with international standards.

4. Economic impacts of the new airport

The most direct way in which airports contribute to economic development is through the increase in air connectivity. As illustrated in figure 4.1 we can observe how both international passengers and cargo surged with the opening of the new airport. During the last ten years of the old airport operations, the compound annual growth rate (CAGR) was 7.3% for passengers and 5.7% for cargo. During the first three years of the new facility, the compound annual growth increased to 10.6% for international passengers and 10.7% for freight.

4.1 Employment opportunities

In order to understand the impact the airport is having in terms of jobs in the neighbouring area, it is important to have an idea of the labour market size before its opening. Using information from the *Quito Mobility Survey* done in 2012, it can be observed in figure 4.2 that

only 7% of jobs available in the city was concentrated in the AZ.Tumbaco, before the operation of the new airport. Although it had the third highest jobs/people ratio (0.35) in the city, after the CBD (0.72) and the old town (0.47) where several public sector jobs and commercial activity still take place.

According to the local newspaper *El Comercio* (2015), two years after its inauguration the new airport employed around 7,500 people, significantly higher than the previous 5,000 at the old airfield. When compared with the 58,000 jobs available in the AZ Tumbaco in 2012 (*Quito Mobility Survey*), the airport contributed with a 13% increase.

Figure 4.1. International Operations Growth: Old versus New Airport (2003-2015). Source: Quito Tourism Bureau (2016a)

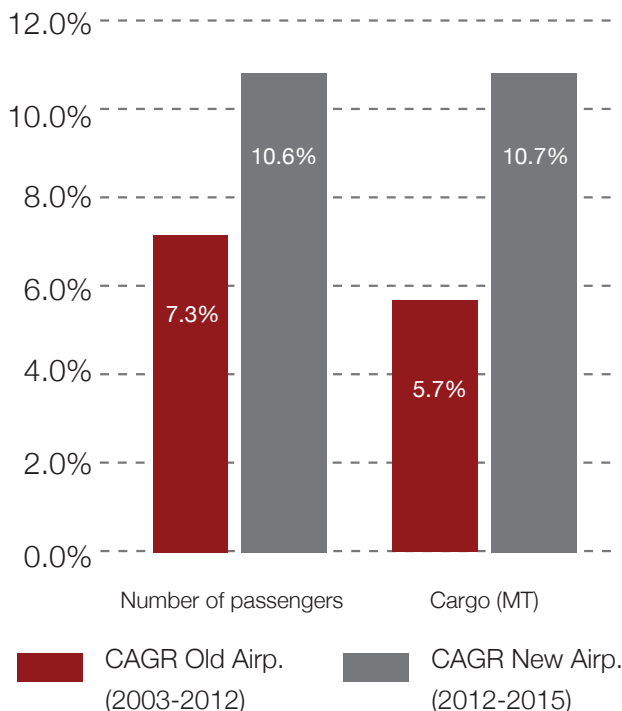
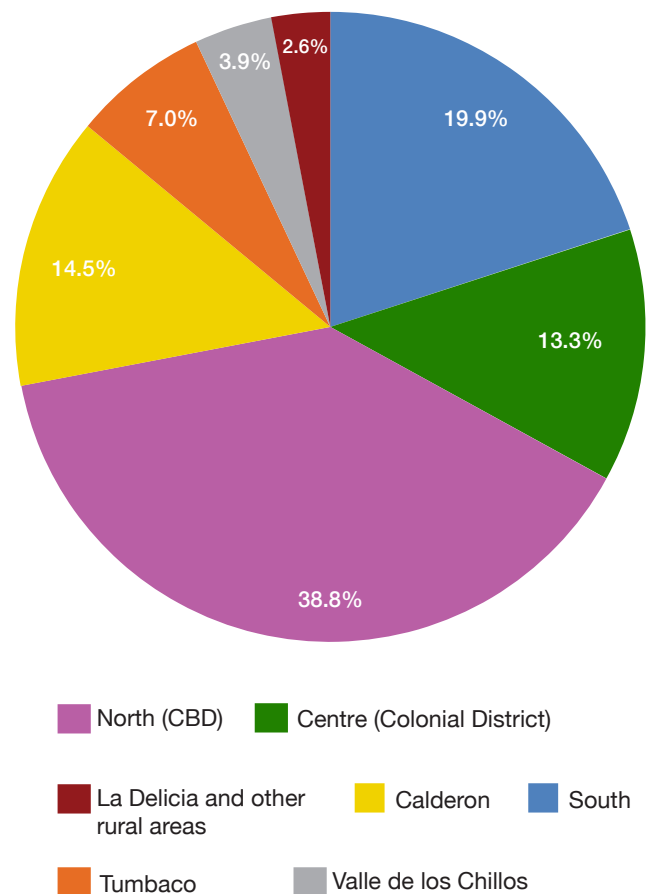


Figure 4.2. Jobs Share by Administrative Zone in Quito's Metropolitan District (2012). Source: Quito Mobility Survey (2012).



By following Robertson's (1996) estimate of an extra 10-20% in indirect jobs created in the related businesses, and considering that the 7,500 jobs excludes those created by facilities such as:

- Car rental companies
- Storage facilities in the surrounding areas
- Three new hotels that will add 500 rooms (*El Comercio*, 2015)
- 65 hostels in Tababela (*El Comercio*, 2015)

It can be estimated that the total direct and indirect employment opportunities by the new airport are between 8,500 and 9,000, or a 15% increase in the zone. This increased number of jobs in Tumbaco, it is still far from the 319,000 jobs that *Quito Mobility Survey* identified for the CBD in 2012.

