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YOUNG PLANNERS WORKSHOP

E-BOOK 2018

AIRPORTS, CITIES AND URBAN DEVELOPMENT

GROUPE ADP

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PRESENTATION

By Ignacio Pemán Gavín, President of the ECTP-CEU

It is a pleasure for me to present this e-book collecting the papers presented in the 7th edition of the ECTP Young Planners Workshop. Since 2011 The European Council of Spatial Planners (ECTP-CEU) organizes this workshop as a way to promote amongst young planners Spatial Planning as the appropriate instrument to achieve an integrated perspective of cities and territories.

This year again, the Young Planners of the workshop experienced how different viewpoints and approaches of different planning cultures can produce a variety of solutions to specific urban and territorial issues.

This edition, the ECTP-CEU proposed a strategic theme specifically oriented on the articulation and integration between cities and airports, considering the increasing importance for the territories and focusing on the issues in strategic planning; such as sustainable mobility and energy efficiency.

Traditional design and airport planning considers the airport as an isolated infrastructure accessed by planes and passengers. But the design of airports, in which the City is in the center and the airport on the periphery is changing to a model where the airport is at the center and the city is developed around it; keeping businesses, enterprises and workers within the global market. Indeed, modern airports go beyond the traffic of aircrafts and provide commercial and industrial activities which often extend beyond the airport area.

The call for proposals led to a wide range of submissions from many different parts of Europe; the Workshop welcoming participants from Ireland, Serbia, UK, Hungary, Spain, Italy and Turkey. The final works were presented and discussed at the occasion of the Ceremony of the XIIth European Urban and Regional Planning Awards in Paris last 18th May 2018.

Different scales of airports and cities and different relationships between urban development were analyzed. Future airports such as Hong-Kong, México and Istanbul presented new perspectives; other airports in city centers -London City- and others in rural areas in former Yugoslavia were discussed.

Not only specific projects were presented; the workshop also analyzed mobility issues such as the case of Budapest. Sustainability and environmental perspectives and new methologies for planning the metropolitan area of cities were also examined within a general point of view such as the with airports in Spain.

The final papers presented in this e-book propose to all spatial planners, members of the ECTP-CEU member associations throughout Europe, to have intersting documentation on the impact of the airports in cities and territories and about new challenges of airports from a wide range of perspectives.

Finally, let me conclude by thanking Vladan Djokic, member of the ECTP-CEU Executive Committee and representative delegate from corresponding member of University of Belgrade, who has led this edition of Young Planner's workshop. Thanks also to Julian Hills, ECTP-CEU Secretary, for all the support to the workshop and for the layout and graphic design of this e-book.

Ignacio Pemán

President of the ECTP-CEU

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SUCCESSFUL AIRPORT CITIES: LESSONS LEARNT FROM AIRPORT CITY STOCKHOLM

Alicia Lawrence

Abstract

As a transport node, the functionality of airports is the primary focus for consideration in their development, yet as with many transportation facilities airports are responding to changing passenger demands. No longer solely regarded as locations for entering and leaving a country, airports are now being recognised as the ultimate transit oriented development strategy.

As transport hubs, airports are the first point of contact many visitors have in their destination and so they form the first impression many visitors make of the country. Many airports have understood this and are diversifying their land use strategies incorporating new infrastructure with the aim to provide a cultural induction to the city region through their service offerings and design.

Lastly, there are many complex environmental, political, financial and regulatory factors that must be taken into consideration at airports with regards to land use. Airport City is the term used to describe airports that have diversified to include additional land uses within their boundary. This paper will consider the emergence of airport cities and identify key factors that contribute to a successful airport city. This paper will review Stockholm airport city as a case study to assess some of the opportunities airports cities provide and identify key lessons learnt for enhancing the process of planning modern airports and cities.

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1.0 Introduction

All over the world airports describe themselves as the gateway to the city, however, in many regions there remains fragmentation in the relationship between airports and cities. The airport city model where airports become the centre of new city areas by the creation of business and retail services within the airport boundary is a step in the direction towards improving the functional integration between airports and cities however there are complexities in combining airport development and urban planning that mean that it is not always a success.

Whilst the airport city model has proven successful in many of the examples such as Schiphol, Munich and Dallas Fort Worth (DFW), there is doubt over the extent to which this can be a success in all airport regions in need of boosting economic revenue and improving connectivity. To understand and evaluate the benefits of airport cities approach and how they play a role in the cultural and functional integration between airports and cities a case study; Airport City Stockholm will be reviewed by the paper to provide insight into the planning approach adopted. The paper aims to draw out lessons learnt for emerging airport cities to assess what they need to achieve from their planning approach to replicate the benefits seen at airport cities around the world such as in Stockholm Arlanda.

1.1 Research Aim

This paper will explore whether airport city Stockholm was a successful airport city transformation based on its ability to deliver a holistic strategy integrating the airport to the wider metropolitan area successfully and in doing so explore the benefits airports can reap from this planning strategy.

Airport city Stockholm claims to be 'the airport city of the future' (Swedavia Airports, 2017).This paper will respond to the hypothesis that airport city Stockholm was a success by focusing on the following four factors;

1. Governance and stakeholder engagement
2. Appropriate infrastructure
3. Investment into economic development
4. Sustainability and consideration of the environment

This primary objective of this paper is to contribute to the discussion on the importance of airport development by understanding modern methods of integration with the wider metropolitan city. Key themes of this paper are strategic planning, land use and the quality of urban development.

2.0 Context

2.1 Diversification

Airports are no longer solely destinations for passengers to meet aircraft to travel to and from their destinations, but have evolved into multifaceted business operations with both spatial impacts and functional implications that extend deep into the surrounding regions and metropolitan areas. Airports have become vital centre's in international connectivity (Freestone, 2009). Whilst they have maintained their primary function as aviation interchanges, airports have simultaneously developed lucrative terminal retail, commercial and industrial businesses (Baker & Douglas, 2013).

2.2 Revenues

The role of aviation in the modern economy is greater than solely a transport service provider to industry and members of the public. Aviation is a key driver of prosperity, economic and social growth. The Airports Council International describes airports as critical catalysts to economic growth (ACI Europe, 2015) demonstrating the scale of aviation's contribution to wealth generation in the host country.

From large scale employment, technological developments, global transport systems and major infrastructure investments there are many opportunities for airports to generate a wave of effects for different groups of people.

The need for diversification in order to influence revenues is an example of reforms in airport business' that can be identified as an origin of the concept of airport cities (Paneda, Reis, & Macario, 2010). As identified by the founder of the airport city model John Kasarda the core business case for the airport city model is its reliance on three key arguments (Kasarda, 2010);

(1) Passengers, service-sector businesses, and shippers have unmet needs,

(2) The needs of theses airport stakeholders become primary airport area growth drivers as they increase in size and economic importance,

(3) Airport operators and their enterprise partners can benefit financially by addressing those needs.

2.3 Connectivity

Expansion of developable land surrounding airports has also been influenced by increasing requirement to utilise the proximity to global connections. Services offering air transportation or that frequently rely on goods transported internationally as well as those catering to the local needs of passenger and employees of the airport are creating corridors of development between the airport and metropolitan areas that they are so frequently detached from. These areas usually with good highway access are attractive to various businesses needing regional connectivity and so they are leading the way in a need to develop such land (Kasarda, 2010).

However, although this demonstrates a case for development strategies to enable the role of airports to diversify, expand and to better integrate with wider metropolitan region, a greater depth of understanding of this methodology is required to justify it as a suitable mechanism as a sustainable urban development strategy. These new urban forms, even the most successful ones adopted as part of extensively planned larger airports, provoke a series of planning issues (Freestone, 2009).

3.0 Airports, Cities and Integration

The role of airports as cores for urban development is historically key in urban planning history. Notable urban planners such as Le Corbusier in his city design strategy have incorporated airports into the centre of the city (Pearman, 2004). Economically airports bring visitors from around the world to the country and are big contributors to GDP, for example in 2014 The aviation sector contributed £52 billion (3.4%) to UK GDP and provided close to one million jobs throughout (Oxford Economics , 2014). Similarly, in a shift towards sustainable cities airports have a leading role to play in energy efficiency & sustainability. Many airport operators have developed initiatives specifically to tackle the negative association of airports and pollution and promote sustainability. Better regulation and the development of accredited schemes has even led to many airports becoming carbon neutral (Airport Carbon Accreditation, 2018).

With increasing breakthrough in technology, the definition of access is changing. Co-locating no longer means spatial proximity must be small, continuous access is becoming an increasingly more important performance indicator and it is allowing for a restructuring of traditional land use arrangements. Smart mobility and improving transport links between airports and the buffer towns can create strong ties to the surrounding areas. Many airports have multimodal transport links giving passengers numerous options to travel to and from the airport. In the context of Airport cities, the airport represents the central business district of wider developments known as aerotropolis', the aerotropolis acts as a physical and functional connection to the wider area.

3.1 Planning challenges

The planning process of any nationally significant infrastructure has large implications on the city it is in as well as many secondary effects on the people who will eventually use the infrastructure. Good place making should be holistic, cohesive and designed to allow maximum accessibility to public spaces whilst ensuring functionality as well as sustainable design. This is no different for master planning of airports and airport cities.

One of the main complexities the airport city model needs to reconcile is the difference between strategic urban planning and airport master planning. Although airport masterplans take into consideration land use planning up to and often outside of the airports red line boundary there is a propensity to adopt a business-like approach to planning and development decision-making more so than new urban city planning approaches (Trezise, 2014). Urban planning aims to be comprehensive, the 10 principles of new urban planning developed by the United Nations provide key indicators as to what holistic planning should look like (UN-Habitat, 2016). This provides noteworthy criteria against which airport city planning can be measured.

The 10 principles of New urban planning are:

1. Promote sustainable development
2. Achieve integrated planning
3. Integrate plans with budgets
4. Plan with partners and stakeholders
5. Meet the subsidiarity principle

6. Promote market responsiveness
7. Ensure access to land
8. Develop appropriate planning tools
9. Be pro-poor and inclusive
10. Recognize cultural diversity.

The next chapter of this report highlights key challenges faced in airport development and airport city planning.

3.2 Revenue generation

One challenge facing growing airports is their ability to generate more revenues whilst safeguarding their main functions. Airports generate non-aeronautical revenues from a range of sources such as car parking, retail, food & beverage, real estate and advertising. Airports in Europe are finding it increasingly challenging to boost such revenues (Airports Council International , 2013), due to a combination of factors which significantly increase commercial pressures such as:

- Off-site airport car parking and incentivisation for passenger by airlines to use them.
- Online shopping reducing the need for stores to rent airport space.
- Increased security requirements causing stresses for passengers who therefore reduce spend.

Non-aeronautical activities are a key source of revenues, which are used to maintain and expand airport facilities, and often to reduce the proportion of costs that must be paid by airlines and passengers. A reduced ability to generate such revenues is therefore a concern for the overall aviation sector (Airports Council International , 2013)

3.3 Safeguarding land use

Many state-owned airports are located at considerable distances away from their main city's centre. This was logically done to safeguard for expansion of the airport whilst at the same time ensuring safety and reducing the impact of noise as far as possible (Baker & Douglas, 2013).

Whilst this distance can be seen as a negative, airports of the future must be able to accommodate increased passenger demand and increased requirements in terms of infrastructure investments. According to the international air transport association the top 100 busiest airports by passenger volumes do not have available excess capacity. As identified by IATA's research, apart from four airports, the remaining 96 busiest airports will need to have major infrastructure development programs within the next 10 years and 457 of the total airports studied currently have infrastructure capacity issues in terms of runway and terminal capacity (International Air Transportation Association, 2018).

IATA's research into limited resources at airports worldwide raises some fundamental questions regarding the planning of airports to meet this new demand as well as inspiring modern ideas about the airports of the future and how these integrate with the wider surrounding region, these include understanding if airports can provide for more demanding passenger needs and the necessary capacity without infrastructure and operations at airports significantly changing.

Figure 1: Airport Capacity Map Source: (IATA, 2018)

Such questions present opportunities for innovate ideas to ensure flexibility in the airport boundary. Improving connectivity from the airport to the city provides the opportunity to alter what happens on and off the airport site. Collaborations such as distributing airport secure entry gates within the cities multimodal transport links and therefore moving away from centralising all the processes at airports provides insight to the future possibilities of airport access. Similarly, the location of airport support services, retail space and other uses traditionally located in the airport could change. Using the corridors from airport nodes as ideal locations supports sprawl of the traditional airport boundary.

4.0 Subject description

Spatial planning for airports is no longer just about setting out the orientation of solely aeronautical related activities. Increasingly airports are beginning to incorporate spaces outside the boundary for improved connectivity and inviting alternative land uses within the boundary to enable more holistic place making and increase generated revenues. Whether airport city development successfully takes place is reliant on key considerations such as space available on the airport, the location of the airport on the landside infrastructure networks, the economic structure of the region, the institutional selling and planning framework (Knippenberger & Wall, 2009)

The nature of an airport is a business yet cities are much more difficult to define. Similarly, the two entities have very different functionalities and so there needs to be measured approaches in the integration of the two to ensure the relationship works. As a business, primarily airports can be thought of as a part of albeit an extension of the city. This raises the questions of what makes a successful city and what makes a good airport?

The Federation Aviation Administration of the United States, concludes that the compatibility of airport land uses is a crucial factor to both the local government and the airport. Understanding the functionality of the airport and

its impact on or from the local community are key for ensuring that land use is compatible. It is policy that allows both government and airports to maintain a clear understanding of their roles to enable them to deliver compatible development (Federal Aviation Administration , 2017).

Different stakeholders at airports are likely to have conflicting views on development plans and proposals by nature of their different perspectives however in order to reach a shared understanding negotiation is important (Jialiang Yao, 2005). The airport operator is often responsible for the planning and development of the masterplan however the more collaborative the process the better.

Attractive cities are not developed as projects but evolve naturally over time (Trip, 2014). This same organic approach is not generally adopted by airports who need to be much more measured in their development approach when it comes to adopting the airport city model. Understanding each airport and the potential to develop site specific infrastructure rather than a generic city model is key.

5.0 Analysis

5.1 Case study: Airport City Stockholm

Stockholm Arlanda Airport in Sweden and is one of the main gateways to the country with connections to over 150 destinations worldwide (PwC, 2014). Located 20 minutes from Stockholm and 20 minutes from Uppsala, Airport City Stockholm is in the middle of the fastest growing region in Sweden. The airport currently serves around 27 million passengers (2017) and has 3 runways with a terminal gross floor area of 140,000sqm (Swedavia Airports, 2018).

Plans for the Airport City Stockholm; Sweden's first airport city were unveiled by joint managers of the development Swedavia who own and operate Stockholm Arlanda Airport, the Municipality of Sigtuna and Arlandastad Holding AB.

The development aimed to take advantage of growth in the Stockholm as a region and the idea that airport cities are especially suitable places in which to run businesses and set up new operations. A general trend of a need for new business locations for commerce and operations in well-developed corporate clusters with good access and services provided a timely opportunity for the airport to implement its strategy (Swedavia Airports, 2017). The airport city's unique selling point is its focus and objectives for the airport city being to be sustainable, commercial, nearby as in connected, urban and environmentally sound (Swedavia Airports, 2017).

5.2 Strategy

Increased passenger demand at Stockholm Arlanda airport as well as future forecasts prompted the airport to begin a development for expansion of their terminal capacity. Although this project was an operational requirement the plans went beyond developing solely airport operations and consideration of how the airport could become as close to a thriving city as possible was made from the beginning.

One of the first similarities to an urban area the airport city was able to harness is connectivity. Stockholm airport city covers approximately 800 hectares within proximity to numerous transport nodes. This is a strong factor in the success

of the airport city, Stockholm Arlanda has access to roads, air travel and railways including the Arlanda express a high-speed rail link which delivers 20-minute journey times to nearby city Uppsala and commuter trains to Stockholm in 40 minutes (PwC, 2014). The airport city also had a strong contribution to the region in terms of employment and job creation. There were already up to 20,000 people working in Stockholm's Airport city with 200 businesses setting up offices there. Employment data showed that of the 20,000 employees 17,000 contribute to the airport in some way. Figure 2 shows the airports proximity to the local cities.

Figure 2:Airport City Stockholm location source: (PwC, 2014)

5.3 Impacts on Land Use

The development of the Stockholm Airport City was a joint urban planning strategy by the partners to ensure the delivery of a holistic vision. This approach demonstrated their shared ambition for the project (Arlandastad Holding, n.d). The strategic plan for Stockholm Airport City is based on the creation of six districts (Swedavia Airports, 2017), each with its own purpose that has led to the creation of the same designated areas within the airport boundary. A deliberate attempt was made to create city areas within the airport boundary that can be found in vibrant urban areas:

1. Sky City: The city centre, aims to provide a sense that people are already in the Stockholm city centre
2. Park City: The Airports entrance, is a green park linking the area with other parts of Airport City
3. Drive LAB Stockholm: knowledge cluster for developing the automotive industry of the future
4. Märsta Business Park: established corporate park with good services which is closely integrated with the town of Märsta.
5. Cargo City – Cargo and logistics at the airport: located adjacent to the airport with a focus on cargo and logistics.
6. Logistic Center – Rosersberg Logistik along Route E4: logistics hub with warehouses and extensive parking and transport areas.

5.4 Success or failure

Although the development is not yet completed the gradual success of the airport city can be determined by notable outcomes to date. One clear observation from this plan is the style of development which has aimed to recreate several areas in the airport boundary that might be seen to replicate different areas that make up todays metropolitan cities and regions. Sky city is Stockholm airport city's downtown" a necessary part of urban areas that created a natural feel and link to the wider Stockholm city area (Furuto, 2013). Such consideration led to decisions for good placemaking such as the creation of an attractive environment, ensuring the land uses are fit for purpose, with spaces and buildings that serving the communities they are located in.

Job creation and stimulation of economic growth in the airport city has had a multiplier effect on the wider region of Stockholm. Gross Value Added per employee in the hotels and restaurants sector alone at the airport city is 67% higher than the Swedish industry average, and is 54% higher than the industry average in Stockholm (PwC, 2014).

Sustainability and the environment was not a secondary factor but played a prominent role in the space. Park city not only welcomes visitors to Airport city Stockholm but adds depth to the environment and demonstrates that it was not all about creating office uses to generate revenues but a circular city.

Stakeholder management was the key driver for success at Airport City Stockholm. All groups involved worked together from an early stage of the process which was seen in the long run as a development that satisfied all the stakeholders was achieved.

Last but most importantly not least functionality at Stockholm airport city was not compromised for the creation of the non-aeronautical activity. The primary focus of the development was expansion to accommodate growing passenger demand however the delivery vehicle of this expansion project led to a multidimensional transformation to the whole site.

6.0 Conclusion

Historically airport planners have focused on the design of airports to their boundary and urban planners plan cities in a comparable manner; the two have rarely met however, of recent, an opportunity for greater collaboration has emerged. Strategically there are benefits in combining the spatial planning of airports to be more greatly intertwined with that of the city. Often seen as the gateway to the city airports can act as catalysts for the cultural experience of visiting a city to begin from touchdown.

This paper has explored the cultural and functional integration between airports and cities through the creation of airport cities by analysis of Airport City Stockholm. As unique and organic entities, cities are created through a combination of strategic planning and evolution over time. As demonstrated in Airport City Stockholm, a well organised approach to delivering a holistic vision that considers numerous stakeholders can deliver a well-rounded solution.

Despite this approach it is commonplace that masterplans are replicated without taking regional, economic and cultural circumstances into account. Whilst this is not recommended as failed airport city examples are emerging based on this, there is the opportunity to take lessons learnt away from successful schemes (Wiedemann, 2017).

6.1 Lessons learnt

The case study covered in this report highlighted the main factors as being core to its success:

1. Good governance and stakeholder engagement

An aligned approach from stakeholders such as the airport, the urban planning department, the municipality and major transport providers to define the future vision of the airport city.

