



Green Airport Infrastructure in Colombia: Opportunities for Public-Private Partnerships Schemes

Juan David González-Ruiz^{1,2*}, Eduardo Duque¹ and Juan Restrepo¹

¹Institucion Universitaria Esumer, 80126 Medellin, Colombia

²National University of Columbia, Robledo Campus, 65223 Medellin, Colombia

ABSTRACT

This paper describes the state-of-the-art of green airport infrastructure in Colombia. It is aimed at identifying opportunities for public-private investment in this type of projects which constitute a growing global trend in the air transport industry. The study provides an insight into the green airport infrastructure industry in Colombia based on available literature. The relation to green airport infrastructure projects and Public-Private Partnerships were also analysed. Findings reveal that green airport infrastructure ensures compliance with the COP21 commitments and the Kyoto protocol.

Keywords: Airport management, Colombia, concessions, green airport infrastructure, public-private partnerships

INTRODUCTION

AENA (2016), the Spanish state organisation that manages the civil airports, defines a green airport as “one that responsibly uses the natural resources it needs for its operation, reduces energy consumption and promotes the use of renewable energies to reduce emission of greenhouse gases (GHG), and to properly manage its waste”. In short, it is an airport which has minimal impact on the environment and works towards becoming a neutral facility in

terms of carbon emissions (nought GHG produced). This paper identifies the feasibility of developing green airport infrastructure in Colombia by means of Public-Private Partnerships (PPPs) with the main purpose of encouraging the development of sustainable infrastructure. This is in order to comply with its COP21 commitment as well as the Kyoto protocol (García et al., 2015).

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E-mail addresses:

jdgonzalez@esumer.edu.co (Juan David González-Ruiz),

eduardo.duque@esumer.edu.co (Eduardo Duque),

juan.restrepo43@esumer.edu.co (Juan Restrepo)

*Corresponding Author

There have been many studies on climate change and its effects on aviation. Even the ICAO (International Civil Aviation Organization) had devoted complete chapters on this topic in its 2010 and 2013 Environmental Report. Also, the Federal Aviation Administration (FAA) has been working on this issue for several years (Transportation Research Board, 2012). In Europe, EUROCONTROL (the European Organisation for the Safety of Air Navigation, with 41 member states), which is committed to building a Single European Sky, has shown the way and among others, included future climate change in its Challenge of Growth reports since 2008 (Eurocontrol, 2013).

Globalisation has contributed to improvements in many sectors, including transportation. Air transport (passenger and cargo) is currently a major actor in the development of tourism, its demand has increased significantly over the last 16 years. Aerocivil (the Colombian Air Traffic Authority) confirms this growth in its reports. In 2014, 54 million passengers have passed through air terminals in Colombia carried representing an increase of 140% compared to 2004; only El Dorado Airport, the most important in Colombia, reported 21,046 arrivals and 21,307 departure flights last year (Aeronáutica Civil, 2016). That report also documented an increase in air cargo transport.

Colombia has associated the building of airports to territorial management plans, so progressively, they have been made part of regional economic growth strategies. This is the reason why developing sustainable projects based on PPP schemes can improve living standards as well as increased urbanisation. In fact, El Dorado Airport is the third busiest terminal in Latin America (after Guarulhos Airport in São Paulo and Benito Juárez Airport in Mexico) (El Tiempo, 2014). According to the Airports Council International (ACI) (Airports International Council, 2016), only in Latin America, passenger traffic in air terminals raised 6.6% in the first half of 2015; this is more than the world's average, which is 5%. It also reported that by 2031, the region would mobilise 1,000 million passengers (an important figure taking into account that in 2011 the figure was around 440 million) (Semana, 2015). Air traffic in Colombia is controlled by the National Planning Department (NPD). It runs under the control of the National Ministry of Transport and has presidential approval. In 2002, the NPD was focused on road and maritime transport since, at that time, they were the most popular mode of transport. At that time, there was a lack of specific regulations for air transportation.

Therefore, this paper reviews how PPP systems (particularly airports) can act as effective instruments to develop sustainable structuring in Colombia. In this way, private-public partnerships can encourage private investors to participate in these projects and, boost environmentally-friendly investments. In fact, Colombia Act 1508 (2012) and Act 1682 (2013) respectively on PPPs and infrastructure helped to accelerate the development of social and economic infrastructure projects, emphasising transport. Nevertheless, the requirements or conditions leading to sustainable development are not clear and lack consideration of environmental variables, particularly funding processes. This paper is structured as follows. The introduction section is followed by a description of green airport characteristics in the next. The main activities related to environmental sustainability are dealt with in the subsequent section. Next, the relation between PPPs and developing sustainable infrastructure will be presented.