On a research project regarding the effects that the new airport was having on the local communities surrounding the airport, Bayon (2014) found that up to 2014 only 10% of the people working directly at the airport came from parroquias in the vicinity. This share increased when airport related companies were included. For example 40% of the staff in freight companies interviewed by Bayon (2014) came from the neighbouring areas. The share of local

workers seems low compared with other airports; such as in UK where Robertson (1996) found that between 80% and 90% of employees live within 30 minutes' drive.

4.2 Airlines adaptation

Airlines are usually the first to adapt when an increase in airport capacity occurs. The adaptation refers to new airlines starting operations, frequencies increasing and also increments in the number of seats due to bigger planes. In the case of Quito's new airport, we have seen all three adaptations happening, as compiled in table 4.1 the changes that airlines made since the beginning of the operations.

In three and a half years since the operation of the new airport, four passenger (Aeromexico, VivaColombia, Insel Air and Jetblue) and three freight (Emirates Cargo, Korean Airlines and Air Bridge Cargo) airlines started operations to and from Quito. The changes also include four new direct passenger flights that did not exist at the previous airport to Mexico City, Dallas, Fort Lauderdale and Aruba. In terms of cargo the new destinations are: Seoul, Dubai and Moscow.

There are also increases in capacity on existing routes, such as: Panama, Madrid, Miami, Bogota, Atlanta and Houston for passengers, and destinations like Amster-

Table 4.1. Airlines operation changes in Quito's New Airport. Source: Quiport's webpage and several Ecuadorian media.

2013	Aeromexico started operations in route Quito-Mexico City with 7 weekly flights.
2014	Iberia changed plane to a A340-600 with 342 seats.
	Viva Colombia started operations in route Quito-Bogota with 3 weekly flights. Emirates Cargo started operations with a 777-200F plane.
2015	American Airlines changed plane from 757 to 767 in its route Quito-Miami.
	Insel Air started operations in route Quito-Aruba with 2 weekly flights.
	American Airlines started operations in route Quito-Dallas with 5 weekly flights.
	Delta Airlines increased the number of flights in route Quito-Atlanta during summer period.
	United Airlines increased 2 additional weekly flights in route Quito-Houston during summer and Christmas.
	Viva Colombia increased its weekly frequency from 3 to 5.
	Aeromexico changed plane from 737-700 to 737-800 in route Quito-Mexico City.
2016	Copa Airlines increased its daily flights from 4 to 5 in route Quito-Panama.
	KLM Cargo changed plane from MD11 to a 747-400 (freight capacity from 80mt to 112mt).
	Jetblue started freight operations in route Quito-Fort Lauderdale with daily flights.
	Korean Airlines started freight operations in the first quarter and regular flights since September 2016. Air Bridge started charter freight operations in 2015 and regular flights since September 2016.

dam, Miami and Madrid for cargo. These increases in options and competition are a direct benefit to consumers and an incentive for tourism.

4.3 Passenger evolution

The passenger evolution in Quito has had a markedly different behaviour for the international and domestic markets. While the domestic market reached a peak in 2011, during the operation of the old airport, the international passengers market has increased rapidly since the opening of the new one.

The domestic passenger market decline in recent years could be explained by the reduction of a fuel subsidy for domestic operations decided by the government in 2011 (*El Universo*, 2011), which increased the price of flight tickets. Another element that could have contributed was the improved quality of roads that increased the attractiveness of road trips in a rather small country like Ecuador (252,000 square kilometres).

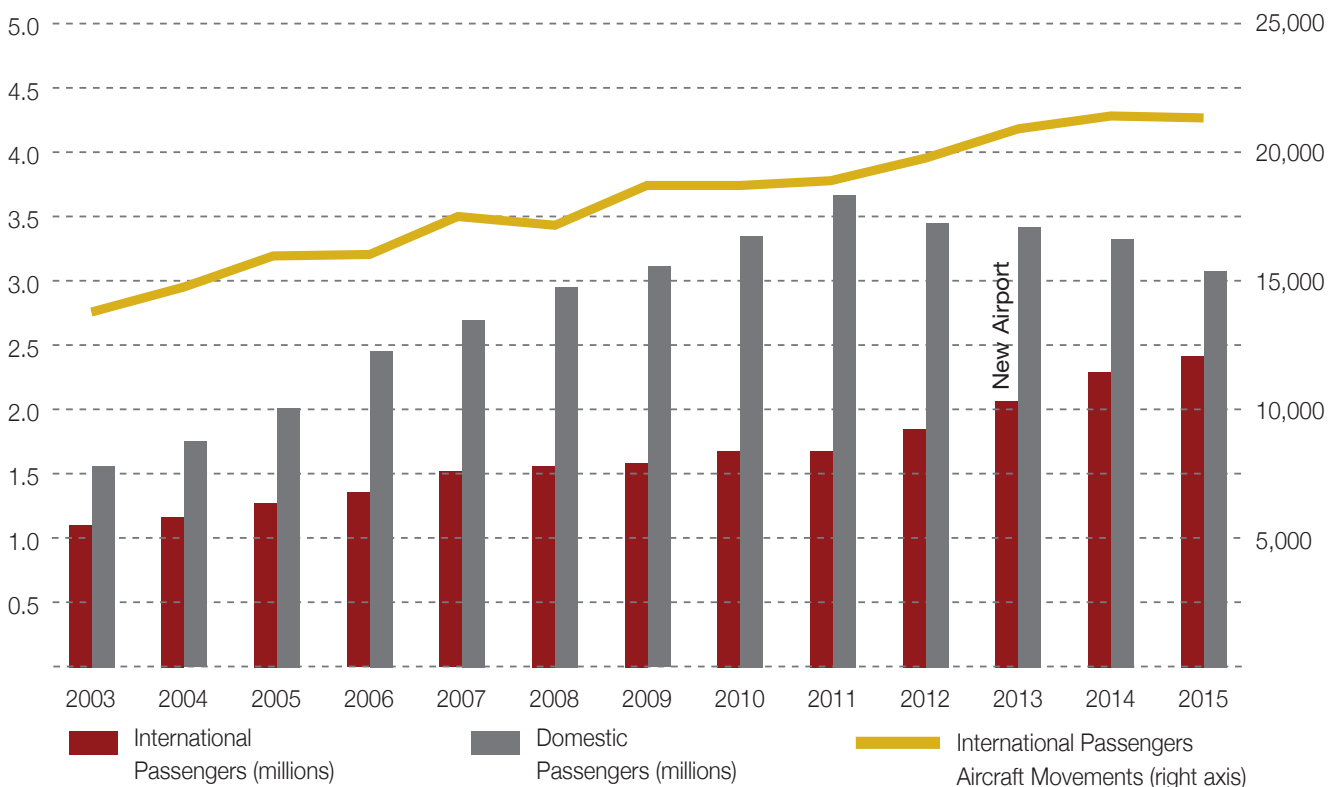
On the contrary, the international passengers market in Quito doubled in the last decade, from 1.28 million in 2005 to 2.43 million in 2015 (*Quito Tourism Bureau*, 2016). This is the outcome of a 34% hike in the number