2. Appropriate infrastructure

Strong transport infrastructure links (road and rail), and a continued development of these links to support demand and enable growth between the airport and two nearby cities, Stockholm and Uppsala.

3. Investment in economic development

Knowledge clusters and flexible business locations developed on the airport site provided dual advantages by solving the infrastructure needs of the surrounding region and creating new revenue streams.

4. Sustainability and consideration of the environment

The environment as a primary consideration to the airport and incorporating it throughout the development worked as both a cultural show to visitors entering Stockholm through the airport city and demonstrated future consideration for the urban space.

This research found that the airport city model is a good reference and starting point to develop discussion between airport planners, airports and town planners however airports must pay attention to the needs and make-up of the community and regions they serve. There are many planning challenges that face airports and their expansion. By incorporating the four key factors of good governance, ensuring appropriate and relevant infrastructure, connecting local and airport economic development and planning sustainably better integration between the airport and the city can be and will be seen in the future.

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MASTERPLANNING THE GREEN AIRPORT OF THE FUTURE:

NEW INTERNATIONAL AIRPORT FOR MEXICO CITY

Anna Bevington

May 2018

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"NAICM will be a world-class airport, a benchmark for low carbon, representing the people of Mexico as an innovative and sustainable gateway to the country."

Overarching vision for NAICM (GACM quoted in Arup SMP, 2018)

Figure 1: Artist's impression of NAICM (Source: FP-FREE)

1. Introduction

1.1 Overview

Mexico City's new international airport (Nuevo Aeropuerto Internacional de la Ciudad de México or NAICM) is expected to be the world's second largest airport. Currently under construction and due to begin operations in 2020, the airport will be capable of handling 120 million passengers annually. NAICM is aiming to be the world's most sustainable airport, partially powered by renewable energy and the first airport terminal to obtain Leadership in Energy and Environmental Design (LEED) v4 for Building Design and Construction Platinum certification.

As part of NAICM's aspiration to become a world class reference for green airports, the developer Grupo Aeroportuario Ciudad de Mexico (GACM), was provided a grant agreement by the US Trade and Development Agency for the development of a Sustainability Management Plan (SMP) for the airport. The purpose of the SMP is to develop a comprehensive roadmap for enhancing NAICM sustainability aspirations, selecting focus areas for improvement and establishing meaningful goals, key performance indicators (KPIs) and metrics for measuring progress.

1.2 Research aims and key questions

This paper will explore how airports can successfully plan for a sustainable, energy efficient future. The research will focus upon three key questions:

- Taking the example of NAICM SMP, what role can spatial planning play in delivering sustainable airports?
- What are the challenges and opportunities in achieving a sustainable, energy efficient future for airport cities?
- What lessons can be learnt for embedding sustainability in similar large scale infrastructure projects?

Drawing upon the key themes of the 2018 ECTP workshop, the analysis section of the paper will be structured around the following perspectives:

- Strategic planning
- Smart mobility
- Energy efficiency

2. Context

2.1 Introduction to the case study

Mexico City's current international airport is Latin America's busiest airport, receiving over 270,000 visitors and facilitating over 1,000 flights every day (Sierra and Ruelas, 2017). The airport was officially declared at saturation in 2013 and can no longer keep pace with the country's development and increasing passenger flows. In September 2014 the Mexican Federal Government announced plans for the development of a new airport on a 5,000ha site to the east of the city.

The new NAICM airport will ultimately be six times larger, growing from an initial three runways to a total of six (Parsons, 2017). Designed by a joint venture between architects Foster & Partners and Fernando Romero Enterprises (FP-FREE), in collaboration with Arup, the first phase of the airport will comprise a single x-shaped terminal building with an initial capacity of 57 million passengers annually. Preliminary site works began in 2015 with an average of 10,000 construction workers onsite each day and the airport is due to opens its doors in 2020 (ibid). Set out in section 2.2-2.3 are some of the key challenges and opportunities affecting this project.

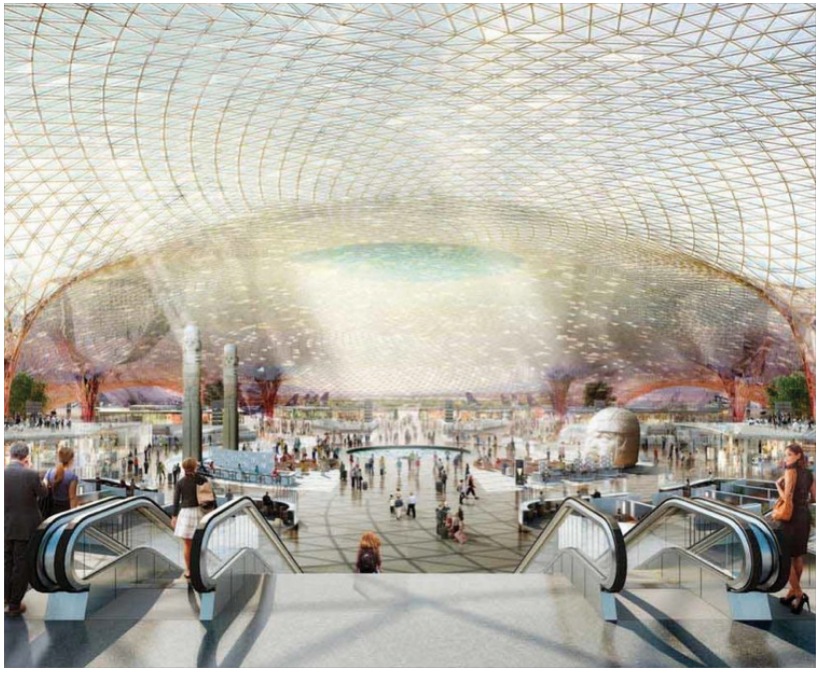

Figure 2: Proposed terminal design (Source: FP-FREE)

Figure 3: Aerial view of the proposed x-shaped terminal (Source: FP-FREE)

Opportunities
+ Economic growth
+ Rising middle class
+ Funding
+ Aerospace industry
+ Energy reform

Challenges
The site -
Transport and access -
Behavioural change -
Governance and politics -
Inequality -

Figure 4: Overview of the key opportunities and challenges associated with NAICM

2.2 Key challenges

There are a range of challenges associated with NAICM's path towards carbon neutrality.

Firstly, the **site**. NAICM will be situated on the site of the former Lake Texcoco where the soil is 80% water and 20% clay. GACM have undertaken extensive topographical, geotechnical, ground, subsidence, and cracking studies across the site which have informed the airport design including location of runways and buildings (Mehta, 2016). Arup's experts developed an innovative foundation system to address these conditions, and the terminal roof has been designed as a highly efficient lightweight grid shell, allowing the building to float and adapt to the subsidence of the soil.

Figure 5: Construction workers at the former Lake Texcoco site (Source: Brett Grundlock)

Secondly, **transport and access**. NAICM will be located twice as far from the city centre as the current airport, and is predicted to require extensions to four bus lines and one line of the metro. Coupled with the fact that Mexico City has the worst traffic in the world, the new airport will result in an additional 100,000 passengers each day (MEPP, 2016).

Thirdly, **behavioural change**. Achieving a shift towards sustainable living will require a widespread change in the national mind-set. Mexico is currently one of the worst offenders for waste management, producing over 100,000 tonnes of waste per day, of which only 3% is recycled compared to an average of 24% in the US (Mexico News Daily, 2016).

Fourthly, **governance and politics**. In 2002 the Federal Government announced plans to build a new airport terminal on communal farmland. A decree was used to try and acquire the land, leading to a protest by the local community resulting in violent confrontation (Knoll, 2015). This time, transparency has been a cornerstone of the NAICM plans, with a collaboration between GACM and the Organisation for Economic Co-operation and Development (OECD) overseeing all elements from governance to reporting and procurement (Warden, 2017).

Lastly, **inequality**. Inequality is a significant public issue in Mexico and the site of NAICM is located adjacent to one of Mexico City's poorest neighbourhoods. This requires careful management to ensure that these low income communities do not bear all the burden and none of the benefits.

2.3 Key opportunities

However, coupled with these challenges are a unique set of opportunities.

Firstly, **the economy**. The country has seen steady growth rates over the last two years and this is set to continue through 2018-2019. Mexico is one of the top five visited countries in the world with a tourism industry worth $3.2 billion a year (Parsons, 2017). The completion of NAICM is expected to further boost the country's international presence and create 4,000 new jobs for every million passengers (Mehta, 2016).

Coupled with this is a **rising middle class**. Mexico's middle class is the fastest growing segment of the population, comprising 47% of households (Martin, 2017). With this comes a growing demand for air travel and a wider population able to access airline travel for the first time. In the first six months of 2017 domestic air traffic in Mexico grew by 12% while international traffic saw a surge of almost 15% (Anna.Aero, 2017).

Thirdly, **funding**. The $13 billion project costs are funded by an innovative and robust mixed-financing model, with a combination of public funds and private financing (Mehta, 2016). After debt service is paid, all profit goes to the public purse (Warden, 2017). Users themselves also help contribute to the financing of construction through the Airport Use Fee, which essentially makes NAICM a partly self-financing project (Presidencia de la República, 2018).

Fourthly, **the aerospace industry.** Today Mexico is home to over 300 aerospace manufacturers and the civil aerospace industry in Mexico accounted for 65% of the total market value in 2017 (Sierra and Ruelas, 2017). It is hoped that NAICM will help establish a global cargo and logistics hub for the country.

Lastly, **energy reform**. Mexico is showing a growing commitment to sustainability. In 2015 the Government introduced an Energy Reform which ties the country to generating 35% of energy from clean sources (Warden, 2017).

3. Subject description

3.1 Sustainability of the airport industry

The airport industry is not traditionally associated with sustainability. It is estimated that the industry currently contributes between 2-3% to global warming and the projected growth of air transport could see this rise to around 10-20% by 2050 (Baxter et al., 2014). However, air transport equally plays an important and growing role for commerce, tourism and trade and it is therefore critical that the sustainability of the industry is improved (ibid).

Airport buildings themselves require significant amounts of energy to sustain round the clock operations and the average large airport will typically consume as much energy as a small city. Consequently, they present a unique opportunity for significant energy savings and leadership in sustainability innovation.

3.2 Growth in air travel

As shown in figure 6, global air traffic passenger demand has seen a steady increase since 2013, peaking at 7.5% growth in 2017 (Statista, 2018). This growth in demand for air travel is due to multiple factors including the wide scale growth of low cost carriers and regional airlines, allowing for innovative low fare business models. The rise of middle classes in emerging markets is only set to fuel this demand, and Latin America is expected to see the biggest growth in air traffic in coming years (Statista, 2018). Another factor is the recent decrease in oil prices which has substantially decreased the operating costs of airlines: "This has resulted in a positive and healthy ambiance for the airline market, permitting new players and airlines to start playing in a market characterised by high barriers and high investment

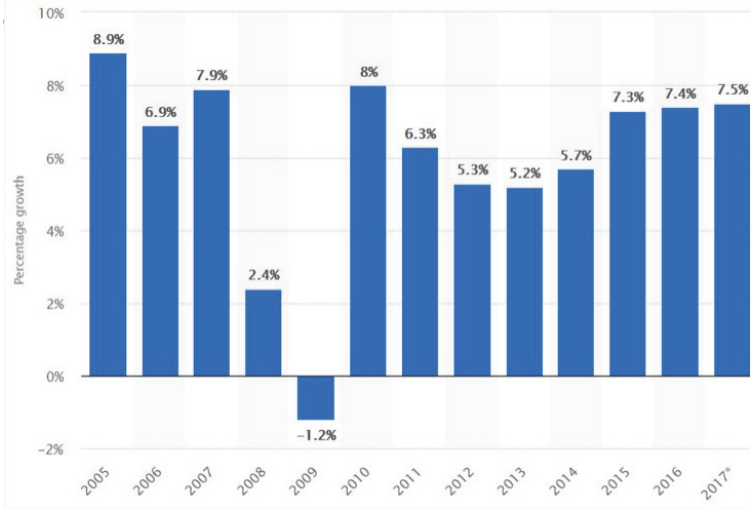

Figure 6: Annual growth in global air traffic passenger demand from 2005 to 2018 (Source: Statista)

3.3 What is being done?

The importance of improving sustainability in the airport industry is gaining worldwide momentum and several recent initiatives show a growing commitment to achieving this. Recent years have seen an increasing number of airport projects achieving green building certifications and several existing airports setting ambitious energy reduction targets, such as Dubai airport's 20% energy reduction plan by 2020. There are also a number of international conferences dedicated to green airports such as the Airports Going Green Conference organised by the American Association of Airports Executives AAAE (Choufani, 2016).

Other energy reduction schemes include the Airport Carbon Accreditation initiative which was launched as a voluntary and independent program to help reduce the airport industry's carbon footprint. In December 2015 the programme announced plans to increase the number of carbon neutral airports from 20 to 50 by 2030 (ACI Europe, 2015).

The EU has introduced a three-year project to specifically reduce the emissions of heating, ventilating and air conditioning (HVAC) systems, which contribute to half of all energy consumption at airports. Supported by a funding pot of €2.6 million, the project will use new software coupled with an energy action plan to help airport managers reduce the energy needs of HVAC equipment by 20% (European Commission, 2014).

4. Analysis and research

4.1 Introduction to the NAICM Sustainability Management Plan

As part of NAICM's aspiration to become a world class reference for green airports, the project sponsor GACM was provided a grant agreement for the development of a SMP for the airport. In June 2017 Arup were commissioned by GACM to prepare the SMP. The plan identifies a comprehensive set of short and long term measures to help the airport achieve its sustainability goals. The SMP places a strong emphasis on collaboration with stakeholders and partners to implement the proposed innovation and change. The following analysis section explores some of the ways in which the SMP is addressing the ECTP's three key themes of strategic planning, smart mobility and energy efficiency.

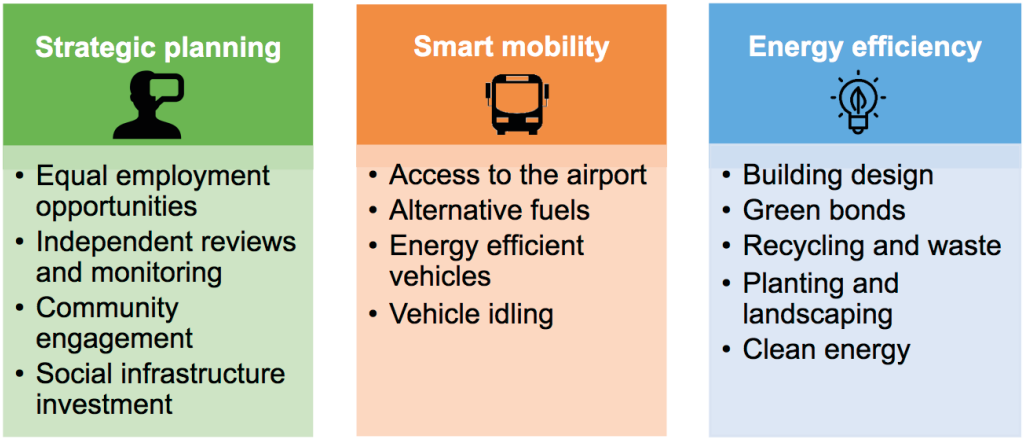

Figure 7: SMP focus areas within the three key themes of strategic planning, smart mobility and energy efficiency

4.2 Strategic planning

One of the unique features of the SMP and the overall planning process for NAICM has been the focus on transparency, engagement and collaboration. Learning from the mistakes of previous government-led projects (see section 2.2), the development of NAICM is being driven by a focus on front-loaded engagement and bottom-up planning. The mission statement in the SMP places particular emphasis on disseminating benefits to the low income communities nearest the airport and arranging outreach activities to encourage young people into the aviation industry.

> *"Building and maintaining positive relationships in the community is a critical component of the Sustainability Management Plan. GACM should work with local governments, businesses, non-profit organizations, and private citizens to ensure that NAICM is and will always be a force for good in our own backyard."*
> *GACM's mission statement in NAICM SMP (Arup, 2018)*

During the pre-construction phase GACM held a public meeting with around 650 residents that live near the NAICM site, where presentations were given on key issues and answers provided on any inquiries that had been submitted to the project (Mehta, 2016). GACM have also set up two key collaborations; the first with the OECD, which has been employed to undertake regular public progress reports, and the second with the Citizen's Observatory of the NAICM, a group composed of four renowned civil organisations in Mexico, formed with the purpose of resolving any concerns that citizens may have regarding the project (ibid). Further to this, a public portal will be set up online and regularly updated with the latest information about each of the SMP's sustainability initiatives, KPIs and policies in an easy-to-understand form.

During the construction phase, a public consultation survey was undertaken in which 119,000 homes in the local vicinity were contacted to seek opinions on the project. Demonstrating the public interest in the project, GACM's Director General Federico Patiño revealed that whilst consultations for road projects normally receive between 20-30 enquiries, the NAICM project received more than 5,000 (Warden, 2016). The follow up to the consultation exercise is now aimed at addressing stakeholder concerns and improving awareness of the project benefits (OECD, 2018). One of the key issues identified during the consultation was the extreme poverty conditions in the municipalities surrounding the construction site. In light of this, the OECD's second progress report recommended that a specific collaboration is set up between NAICM and the national, sub-national and local governing bodies to provide quick and effective solutions to any issues affecting these communities during delivery of the project. Parsons, the company responsible for program managing the overall project development, are also considering assembling a panel of experts to resolve disputes (Warden, 2016).

Once operational, the airport will set up an annual economic contribution to the surrounding communities which would be used to reach the following twofold goal: "to increase outreach with employees, tenants, and the local community related to sustainability and, to set GACM and a local ally to promote education and work opportunities for the local youth" (Arup, 2018). GACM are already working with the Government on improving social infrastructure for local communities, including schools, hospitals, public spaces, transportation, and access to public services such as water, electricity, and plumbing (Mehta, 2016).

With regards to employment opportunities, the SMP identifies that offering equal opportunities to small business and minority-owned businesses is a relatively new concept in Mexico and a unique opportunity for NAICM to become a leader in best practice for public sector owned companies. Likewise, the plan recommends a percentage target for seeking employees from local communities and ensuring equal payment regardless of gender or disability (Arup, 2018).

4.3 Smart mobility

Given the location of the NAICM site approximately 10km further east from Mexico City centre, the need for sustainable access to the airport is of critical importance. Congestion currently costs Mexico City 2.6% of GDP every year, however steps are being taken to combat this (Embarq Network, 2015). The Federal Government has committed $150 million to expanding and modernising sustainable public transport systems including new energy efficient buses and extensions to lines of the metro system which will improve access to NAICM (ibid). A tender has also been issued for the pre-investment phase of an Express Train that will run from Observatorio, one of the metro's main connection points, to NAICM in just 35 minutes (Salas, 2017).

Currently less than 30% of passengers travel to the existing airport by public transport and the NAICM SMP aims to increase this to at least 50% (Arup, 2018). It is recognised that public transport improvements will be staged over time. Upon opening in 2020 the airport will prioritise bus service provision with at least 1,000 trips in each direction daily. Once rail service becomes operational, the bus service will then be reassessed to take into account the additional capacity provided by rail services. The masterplan for the airport has been designed to include protected areas of land for the physical infrastructure to facilitate these future public transport investments.

The SMP also proposes a series of short term initiatives to improve sustainable travel within the airport site. This includes a plan to reduce vehicle idling amongst airport fleet vehicles, passenger and commercial vehicles through installation of technologies such as automatic shut-off engines, setting an idling time limit, and use of battery-powered auxiliary power systems and fuel-fired heaters. In order to encourage use of green vehicles in the future, the SMP recommends including sustainability requirements in the process to purchase new vehicles within the NAICM fleet. The plan also seeks to incentivise the use of energy-efficient vehicles amongst NAICM's tenants such as airlines, restaurants and shops. One of the longer term initiatives to improve the efficiency of vehicles involves increasing the number of electric charging stations, and other alternative fuel sources, such as biodiesel or compressed natural gas, in the passenger and employee parking areas (ibid).