Becoming green

As a global trend, the advances made in air transport have forced the different administrations to acknowledge the importance of establishing concrete actions leading to improvement of general airport transport (infrastructure and management), in particular cargo and passenger transit. As a result of these and other general improvements, Colombia has turned into a middle-power regional actor with one of the most solid economies in Latin America. The Colombian government has refocused public investment towards modernising airport infrastructure, and with regards to airports with the highest air traffic rates (like El Dorado, Bogota's air terminal), it decided to outsource the managerial processes by means of concessions. The system of granting concessions to companies establishes that they must take charge of the management, modernisation, expansion, operation, maintenance and commercial exploitation of the concession area.

On this concern, El Dorado Airport's concession called OPAIN (a Swiss-Colombian firm), which started in 2006, has led the terminal to gain recognition. Thanks to the set of modernisation activities performed by OPAIN, El Dorado won an important award recently. The globally known Skytrax has been associated with the concept of quality excellence in the air transport industry. It is also recognised for its airline and airport star rating programme: The World Airline Awards and Airport Awards. El Dorado is now among the 23 airports in the world which have been granted four stars by Skytrax (Skytrax, 2016). The terminal staff is an example of good quality in aspects such as efficiency, courtesy, language, attitude and knowledge of all persons providing services.

On March 16, 2015, at a ceremony in Paris, OPAIN's manager received from Skytrax, the qualification certificate and the Four Star Prize by the best staff in South America. It is important to note that only 4 airports have got the 5 Star Qualification: Hong Kong's International Airport, Seoul's Incheon International Airport, Singapore's Changi Airport and Tokyo's Haneda International Airport. The other 19 terminals which received four stars are located in cities such as Amsterdam, Copenhagen, Dusseldorf, Kuala Lumpur, London (Heathrow), Beijing and Shanghai. This favourable scenario, in the long run, will permit Colombia to take good advantage of the multiple FTAs it has signed. However, this award represents just one aspect of El Dorado's objectives. Since this sector is growing significantly both economically and socially, the trend is to lead this terminal to reach the degree of modernisation of the main international terminals in the world. This is possible through the implementation of an effective managing system, offering excellent customer service and through the adoption and deployment of a range of technologies (apps), integrated across an open system. These are implemented not only in airports but in majority of spaces in smart cities.

In addition, passengers and cargo are beyond the currently capacity of the terminal. Therefore, by 2021, another airport (El Dorado II) will be constructed, 15 km far from El Dorado. This is mainly due to the forecasts which have determined that in five years, the passengers using El Dorado are estimated to be around 40 million (Revista Semana, 2015). However, besides interconnecting people, the new facilities, the runway repaving and the excellent services offered are El Dorado's main challenges to becoming sustainable and green. It can be said that the marketplace has become green. Undoubtedly, it will become greener

as time passes and humanity is directed towards preventing its own annihilation. The biggest challenge our world is facing is dealing with protecting the environment.

Among major environmental concerns are:

- The destruction of the ozone layer
- The destruction of rain forests
- The availability of drinking water
- The renewable-sustainable green energies
- The endangered species, and
- The air and water pollution

In this regard, Colombia has already been working on some of these issues, and thus, Duque et al. (2016) state that Colombia can participate in the international carbon credit market through the sale of CER (Certified Emission Reductions). This is encouraged by the domestic demand reduction commitments imposed by the European Union and Japan. El Dorado Airport is now currently leading in sustainable operations. Spain, Germany, Mexico, the US and India have 100% solar powered airports in the world: Cochin airport (CIAL Cochin International Airport Limited, 2016) in India have taken the lead in this regard. Many airports throughout the world have extensive programmes to mitigate carbon emissions and programmes such as the Airport Carbon Accreditation, which are gaining ground (Mosvold, 2015).

Green actions

The set of actions that pushed El Dorado Airport towards a greener operation include control of the surrounding fauna (birds and mammals which threaten the safety of flights), under the guidance of OPAIN. According to OPAIN's Fauna Control System (2011), four main activities are carried out: (i) watching patrols; (ii) dispersion patrols; (iii) fauna monitoring; and (iv) new risk monitoring.