of aircrafts covering international routes in the same period. The higher growth in passengers than in aircrafts evidences airlines shifting into bigger planes once the longer runway in the new airport started its operations. As mentioned by Jorge and De Rus (2004, p. 317), "larger aircraft are cheaper to operate on a per seat basis than smaller aircraft", and the reduction in operational costs leads to increased competition between airlines, that could translate into lower prices for consumers.

This international passenger growth since the opening of the new airport, 32% between 2012 and 2015, is an important contributor to the increase in the number of tourists visiting Quito and the surrounding region. The number of visitors to the city increased from 533,458 in 2012 to 706,848 in 2015, according to *Quito Tourism Bureau* (2016b). In the previous three years (2009-2012) it had grown only by 15%.

Tourism is a relevant industry for Ecuador and Quito; according to the *Tourism Ministry* it generated \$1.5bn in revenues in 2015, which meant it was the fifth biggest income generator after exports such as: oil, bananas, shrimps and processed fish. The share of Quito in that revenue is around \$400 million, based on the average tourist expenditure in the city, \$565 per visitor in 2015 according to *Quito Tourism Bureau* (2015), and the 706,848 tourists that visited the city in that year.

Figure 4.3. Passenger Evolution at Quito's Airport (2003-2015). Source: Quito Tourism Bureau (2016a).



Analysing the evolution of visitors by nationality we can find that citizens from countries where air connectivity with Quito improved, experienced a faster growth compared with the last three years at the old airfield. Tourists from the U.S. provide the single biggest share, and as previously mentioned, the new airport brought one new U.S. airline, 2 new direct routes from U.S. cities and seats increments in 3 other routes. This translated into a boost of +15% in the number of U.S. visitors in the period 2012-2015, compared with +8% growth in 2009-2012. Similar faster growth can be seen in visitors from Spain: +27% in 2012-2015 versus +5% between 2009 and 2012; Mexico: +50% in 2012-2015 versus +36% between 2009 and 2012. In other cases, the operations of the new airport changed a declining trend, like the case of UK visitors: +25% in 2012-2015 versus -20% between 2009 and 2012; or France: +13% in 2012-2015 versus -11% between 2009 and 2012. It should also be considered that Quito is Ecuador's main gateway for tourists; around 45% of them enter the country through the capital, according to the *Tourism Ministry* (2016), and hence any increase in the city's air connectivity has a national repercussion.

It is important to mention that air connectivity is not the only variable that affects the number of tourists arriving to the city, aspects such as advertising campaigns to promote Ecuador as a destination, a growing economy that attracted business visitors, trade and even the general awareness of the country all played a role in the increase of tourist for the period analysed. A downside is that although the number of tourists has increased in recent years, it is highly concentrated in the Americas (73%),

with small participation from other continents, such as Europe (23%) or Asia (3.1%), which also reflects the air connectivity patterns (Tourism Ministry, 2016a).

4.4 Freight evolution

Freight evolution has also shown a strong growth. Between 2012 and 2015 total freight moved by Quito new airport increased by 32%, from 178,822 metric tonnes (mt) to 236,020 mt. This rapid increase contrasts with that observed in the last years of the old airport, when saturation point was reached. The old cargo terminal was designed for 150,000 mt a year, a limit that was surpassed in 2010.

Most of the international freight moved in Quito's airport are exports (81% of total cargo in 2015). Exports by air travel from Quito in 2015 represents 0.6% of Ecuador's total exports by volume and 2% of non-oil exports (Banco Central del Ecuador, 2016). Although the number is very small, it has been growing in the last three years since the beginning of the new airport operations, and in the first 2 months of 2016, the share hiked to 2.5% of non-oil exports, almost twice that in 2008 (1.3%). When the analysis is based on value rather than volume, the share increases to around 10% of non-oil exports. This is in line with what Kasarda and other authors mentioned: air travel is preferred by industries with a high value to volume ratio.

The most relevant good exported from Quito's airport are cut flowers; as can be seen in figure 4.4, These exports have been growing steadily for the last decade, moving

Figure 4.4. Exports Evolution from Quito's Airport (2008-2015). Source: Quito Tourism Bureau (2016a) and Banco Central del Ecuador (2016a).