4.4 Energy efficiency

NAICM's commitment to becoming the world's most sustainable airport and a world class reference for green airports sets high expectations for energy efficiency. In reality, the move towards carbon neutrality will be sought in stages through a range of short term wins and longer term initiatives that will reduce energy consumption in steps. Demonstrating its commitment to innovation in sustainability, NAICM will be the first airport in the world to be partly financed by green bonds. A Green Bond Framework has been set up to provide funds for eligible sustainability projects such as on-site renewable energy production, water and waste management, pollution prevention, energy efficiency and green buildings.

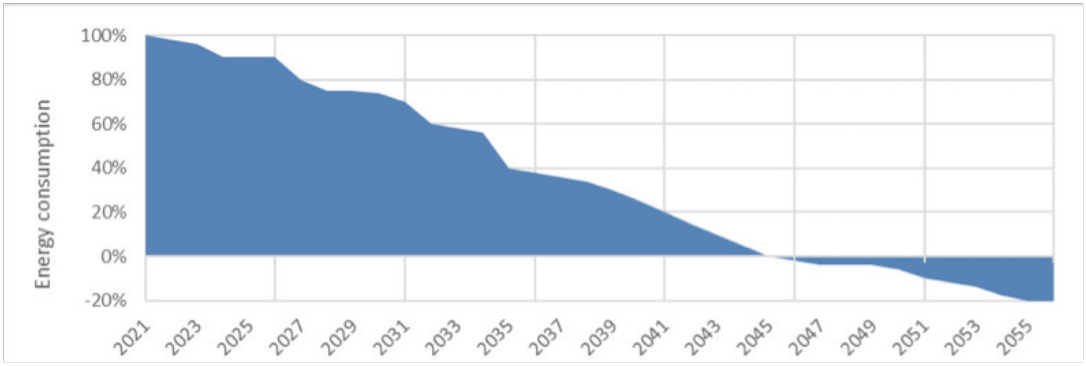

Figure 8: Net energy consumption forecast (Source: Arup)

The preparation of the SMP itself is being funded through a grant agreement and its purpose is to identify the specific initiatives which will help NAICM achieve its sustainability objectives. Once built, the airport's goal will be to operate with 100% renewable energy and achieve reductions in water and energy consumption through the use of specific heating and cooling systems, lighting, electronics as well as water through the onsite treatment of potable water (S&P Global, 2017). Short term initiatives include grouping flights in a certain part of the concourse during non-peak hours, allowing the airport to shut off air conditioning, lighting or non-critical loads in unused areas. Longer term priorities include regular recommissioning of HVAC and other high consuming systems, development of a Sustainable Purchasing Policy to promote the use of high-efficiency equipment, and increasing the use of renewable energy sources such as photovoltaics, fuel cells with sustainable hydrogen, or solar thermal energy (Arup, 2018).

NAICM has been designed to be the first airport in the world to achieve LEED v4 BD+C Platinum certification, the highest level of certification available. Arup has designed a terminal where, for a significant portion of the time, space temperatures will be maintained by 100% outside air, needing no additional cooling energy. Demonstrating the commitment to sustainability, Arup designed the raft foundation to double as the outside air distribution plenum (thus eliminating many tons of sheet metal for ductwork). Outside air is brought from the roof, where the best quality air is present, down through the roof structure and into the foundation, where the air can be pre-cooled through heat exchange with the ground.

The external spaces around the airport are also being improved through the creation of a new 670ha forest, coupled with a reforestation program covering 2,000ha (Mehta, 2016). Jose Luis Romo of GACM states that their goal is to "transform an area that is currently degraded into a new lung for the east side of the Valley" (ibid).

In addition to the physical infrastructure, a key element will be facilitating the necessary behavioural change to improve waste management (see section 2.2). As shown in figure 9, the potential to influence impacts and costs of sustainability are greatest at the planning stages of a project, highlighting the importance of a robust user plan.

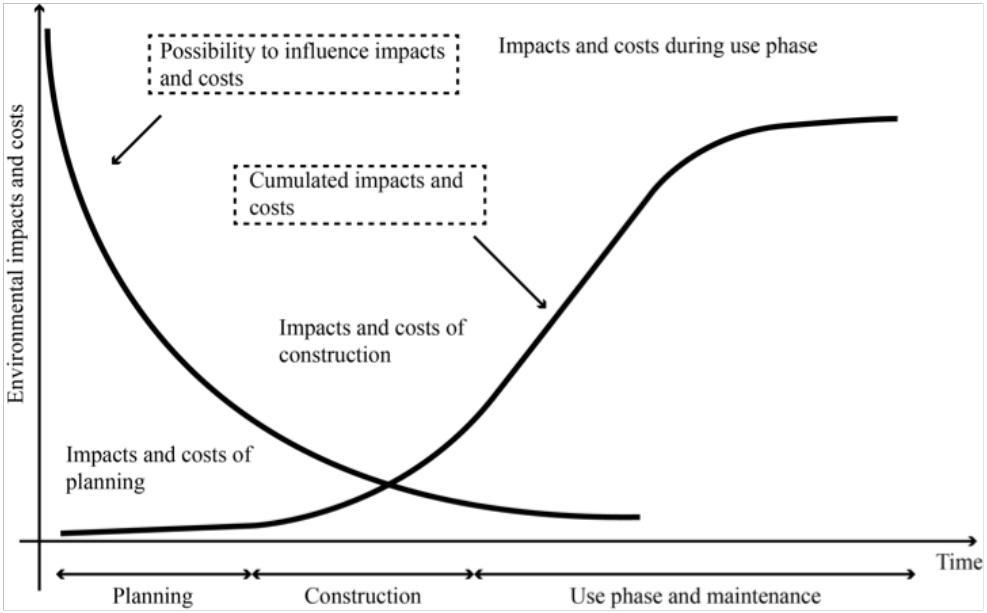

Figure 9: Impact and cost of sustainability throughout a project (Source: Arup)

Measures identified in the SMP include the provision of segregated waste bins, and an airport-wide organic food waste composting program. Underpinning these measures will be an extensive education program to improve awareness amongst stakeholders, passengers, tenants and employees. The knock on effects of waste reduction will include decreased transportation emissions, reduced resource usage, and the ability to produce new products from recovered materials rather than virgin materials (Arup, 2018).

5. Conclusions

5.1 Reflection on research questions

To conclude, this paper will reflect back on the three key research questions set out in section 1.2.

'Taking the example of NAICM Sustainability Management Plan, what role can spatial planning play in delivering sustainable airports?'

Having a spatial plan, in this case the SMP, is pivotal to the success of any large scale project. The plan forms both the evidence base and action plan to monitor progress. When aiming for high levels of sustainability, a spatial plan ensures accountability amongst all stakeholders and helps translate high level ideas into achievable initiatives. This is particularly important for developing countries, where the application of sustainable technologies may not be commonplace.

'What are the challenges and opportunities in achieving a sustainable, energy efficient future for airport cities?'

The challenges and opportunities are unique to each airport city, depending on their economic, social and environmental context. As this paper has shown, Mexico's key challenges revolve around a societal inequality, coupled with poor physical infrastructure and challenging ground conditions on site. However, it is clear that the social factors are always the most challenging. With the right team of experts in engineering, environment and architecture, innovation in physical sustainability is far easier to achieve than innovation in social sustainability. The greatest challenge for NAICM and other developing parts of the world, will be re-educating the population to achieve the greatest levels of sustainability.

'What lessons can be learnt for embedding sustainability in similar large-scale infrastructure projects?'

There are three key lessons to be learnt from the NAICM project which could help improve the sustainability of future infrastructure schemes.

Firstly, setting out sustainability targets from the outset. From its very conception, the developers of NAICM committed to this being one of the most sustainable airports in the world. By publicly committing to headline targets and figures, developers feel a sense of accountability to follow through and achieve them. It is important to note that this must be supported by a strong vision and action plan covering the entire project lifecycle to ensure deliverability. In the case of NAICM, the commissioning of independent review bodies to review progress against their self-set targets is a new concept that has significantly improved the accountability of the project.

Secondly, honesty in communication and engagement. This lesson is particularly pertinent to Mexico given the country's turbulent past, however the principle should be applied to any similar project. In order to achieve true social sustainability, it is important to fully and meaningfully include stakeholders and local communities in the development of the project. It is well known that projects of this scale will undoubtedly have adverse effects on certain communities and residents, and with airport projects there is a real danger that low income groups will see none of the benefits

as they are unlikely to be users of the final infrastructure. The creation of an online portal for NAICM to share environmental studies and progress reports will help keep the local community informed, and also provides a further incentive to ensure their KPIs are being reached.

Thirdly, identifying realistic goals and small steps. Linked to the first lesson, it is important to commit to a goal which is achievable in the long term. Equally, it must be accepted that the vision of sustainability cannot be achieved overnight, it is a combination of short term wins and longer term strategic goals.

5.2 Final thoughts

It is clear that the airport industry presents a unique opportunity to make large scale improvements in sustainability. The typical scale of airport infrastructure, the associated adverse effects and the continued growth of both cargo and passenger industries worldwide demonstrates the importance of projects like NAICM in setting a new standard for green referencing. Of vital importance is ensuring a rounded approach to sustainability, focusing not only on the physical aspects but the associated social factors to ensure long term success.

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THE ECONOMIC AND ENVIRONMENTAL IMPACT OF ISTANBUL'S GRAND AIRPORT PROJECT ON THE URBAN STRUCTURE AND BEHAVIOUR OF ISTANBUL

Ahmet Baş

Muhammed Ziya Paköz

Fatih Eren

ABSTRACT

The aviation market has always been critical not only for the passenger and freight transport, but also for enhancing the regional and international connectivity as well as national economic growth. Many countries are in an attempt to develop new high capacity airports to acquire a big portion from this market. New airports offer many facilities such as game centers, shopping malls, zoos, botanical gardens, trade centers and so on to increase their global attractiveness and to provide a new way of flight experience for their customers.

Two airports, which are Atatürk and Sabiha Gökçen, serve domestic and international flights in Istanbul, Turkey at present. Both of them were built in a traditional airport style and have run over capacity since 2010. Therefore, the Turkish government has decided to develop a new airport in Istanbul that would be one of the biggest, high-tech and green airports in the world.

The new airport is located at the north part of Istanbul, Arnavutköy region near the Black Sea. There isn't any crowded settlement or a large urban function around the project area. A new motorway and a bridge (Yavuz Sultan Selim) have been constructed to connect the airport to the city center by road. A new tube project is now under construction to support this connection by a subway train.

This paper aims to explore the impact of Istanbul's new grand airport on the urban structure and behavior of Istanbul and discusses the project in an economy/nature dilemma from an international perspective.

Keywords: Istanbul, New Airport, Transportation Investment, Economy, Environment, Urban Structure and Behavior.

1. Introduction

Aviation market is one of the biggest and fast growing economic sector in the world according as the IATA reports (IATA, 2018). IATA expects 7.8 billion passengers to travel in 2036, a near doubling of the four billion air travelers expected to fly in 2018 (Table 1). The biggest driver of demand will be the Asia-Pacific region (Figure 2), which will be the source of more than half the new passengers over the next two decades. The five fastest-growing markets in terms of annual additional passengers in 2036 compared to 2016 will be by turns: China (921 million new passengers for a total of 1.5 billion), US (401 million new passengers for a total of 1.1 billion), India (337 million new passengers for a total of 478 million), Indonesia (235 million new passengers for a total of 355 million) and Turkey (119 million new passengers for a total of 196 million) (Casey, 2017).

A new international airport for Istanbul as an idea was initially shared with general public after a declaration of President Erdogan in 2005 (Erdoğan, 2005). All formal planning procedures and preparations were completed in seven years' time and the construction of the airport was started in 2012. According to the schedule, the first stage of the mega project is going to be finished at the twenty-nine of October, 2018 and will provide service to 90 million passengers per year and 3500 aircrafts per day. There would be a big passenger and freight activity in and out of the Grand Airport in İstanbul. In order to conduct these circumstances, a new motorway was constructed and tied up to the airport, new subways are under construction and is going to be finished by the opening ceremony of the airport. Additionally, a port will be constructed to connect the airport to the Black Sea and other harbors (Figure 1).

Country	2012	2013	2014	2015	2016	Ratio (%)
World	2,894,054,972	3,048,275,073	3,227,291,386	3,463,849,192	3,696,181,786	+ %22
USA	736,699,000	743,171,000	762,710,000	798,222,000	822,949,000	+ %11
China	318,475,924	352,795,296	390,878,784	436,183,969	487,960,477	+ %35
UK	115,419,921	118,605,866	124,901,676	131,512,993	145,120,984	+ %21
Ireland	92,637,189	93,408,036	98,449,140	114,739,133	125,648,741	+ %26
Germany	105,978,475	109,062,322	112,353,099	118,108,024	124,743,942	+ %15
India	72,151,829	75,589,071	82,718,883	98,927,860	119,577,835	+ %40
Japan	98,907,859	107,573,000	110,547,000	114,128,000	117,706,000	+ %15
Turkey	63,350,312	74,413,805	84,574,844	96,604,665	100,366,461	+ %27
Indonesia	79,405,800	81,721,356	85,215,880	90,095,129	96,529,128	+ %18
Brazil	94,752,568	95,591,641	100,403,628	102,039,359	94,142,377	- %1
UAE	59,948,767	68,151,865	75,608,196	84,701,558	92,160,692	+ %35
Russia	58,727,125	64,072,322	72,189,961	76,846,126	77,458,318	+ %24
South Korea	39,969,577	54,530,105	58,289,180	65,482,307	77,134,151	+ %48
France	64,683,769	63,925,151	63,434,263	65,039,503	65,362,743	+ %1
Hong Kong	32,247,332	34,644,497	37,933,773	41,867,157	43,454,423	+ %26
Netherland	31,672,224	33,455,251	33,956,338	34,870,205	37,652,448	+ %16
Singapore	29,138,458	31,729,241	33,643,518	33,585,397	34,969,110	+ %17
Qatar	17,187,171	18,737,348	21,425,066	25,263,224	31,209,097	+ %45
Luxembourg	781,146	1,555,788	1,710,624	1,830,972	1,845,726	+ %58

Source: https://data.worldbank.org/indicator/IS.AIR.PSGR

Table 1: Aviation passengers and chancing by years according to the World Banks Statistic (World Bank Groups, 2018).

Istanbul's grand airport is a strategic project of the Turkish government planned for making Istanbul an international hub of airway transportation and logistics. The realization of this project is crucial for the Turkish government to reach Turkey's strategic 2023 economic targets and to grow the national economy rapidly (Eren, 2017). Istanbul's grand airport was born in this context. The new airport will make a significant contribution to the national economy and will reshape all passenger and cargo demands in the EMEA (Europe-Middle East-Africa) and MENA (Middle East and North Africa) regions.

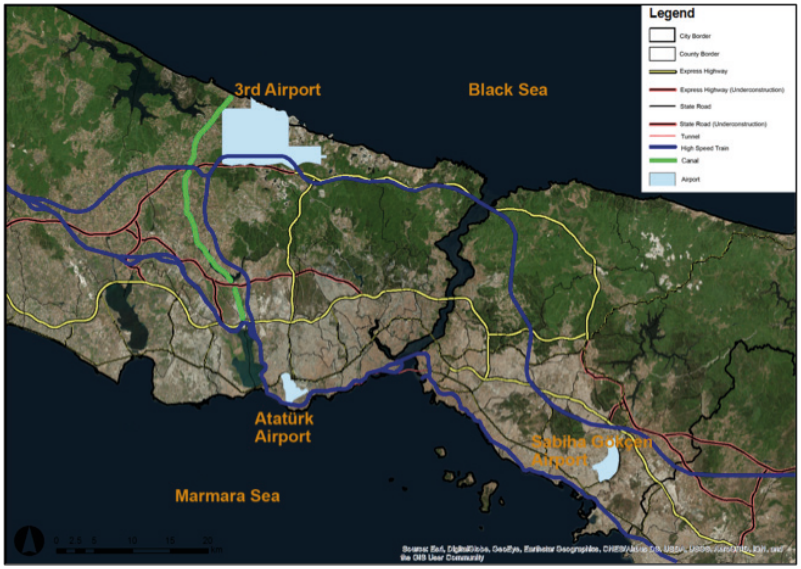


Figure 1: The Istanbul Grand Airport Location and other transportation services in İstanbul (Source: İstanbul Territorial Master Plan Revision Analysis Report).

The area where the new airport is being built is in the northern part of Istanbul, on the borders of Arnavutköy and Eyüp municipalities; is located in a region close to the habitats, water resources, forests and agricultural areas that are important for Istanbul in terms of natural resources, biodiversity and ecosystem services (Figure 1 & Figure 4). The western part of the area is in the mid-range and long-range protection zone of the Terkos Dam Lake, the northern part is located in the Black Sea coastal area, the middle and southern parts are partly within forest and agricultural areas and the long-range protection zone of the Alibeyköy Dam Lake. Nevertheless, within the area where the airport is being built, there is a deterioration caused by the many stone quarries and mining operations that have been operating for many years. Therefore, some parts of the project area need to be rehabilitated.

It is clear that the trivet of the sustainability concept needs to be balanced. Istanbul's Grand Airport is a big project that excessively affects economy, environment and society from different aspects. In this paper, we discussed the impact of

Istanbul's new grand airport on the physical, economic and social structure of the city and how to deal with economy/ nature dilemma from an international perspective. Within this context, firstly we explained the current situation in the aviation market and air transportation in the world and what will the effects and position of the İstanbul Grand Airport on the market. Secondly we analyzed the strategic and spatial planning process of the new airport and its possible effects on urban form and behavior. Finally, we investigated environmental impacts of the airport both in construction and operation process.

2. Aviation market and air transportation in the world and Turkey

According as the Transportation in Turkey, Country Report, Turkey's civil aviation sector has grown ten times faster than the world average. Total air traffic growth expected for Turkey in the reports of international civil aviation organizations like European Organization for the Safety of Air Navigation (EUROCONTROL) and International Air Transport Association (IATA) for 2015 had already been reached in 2005, i.e. 10 years before the anticipated year. Main causes of this development are liberalization of the sector and economic growth in Turkey (Ministry of Transport and Communication, 2011).

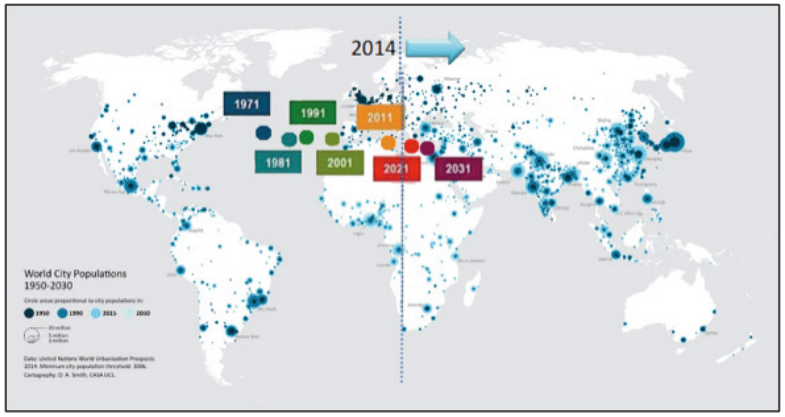


Figure 2: World City Populations and Projections as shown with the aviation traffic gravity from 1971 to 2031 (Source: Airbus Global Market Forecast 2012-2031, 2012)

The General Directorate of State Airports Authority (DHMI) announced that through 2016 alone the passenger traffic in Turkey's airports increased by 10.5% to 174,1 million people, including direct transit passengers. The statistical data published by DHMI shows that between 2007-2016 the number of aircrafts has increased with 111%. The total amount of freight (mail, cargo, and baggage) carried both domestically and internationally has doubled. As for air cargo, its growth rate is around 161% (Table 2).