Patrols keep track of the different areas of the facilities. The runways, taxiways, ramps, parking decks and the areas surrounding the terminal are constantly monitored. This is a necessary manoeuvre since the terminal is bordered by wide green fields and ponds which attract diverse types of birds (OPAIN, 2011). Besides, the airport area is located in the middle of migration routes of certain bird species. El Dorado also has its own solid waste management system. Although air transport provides an invaluable service to people, it is undeniable that these activities have serious effects on the environment. The terminal's administration has been working on the implementation of measures leading to effectively protecting the environment and minimise negative impacts (air pollution, noise production, and the alterations to the surrounding soils, water and living organisms). Concerning the organic and inorganic disposed materials produced by El Dorado, it is important to consider the types of solid waste. The table below shows the eight categories of solid waste:

Table 1
Classification of the solid waste produced at El Dorado Airport

Type of waste	Place of origin	Cause
Waste from local flights	Platforms, decks and passenger terminal	Human activities (local passengers, visitors and airport staff)
Food waste	Fast food restaurants	Biodegradable waste from food
Packaging and containers	Cargo holds, platforms, decks and passenger terminal	Product wrapping and containers
Waste from international flights	Platforms, decks and passenger terminal	Human activities (local passengers, visitors and airport staff)
Waste from cleaning services	Site serviced by the contractor	The action of sweeping, mopping and cleaning in general.
Mud	Wastewater treatment plants	Normal operation of wastewater treatment
Waste incinerator ashes	Waste Incinerator	Controlled combustion of waste
Garden and lawn mowing waste	Green fields	Green fields maintenance processes

Source: Ministerio del Medio Ambiente (2001)

Not only solid but liquid waste are disposed of safely. Solid waste is classified into recyclable and non-recyclable materials. Plastic, glass, metal and paper are collected to be sold. The organic disposable material is then safely incinerated. Water waste (polluted rainwater, polluted water from cleaning procedures, water polluted with oils or fuel etc.) is also treated in a responsible way through specific disposal protocols (conducts, treatment tanks, blue water collectors etc.). Rainwater is recycled and bathroom use. Around 127 m³ of water are reused on a daily basis.

Unfortunately, the previous activities and measures were insufficient to elevate El Dorado to the category of a green airport. According to the Airport Carbon Accreditation Organization (2016), it is necessary to comply with different requirements such as Mapping (footprint measurement), Reduction (reduced carbon footprint), Optimisation (third party engagement in carbon footprint reduction) and Neutrality (carbon neutrality for direct emissions by offsetting) in order to get certified as a green airport. In fact, only three air terminals have been certified as ecological (green). It represents just 2% of Latin American & Caribbean air passenger traffic (Airport Carbon Accreditation Organization, 2016).

- Tijuana International Airport (operated by Grupo Aeroportuario del Pacifico) in Mexico
- Quito International Airport (operated by Corporación Quiport S.A) in Ecuador
- Galapagos Ecological Airport (operated by Corporación América) in Ecuador

PPPs schemes as a tool for developing sustainable airports

The building of sustainable infrastructure will lead to the creation of intelligent cities incorporating new standards, systems and capacity to create an organic network that enable the creation of synergies between the different components of the city. Thus, the integration

of sustainable (and smart) cities, will also bring challenges, as well as opportunities (Nam & Pardo, 2012). Consequently, the enactment of Law 1508 of 2012, which is based on Project Finance schemes, allows private participation for building public infrastructure. This law is expected to close the gap between social and economic infrastructure (Congress of Colombia, 2012, 2013). In addition, the objective of these regulations is to increase the speed of developing infrastructure projects. In other words, this law established the parameters to developing infrastructure projects in Colombia, allowing the State to monitor the process of designing, managing and implementing. This is a mechanism to encourage private participation since the investors can have clear roadmaps to define the different investment strategies.

However, in order to build sustainable infrastructure, especially airports, it is necessary to find financial resources to promote the development of environmentally-friendly infrastructure. As a consequence, the Clean Development Mechanism is proposed as an alternative leading to develop sustainable projects, which, in turn, will allow Colombia to meet its COP21 commitments. Unfortunately, this mechanism has not been used in Colombia in transport infrastructure projects. It represents a real challenge for project developers to incorporate sustainable elements in funding. These facts suggest that private investors play a fundamental part. Alternatively, financial resources are becoming increasingly limited; hence, the primary challenge lies in the financing process. In the current situation (debt crises in the developed countries), raising financial resources will be hard. This leads the development of new projects to search for new funding sources. Thus, this paper proposes that elements such as sustainability and financing (which had never been linked to building airport infrastructure) are essential for the development of the sector. Thus, this paper was aimed at connecting project development via PPPs focusing on the concept of environmental sustainability and financial profitability. Therefore, PPPs must be considered as the State's management tool for encouraging the development of green airports; project developers can view it as a mechanism that enables and promotes the generation of new sources of funding for the sector.

The following figure shows the main elements of PPPs and their relationship with sustainable infrastructure.