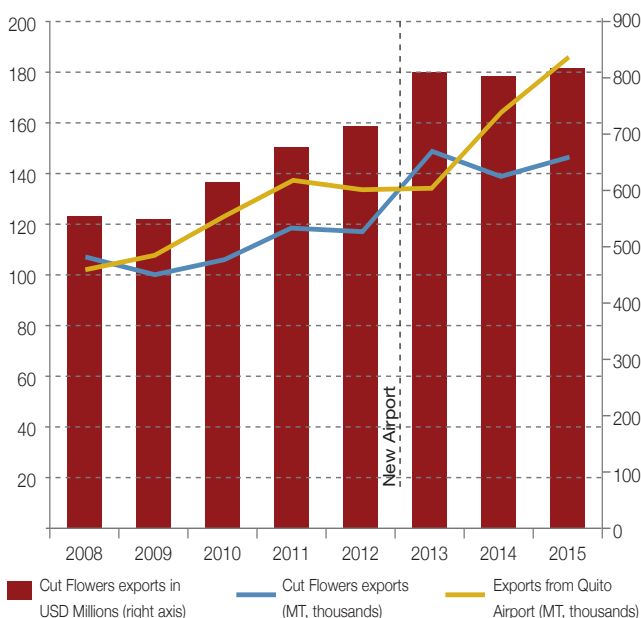
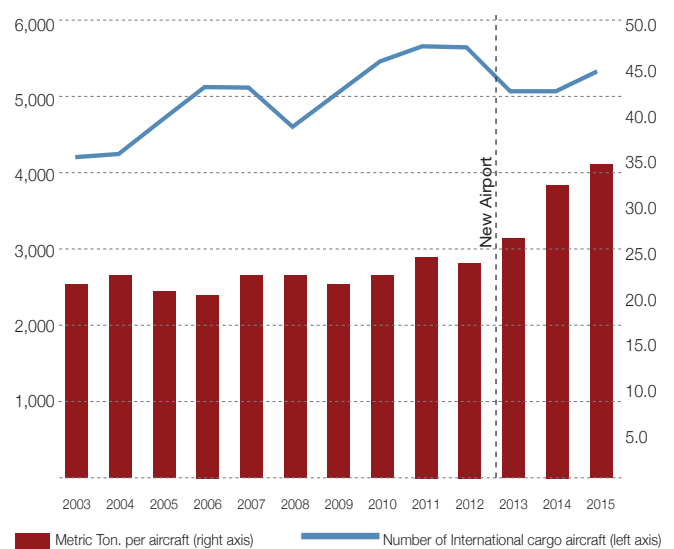


Figure 4.5. International freight operations at Quito's Airport (2003-2015). Source: Quito Tourism Bureau (2016a).



from 107,000 mt in 2008 to 146,000 mt in 2015. Figure 4.4 shows how this product used to represent on average 90% of the exports going through Quito's old airport. In 2013 cut flower exports were higher than the total airport exports due to some exports diversion to other airports during the transition process between the old and new airport. An interesting feature of the recent years with the operation of the new airport is that the concentration in cut flowers seems to be reducing, its share in the airport exports by volume decreased to 79% in 2015 and 73% in the first 2 months of 2016, which reflects an export diversification process, as argued by Kessides (1993).

The relocation of the airport brought changes in freight airlines operations. As seen in figure 4.5 in the weight per aircraft (bars in the graph) the number of cargo aircrafts reduced with the opening of the new airport as a result of the increment in the size of planes. As it was explained earlier in this paper, the length of the runway and the high altitude of the old airport were obstacles for the take-off of bigger planes, obstacles that disappeared or were considerably reduced with the new infrastructure. A good example of this change can be seen in KLM; the Dutch airline used to fly with a MD11 that was changed to a 747-400F in 2015, increasing its freight capacity from 80mt to 112mt, or a 40% growth.

4.5 Users wellbeing

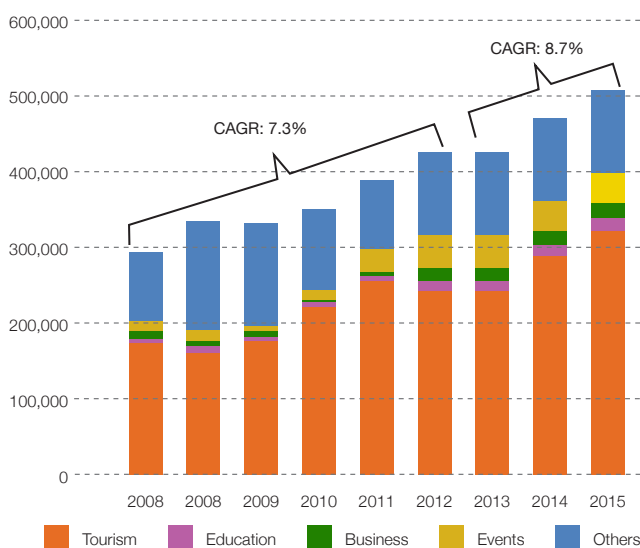
As mentioned by Halpern et al. (2011), airports provide services to the local population, such as facilitating holidays, study and business in other locations. The first impact after an airport capacity increases is an improve-

ment of service conditions, due to reduction in wait times, upgrades in comfort and an improved variety of commercial and leisure options. In that sense, the new airports' facilities are significantly better compared with the previous one. According to Quiport (the company managing the airport), the new airport has been considered as the leading airport in South America for the last three years by the World Travel Awards. It was also declared as the Best Regional Airport in South America by Skytrax in the World Airport Awards in 2016, and reached second place in the Airport Service Quality Awards in 2015 for Latin America and the Caribbean (Quito Airport webpage, 2016). The last two awards are defined by airport user's surveys and therefore reflect a high level of satisfaction with the service the new airport is providing.