Table 2: General Aviation Statistics Based On Flights, Passengers and Freights in Turkey (2002-2016)

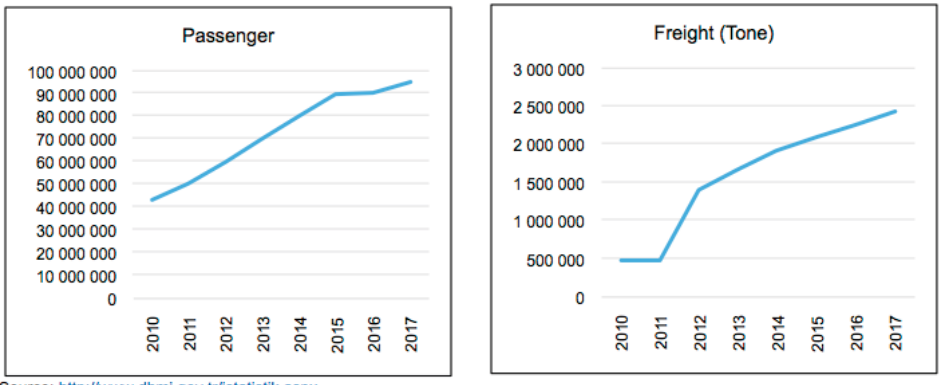
YEARS	2012	2013	2014	2015	2016	Chancing Ratio According to the Previous Year (2016/2015)	Annual Average Chancing in the Last Decade (2007-2016) (%)	Chancing Ratio Compare to 10 Years Ago (2016/2007)
Passenger Traffic (Direct Transit Included)	131,029,516	149,995,868	166,181,339	181,437,004	174,153,146	-4.0%	10.5%	146.3%
Passenger Traffic	130,351,620	149,430,421	165,720,234	181,074,531	173,743,537	-4.0%	10.6%	147.2%
- Domestic	64,721,316	76,148,526	85,416,166	97,041,210	102,499,358	5.6%	13.8%	220.8%
- Abroad	65,630,304	73,281,895	80,304,068	84,033,321	71,244,179	-15.2%	7.1%	85.8%
Direct Transit Passenger	677,896	565,447	461,105	362,473	409,609	13.0%	-0.2%	-2.2%
Total Flight (Overflight Included)	1,376,486	1,504,973	1,678,971	1,814,958	1,829,908	0.8%	7.7%	95.6%
Flight Traffic	1,093,047	1,223,795	1,345,954	1,456,673	1,452,995	-0.3%	8.7%	111.0%
- Domestic	600,818	682,685	754,259	832,958	886,228	6.4%	10.4%	142.7%
- Abroad	492,229	541,110	591,695	623,715	566,767	-9.1%	6.4%	75.3%
Overflight Traffic	283,439	281,178	333,017	358,285	376,913	5.2%	4.8%	52.5%
Freight Traffic (Cargo+Post+Luggage) (Tonne)	2,249,133	2,595,317	2,893,000	3,072,831	3,076,914	0.1%	7.9%	99.0%
- Domestic	633,076	744,028	810,858	871,327	857,335	-1.6%	8.4%	106.9%
- Abroad	1,616,057	1,851,289	2,082,142	2,201,504	2,219,579	0.8%	7.8%	96.1%
Cargo Traffic	624,058	731,962	842,241	904,762	1,032,943	14.2%	11.2%	161.0%
- Domestic	84,431	100,097	104,941	101,447	81,587	-19.6%	1.2%	11.4%
- Abroad	539,627	631,865	737,300	803,314	951,356	18.4%	12.8%	194.9%

(Derived from DHMI Statistics: http://www.dhmi.gov.tr/istatistik.aspx)

Many busy airports around the world are facing different capacity constraints. In 2007, the Federal Aviation Administration of USA (USFAA) issued the Capacity Needs Report, in which 48 of the USAs' busiest airports that would fall short of needed capacity between 2007 and 2025 were analyzed. The list included such airports, as Baltimore-Washington International, Boston Logan, George Bush Intercontinental, Hartsfield-Jackson Atlanta, and others. There are also many European airports with high traffic loadings with almost full capacity utilization during many hours of the day such as London-Heathrow and Frankfurt airports (Düzgün & Tanyaş, 2014).

The Atatürk Airport is in the same situation and currently facing numerous capacity constraints. Sabiha Gokcen International Airport has been taking part of the traffic since 2001 and unless it has facing immediate problems yet, additional runways and terminals might be needed soon. Ataturk Airport has almost reached its full capacity. Besides the possibilities to improve and expand it are severely limited. The average annual rate of increase in aircraft and passenger movements is more than 10% government authorities have even stated that the number of travelers has recently surpassed Istanbul's population by four times (Düzgün & Tanyaş, 2014).

Currently 55 operational civilian airports are run across Turkey and the two busiest of them are the Atatürk International Airport and Sabiha Gökçen International Airport are located in İstanbul. Istanbul is the crowded city of Turkey and one of its most important gateways to the world. The city is a major aviation center, as well as the main national and international hub in Turkey with more than 100 million passengers per year according to the 2017 data. Today nearly 50% of Turkeys' passenger traffic and commercial flights come from the two airports in Istanbul Ataturk Airport and Sabiha Gökçen International Airport (Figure 3).



Source: http://www.dhmi.gov.tr/istatistik.aspx

Figure 3: Istanbul's' Airports Passengers and Freight Traffic Between 2010-2017.

Ataturk Airport is the busiest airport in Turkey from the point of total passenger (63.7 million in 2017, 44,2 million of them international). As it seen from the Figure 3 above, the total passenger traffic of İstanbul airports increased double within the last 8 years. The Ataturk Airport is also the biggest international airport serving, the main base for Turkish Airlines, and an important transit point for international flights between Europe, Asia and Africa. According to the World Airport Codes report Ataturk Airport 15th in its list of busiest airports in terms of passenger traffics (World Airport Codes, 2018). Furthermore, the Airport was named the world's 10th in terms of international passenger traffic, and the 5th busiest airport in Europe. The airport has more than 180 international flights by 81 airlines to more than 130 countries around the world. According to 2017 statistics by Atatürk Airport Administration, the Airport serves nearly 1,000 aircrafts and 100,000 passengers every day. In September 2016 Ataturk Airport broke air traffic record of all time in Europe with 1,500 landings and takeoffs and serve 210.000 passengers in a day (Atatürk Airport, 2018).

As it clearly understands from the Table 3, in most of the world's busiest airports, more or less 50-75 thousand employees directly works in airport including all ground and air services, independently from area size. Thus, in the İstanbul Grand Airport, it is expected 80-100 thousand employees will work after the first phase finished (Hürriyet, 2016). This is an acceptable and rational number compare to other international airports. Not only passengers also employee's activity will make a big mobility in and around the city. There would be new facility areas inside the airport such as botanic garden, shopping malls, fair and congress hall and so on. As well as functional distribution, new sub-urban cores would be occurred close to airport.

Table 3: Busiest Airports Passenger Traffic and Their Area with the Number of Employees.

Airport	Passenger (000) (2016)	Employee (000)	Area (km2)
Atlanta Hartsfield Jackson International	101.4	63	29
Beijing Capital International	89.9	70.7	28
Chicago O'Hare	76.9	41	29
Los Angeles International	74.7	50	30
Hong Kong International	68.3	73	12,5
Paris Charles de Gaulle	65.9	86	32,38
Dallas Fort Worth	64	60	78
İstanbul Atatürk	61.8	50	11,75
Frankfurt/Main	61	80	20
Singapore Changi	46	50	48
Sidney	37	28	25
İstanbul Grand Airport (Projected)	150	80-100	76.5

Source: All required data taken from the legal administrative office of related airports website.

3. Planning and implementation process in the IGA and its possible effects on urban structure and behavior

The Turkish government has decided to develop large-scale transportation and infrastructure projects all over Turkey to be in the forefront in the global economic competition. Turkey's global city Istanbul has undertaken a strategic mission to be the engine of national development and economic growth. Istanbul's new international airport project as an idea was initially shared with general public in 2005. Prime Minister Erdogan declared that "Istanbul's existing airports have difficulty in meeting the demand so the city needs a new giant international airport. Instructions have been given to the Ministry of Transportation to start a search to find the best location for Istanbul's new airport" (Erdoğan, 2005). In addition, the Turkish government published "Turkey's 2023 Strategic Vision Paper" in 2008. Under the title of "Economy", "transportation and logistics" are chosen as the strategic sector for Turkey in this paper (Şensoy, 2008). "Building a new grand airport in Istanbul", "developing Istanbul into an international hub for airway passengers/loads" and "making Istanbul an international center of attraction for transit air cargo transportation" are taken place as strong proposals and strategic targets both in the ninth (2007-2013) and the tenth (2014-2018) national development plans (DPT, 2006) (Ministry of Development, 2013). The Turkish Council of Ministers took a cabinet decision to develop Istanbul's new international airport at "the Arnavutköy Region" near the Black Sea on the 13th of August 2012. A plan amendment on Istanbul's 1/100.000 Master Plan was done by the Ministry of Environment and Urbanization. Thus, the planning process of Istanbul's grand airport was completed. Istanbul's grand airport has been the first ring of Istanbul's mega-projects chain. After that, several large-scale transportation and infrastructure investments which will have important impacts on the urban structure and behavior have also been started in Istanbul.

The mega project starts and continues under the leadership and control of Recep Tayyip Erdogan (as the Prime Minister and later on as the President) in individual terms from beginning to the end. The Ministry of Development sets

a strategic goal to build a new grand airport in Istanbul in the ninth and the tenth national development plans. The Ministry of Environment and Urbanization is responsible for the site selection and upper-scale plan-making processes. The Ministry of Transport, Maritime Affairs and Communication draws the motorway and railway link projects which are necessary for the airport. The Istanbul Metropolitan Municipality is responsible for lower-scale plan-making processes. They are responsible from the urban subway and public transportation systems. General Directorate of State Airports Authority which operates under the Ministry of Transport, Maritime Affairs and Communication puts the project out to tender with a Build-Operate-Transfer Model. Housing Development Administration of Turkey which operates under the Prime Ministry completes land expropriation works in the project area. The structural/architectural project is designed by nine international private companies which are Nordic Office of Architecture, Grimshaw, Arup Associates, Haptic Architects, Perkins+Will, Scott Brownrigg, Fonksiyon Mimarlık, TAM+Kiklop and Pininfarina+Aecom. IGA Company which is established as a joint initiative by five local real estate construction, development and investment companies (Cengiz, Mapa, Limak, Kolin, Kalyon) wins the tender paying 22 billion 152 million Euros to the State. The construction and development cost of Istanbul's new international airport is 10 billion 247 million Euros (Hürriyet, 2013). The project is funded fully by private sector finance. 16-year credit agreements are signed between the IGA Company and local/foreign banks (Ziraatbank, Halkbank, Vakifbank, Denizbank, Garantibank and Finansbank) (Milliyet, 2015). The IGA Company which bear the construction and development cost has the right to run the new airport project for 25 years. It has to pay 1 billion 46 million Euros rent per year to the Turkish Government (IGA, 2017) (IGA, 2017).

The Turkish government has followed seven strategies below to start, progress and finish the airport project smoothly and successfully:

- Strategy to stick Turkey's 2023 vision and project's time schedule
- Strategy to protect national interests
- Strategy to create a powerful but closed airport project organization
- Strategy to run the pre-planning stage in strict confidence
- Strategy to carry out the airport project under the strong support and control of the national government
- Strategy to seek public support for the airport project
- Strategy to disprove each claim and criticism alleged by opponent groups regarding the airport Project

The airport will reach 90 million passengers per year in the first stage, 120 million in the second and third stages, and 150 million passengers in the fourth stage. In the case of cargo transportation, it is planned to increase the air cargo tonnage to 5,500,000 tons in the first stage and to 6,000,000 tons in the second and third stages. The units planned to be constructed within the scope of the project; air side facilities, passenger facilities, cargo facilities, airport support facilities, airline support facilities, airport approach roads, airport service buildings, other aviation related facilities and airport city complex (AK-TEL Mühendislik, 2016).

Istanbul New Airport will generate employment in the range of 80-100 thousand persons directly and more than 150 thousand persons indirectly for 2025 and an additional household income of approximately 3.8-4.4 billion dollars in Turkey. It is predicted that airport's contribution to the national economy will be in the range of 4.2% - 4.9%. Istanbul's and Turkey's ties with the world will be strengthened and Istanbul's feature to become an international meeting and transfer point in the world will become stronger. Therefore, İstanbul will be a more competitive city in the global arena. The new airport is expected to give momentum to the construction sector and urban regeneration projects in Istanbul (EDAM, 2016).

The start of the new airport's operations with the ability to provide very high quality, capacity and versatile aviation services in Istanbul will change current conditions and reshape all passenger and cargo demands in the Europe-Middle East-Africa (EMEA) region. It is estimated that other airports in the EMEA region will lose an average of 14% passengers while Istanbul will gain 21% additional passengers (Akşam, 2018).

New settlement projects are planned close to Canal in terms of urban renewal projects in İstanbul. Nearly 500 thousand habitants are expected to settle around the canal which is close to İstanbul Grand Airport. İstanbul is going to be a hub in aviation market by İstanbul Grand Airport. More than 150 million passengers will use the airport and half of the would be transit passenger. So, at least 75 million passengers will visit İstanbul. According as the general equilibrium of aviation traffic in İstanbul, nearly 40 million tourists will visit İstanbul in the next 10 years by starting of İstanbul Grand Airport operation. This makes a big human activity either social or economic manner.

When the macroform of Istanbul is examined, it is seen that the main development of the city is formed in the east-west axis. However, the industrial areas in İkitelli and Hadımköy and the new settlements built in the Başakşehir district have caused the east-west axis development to proceed to the north. The new airport, which is under construction on the Black Sea coast in northern Istanbul, is expected to accelerate further northward development. In addition to the airport construction, The Northern Marmara Highway and the "Kanal Istanbul" Project are also expected to accelerate this trend. The development of the city to the north can be described as the danger of affecting the northern forests and the ecological corridors in the north.

4. Environmental Conditions in the İstanbul Grand Airport

According to the IGA Environmental and Social Impact Assessment Report, 5230 hectares of total 7650 hectares of land under the INA Project area are covered with forests and 610 hectares are covered with water reservoirs of different sizes that was pre-existing stone quarries and filled by precipitation, 236 ha of grassland, 60 ha of dry farmland and 2 ha of shrubs. However, 1180 hectares (including some of the forest areas) belong to six licensed and operated mining sites. The 332 ha area consists of the connection roads and three landfill sites within the boundaries of the Project Area (Figure 4). The total population around the Project Area is 5.760 according to the 2013 census. This population resides in rural settlements (IGA, 2015) (İGA, 2015).

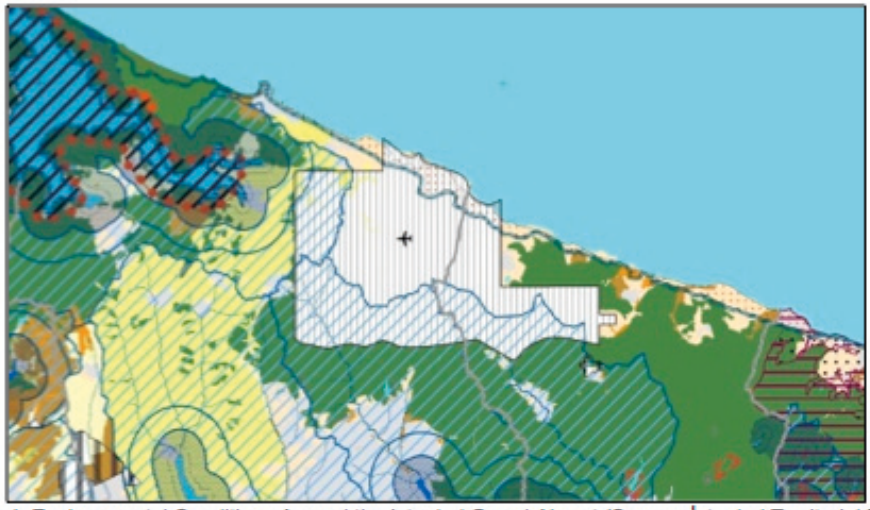


Figure 4: Environmental Conditions Around the Istanbul Grand Airport (Source: İstanbul Territorial Master Plan Revision Analysis Report)

The effects of the new airport on the natural environment have been examined in detail in the Environmental and Social Impact Assessment Report prepared by the IGA. It has been stated that the principles of «prevention, mitigation and remediation» in the direction of the mitigation hierarchy are adopted in the impact assessment process, including the identification of mitigation and control measures. The report prepared in this context emphasizes that the new airport will cause a significant increase in greenhouse gas emissions during both construction and operation, and that mitigation measures should be taken in this. Noise maps have been prepared for the new airport, population and settlement areas to be affected according to these maps are shown (IGA, 2015).

The project area is located in a region that the ecological diversity of Istanbul is the highest with natural habitats, bird migration routes, endemic plant species, important natural and plant areas, land and water ecosystems. For this reason, it is predicted that there will be adverse effects both during construction and operation. An Environmental

and Social Management Plan has been prepared in order to reduce the most negative impacts on natural resources (ENVIRON, 2015). This plan includes mitigation, monitoring and emergency steps. For example, to monitor migratory birds, a bird radar system was established before construction began, five bird scientists were employed, a bird database was created, and a bird management program was started (IGA, 2018). On the other hand, the IGA has put into practice the Biodiversity Action Plan in 2015, so many actions have been taken to protect biodiversity (IGA, 2016) (IGA, 2016).

One of the most important effects of the new airport will be on the water basins of the city. The Project Area is located 12 km north of Alibey Dam, 2.5 km east of Terkos Lake. These two water bodies meet approximately 27% of Istanbul's total water needs. Approximately 7.3 km2 of the Terkos Basin (approximately 740 km2 in total), approximately 17.7 km2 of the Alibey Basin (approximately 159 km2 in total) within the north-western borders of the Project area and within the southwestern boundaries of the Project area. Approximately 0.5 km2 or 50 hectares of the north-western corner of the Project Area remain within the Terkos Lake mid-range protected area. It is highlighted in the ESIA report that no construction would be done within the mid-range protection area of the Terkos Lake (IGA, 2015).

The forest asset in the project area is another important consideration. It is emphasized that the INA Project will have two main effects on forestry: loss of tree / forest assets and loss of carbon capture capacity resulting from forest loss during preparation of land for construction. It is mentioned in the report that this effect is negative and high, it is needed for reforestation plan (IGA, 2015). The IGA commits to plant 5 saplings for each tree cut to compensate for the loss of trees. At the same time, some of the trees were moved to other public spaces (IGA, 2018).

5. Conclusion

There has been a fabulous growth at air transportation in Turkey in the last decade that is expected to continue in the upcoming years (the average annual rate of growth in passenger and air traffic is expected to be around 10% till 2020). On the other hand, Turkish aviation sector is facing numerous capacity constraints. Ataturk Airport and Sabiha Gokcen, two of the busiest airports in the country, may not be able to deal with the growing passenger demands and capacity insufficiencies. So, the construction of a third airport in Istanbul, which is going to be a solution to these problems, started in June 2014 and 85% of construction has finished in the first phase. The construction of İstanbul Grand Airport is brought in many hopes and expectations. It is undoubtedly going to affect many sectors of the Turkish economy, such as tourism, transportation, and international trade.