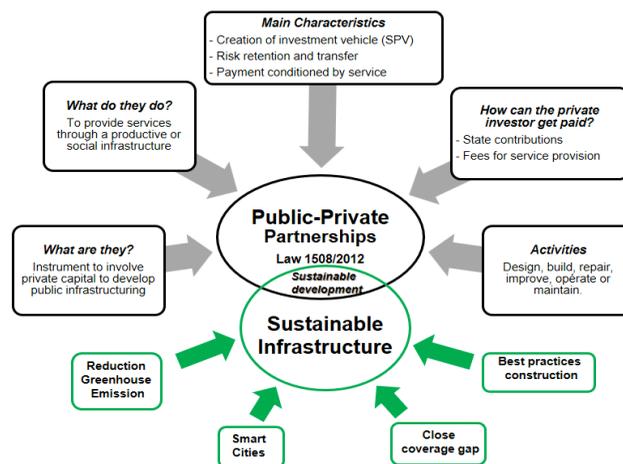


Figure 1. Relation between PPPs and the development of sustainable infrastructure
Source: Own elaboration

Table 2
Airports projects structured accordant to Law PPPs in Colombia

Type of PPP	Name	Competent State Body	Status
Public Initiative	PPP Project for Barranquilla y South-western airports (Armenia-Neiva-Popayan)		Hired
Private Initiative without public resources	Rafael Nunez Airport (CTG) – Structuring, design and construction of a runway and expansion of the current platform		Pre-feasibility under review
Private Initiative without public resources	El Dorado Airport (BOG) – Studies, design, financing, construction and maintenance	Agencia Nacional de Infraestructura - ANI	Rejected Pre-feasibility
Private Initiative without public resources	El Dorado Airport (BOG) – offer of a private initiative hotel, aero-mall, business and complementary service centre		Pre-feasibility under review
Public Initiative	Modernisation of passenger terminal – International Matecana Airport (PEI)	Aeropuerto Internacional de Matecana	Feasible
Private Initiative without public resources	Restructuring of open-air areas of El Dorado Airport’s master plan (BOG)		Pre-feasibility under review
Private Initiative with public resources	Private initiative of El Eden Airport (AXM), Benito Salas Vargas Airport (NVA) and Guillermo Leon Valencia Airport (PPN)		Pre-feasibility under review
Private Initiative without public resources	PPP – Public Initiative of Gustavo Rojas Pinilla Airport (ADZ) and El Embrujo Airport (PVA)	Agencia Nacional de Infraestructura - ANI	Pre-feasibility under review
Private Initiative without public resources	Restructuring of open-air areas of El Dorado Airport’s master plan (BOG)-PPP		Pre-feasibility under review
Private Initiative without public resources	Airport concession for Gustavo Rojas Pinilla Airport (ADZ) and El Embrujo Airport (PVA)		Pre-feasibility under review

Source: Departamento Nacional de Planeación (DNP, 2016)

It is expected that in the future, environmental sustainability criteria are included in the bidding process of such projects. Thus, sustainable sources of financing such as CERs can be used. It is also important to note that the development of infrastructure projects could generate a market of securities indexed to those projects, which would result in expanding the financing and investment options. Thus, the Latin American Market (LATM) would be a good window to trade securities of various projects and sectors.

CONCLUSION

This paper has discussed the current development pertaining to green airport infrastructure in Colombia. The need for special policies for sustainable infrastructure, particularly in the air terminals, has obstructed the development of such projects. There is no doubt that PPP sustainable projects can play a fundamental role in the design of better practices. Consequently, the idea of sustainable infrastructure will be reinforced by improving quality levels and by encouraging funding of eco-friendly assets. With the purpose of fulfilling Colombia's commitments made at the COP21, the Government must implement taxation for example, to promote the development of sustainable infrastructure. Also, it is necessary that the bidding process for projects developed under PPPs to include environmental variables. Thus, in future, the economic development of a country will be directly related to its ability to develop sustainable infrastructures. In environmental terms, El Dorado Airport has developed important mechanisms to promote sustainable infrastructure. However, there is evidence that all the other airports in Colombia are behind in terms of implementing eco-friendly environmental practices. This will impede the evolution from "grey infrastructure" to "green". It is therefore necessary to set-up a solid framework in order to ensure investors focus on ecological investments to promote green airport infrastructure in Colombia. Future research should include analysing how stakeholders such as Investment banks, project developers, the Government and multilateral banks can participate in the development of such projects.. Finally, this paper has proposed the use of dynamic of systems as instruments to measure the impact on hybrid financing mechanisms on the reduction of GHG emission.

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