The main service Quito's airport provides is as gateway for international travel. As shown in the passengers section, the number of trips abroad has increased due to the improved air connectivity. Based on information from Quito's Tourism Bureau (2016) for residents in the Metropolitan District of Quito, it can be observed that since the operations of the new airport began, there has been a significant increase in the number of local residents flying abroad, from 404,000 people in 2012 to 510,000 in 2015, an average annual growth of 8.7%. To put this growth in context, the population growth in the same period in Quito was around 2.7%

This growth happened in all flying categories but is particularly marked in categories like education (+68% for 2012-2015) and business (+48% for 2012-2015), as can be seen in figure 4.6. Although it is difficult to attribute the evolution of these categories just to the operation of a new airport, because several variables may have influenced them, the general trend is in line with what authors like Halpern et al. (2011) and Sellner and Nagl (2010) mentioned regarding the effects of an increase in air connectivity.

Figure 4.6. Evolution of Quito residents flying abroad by category. Source: Quito Tourism Bureau (2016b).

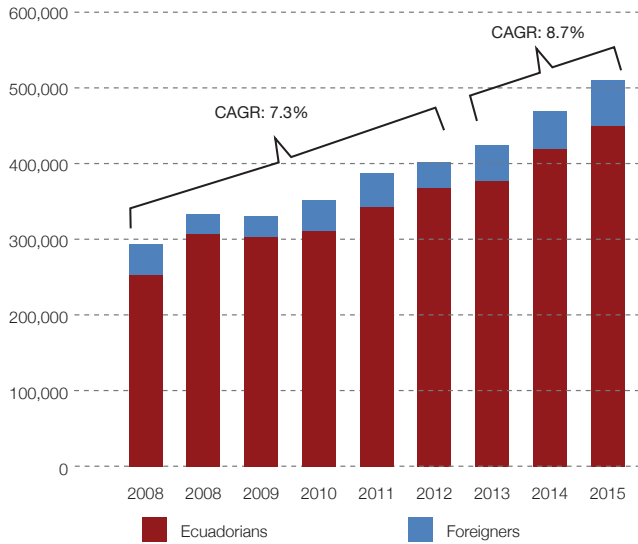


4.6 Business and residents attraction

The period since the opening of Quito's new airport seems rather short (three years) to identify the existence of firms relocating to the city. As Kasarda (2013) and Button (2000) mention, these types of impact are part of the catalytic or perpetuity effects, and may require a longer period to materialise. It was impossible to find, during this research, firms whose decision to locate in Quito can be attributed to improvements in air connectivity that the new airport provides.

In terms of new residents, it is also difficult to identify the role that the airport played in their decision of basing their residency in Quito. In figure 4.7 we can see the share of foreign residents that travelled abroad between 2007 and 2015. According to Quito Tourism Bureau (2016b) the number of

Figure 4.7. Evolution of Quito residents flying abroad by nationality. Source: Quito Tourism Bureau (2016b).



foreign residents flying internationally increased from 38,410 in 2012 to 56,206 in 2015, that is a 46% boost, higher than the growth in the last 3 years of operations in the previous airport (28%). With the available information it is difficult to attribute if the travel increases of foreign residents is due to more foreigners residing in the city or simply an increase in travel frequency by the same residents.

When analysed by country of origin, the highest increases in travelling abroad for the period 2012-2015 are observed in citizens from: Spain (173%), Venezuela (134%), Mexico (111%), Argentina (98%), Brazil (90%), Colombia (61%) or USA (49%). In almost all cases there have been improvements in air connectivity with those countries: either the introduction of direct flights or an increase in the number of seats available. In that sense, the increase in foreign residents flying abroad can be seen as a direct effect of improvements in air connectivity.

Another aspect that could evidence the impact that the new airport is having in helping Quito become a more attractive living destination for foreigners can be seen in the information collected by *Quito Tourism Bureau* (2016b). In regular surveys conducted by the *Quito Tourism Bureau*, when asking tourists the reasons for visiting the city the number of people responding Other (which include the answer visiting friends and family) grew 79% for the period 2012-2015, the highest of all categories.

4.7 Externalities

As mentioned previously, one of the aims of relocating Quito's airport outside the city was to reduce the impact of its externalities. The old airport was located in a densely populated area, with 4,348 people per km² (INEC, 2012). Its current location is in a rural parroquia, which according to the latest census (2010) had a population density of 111 per km². If we consider the wider impact of noise and pollution by including the population of the surrounding *parroquias*: Puembo (pop.: 13,593 and density: 428 per km²) and Yaruqui (pop.: 17,854 and density: 248 per km²), the number of dwellers affected is still considerably lower than at the previous airport.

Authors like Nero and Black (1998, p. 276) consider that "airport expansion is a trade-off between economic benefits and environmental costs", though in the case of Quito this does not seem to be that clear. The better operational conditions in the new airport, lower altitude and longer runway, contributed to a reduction in aircraft movement: total number of aircrafts reduced from 74,366 in 2012 to 61,155 in 2015 according to *Quito Tourism Bureau* (2016a). This is the result of fewer domestic flights and a shift into bigger aircrafts in cargo as shown in figure 4.5. In the international passenger market, the number of aircrafts grew from 19,807 in 2012 to 21,368 in 2015. When this increase of 8% in international passenger aircrafts compared with the 32% increase in international passengers in the same period, it can be concluded that most of the growth came from bigger planes, and not due to the increases in take-off and landings. On the other hand, due to the new location being 40km from the CBD and an increase in the number of users getting to the new airport requires higher consumption of fossil fuels and thus an increase in resulting pollution as compared with the old one.