Once the new airport is operational, Istanbul will become an important point of transportation by moving to the center of people, goods and service flows in the EMEA region and will change international economic balances. Depending on this situation, there will be a significant increase in the number and speed of commercial activities in the city. From one side, new commercial centers will be built in the west and north of the city, while on the other side the city will be the versatile, multi-purpose and intensive pedestrian / vehicle mobility in the east-west and north-south axes. Istanbul is equipped with very strong and integrated multi-mode transportation options in itself and on the regional-global level. In this respect, Istanbul aims to increase its tourism revenues and to become a center that provides qualified and specialized health services to the world. If other planned large-scale transportation and infrastructure investments are completed in the Marmara Region as complementary elements of the airport and the process is well managed at the regional level, urban development and investments may be able to spread to a wider geographical area in a balanced manner in the following years. Regional scale transportation and infrastructure investments will enable everyone to enjoy uninterrupted, safe and comfortable transit through Istanbul. As the multimodal and highly alternative transportation investments continue in Istanbul, it is expected that the vehicle traffic on the Istanbul Bosporus Bridges will decrease and the inner city traffic will be relieved because a transportation infrastructure is formed in the city to meet not only local transportation needs but also regional and global transportation needs at the same time. However, every new investment that adds a new vision and prestige to the city (just like the airport) increases the land values in Istanbul and provides a convenient base for the city to grow as a multi-centered city.

The new airport supports Istanbul's goal of being primarily a regional and eventually a global financial center. Despite the fact that there will be some environmental effects of the new airports due to its location and size, the new airport project is designed to be environmentally friendly (low emissions, green) by utilizing advanced technology, and the negative effects on the natural environment is minimized by a number of mitigation strategies. Therefore, the airport is a positive example for future mega projects that will be developed in the coming years in Istanbul.

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HOW CAN THE AIRPORT DEVELOPMENT ENHANCE ENVIRONMENT PROTECTION AND PROMOTION: THE CASE STUDY OF PONIKVE AIRPORT

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Veljko Divac
Katarina Đurić

Abstract

This paper analyzes airport strategic development plans through sustainability goals. Focusing on environmental issues, especially on the planning process in physically development of airport infrastructure considering local community needs. It is shown on the case study of Ponikve airport, and its converting from neglected airfield to an early stage prosperity airport that can enhance local economie of south west Serbia.

Sustainability goals are grouped in three categories - economic, social, and environmental, and analyzed through the enviromental and social parameters, that gave us a conclusion who and when should react for better overall results of the airport development. This case is applicable to smaller airports that are in the process of becoming more commercial. In the Ex-Yugoslavia space that are mostly ex-military airfields, but that can be also small sport, or other types of airfields.

1 Introduction

In order for something to be sustainable, it must meet sustainability criteria in these three categories: social, economic and environmental. Air traffic and transport have huge impact on urban development, but especially on the environment. Through urban strategic planning of green airports and research of airports main environmental problems: climate change, biodiversity, land take, air, noise and water pollution and water use we drew out some of the main measures for minimising airports impact on the environment.

In this paper, through a case study of an ex military airport in western of Serbia - Ponikve, we are researching sustainability potential for similar cases. In public enterprise Aerodrom Ponikve's Business plan, that is in accordance with GRP, their main focus is on economic sustainability. Ponikve airport serves us as a model example for small airports under developement, not only in Ex-Yugoslavian region, but also for other regions around the world with similar historic and economic backgrounds.

Comparing Aerodrom Ponikve's Business plan and GRP with the recommended measures for environmental sustainability of airports we can come to the conclusion that latter were mostly not planned for implementation due to lack of funds. But, if planned properly, with economic sustainability of an airport would come economic sustainability of the local community, thus providing the means for taking in account environmental sustainability measures as well.

2 Context: Environmental approach to airport development

Airports that we are studying are smaller airports under development. Small countries like Serbia have only a few operation airports, for example two for big international traffic, but have potential for more. Smaller, already existing (usually ex-military) airfields, not in use anymore are the besway to increase air traffic. Some of the necessary infrastructure is already built. Ex-Yugoslavian region had a lot of similar airfields which were in the time of Yugoslavia both for a civilian and military purposes. Such airports already have some ground infrastructure like runway, buildings, fuel tanks, water supply, etc.

Figure 1 Map of Ex-Yugoslavian region with airports in use

Serbia lags behind some of its neighbors in the process of converting its existing airfields into successful airports that can enhance local economies. Airports provide employment, channel investment and support ancillary businesses. They can maintain or improve the living standards of local and regional residents. Croatia is way ahead in that process with nine airports in international transport functioning today, three of them with more than two million passengers, where Serbia has only one with that amount of passengers. Most of them are ex-military airports converted to today's needs, in this case big touristic potential of Croatia.

In the case of Serbia it is undergoing the process of converting its two airports: Morava, near City of Kraljevo, and Ponikve near city of Uzice. We will show case study of airfield Ponikve, situated in the vilage of the same name. Located in south-western Serbia, on the border of City of Uzice and munisipality of Bajna Basta, approximately 18 kilometars

nortwest from centar of Uzice. It was built in mid 1980s, as a military airport. The runway was one of the longest in Yugoslavia, 3 087 long and 45 metars wide, on the altitude of 918m. In 1996 it had civil flites two times a week with airport of Tivat, Montenegro. During the bombing of Serbia in spring of 1999. runway and other infrastructure were heavily damaged. Goverment of Serbia in december of 2010. transfer Ponikve Airport (550 ha) from Serbian military to City of Uzice.

Public Enterprise Ponikve is in charge of the airport in behaf of the city of Uzice, and the company is coordinating all the necessary actors in trying to put airport in ful operation, and managing airport for offering airport services. Today situation of airport is that is in partial use, about 1800x30 metars of runway is in operation condition. Surroundings are cleard of all mines and bombs from nato bombing, and in 2013. One of the ex military building is renovated for general aviation use.

The main perspective of the airport is development of civil flights on the regular basis.This proces is in progress, with lot of the plans for airport allready done, and of course beginning of infrastructure work.

There are over 180 000 peopre that live within one hour drive from the airport, and over two milion people within three hour drive. The perspective in not only development of airport as a only developing the necessery airport infrastructure and making it operational, but takeing in considering the whole comunity and its problem with the airports problems, for making the whole solution for this part of the country.

Figure 2 Airport Ponikve

There are two major touristic centers nearby - Tara national park and Zlatibor mountain, with other touristic points nearby. The landscape itself, natural water springs, small rivers and streams, gave the opportunity for building lots of artificial lakes for water and electric sources, one of them near the airport Ponikve - supplying water to the city of Uzice. Lake Vrutci on the river Djetinja, was built nearly at the same time as the airport, as a part of Uzice's water supplying sistem.

Transport infrastructures like airports have considerable effect on city's urban development and have negative impacts on the environment. Many reports show that the contribution of airports to environmental disturbance at a local and global scale is significant. Key environmental impacts may result from airport operations, airline operations, airport access or various construction projects in the airport landside (Asimina Voskaki, 2015). Airport industry has been adopting sustainability approaches to airport and airport city development. In that way, they aim at achieving the full integration of economic viability, operational efficiency, livability, natural resource conservation and social responsibility (Nurhan Oto et al., 2012).

3 Subject description

Having in mind that air traffic is a fast growing sector, unplanned urban growth happening around airports - also known as airport city- comes as no surprise. Small portion of airport cities is planned from the beginning, but most of them naturally grow and evolve due to airport land availability, improved surface transportation access, growing air traveller consumer demands, airport revenue needs, new business practices, and site specific commercial real estate opportunities. This causes many problems regarding sustainability.

Sustainability goals usually are grouped in three categories - economic, social, and environmental.

Developing sustainable airports is the future of airport planning. They have an impact on the surrounding environment and the people that live in the area. Therefore, it is important for airports to be socially and environmentally responsible. Starting urban strategic planning of airports from the beginning of their development, helps not only minimise all the common issues when it comes to airports, but can also help some location specific environmental, social and economic problems.

3.1 Environmental sustainability

On the global level airports have significant impact on the environment in terms of climate change. At a local level, noise seems to be the main concern. In reality airports have strong global and local impact, not only on climate change but also biodiversity, land take, air, noise and water pollution, as well as water use.

According to researchers the biggest part of carbon emission in life cycle of an airport comes from operating and maintenance as well as construction process. It is necessary to manage ground aircraft movement, staff travel,

operational vehicles and water and waste but also control emissions through a combination of energy efficiency initiatives and investment in less carbon intensive energy sources and buildings.

For the facility itself, most of the energy consumption comes from cooling systems, interior lighting and baggage handling systems. When it comes to energy saving strategies it is recommended using passive architecture elements and energy saving mechanical and electrical elements.

It is proposed that negative effects on local biodiversity would also be minimized by minimizing the intrusion and translocation, restoration and creation of habitats.

Also specific planning and re-organization of farm units in airport masterplans and environmental statements has been proposed for regulating the use of land that would otherwise have been used for farming.

Suggested solutions regarding pollution and air quality concerns are to reduce aircraft emissions at landing and take-off, sustainable management of airport fleets to aircraft engine efficiency, as well as the use of alternative fuel sources for ground support equipment and power heating.

Using urban planning, applying new technologies and designs, and restricting operation of particular aircraft types, frequency of flights and night-time flights, planning and managing land use, and redistributing noise by managing runways and routes use are some of the measures employed to meet noise quotas and prescribed limits.

Some of the activities of airports may result in the discharge of pollutants to adjacent water bodies and consequently trigger aquatic life and human health. Some of the measures proposed in master plans and environmental statements for minimizing water pollution are to minimize spillage, improve environmental management procedures, discharge and treat foul drainage and sewage and to carry out flood risk assessment.

As for water saving strategies - effective fittings and fixtures, various leak detection systems, water reduction devices and implementing water recycling operations are considered to be most effective.

Trough sustainability research and development airports can improve existing environmental, social and economic practices, discover new ones and also benefit through the implementation of new technologies, processes and ideas.

It is important when exploring environmental issues not to forget economic and social side of sustainability for the strategic planning to obtain its full sustainable potential.

3.2 Social sustainability

Each person, company, organization or authority representative involved in or affected by a course of action is a stakeholder. It is of the highest importance to recognize all of the stakeholders and to assess their levels of power and interest in the problem.

Here are singled out stakeholders engaged in the issues and actions related to airport development. They are divided into three categories: influenced, influencers and resourceful. First category, influenced, has low level of power, but great level of interest. They can ask for actions that they need. Second category, influencers, has great level of power but low level of interest. They can demand actions which then must be implemented. In ideal situation, second category supports and defends needs of first category. Resourceful, or the third category, are stakeholders that have both power and interest to do some actions. As their name says, they have resources to implement actions at once.

Table 1 First category of stakeholders for the airport and their requirements

INFLUENCED	Requirements
Local Community	Economic Development Initiatives for Green Sustainable Development Employment
Employees	Career Progression (Growth and Development) Good Working Conditions
NGOs (environmental pressure groups)	Environmentally Friendly Initiatives for Green Sustainable Development

Table 2 Second category of stakeholders for the airport and their requirements

INFLUENCERS	Requirements
Local Authorities	Compliance to Regulatory Norms Economic Development Employment
Media	Community Benefits Network Systems Welcoming Ambience
Government	Policy Formulation Compliance to Regulatory Norms Regional Development
Passengers	Welcoming Ambience Clean and Efficient Infrastructure Safety and Security
Services Partners	Infrastructure Network Systems Environmentally Friendly

Table 3 Third category of stakeholders for the airport and their requirements

RESOURCEFUL	Requirements
Investors	Return on Investment Growth
Airport Company	Business Opportunities Growth Employment Legal Permissions Cost Effective
Airline Companies	Infrastructure Water Power Network Systems Cost Effective

4 Research/Analysis

Of all government issued spatial plans, the area of Airport Ponikve is covered, with most detail, with General Regulation Plan (GRP) of Ponikve. This plan provides legal framework for all further development. It represents the best possible scenario of area development.

However this is not the only document that concerns this area. Airport itself is run by a public enterprise called Aerodrom Ponikve which has several Business Strategies that are related to different time frames. Actions proposed in these documents are in accordance with GRP, but they do not include all actions and measures proposed in the latter, since they are more focused on business development and economic benefits. This strategy predicts total number of flights in 2027 to be 1983. Compared to current state that is growth of 700%.

South of the airport are located smaller village communities that are out of the controlled airspace. In the controlled airspace, in both directions (west and east), on greater distances, there are several village communities, but the terrain is in the decline. Area north of the airport is uninhabited. In the direction of take-off runway is the National Park Tara.

Since Ponikve plateau is poorly populated, GRP does not predict mayor limitations to Airport development from negative effects of air traffic.

Airport has suffered from inactivity and needs revitalization and modernization, landside areas are inadequate for civil airport and they need to be repurposed for passenger use. This means more investments in infrastructure, both transportation and communal. Most notably, airport lacks sewerage system, as well as good enough water supply system that can provide for fire protection system.

4.1 Air and Carbon Footprint

Air pollution in area of Ponikve Airport can be expected as a result of emissions of negative particulate matter in the realization of planned projects, rehabilitation and decontamination of micro locations, and of air traffic with other accompanying forms of traffic. In the GRP it is said that air pollution is not mayor issue for Ponikve Airport because of the favorable winds that blow in the area and purify the air.

Air quality is supposed to be monitored and additional measures should be applied if limit values are exceeded. It is unclear what the additional measures that GRP proposes are.

Air quality is also affected with the issue of heating. This means that all inhabited area is comprised of individual heating systems that are mostly based on high-polluting, non-renewable fuels that could be replaced with one heating plant. It is planned that the plant will use renewable energy sources.

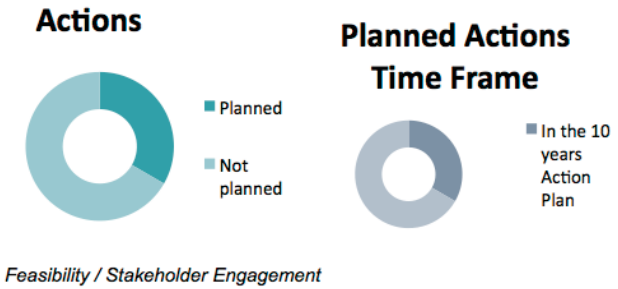
In order to provide enough power for growing needs of the airport and area, there is a plan for building renewable energy plant in a form of solar power plant. It is supposed to be nearby the airport, grow side by side with the airport and eventually totally replace all other sources in the area.

Also road network should be reconstructed so that the traffic flow is enhanced and carbon footprint reduced.

The ten year Business Strategy plans only acting upon the issue of road network, by building more access roads to the Airport.

Table 4 Inclusion of Environmental Sustainability Measures in the GRP related to Air Quality

Sustainable Airport	General Regulations Plan of Ponikve
manage ground aircraft movement, staff travel, operational vehicles	-
manage water and waste	-
control emissions through energy efficiency initiatives	+
control emissions through investment in less carbon intensive energy sources	+
control emissions through investment in less carbon intensive buildings	-
reduce aircraft emissions at landing and take-off	-
sustainable management of airport fleets to aircraft engine efficiency	-
use of alternative fuel sources for ground support equipment	-
use of alternative fuel sources for power heating	+



Surprisingly small number of sustainability measures is actually incorporated in GRP and Business Strategy. The only measure incorporated in the Business Strategy is mandatory energy efficiency of new and refurbished buildings. Other great activities included in GRP concerning energy and heating sources are very far from being implemented. Main reason for this is how huge investment it represents for company that underdeveloped like Airport Ponikve. Also, when it comes to power and heating, company should not be alone in planning and financing. Local authorities have responsibility towards population inhabited in the area.

All unplanned measures are in the highest interest of local community and environmental groups. Some actions, like managing ground movement or managing water and waste are easier to be done, with less financial resources and more organisational actions. Although Resourceful group does not have big economic benefit, for measures like this they could budge easily. Some others that demand more of an investment like alternative fuels and less carbon intensive buildings. And some measures influence Airline Companies, which means managing core business by other interests then cost effectiveness. At this point it is unthinkable that company does so.

4.2 Noise

Noise is the most prominent problem that airports are facing. GRP finds that this area won't be significantly influenced by the sounds and vibrations that plane landing and take-offs are making. However, it gives set of instructions for creating protective zones and belts that are minimizing noise pollution.

Protective greenery is to be planted along the traffic routes, next to the populated areas and near the highest noise intensity locations. Furthermore, the plan insists on sound insulated facades and artificial noise barriers where needed.

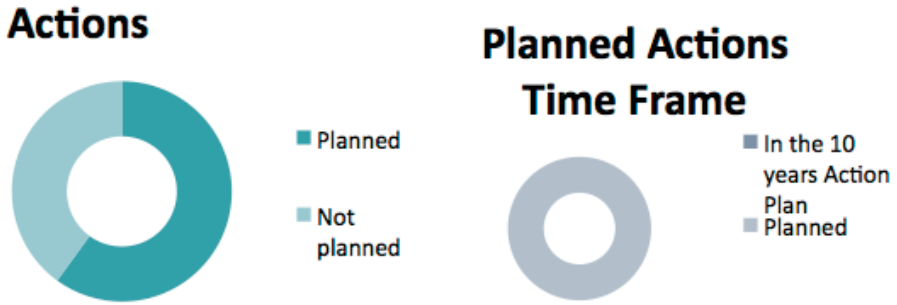
Land use, as well as landing and take-off procedures, are adjusted to minimize the negative influence of the noise on activities and nature protected areas.

Devices that register noise levels should be utilized for active monitoring and mapping of endangered village areas and ecosystems.

The ten year Business Strategy does not plan Airport to act on any of these measures.

Table 5 Inclusion of Environmental Sustainability Measures in the GRP related to Noise

Sustainable Airport	General Regulations Plan of Ponikve
applying new technologies and designs	+
restricting operation of particular aircraft types	-
frequency of flights and night-time flights	-
redistributing noise by managing runways and routes	+
planning and managing land use	+



Feasibility / Stakeholder Engagement

Within the jurisdiction of GRP noise levels are carefully maintained, but they are not of concern to the Business Strategy. This is because sound levels are important for community, nature, employees, media, government, service partners. Such number of interested actors explains the issue being covered in the GRP. However, none of these stakeholders has actual resources for taking measures into actions. Although, the power of influencers should be enough to make Resourceful to act upon these measures, the reality shows that it is not so.

Unplanned additional measures are extremely unfavourable to the Resourceful group since they are supposed to be restraining scope of business activities. In the present and ten year frame these measures are not really important since projected number of flights won't be that large to call for such drastic measures. Applying planned measures would make difference enough.

4.3 Water

Protection from water pollution implies to the quality of surface waters, vulnerability of groundwater and quality and use of spring water.

In the area of Airport Ponikve it is strictly forbidden to directly or indirectly cause pollution of surface or groundwater. This decision is hugely influenced by the proximity of both city and airport water sources. All activities must provide protection from groundwater contamination, i.e. all surfaces used for all kinds of activities must be made of waterproof materials with gutters for drainage and all released waters must be filtered.

Airport water source it is not completely put in use, which is why the system has troubles with water pressure and cannot withstand addition of fire protection system. Improving the system could fulfill need of additional 191 households to the current 453 households that are supplied from this well.

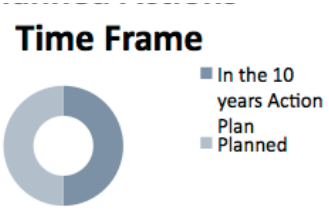
The most serious issue is the sewerage system. Soil being extremely porous and city's primary water source being very near, it is of crucial importance that this area has really effective and proper sewerage system. It is planned that one day a wastewater treatment plant will be established, but until then, temporary, one septic tank should be used on the whole area.

Also, monitoring groundwater quality and possible leakage of waste waters and oils is highly emphasized in the Plan.

Of all environmental issues Business strategy mostly deals with burning water issues which are water supply and sewerage system. It is planned to make stable water system for supplying drinking water and fire protection system, as well as septic tank for wastewaters.

Table 6 Inclusion of Environmental Sustainability Measures in the GRP related to Water Quality

Sustainable Airport	General Regulations Plan of Ponikve
minimize spillage	-
improve environmental management procedures	+
discharge and treat foul drainage and sewage	+
effective fittings and fixtures	+
various leak detection systems	+
water reduction devices	-
implementing water recycling operations	-



Feasibility / Stakeholder Engagement

Planned actions are demanded by national laws issued by the government. They represent the basic building infrastructure and are necessary for any building functioning on the Airport Site. This makes them necessary to the Airport Company. Procedures and leak detection systems which are in the high interest of environmental groups are not planned for more recent application. These two measures are not as invasive and could be presented to Resourceful as a part of responsible business strategies. Also, government should give them incentives for taking part in dealing with community-important issues.

Unplanned additional measures, in this case, are minimising water consumption and consequently reducing maintenance costs, which is primarily favourable to the airport company itself. Lack of these ideas in the plans is lack of knowledge. Lack of them in the business strategies is because of the big starting investment. However, these investments pay themselves off.

4.4 Biodiversity

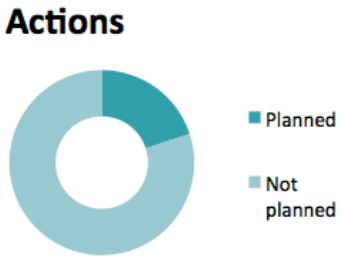
Biodiversity and natural habitat are hard to be maintained at the same quality level with growing airport nearby. Habitat area is reduced because in the landing/take-off area some animals (birds and small rodents in particular) are banned, for safety of planes and humans, as well as animals themselves. GRP plans cutting down all high plants and replacing them with grass surfaces in the runway area.

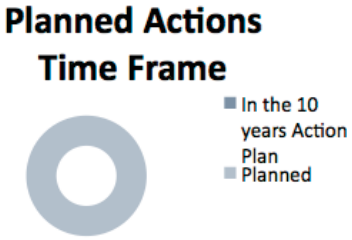
Around the airport is planned to plant some greenery but it is emphasised that it should be unsuitable for certain types of birds and insects. Plants should also be chosen based on species that are already autochthonous, resistant to air pollution, dust and dominant winds.

The ten year Business Strategy does not plan Airport to act on any of these measures.

Table 7 Inclusion of Environmental Sustainability Measures in the GRP related to Biodiversity

Sustainable Airport	General Regulations Plan of Ponikve
minimising the intrusion	-
translocation, restoration and creation of habitats	-
rescue of important species	-
hedge restoration and improvement	+
mitigating the loss of mature trees as a result of height restrictions by substituting small trees and shrubs and hedge thickening	-





Feasibility / Stakeholder Engagement

Improvement of hedges is the only action from sustainability set included in the GRP. It supposed to be done for safety of planes (airlines), passengers, local communities and nature (NGOs). However, it is not planned for recent implementation since Ponikve has no scheduled commercial flights yet, so the most powerful stakeholder (airlines) is not yet precisely defined. However, if the planned flight growth happens within planned time frame this measure should be implemented in the same time.

Some of unplanned measures are partly covered in the plan, but they are not as clearly defined. Furthermore, their goal is mostly to support safety of aviation instead of saving biodiversity, which is why formulation and action plan of these measures should be improved. Unfortunately, is in the interest of the least powerful to do so: main stakeholders here are NGOs and local community. In cases like this, the intervention of the second group of stakeholders is crucial. Without pressure of these stakeholders, power holders are going to remain passive.

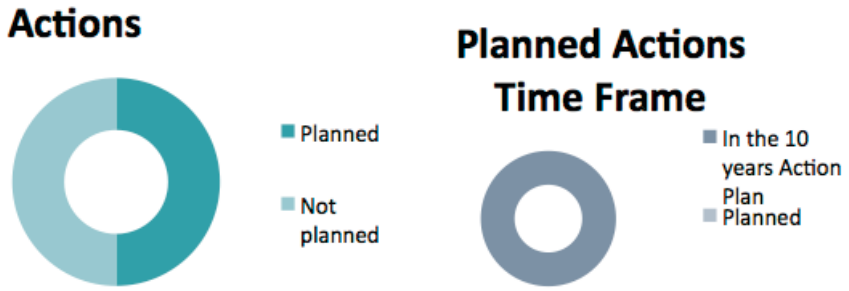
4.5 Energy consumption

The Plan recommends encouragement of energy efficient solutions and technologies in the building making process, use of renewable sources and central heating system, but does not give a specific set of incentives to reach such goals.

The ten year Business Strategy plans for building several new facilities. They are all supposed to be in accordance with current Serbian civil engineering laws and have C level of energy efficiency.

Table 8 Inclusion of Environmental Sustainability Measures in the GRP related to Energy Efficiency

Sustainable Airport	General Regulations Plan of Ponikve
passive architecture elements	+
energy saving mechanical and electrical elements	-



Planned actions are demanded by national laws issued by the government. This means that the stakeholder with power of influence demanded use of passive architecture elements in order to enhance energy efficiency and most powerful stakeholders with the resources have to abide this.

Unplanned additional measures, in this case, are minimising energy consumption and consequently reducing maintenance costs. This is primarily favourable to the airport company, so implementation of this measure is to be done solely by the airport itself. It is an investment that is sure to pay off in the future.

5 Conclusion

Growth of airports is encouraged for its economic and social benefits. Such increase of capacity should not happen at the expense of more environmental burdens.

Ponikve has GRP with, not perfect, but decent idea of care for environment. However, business strategy doesn't include most of the measures proposed in GRP. This is understandable when taken into the account that Ponikve Airport is underdeveloped company. Financial conditions for all kinds of actions are very unfavourable. Airport needs to gain more capital in order to invest in many of these green actions, but a lot of them could actually pay off in the long run.

In general, it is hard, but not impossible, to become sustainable in the harsh economic market. It is necessary to cooperate with right stakeholders, listen to new ideas and carefully value each project, but steady economic development has to follow all of this. Government and local authorities should show greater support to the influenced group of stakeholders which comes with the ideas and needs for better environment quality. Also, government should give more incentives and fewer obligations for going green, so that the Airport Companies could more quickly feel the benefits and would more easily agree to take action.

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PLANNING AIRPORTS IN HEROIC TIMES OF YUGOSLAVIA – LOOKING BACKWARDS IN ORDER TO UNDERSTAND THE PRESENT

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INTRODUCTION

This research aims to open up a discussion about former Yugoslavia's heroic planning goals resulting from socialist regime established in the early 1950s. Strongly influenced by the socialist ideology, the increase of air traffic capacity and establishment of the airport network was one of the main objectives of the Yugoslav planning practice in the period from 1950 to 1980. Our main hypothesis is that although planning practice nowadays continues to emphasize the importance of the airport network, this network is still not established and single airports act as competitive parties and not as parts of the network.

The hypothesis was tested through content analysis and historical comparative research. The main research material used for analysis were Spatial plans of Serbia (years 1982, 2004, 2010), General plans of Belgrade (years 1950, 1972, 1984 and 2003) and Nis (years 1995, 2011) and additional studies and expert analysis (Archive documentation of Yugoslav Institute for Town Planning and Housing and Belgrade Institute of Urban Planning). The historical comparative study was conducted in order to analyze changes in strategic thinking about airport networks on international, national and city level.

The synthesis of content analysis and historical comparative research can provide a better understanding of the strategic planning perspective and social processes over seventy years of planning practice in Yugoslavia / Serbia. At the same time, it could create a starting point for further thinking about airport networks and their relation to the international, national (regional) and city level emphasizing the cultural and functional integration of analyzed airport cities.

CONTEXT

The period after the Second World War was characterized by significant changes in the political and social situation in Yugoslavia. These changes were initiated by technological and economic development and constant need for modernization in order to accomplish the socialist idea of the new society. Accordingly, the new state-required horizontal and vertical coordination between governmental bodies and adequate professional capacity of an individual.

Modernization was stimulated through five years socio-economic development plans (Timotijević, 2012). The realizations of these plans had stimulated the establishment of new institutions and institutional arrangements in urban planning as well. By this means, National Urban Planning Institute of the Republic of Serbia was established in 1945 followed by the establishment of the urban institute's network across the country. This period can be perceived as the beginning of the heroic time of Yugoslav planning practice.

Although the beginning of the air traffic in the Yugoslav region can be traced to the early 1920s, when the first line connecting Paris and Constantinople operated over Belgrade airport (Ilić and Sretenović, 1964), strategic planning and thinking about airport cities and the establishment of the network appeared in the heroic period in 1950s. Socialist regime made possible construction of large infrastructure projects including Belgrade Airport through nationalization

of land, centralization of planning, centralized decision making and centrally planned economy. By the year of 1965, Belgrade and Nis Airport were activated, operating as the only two civil airports in the Republic of Serbia, but only Belgrade Airport served as the international one.

Industrialization and modern technological development reached its peak in Yugoslavia in the 1970s and 1980s, when Yugoslavian airport traffic had a significant role in International airport network, head in the head with the UK and France and even ahead of Germany and Italy. In 1976, Yugoslavia had 17 civil airports, but only Belgrade airport was located in the inner territory of the Republic of Serbia, having 32% of air traffic, 31% of all passengers and 74.4% of all manufactured goods (Božičković, 1976).

Due to the major role in Yugoslav air traffic, as stated above, Belgrade airport was experiencing an overload at all levels and required the extension of the airport capacity and development of accompanying road and railway network.

In following period, socialist regime experienced a decline of power and impacts on the society. None of the above-stated goals in planning documents was implemented, leaving airports with the original capacity and built infrastructure and airport network only as an idea on the paper.

The 1990s brought changes in the political regime that had great influence on the planning system and general urban development in the Republic of Serbia due to the international sanction, inflations on the national level, privatization of land, change in legislation, regulation and procedures. During this period, Yugoslavian borders were frequently closed causing occasional suspension of air traffic and having a negative impact on airport ability to operate on the productive level.

NATO aggression in 1999 affected most of the military airports in Serbia, including Nis airport that was bombed 57 times, demolishing 17% of all airport infrastructure (Nis Airport, 2018)

On the other hand, neo-liberalization of the market, introduced after 2000, limited the economic power of the state that has already been politically and financially vulnerable.

Since airports enterprises were left in national ownership, their development was limited until the year of 2009, when new visa policy for Serbian citizens was introduced triggering new investments in airport facilities.

Belgrade Airline Company was privatized in 2013, while the airport has been given under concession in 2017. In comparison to Belgrade airport, by the year of 2015, Nis airport was used for charter flights and as the alternative for airports in Pristina, Belgrade, Podgorica, Skopje and Sofia (Niš General master plan, 2011). After 2015, Nis airport has been developing as an airport for low-cost companies, increasing its annual passenger flow from 1,335 to 331,582 (Nis airport, 2018). In 2018, the new political idea of transferring ownership over the Nis airport from the city of Nis to the Republic of Serbia appeared. This act caused public opinion disapproval and protest of the local citizens who consider local airport as the important social inductor and powerful economic driver for the south of Serbia that was neglected in past decades. This problem is deepened by the public appearance of leading political representatives who are

giving unclear and unsynchronized information about the clausule in the Belgrade concession contract. This clausula refers to the allowed increase of Nis airport passenger flow up to a maximum of 1 million over the next 12 years (Tanjug, 2018; Južne vesti, 2018).

The current relation between two airports brings us back to the notion of the network, possibility of its existence, as well to its importance for cultural and functional integration.

SUBJECT DESCRIPTION

The network can be understood as a large system consisting of many similar parts that are connected together to allow movement or communication and flow between or along the parts. Robert Freestone emphasizes the central role of the flow of goods, people, and services in the globalized world, where airport networks help define world connectivity (Freestone, 2009).

Drawing from his argument about the importance of connectivity, as a critical aspect of globalization, the network is only achievable if parts (airports) act as an integrative element of the network. In terms of our research, lack of interconnectivity and coordination, recognized on the national level, results in airports that function as competitive parts and not as a part of the network. The current situation, characterized by the competitiveness between these two airports, creates uneven and unstable conditions and challenges for the urban development.

Seventy years of strategic thinking and planning about airport network is worth of researching and further elaboration and should not be simply forgotten and replaced with the planning driven by the market rules. Plans, expert analysis, and studies, developed for the Yugoslav region from the 1950s onwards, resulted in the spatial distribution of airports at the national level and definition of the network structure. During the heroic time of planning, this network was reconsidered and evaluated through expert analyses, developed as an integrative part of the plan, focusing on the implementation of stated ideas.

After the change of political and economic system introduced in the 2000s, strategic goals and structure of the airport's network remained the same, transferred from plan to plan but with no instruments for the implementation. In a time of new socio-economic conditions, airports are no longer perceived as a driving force for urban development, nor their spatial distribution across the country is considered as an opportunity for equal regional prosperity. Today plans developed for the city level and political decisions adopted by national and city bodies, consider airports as single entities without referring to the airport network and its elements.

The network presents great potential for urban development but its implementation can be perceived as an even greater challenge for urban planning and public policy. Having that in mind, our research strives to trace the development of the strategic ideas about network establishment across international, national and city level, their change over the time and the relation to the process of the implementation.

ANALYSIS – RESEARCH

Research includes analysis of four different periods - from 1950 to 1960, 1961 to 1975, 1976 to 1985 and 1986 till today, following the extent of strategic thinking of airport network and its impacts on international, national and city level.

Strategic thinking in the period 1950 - 1960

One of the major documents adopted in the early 1950s was General Master Plan of Belgrade. Having in mind that plan was developed right after the 2nd World War, it became an instrument for the development of postwar heroic ideas. This argument could be supported by the attitude of the professional public, which characterized this period as a period of great engagement and activity of urban planners led by their entrepreneurship in assisting authorities to solve urban development problems (Novaković, 1987). Accordingly, construction of modern airport terminal has developed a line in line with the building of completely new part of the Belgrade - "New Belgrade".

Observation of the international level leads us to the inference that urban planners saw Belgrade as a central point for connecting the East and the West, North Europe with North Africa emphasizing the geostrategic position of Belgrade through diagrams presented on figure 1 and 2.

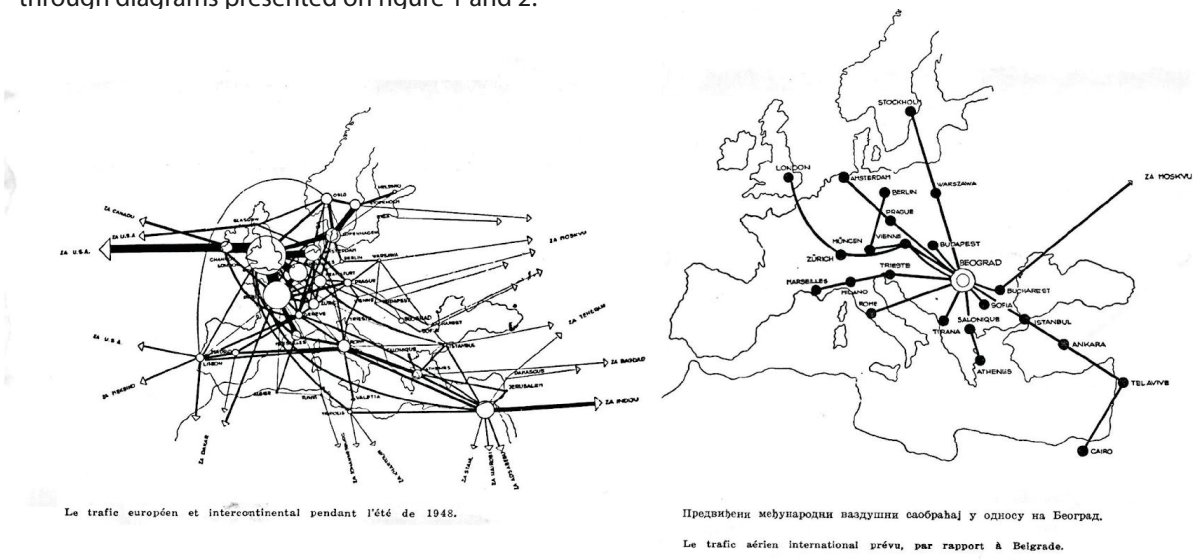
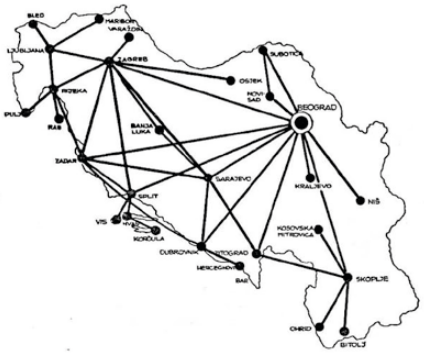
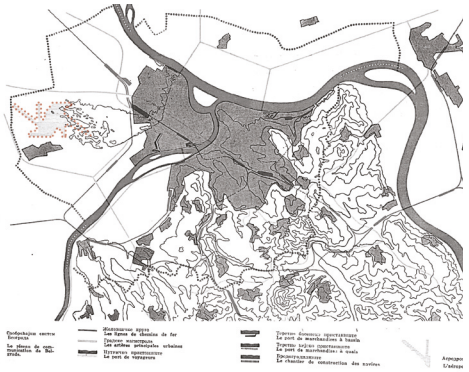


Figure 1 International level of airports network, General Master Plan, 1950 (Cvrčanin, 1951)

The main goal at the national level was to develop Belgrade airport as a central point of Yugoslavia's air traffic, connecting North and Central parts of Yugoslavia with Adriatic sea (Beograd Generalni urbanistički plan 1950, 1951). The Plan, although adopted on the city level, included the diagrams of the national network, defining the spatial distribution of the airports across all of the republics of Yugoslavia. According to this plan, Serbia should develop 6 airports, Slovenia 3, Montenegro 2, Croatia 12 (due to its length of the seashore and the exploitation of tourism potential), Macedonia 3, while 2 airports should be built in Bosnia and Herzegovina (Figure 2- left).

Strategic thinking on the city level included the design of the new Airport building in Surčin, 16 km away from the Belgrade city center (Cvrčanin, 1951). Developing of the new airport implied the need for the first airport city for 30-40 000 citizens, located 15-20 minutes away from the city center but connected via highway and fast railway system (Figure 2 – right).





Les lignes aériennes prévues pour les transports intérieurs.

Figure 2 National level (left), City level (right) (Cvrčanin, 1951)

This plan can be perceived as the first strategic plan, yet the plan that included the network on all three levels: international, national and city level that will have a major impact on all further periods.

Strategic thinking in the period 1961 - 1975

Following period has been characterized by the tendency of continuous increase in air traffic (Draft of General Master Plan of Belgrade for 1972, 1971). Besides that, in this period strategic thinking of the air traffic network on an international level has not been recognized.

At the national level, one of the most important documents adopted in this period was Spatial Atlas of Yugoslavia 1972, named as "Atlas" due to its size but was really a Planning document by its content (JUGINUS, 1972). This Atlas was developed as the first document that emphasized the unity of Yugoslavian space since there were no Spatial plans by that time. Amongst other topics of spatial development, one segment of Spatial Atlas dealt with the development of airport network in the territory of former Yugoslavia. The network defined three different types of airports - the international airports, airports for internal traffic at the national level and local airports, as well as their load in relation to the developed capacities (figure 3). A measure of a load of airport operations (arrivals and departures), passengers and goods flow is presented in figure 3. This document will be exhibited as the part of the planning legacy at the MOMA exhibition: Toward a Concrete Utopia: Architecture in Yugoslavia, 1948–1980.