In an effort to reduce the environmental impact of its operations and following the industry's best practices, Quito's new airport was certified by the Airport Council International (ACI) to be in the process to become "Carbon Footprint" neutral. The current status of the airport is phase 1: assessing the carbon footprint, out of four stages. The programme looks to identify and measure the environmental impact that the airport generates, and then design processes and mechanisms to reduce it, such as: wastewater management, reforestation campaigns and environmental education programmes (Quito Airport webpage, 2016).

5. Urban and spatial impacts of the new airport

5.1 Urban sprawl and population Increase in the new airport surrounding area

Quito grew considerably during the second half of the 20th century, from around 200,000 in 1950 according to Bayon (2014) to 2.23 million in 2010 (Census, INEC). As mentioned before, during the first half of the past century the city grew from the old colonial town into the north and south due to the complicated topography of Quito being in the middle of the Andes resulting in an unusual elongated form. Although during the most recent decades the growth to both north and south remains, there has been a significant increase in population in the two valleys to the east of the city: Valle de los Chillos and Tumbaco. The attraction of these two valleys was lower land prices, lower altitude and warmer weather than Quito (Carrion, 2012).

AZ Tumbaco has been growing faster than Quito and the entire country, as can be seen in Table 5.1. In fact during the 1990's its population grew three times faster than Ecuador and more than twice Quito's growth rate. Although growth in the first decade of the 21st century has slowed down, it was still considerably higher than that of Quito and Ecuador. Tababela is, as mentioned before, a scarcely populated area that nevertheless saw an increase in population growth in the period 2001-2010 compared with the previous decade, a trend that goes against the rest of the country and coincides with the new airport construction.

Table 5.1 shows how AZ Tumbaco was already a population growth area before the opening of the new airport; a trend that has been reinforced since its inauguration. According to the local newspaper *El Comercio* (2015), the number of people living in Tababela in 2015 was 3,105, a 10% increase from 2010. According to the same newspaper, a similar percentage increase was observed in surrounding *parroquias* such as: Pifo, Puembo and Yaruqui.

5.2 Land price, land use and social fragmentation

A common feature of CBDs and sub centres of economic activity is a higher land price than in other parts of the city, as a result of increasing demand for a limited space. Airports and the economic activity they generate usually create similar situations. The price of land can even exceed those of the actual city's CBD as explained by Charles et al. (2007, p. 1,012); "Amsterdam's Schiphol airport is a current example of the commercial value of land being higher in the vicinity of the airport in comparison with the CBD or suburban areas". In table 5.2 we can observe that AZ Tumbaco has the third highest property average price per m² in the city, only after the current CBD and the old CBD in the old town.

Based on an analysis done for the construction period of the airport, 2003-2012, Bayon (2014) explained how in Tababela its construction had translated into an in-

Table 5.1. Population evolution for key areas. Source: INEC (Ecuadorian Institute for Statistics and Census).

	Population			Average Annual Growth	
	1990	2001	2010	1990-2001	2001-2010
Ecuador	9,648,189	12,156,608	14,483,499	2.6%	2.4%
Quito	1,396,070	1,839,853	2,239,191	3.2%	2.7%
Adm. Zone Tumbaco	75,178	131,368	173,571	7.5%	4.0%
Tababela (Airport)	1,804	2,277	2,823	2.6%	3.0%

crease in land price of up to 10 times. This increase in land price came together with changes in land use and employment in Tababela. Again according to Bayon (2014) traditional agriculture activities dropped from 45% of the employment in 2000 to 32% in 2010. On the contrary activities such as: transportation, manufacturing or real estate experienced a boost in the jobs share in Tababela. During the research for this paper it was not possible to find more recent data regarding the structure of the labour market.

Land price increase is not related exclusively with the new airport, but the roads that connect it with the rest of the city also contributed to this phenomenon. Medda (2012) explains how transport infrastructure can have effects on land value due to the increase in accessibility to: urban externalities, social infrastructure and development infrastructure. Indeed, according to local newspaper *El Comercio* (January 31, 2015), after the construction of one of the roads (Ruta VIVA) land prices in the surrounding areas increased considerably. For example one real estate promoter mentioned price rising from \$100 per square meter in 2013 to \$250 at the beginning of 2015. *El Comercio* (January 31, 2015) also mentioned how the price of a square meter in a

gated community in Puembo, not far from the new airport, went from \$100 before the building of the road to \$410 after it.

Table 5.2. Property average prices by zone in Quito (2014). Source: Hidalgo (2014).

Zone	Average Price per square metre (\$)
CBD	1,304
Centre (Old Town)	1,114
Tumbaco	1,004
North	915
Valle de los Chillos	717
Pomasqui	635
Calderon	590
South	589
Average City	859

6. Lost opportunities

Although the new airport and its related infrastructure is having significant impacts in the economy and the urban configuration of Tumbaco valley, there are aspects that were missing during the design, plan and construction of these infrastructures, which could have helped to amplify the economic impact, distribute the benefits fairly and contribute to creating more efficient connectivity in Quito.

6.1 Public transport

According to the latest mobility survey done in Quito Metropolitan District (2012), there was an average of 80,000 motorised trips done between the AZ Tumbaco and the CBD. Around half of those trips (48%) were done by private car and the other half was done in conventional buses, the only form of public transport that connects that part of the metropolitan area with the CBD.