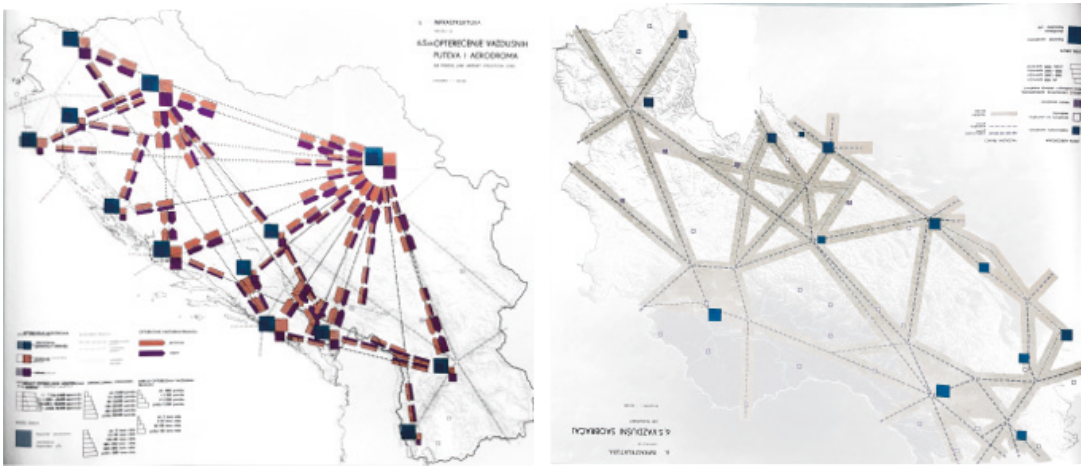


Figure 3 Air traffic network in Spatial Atlas of Yugoslavia (JUGINUS, 1972)

In this period, precisely in 1962, the new modern airport in Belgrade has been put into operation. Location for this airport was defined in the General Master Plan in 1950 while construction began in 1958. Draft of Belgrade Masterplan, presented in 1971, emphasized that current airport capacity will become insufficient by the year of 1985 while its location could limit further development of the city of Belgrade (figure 4-left) (Draft of General Master Plan of Belgrade for 1972, 1971). Although these assumptions have clearly been pointed out, they were not included in the final version of the Master Plan. At the contrary, this plan states that current airport has sufficient capacity for long-term perspective (figure 4-right) (Đorđević and Glavički, 1972). Additionally, the further development of the air traffic is observed through the need of the second airport, whose location hasn't been defined within this document.

In terms of Nis airport, in that time, it served as a national airport, connecting central and south Serbia to the Adriatic sea (Nis Airport, 2018).

Figure 4 left: Belgrade Traffic Network (Draft of General Master Plan of Belgrade for 1972, 1971), right: Land use plan for Belgrade (Đorđević and Glavički, 1972)

Strategic thinking in the period 1976 – 1985

According to the heroic ideas settled in 1950's planning documents, Yugoslavia still maintained the goal of becoming a central point in the air traffic network while connecting Europe and the Middle East through three main Yugoslavian airports: Belgrade, Zagreb and Skopje airport. Strategic thinking about airport network on the international level has been presented in figure 3. Achievement of this goals can be traced through the number of air traffic passengers, comparing Yugoslavia with other European countries, line in line with Great Britain and France (Božičković, 1976).

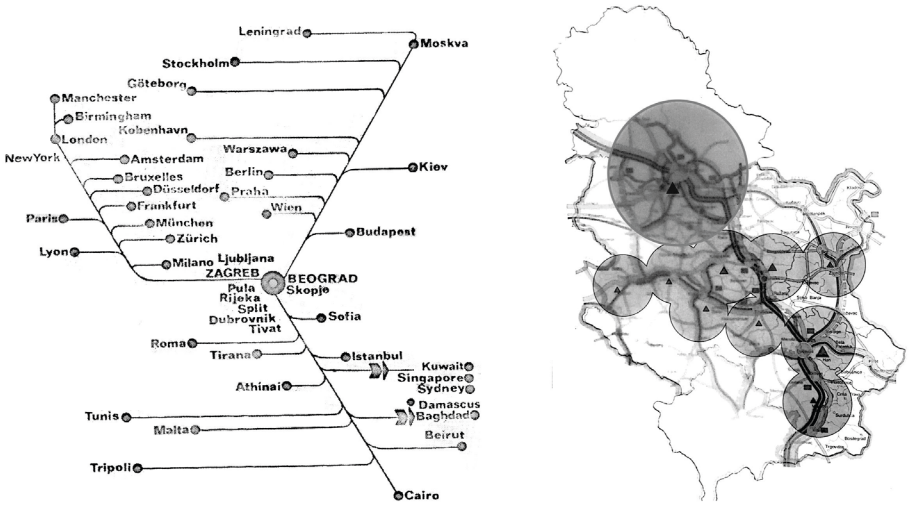


Figure 5 left: Yugoslavian airports in international network (Božičković, 1976), right: Gravitational zones of airports in Serbia (Osnove prostornog plana SR Srbije (for internal use), 1979)

Endeavour of making the Belgrade airport a central point of the airport network at the national level from 1950s to 1970s resulted in uneven distribution of passengers and goods across Yugoslavia, having Belgrade airport with 32% of entire air traffic, 31% of all passengers and 74.4% of all manufactured goods (ibid). These circumstances produced a capacity overload of the Belgrade airport. Additionally, Belgrade airport gravitational zone was covering only 10% of the entire territory of Serbia. Because of that, the main strategic goal in 1970s planning was ramifying airport network in the region of Serbia by the year of 2000 (Spatial Plan of Socialist Republic of Serbia, 1982; Draft Version of Spatial Plan of Socialist Republic of Serbia (for internal use), 1982). According to the expert analysis implemented in the Spatial plan of Serbia in 1980, Serbia should have 9 airports in 3 ranks: international, national and local (1 international airport, 2 national airports, and 6 local airports) (Osnove prostornog plana SR Srbije (for internal use), 1979). Distribution, geostrategic position and radius of serviced territory, both of existing and planned airports, have been presented on figure 4).

During this period, strategic thinking about airport networks at the city level included the adoption of General Master Plan for Belgrade in 1984. General Master Plan (figure 6 - left) predicted an increase of the capacity of existing airport in Surcin (Belgrade), both in airport facilities and extension of runways (Krstić, 1984), but also increase of the capacity of transport infrastructure - road connections between airport and city-center and building of two bridges over the Sava river (figure 6 - right). This increase in facility infrastructure was partly released in 1997, when the new terminal building was opened, while one of the planned bridges has been built in the first decade of 21st century.

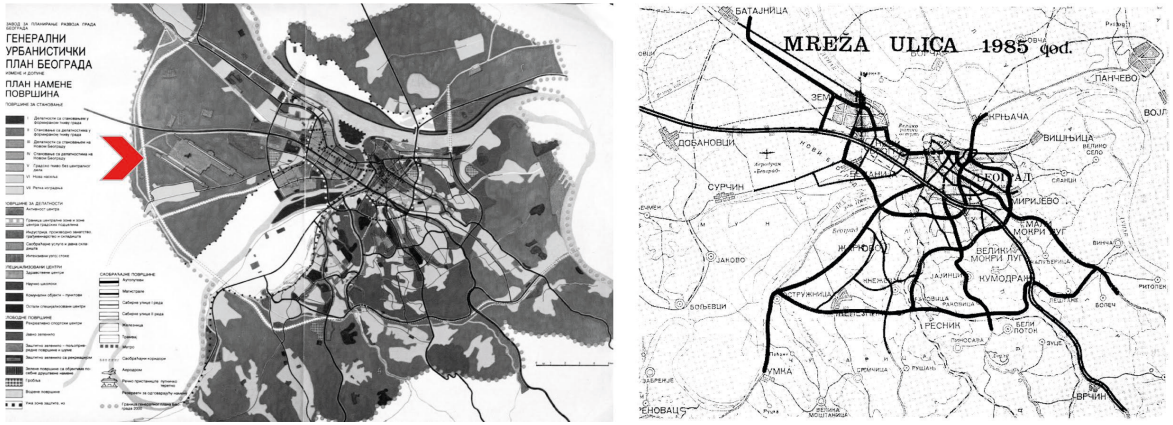


Figure 6 left: Land use plan in General master plan of Belgrade (Krstić, 1984) , right: Road network and the location of the airport (Božičković, 1976).

Strategic thinking in the period 1986 - 2003

Development of strategic thinking in this period is characterized by the lack of adopted planning documents concerning airport network on an international level. New socio-political conditions in the 1990s influenced stagnation of planning process as well, while the first strategic documents have been adopted at the beginning of 2000s, more than two decades after the previous one.

National and city level had the main role in the process of strategic thinking, which can be documented by the number of adopted plans on these two levels and the presence of the topic of airport network development within them. The most comprehensive plan was the Spatial Plan of Serbia and Montenegro from 2004, revised in 2010 and renamed to the Spatial plan of Serbia. Concerning airport network, plan underlines the idea of establishing a network of 16 airports with different rank: three international airports, the transformation of two military airports to civil use, eight regional airports and numerous airports for local sports and recreation (Spatial Plan of Serbia and Montenegro, 2004; Spatial Plan of Serbia 2010-2020, 2010). This plan is still in use but the network remained unformed.

On the city level, Belgrade and Niš can be recognized as the most important nodes of the previously mentioned airport network.

In case of further development of Belgrade airport, extensions of the runway and airport facilities were planned, both through General Master plan of Belgrade, adopted in 2003, and General Regulation Plan of Belgrade, adopted in 2016. The regulation plan proposes an extension of main Belgrade airport runway despite the existing housing settlement located nearby and transformation of existing military airport for civil use, predominantly low-cost flights (Plan Generalne Regulacije Beograda, 2016).

Figure 7 left_ National level of airports network (Spatial Plan of Serbia 2010-2020, 2010), right: Land use plan in Belgrade General Master Plan (Official Gazette of city of Belgrade, 2003)

General Master plans of Niš (both one adopted in 1995 - figure 8 and other in 2011) recognize the potential of Nis airport, not only as an airport for alternative flights, but as an airport with high quality infrastructure, potential for modernization and inclusion into the European airspace that could quickly result in passenger traffic growth (Niš General master plan, 2011).

Figure 8 Land use plan in General Master plan of Niš (Niš General master plan, 1995)

Nis Airport has been seen as a major economic impulse for city development, especially for this town were average salary is almost 10 % under national average rate (Statistical Office of the Republic of Serbia, 2018). Because of the recognized economic and social significance, citizens of the city of Nis are strongly against the change of ownership over the Nis airport (Politika, 2018), promised by the city authority to the Republic of Serbia with no costs attached but according to the clausule in the Belgrade concession contract.

Figure 9 left: Citizens protest against change of the ownership from city to national level. left: https://www.danas.rs/politika/vise-od-deset-hiljada-gradjana-na-protestu-ne-damo-niski-aerodrom/ ; right: http://www.novosti.rs/vesti/srbija.73.html:721505-AERODROM-NA-STAJANCI-Novi-protest-Nislija-ispred-Skupstine-grada

CONCLUSION

Strategic planning perspective about airport networks can be evaluated through several criteria: number and quality of expert studies, clarity and complexity of strategic goals in spatial and urban plans and presence of additional documents following planning process. Evaluation is conducted as a five-scale assessment:

1 - Lack of strategic planning perspective

2 - Low level of strategic planning perspective

3 - Intermediate level of strategic planning perspective

4 - High level of strategic planning perspective

5 - Superb level of strategic planning perspective

Structural and visual representation of the evolution of general strategic thinking ideas over the period from 1930 till 2018 is presented in Diagram 1. Diagram follows different strategic documents adopted over the time while evaluation assessment is presented with three different estimation lines for international, national and city level.

Development of the strategic thinking about the position of the Yugoslav airports in the international network reached its peak in the 1950s when Belgrade airport was envisioned as a central point for air traffic in Yugoslavia. Implementation of those ideas globally positioned Belgrade as one of the top airports in 1976 (as evidenced by (Božičković, 1976)). After this period, strategic thinking on this level was in constant decline due to the unstable economic and political conditions and the reduced role of planning.

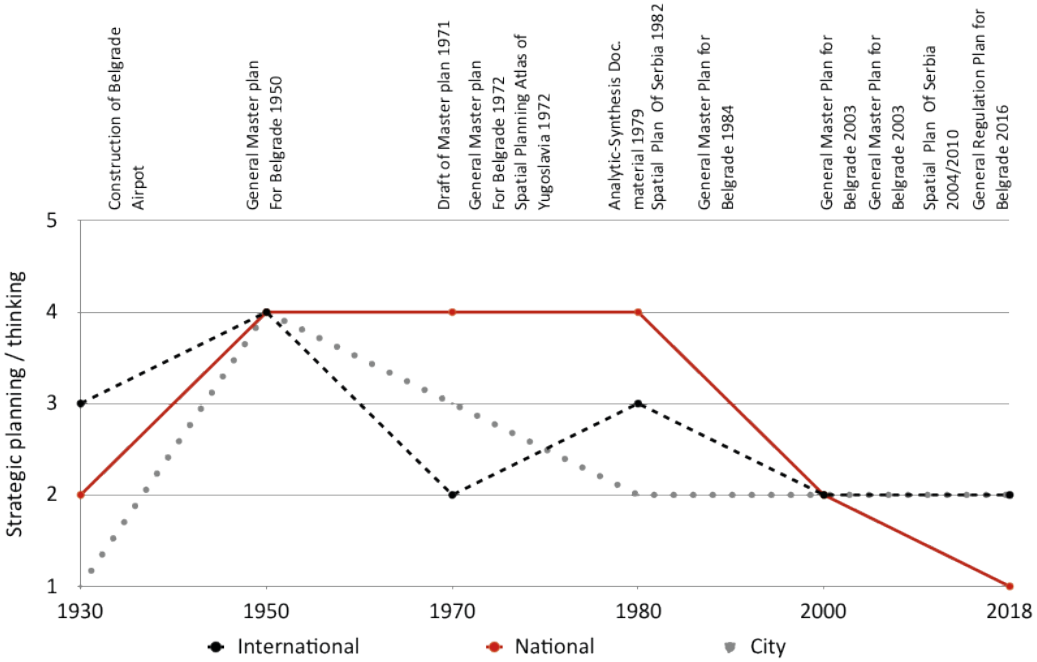


Diagram 1 Evolution of general strategic thinking ideas about airport networks in Yugoslavia / Serbia over the period from 1930 till 2018 (source: authors of the paper)

In terms of national level, it had constant significance in planning documents during the whole period of heroic time of planning (1950 - 1980). Through different documents, a planned network of airports was reconsidered and evaluated but always focused on the implementation of stated ideas. In these times, a great number of airports in Serbia were built or adapted to modern air traffic (Belgrade, Nis, Uzice, Kraljevo, Pristina, etc.), but only Belgrade and Nis outlasted and are present in today's air traffic network. From 2000 to present days, the economic aspect of single entities drove decision-making process, resulting in competitive relations among national airports. These conditions are developed according to the market rules despite the goals for the establishment of airport network.

Observation of development of the strategic thinking on the city level was evaluated through cases of Belgrade and Nis. Since they were built, all of the analyzed documents state the need for the capacity extension (new runways and facilities) that was only partially implemented through the reconstruction of existing facilities. Additionally, the rail line between the city of Belgrade and the airport was planned in early 1950 but has still not been constructed, while the increase of road traffic is only partially developed. Individually, analyzed cities continue to emphasize the need for infrastructure improvements, an increase of traffic flow and need for a capacity extension, but without considering how those extensions will influence existing built structure and further urban development.

Three level analysis indicates the extent of the impacts that cultural, economic and political changes could have on strategic thinking about airport networks. Returning to our original argument, the systematic decline of strategic thinking about any network potentially could lead to the dysfunctionality of its entities. Lack of functionality between single airports can be clearly observed in Serbian case. No matter how good heroic ideas are, using them without conducting expert analyses and without rethinking in correspondence to new economic, social, cultural and political conditions leads to the decline of strategic thinking about airport network and limits the possibility for network implementation.

ACKNOWLEDGEMENT

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SOUTHAMPTON: AN AIRPORT CITY OF THE FUTURE?

Alice Drew

Jen Samuelson

ABSTRACT

Air transport has become part of daily life for both business and leisure trips. It is vital to understand how the relationship airports have with their surroundings can be advantageous to both the cultural and economic prosperity of an area.

Southampton is one of the largest cities on the south coast of the UK, and together with road, rail and sea links, benefits from an airport located just 10 minutes by rail from the city centre. This research paper will aim to explore how Southampton Airport currently integrates with the city and hinterland, the extent to which the airport is key to future growth of Southampton, and the potential for Southampton to become an Airport City.

In order to achieve this aim, the transport links, surrounding and supporting land uses and local embeddedness of the airport will be identified to critically assess the cultural and functional relationship between the airport and the city, as well as identify the economic potential of the immediately adjacent and wider area.

A framework will be produced which will identify the stakeholders and strategies that shape the development of Southampton Airport, the city and the wider area and map the relationships between them. This framework will help understand the current cultural and functional connections between the airport and surrounding area and will secondly identify any mutual stakeholders and strategies that could drive an integrated, collaborative approach to development of the city and airport.

Recent trends have placed an emphasis on developing more Airport Cities as they are major economic hubs which exhibit substantial growth and profits in both the immediate and wider area (Peneda et al 2011). Therefore, this research will look at the qualities which constitute an Airport City and use the information gathered to assess whether Southampton could one day achieve such status.

1.0 INTRODUCTION

The objective of this study is to contribute to the European body of knowledge on airport-centred development. The main aim of the paper is to identify Southampton's potential to become an airport city, which is defined by Peneda et al (2011) as major economic hubs which have exhibited substantial growth and profits. This paper will explore and examine the cultural and functional relationship between Southampton Airport and the city and assess the potential for growth of the Airport to support and develop the wider area and Southampton. The paper will conclude by assessing whether or not Southampton has all the contributing factors to one day become an airport city.

A review of existing research into Airport Cities has been drawn upon to understand the factors which constitute an Airport City, and to assess whether Southampton Airport has the pillars in place to meet this status. In order to assess Southampton's potential to become an airport city this paper will identify key stakeholders and assess their importance and influence on the development of the airport. The existing growth strategies shall be analysed to understand how strategic and local planning are influencing the growth of the Airport and surrounding area.

The research methodology, including the aims and objectives of this paper, is discussed further in Section 3: Subject description. A desk-based research qualitative method was used for this research paper.

2.0 CONTEXT

Southampton is one of the largest cities located on the south coast of the UK, with approximately 236,900 residents (Southampton City Council, 2018). The city has two universities and is one of the major employment zones of central southern England. The administrative body is Southampton City Council. The city benefits from a port which caters for an estimated 1.7 million cruise passengers and 14 million tonnes of cargo each year (Abports, 2018), and is well connected to London, the east and the west via the M27 and M3 motorways and rail links. In addition, the city is one of two on the central southern coast of the UK to have an airport, which sets it apart from other cities in this region.

As shown on Figure 1A below, Southampton Airport is located approximately 4 miles to the north-east of the city centre and lies within the administrative boundary of Eastleigh Borough Council, directly adjacent to the M27 and M3. Southampton Airport Parkway railway station provides direct connections into Southampton in 10 minutes, as well as a direct route into London. The Airport provides flights to over 40 direct European destinations and, for the first time, in 2017 served over 2 million passengers (Eastleigh Borough Council, 2018).

Importantly, whilst the Airport and city are located within separate local authority areas, they are both located within the Partnership for Urban South Hampshire (PUSH) area, which is a cross-boundary organisation which promotes and enables authorities to work together to realise sustainable growth within South Hampshire.

With regard to the Airports immediate context, Figure 1B also shows that the airport is tightly bound by a Country Park, industrial/ business estates, the M27, the Railway Line and railway sidings. Whilst the owners, AGS Airports, own land that is not currently utilised to the benefit of the airport (shown in light blue), access to this area is difficult to achieve due to the surrounding land uses.