As a complement to the airport, both the local and national government invested \$245m (*El Telegrafo*, 2014) and \$198m (*El Ciudadano*, 2014) to build 2 new routes that connect Quito with the eastern valley of Tumbaco. This was in order to facilitate not just the trips to the new airport but also to complement the existent road infrastructure that was highly congested due to the rapid population increase in the AZ Tumbaco. The two new roads that connect Quito with the airport and wealthy areas in the eastern valley are exclusive for cars and conventional buses.

The spatial characteristics of a city influences the transportation needs, as explained by Vasconcellos (2001, p. 53): “The use of the space depends heavily on where people live and perform activities. There is a complex relationship between social and economic factors that lie behind the selection of a place to live, place to work and places to go”. On top of that, large infrastructure projects such as airports can significantly affect transport demand by increasing commercial activity in the area, changing the land use, and by the prioritisation of roads (Litman, 2013).

Once a demand for trips to a particular area of a city is established, the preferred mode of transport will depend on several factors. The use of a particular type of transport mode is a decision constrained by existing conditions, as explained by Vasconcellos (2001). Complementing this view, Paulley (2006) explores the

aspects that influence the use of public transport, and how certain factors such as: fare prices, frequency, safety, service quality and income and car ownership, play a key role in the decision of preferring public or private transport.

The construction of these two roads reinforced the incentive to travel by car in an area where cars already had the highest share of motorized trips, compared with other areas in Quito where the share range from 25% to 38% (2012 Mobility Survey). This higher ratio is related to the high income dwellers that chose this valley as place of residency and the perceived bad quality of the available public transport. The city lost an opportunity to change the current transportation path; the resources invested in both roads could have been used to build a public transport alternative (train, BRT or other) that could have contributed to improving the experience of public transport and hence creating an incentive to use it.

The cost for the city when public transportation is not included during the planning and development of a large-scale infrastructure project like this are significant. This can become more problematic in the future if, as it seems to be happening, the number of people living in the eastern valley grows faster than in other areas. Quito is developing a sub centre of economic activity in an area with a high share of private car use, and the new roads are facilitating the access to certain areas of the eastern valley that were previously remote or badly connected. The design of the new highways did not consider the impact that they could have on the entrance of Quito, a new bottleneck now that the road’s capacity has been expanded.

6.2 Absence of land value capture mechanism

The idea behind a Land Value capture mechanism is, as defined by Medda, (2012, p: 155) “to recover the capital cost of the transport investment by capturing some or all of the increments in land value resultant from the increase in accessibility”. The rationale behind this is summarised by Brown-Luthango (2011): fairer distribution of the cost and benefits of development, contribution to stabilize the property market by regulating speculation, and as a source of revenue for local governments.

Land value capture mechanisms are grouped in three by Medda, (2012): betterment tax, accessibility increment contribution and joint development mechanisms. In the case of Ecuador, the only land value mechanisms in place is a betterment tax, called *Contribucion Especial por Mejoras* (CEM) which has been in place since 1971 and is under the control of local governments to collect, modify or manage. According to Medda, (2012, p. 156) a betterment tax “is directed towards the beneficiaries of increased accessibility, of reduced congestion and pollution, and of lower transport costs achieved due to a transport investment”

Based on the existing legislation, a local government can use the CEM tax to finance public works beyond those related with mobility, such as clean water, sewerage, parks and eventually any other public work as long as it is approved by the City Council. According to Aulestia and Rodriguez (2012) the CEM was the second most significant tax revenue for local governments in Ecuador for the period 2001-2010, although it represents less than 0.01% of Ecuador’s GDP in the period analysed. For the period previously mentioned, the CEM tax represents only 6% of the public investment done by local governments (Aulestia and Rodriguez, 2012). This shows that although the tax is supposed to cover the total cost of the public intervention, in reality this is not the case.

Land value capture mechanisms are not easy to implement, they require robust markets and well established cadastral and tax administration systems in order to determine the exact increase in land value. Brown-Luthango (2011) also highlights how poor administration, lack of enforcement or the under-assessment of land value could obstruct its implementation. Another aspect that needs to be considered is that it can also have a disproportionate effect on residents that are asset-rich but cash-poor, which could be the case of rural communities in the surroundings of both the airport and new roads.

In the case of Quito, the CEM tax is far from charging the total cost of public works, which made it irrelevant and allowed significant levels of speculation since the construction of the new airport. As mentioned before, increases in land prices of 2, 4 and even 10 times in different areas of Tumbaco valley could have been controlled with a better implemented land value capture mechanism. Although implementing a fair and accurate betterment tax requires good data and technical skill in the local government, its absence is even more costly because it permits significant gains for some landowners benefiting from public money investments.

6.3 Developing an export processing zone

When the 1,500 hectares of land allocated to the airport were transferred to the company winning the concession, it was established that 200 hectares would be used to develop a *Zona Economica de Desarrollo Especial* or Export Processing Zone (EPZ) that was never implemented. An EPZ is: “A government policy to promote exports of goods and/or services by offering a more competitive business environment through provision of special incentives including in particular tariff exemptions to input either in a geographically defined area or through a specification process” (Engman et al. 2007).

EPZ’s have evolved rapidly since the first one established in the 1960’s, and its popularity has increased considerably along the last 5 decades. According to Engman et al. (2007) the number of EPZs grew from 79 in 25 countries in 1975 to around 3,500 in around 130 countries in 2006, employing around 66 million workers. They have also evolved in terms of activities included, from traditional production of goods such as textiles and clothing, to specialized products such as electronics and chemicals and even into services sectors like IT and financial services.

If we consider that a successful EPZ should attract investment, export the majority of the output and function without heavy subsidies, then Quito Airport’s EPZ is not one of them. The problems that can be identified are poor planning and design, red tape and insufficient and inefficient promotion. These problems are not exclusive to Quito’s Airport EPZ; at least 2 other EPZ s were planned without success by the current government. In the case of Quito’s EPZ, a lack of clarity in terms of who should manage it: the private airport operator, the local government or the national government, seems to be the main obstacle in its development.

EPZ as an economic growth strategy has some downsides, such as the tax revenue the government sacrifices. Nevertheless EPZs, if well managed, can act as catalysts of a broader export growth, and an airport could be considered a natural spot to locate one, due to its strong link with foreign markets. Ecuador lacks the knowledge of how to design and operate a project like this, making the involvement of a private sector partner a good strategy.

7. Conclusions and recommendations

The aim of this paper was to analyse the impacts the new airport is having on Quito at both economic and spatial levels. It was observed that the new airport has brought a significant improvement in air connectivity for both passengers and freight. The arrival of new airlines, the increase in operations and the shift to larger planes and more convenient frequencies contributed to rapid increases in the number of international visitors, local residents travelling abroad and export growth. By analysing the export evolution through the airport and the role of cut flowers in it, it can even be argued that the new infrastructure is contributing to export diversification.

Nevertheless, Quito's airport is still connecting fewer international passenger destinations (16) than other bigger capitals in the region such as Bogota (32), Santiago (36) or Lima (42). It also ranks below smaller cities which serve as a hub for major airlines like Copa in Panama (85). Another problem of Quito's current air connectivity, especially for passengers, is that it is highly concentrated in the Americas, with little or non-existent links with Europe, Asia or the Middle East.

The increase in the number of foreign residents traveling abroad could be evidence of an improvement of Quito's reputation as an attractive place to live and work, increasing the city pool talent and diversity. Foreign residents can also be a boost for tourism, which can be inferred from surveys done by *Quito Tourism Bureau* where visiting family and friends is very often cited as the reason to visiting the city.

Regarding the capacity of the new airport to create an economic hub that competes with the current CBD, it is important to consider the low starting point in terms of AZ Tumbaco's share of jobs in Quito's labour market. The airport has significantly increased the number of jobs available in a zone that already had the third highest jobs/people ratio. Nevertheless, this rise in the number of jobs generated by the airport's economic activity is not enough to substitute the existing CBD.

The airport's economic impact could have been amplified if the Export Processing Zone which was part of the initial plan would have happened. The EPZ could be a powerful tool to attract FDI and increase exports by using the attractiveness of being close to an international gateway. The airport could have also done more to provide jobs to local communities neighbouring it;

this would have increased the local benefits of this infrastructure and at the same time would have reduced the transportation needs compared to workers currently commuting from Quito.

The new airport is increasing the lure of the eastern valley of Tumbaco as a place for residency, by relocating and creating jobs around the airport economic activity. That increase has not been fully addressed by the local municipality in terms of land price and use; allowing opportunities for speculation and applying pressure on rural communities that have not fully benefitted from being in the vicinity of the project. The creation of the new airport has also resulted in social fragmentation in Tababela, with some residents being able to benefit from the higher land prices and business opportunities, while other residents have seen their way of life disrupted.

The new connection between the eastern valley and the CBD was designed for private cars and could prove insufficient in the future if the number of car users increase as a consequence of the attraction of better road infrastructure. The building of two new connection roads without incorporating any form of public transport alternative meant the loss of an opportunity to reduce the share of private car usage.

An appropriate mechanism of land value capture was not in place to control land price speculation and allowed some landowners to significantly benefit from it. The mechanism could have also helped the city and national governments to repay the investment in the new roads or could have been used to fund a public transport alternative.

The second objective of this investigation was to identify past mistakes performed by the city and ways to improve the positive impacts that this new infrastructure can generate. The following recommendations are proposed to that effect:

- Improve the existing mechanisms of land value capture, in order to ensure that benefits large infrastructure projects create is not concentrated in the hands of few and contributes to repay the public funds used for its construction. Although it will be difficult to use those mechanisms for the existing infrastructure, they can play an important role in future projects like the first subway line, currently under construction.

- Define a clear strategy to develop the Export Processing Zone next to the airport, which should include: clear governance regarding who should plan, design, build and operate the EPZ. Promote the EPZ among private investors; and create a local economic development strategy that contributes to link the international companies operating in the EPZ with local businesses, in order to promote knowledge spillovers and value chain creation.
- Increase the engagement with local communities to ensure they will be the biggest beneficiaries of having the airport. This should include: training opportunities in order to be eligible for jobs, purchase of agriculture products from the local farmers, and increased involvement of surrounding communities in decisions regarding the area. Ensure that part of the tax revenues generated by the airport is reinvested in the *parroquias* suffering most from airport externalities.
- Improve the public transport network to connect the airport with the city. The relocation of the airport in the eastern valley of Tumbaco highlighted a problem well known by the city: its poor connectivity between Quito and its eastern valleys. A better way to ensure that the eastern valleys are fully connected with the rest of the city would be by developing a public transport alternative in combination with public policies to promote its use.
- In order to complement any effort to make public transport a more appealing and attractive transport option for the majority of citizens, it is important to improve the public policies that aim to reduce the use of private cars. Quito currently has in place a vehicular restriction mechanism that applies to a significant area of the city, but excludes the eastern valleys; this mechanism could be extended to Tumbaco and improved by combining with a congestion charge, incentives to carpooling or exemptions to electric cars.

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