Since the 1980s, there have been plans for a link road (the 'Chickenhall Link Road') to unlock the land to the north east of the airport (light blue in Figure 1B). Previous options for this route have included a tunnel under the northern end of the runway, however, due to the expense of undertaking this infrastructure work, this has not been realised to date.

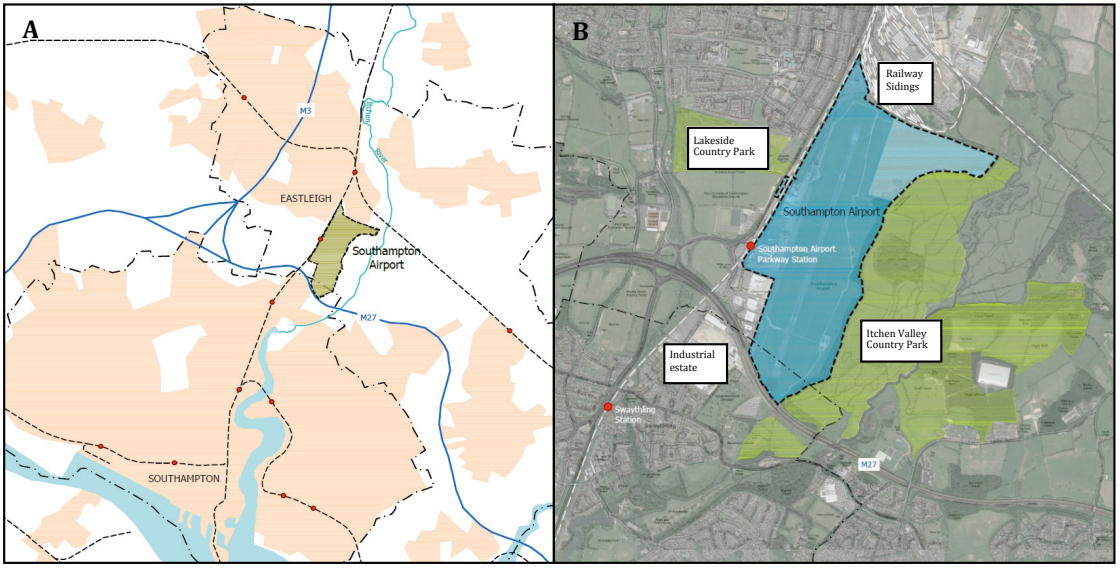

Figure 1: (A) *Context plan of the Airport and Southampton City, showing the built-up areas (beige), rail links (dashed black line) and motorways (blue line);* **(B)** *Context plan for Southampton Airport, showing the physical constraints to growth*

2.1 Challenges and opportunities

AGS Airports, the owners of Southampton Airport, have a clear drive to grow the Airport with an intention for the Airport to become a hub and economic gateway for Southampton through the development of business parks on the site and increasing connections through Southampton Airport for onward destinations (Southampton Magazine, 2017). This has been achieved elsewhere, where airports have become attractive locations for economic activity due to their accessibility both locally, regionally and internationally (Schaafsma et al, 2008). In the UK examples of achieving this include Manchester and Norwich which are also regional airports.

However, to realise this ambition, there are a number of constraints. Firstly, the setting of an airport is paramount to its ability to become a hub and grow (DeRudder et al, 2010). Southampton Airport is physically constrained, as shown in Figure 2 above, which presents a challenge for the physical growth of the Airport in the future. Due to the railway sidings to the north and M27 to the south, there is limited capability to expand the runway which impacts the Airport's ability to operate longer distance flights and increase the number of freight flights (DeRudder et al, 2010). The wider setting of the Airport presents further challenge as the surrounding uses are vulnerable to noise. This has triggered restrictions on the number of flights that can be flown each year, and night flights are not permitted except in exceptional circumstances. In order to increase the number of flights, AGS Airports would be required to apply to Eastleigh Borough Council to amend the original planning permission.

Technology is an important opportunity to overcome some of these constraints, and is progressing rapidly with new generation planes becoming ever quieter, such as the A320neo Airbus which is being introduced by easyjet at Bristol Airport (Bristol Airport, 2018).

An additional challenge for Southampton Airport is the impact of competition from other, larger, airports on the potential catchment for passengers. Gatwick and Heathrow, for example, have greater pull and attraction for residents to the north of Southampton, as they are widely accessible and give greater choice of destination. Therefore, this leaves a more limited catchment for Southampton Airport, which makes it more challenging to increase passenger numbers. In this regard, it is important for the Airport to draw upon its strengths that other locations and 'Airport Cities' cannot offer, such as its relationship with the Port and its well-connected position.

Southampton Airport has unique opportunities moving forward that could be drawn upon. One such opportunity is its location and proximity to other modes of transport as access can be a significant impediment to its appeal for passengers and therefore growth (Derudder et al, 2010). indeed other airports in the UK, such as Cardiff and Bristol, are located at a distance to the nearest city and this is a challenge they are actively seeking to resolve. However, Southampton Airport is located on the edge of Southampton and connected to the wider south coast by rail, bus and road. With some improvements to connections to Portsmouth, this would enhance the catchment for the Airport through direct rail links. Further, the Airport is also a connecting point for passengers seeking to access the Cruise Ports. Therefore, there is significant opportunity moving forward for these connections to be enhanced to be of mutual benefit to the city and Airport.

Further opportunity exists within the current boundary of the airport. The consolidation, expansion and/or re-development of the business park for both aviation and non-aviation functions could allow for businesses to operate with greater efficiency, speed and convenience, which could be an attractive quality to businesses moving forward (Freestone et al, 2014). Furthermore, opportunities exist for the airport to grow as a 'hub' to deliver passengers to other locations that connect worldwide. This could be achieved through a careful selection of destinations, that allow for these onward connections.

Overall, given the connections and existing infrastructure (both economically and physically), the Airport and the city of Southampton has the existing pillars from which to support growth, but there are some challenges in terms of the

physical and planning constraints which would need to be overcome in order to become an Airport City. Therefore, creative solutions , such as technological advances, will be required to turn these challenges into opportunities and for the Airport to grow to support the city and hinterlands. Due to the differing local authorities of the Airport and the City, in order to achieve these opportunities, it would be important that joint-working between relevant stakeholders occurs and there are clear, aligned strategies moving forward.

3.0 SUBJECT DESCRIPTION

In order to answer the research question 'Southampton: an airport city of the future?', the following aims and objectives have been identified, together with a methodology to achieve them.

Aims:

- To identify the factors that constitute an airport city and assess Southampton
- To critically assess the cultural and functional relationship between the city and the airport
- To establish the extent to which strategies and stakeholders promote or affect the development of an Airport City

Objectives:

- To explore how the airport and city are linked and assess their cultural and functional relationship
- To establish what factors are vital to the development of an airport city and assess Southampton against these factors.
- To understand the strategies that shape the development of Southampton Airport and surrounding area
- To produce a framework identifying the stakeholders, their interests and influence

3.1 Methodology

In order to achieve the aims and objectives set out above, a programme of wide-ranging research was undertaken. A qualitative approach to the research was chosen in order to gain deeper knowledge and understanding of the study area. A broad spectrum of reading and a number of meetings with stakeholders were undertaken to gather the information needed to achieve the research aims and objectives. Unfortunately, it was not possible to meet with a representative from the Airport.

Key to the growth of the Airport, and its relationship with Southampton physically, functionally and culturally, are the strategies which are in place to promote and facilitate this growth. A review of the key strategies from relevant stakeholders shall be undertaken. The key strategies reviewed will be:

- PUSH strategies:
  - Transforming Solent: Solent Strategic Economic Plan 2014-2020
  - Spatial Position Statement 2006
- Southampton Airport Growth Strategy 2006
- Eastleigh Borough Council
  - Adopted Local Plan 2001-2011
  - Emerging Local Plan 2016-2036
  - Issues and Options Interim Strategic Transport Study 2015
- Southampton City Council Core Strategy 2015
- Hampshire County Council Transport Delivery Plan 2013

The Airport are currently undertaking a review of their Growth Strategy, however, it is not publicly available at the time of this paper. However, the Airport's intention for growth has been discussed in Southampton Magazine (2017) and it would appear to have similar physical attributes to the 2006 strategy.

As identified previously, one of the key factors in facilitating potential growth of the airport is the role the stakeholders play. This paper will set out the key stakeholders of Southampton Airport, their interest in the airports function, the nature of this interest, their importance and their influence on the expansion of the airport and the surrounding area. These stakeholders were identified through researching the airport, its surrounds and the city.

4.0 ANALYSIS

4.1 Existing cultural and functional relationships between the city and airport (300 words)

As discussed previously within Section 2: Context, the predominant functional link between the city and the airport are the transport links of the M27 and the railway line. The sheer proximity of the airport to the city, combined with these links, mean that physically and functionally, there is a strong relationship between the two.

A key part of Southampton's culture relates to the ports and links to the sea. Southampton City Council's Economic Development Team indicated, within their interview, that there is an existing relationship between the Port and the Airport, where a large proportion of cruise ship passengers that come from the north of the UK or Ireland fly to Southampton Airport to access the Port. Furthermore, it is understood that the Port and Airport have a functional relationship for the crew of the ships to access Southampton. Indeed, the Airport website includes a dedicated page to the cruise ships to promote the combined use. The Airport and Ports of Southampton therefore are, to some degree, working together to promote the cultural interests of the city and help attract passengers to use the cruise ships.

One of the City Council's key objectives is to make 'Southampton a modern, attractive city where people are proud to live and work'. The actions to achieve this objective include 'increase pride in our city by ensuring there is a vibrant and diverse cultural, entertainment and leisure offer' (Southampton City Council, 2016). In this regard, Discover Southampton (2018) cites the cultural attractions of Southampton to include art galleries, theatre, music venues and cinema/film facilities. In addition, museums relating to the nautical and cruise ship history are available within the city. The Airport website includes specific pages relating to the attractions Southampton has to offer, which goes some way to promote a cultural link between the Airport and the City itself. Furthermore, the Airport holds an Airport Runway Run for charity which engages with the local communities.

Overall, there are existing cultural and functional relationships that could be built upon to assist Southampton reaching Airport City status.

4.2 Strategies and stakeholders that influence Airport, city and regional growth

An assessment of the relevant strategies has been undertaken to understand how they support the growth and development of the Airport and its cultural and functional relationships with Southampton and the surrounding area moving forward. Key to the strategic planning of the area and driving cross boundary collaboration for economic growth, which could influence the City's capability for becoming an Airport City, is the Partnership for Urban South Hampshire (PUSH).

The PUSH 'Transforming Solent – Solent Strategic Economic Plan 2014-2020' and PUSH 'Spatial Position Statement', set out that the Airport is considered to be a key gateway for south Hampshire, together with the Ports of Portsmouth and Southampton. The Airport and surrounding Eastleigh River Side are also promoted as a strategic employment location of the future to support the growth of Southampton as a city as well as the surrounding area. Further to this, the Eastleigh emerging Local Plan 2016-2036 recognises the importance of the airport on the economy of the Borough, and its intrinsic links to Southampton and the Port. To achieve this, the emerging and adopted Local Plan allocate land at the airport for employment uses which demonstrates how these strategies support development at the airport and the surrounding area to become an economic hub, which is important for becoming an Airport City.

However, key to the success of the growth strategy for the area, set out by PUSH and Eastleigh Borough Council, are the need for transport improvements to improve the functional connection of the Airport, as a proposed strategic employment location, to the surrounding area. The Transport Delivery Plan (Hampshire County Council, 2013), as well as the evidence base for the emerging Eastleigh Borough Local Plan, promotes the improvement of the rail links to eastern Hampshire and Portsmouth from Southampton Airport through an additional platform at Eastleigh Rail Station. Furthermore, there have been long standing plans to construct the Chickenhall Link Road. However, such transport improvements are costly and as such it is not expected that the road improvements would be completed within the next 20 years of the Plan period. It is clear that the infrastructure strategies recognise that improvements are required, and that there is a drive for these to be addressed, however, fundamental challenges in terms of funding will need to be overcome in order for improved functional relationships to be achieved.

Overall, from a review of the relevant strategies, there is clear intention locally and strategically for the Airport to become an economic hub for Southampton and the surrounding area. Furthermore, it is a key ambition of PUSH and Eastleigh Borough Council to improve the Airports connections within the South Hampshire area which would aid in improving the cultural and functional relationship with Southampton and the surrounding area.

Alongside the strategies of the Council and PUSH, the Airport has previously developed their growth ambitions, most recently published in 2006. The Airport is currently preparing a new growth strategy which, according to their article within the Southampton Magazine (2017), aligns with that of the Council and PUSH in terms of the development of the north east parcel of land.

Looking to the future, the strategies could benefit from recognition of technological advances that could alleviate some of the identified constraints, such as quieter and lighter planes and off site control towers. These could free up land within the site, or improve the capacity of the existing runway, and therefore change the model around which the Airport operates and help it to achieve Airport City status.

The stakeholders are also a key factor that can influence the growth of Southampton Airport and the surrounding area, and could facilitate or hinder the development of an Airport City. We have set out in Table 1 the key stakeholders that would have interest in the growth of the airport, to understand where collaboration would best be achieved, and who is of key importance/influence to sustainable growth. For clarity, the importance identifies the priority that needs to be given to satisfying the needs and interests of a stakeholder, whereas the influence is the power a stakeholder has to facilitate or obstruct future growth.

Table 1: Key Stakeholders of Southampton Airport and their interests

Stakeholder and Interest	Nature of interest in airport expansion (+ive or -ive)	Importance (1 to 5) 5 highest	Influence (1 to 5) 5 highest	Comments
AGS Airports Ltd (Airport Operator and land owner)	Positive	5	5	Highly important and influential for growth of the airport due to their land ownership and responsibility for the continued running of the Airport.

Table 1: Key Stakeholders of Southampton Airport and their interests				
Stakeholder and Interest	**Nature of interest in airport expansion (+ive or -ive)**	**Importance (1 to 5) 5 highest**	**Influence (1 to 5) 5 highest**	**Comments**
Passengers (Travel both leisure and business)	Positive	5	5	Passengers are highly important and integral to the success of the Airport. Any growth would need to meet the needs of the passengers to encourage return use. Therefore, they are highly important to any growth strategy of the airport, but have limited influence over implementation of growth strategies.
Transport and Infrastructure providers (In and outbound connections)	Positive	4	4	Wider growth strategies would be dependent on surface access to the airport, for passengers and cargo. As such, improvements to the existing transport network, such as road and rail, should be considered together with any growth plans for the airport. As such, transport and infrastructure providers would have an active role to play in any holistic growth proposals (such as the provision of the Chickenhall Link Road) and are influential to any growth. They are also important, as their strategies can have an impact on the accessibility of the airport.
Airlines (sub-operator)	Positive	4	2	The quality of the airport and its catchment will influence the Airlines decision to operate from Southampton Airport. As such, the needs of the Airlines are important to any growth strategy. However, they are not highly influential in terms of facilitating or obstructing growth.

Table 1: Key Stakeholders of Southampton Airport and their interests				
Stakeholder and Interest	**Nature of interest in airport expansion (+ive or -ive)**	**Importance (1 to 5) 5 highest**	**Influence (1 to 5) 5 highest**	**Comments**
Cargo / Freight organisations (Movement of goods and potential customer for cargo flights.)	Positive	3	2	The desires of cargo/freight organisations/ businesses would have influence over the Airport's strategy in the future to accommodate greater cargo flights. However, given the current limiting constraints of the Airport, this would not be substantial at present. These organisations would have limited influence to obstruct or facilitate any growth strategies.
Local Businesses (Economic – footfall from passengers)	Positive	3	2	At Southampton airport, there are a number of businesses operating out of the neighbouring business park. The needs of existing and future businesses would have importance in the development of plans at Southampton Airport, which appear likely to include a new business park in the north east area. However, they would not have great influence on the development of the scheme.
Local Council (Political and planning responsibilities)	Mixed	5	5	Any development would be subject to planning approval from the Local Council. As such, any development must accord with relevant policy set by Eastleigh Borough Council. The Council, as a regulatory body, have high influence and importance over any growth plans.
Local Politicians (Political – protecting local residents interests)	Mixed (depending on individual councillor's views)	4	5	Local politicians are important to foster local support for any schemes. They have influence over the planning process, with powers to determine applications at Committee meetings. Therefore, their views are both important and they hold influence.

Table 1: Key Stakeholders of Southampton Airport and their interests				
Stakeholder and Interest	**Nature of interest in airport expansion (+ive or -ive)**	**Importance (1 to 5) 5 highest**	**Influence (1 to 5) 5 highest**	**Comments**
Neighbouring residents (growth of the airport could result in additional noise/ traffic implications for neighbouring residents)	Mixed	3	2	The planning process involves consultation with neighbouring residents who could object to future plans. However, with appropriate community engagement, support from neighbouring residents could be achieved and help to influence sustainable development.
Country Park management teams (Environmental/ sustainability)	Negative	4	1	Growth of the airport could have a negative impact on the neighbouring Country Park and therefore some resistance could be met here. However, aside from meeting the requirements for planning and relevant licensing, the Country Park would have limited influence or importance on any growth plans.

From our assessment, the airport operator, AGS Airports Ltd and Local Council have the greatest overall influence over any decisions for growth of the airport as, respectively, they have land ownership and planning control over any expansion plans. Any plans would have to be brought through consultation and agreement with Eastleigh Borough Council, as well as the Economic Development Team at Southampton City Council. It is clear from the ambition of the Eastleigh Local Plan, and discussions held with the Economic Development Team at Southampton City Council, that both stakeholders, despite their different interests, are keen for the airport to grow and enhance the economic prosperity of the area which is important for joined up, collaborative growth to become an Airport City.

Stakeholders relating to the surrounding uses of the airport, country park management teams and neighbouring residents, would need to be considered for any growth plans in order to achieve sustainable growth. To foster local support, clear engagement should be undertaken with these parties in order to ensure that there would be no material harmful impact on their respective interests. This forms a fundamental part of the planning process and therefore would be important for any scheme put forward to Eastleigh Borough Council for approval. Likely concerns for neighbouring uses would be related to noise and traffic that would be generated if the airport were to expand

and the environmental impact such effects would have. These could be managed through community engagement initiatives, to foster support for the growth of the City and Airport to become an Airport City.

Other important stakeholders are the surface access transport providers and local politicians. In order for there to be joined up and effective planning to create an economic hub at Southampton Airport, as a step towards Airport City status, collaboration between the Airport, the Council and the surface access transport providers would be widely beneficial. Furthermore, buy-in from all stakeholders would be important in order for the Airport to achieve its aspirations and overcome any challenges and barriers to becoming an Airport City.

4.3 Southampton: An Airport City?

Peneda et al (2011) describes airport cities as major economic hubs which have exhibited substantial growth and profits. Although such a phenomenon is mainly based around aviation activities, many commercially run airports have evolved into airport cities by expanding non-aviation development into the areas surrounding the airports (D'Alfonso 2017). Peneda et al (2011) conclude that there are four critical factors which are required for the development of an airport city, these are as follows: the economic potential of the hinterland, the connectivity of the airport and its surroundings, a sustainable development context, and a commercial attitude by the airport operator. Within each factor are a list of contributing characteristics.

In order to understand how Southampton fares in terms of becoming an Airport City, the city and airport are assessed against the factors identified by Peneda et al (2011) in Table 2 below.

Table 2: Assessment of Southampton Airport against factors identified by Peneda *et al* (2011)

Critical factor contributing to airport city status	**Analysis of critical factors at Southampton Airport**	**Degree to which critical factor is present (1 to 3) 3 – A lot 2 – Partially 1 – Not at all**
Economic potential of the hinterland		**11/12**
Strong Local and regional economy to provide a solid base for traffic	Local economy is prosperous, in proximity to Southampton, Eastleigh and nearby business parks	3
Specialised suppliers and large local markets	In the immediate area there are not any specialised suppliers but there are in Southampton City Centre. There is a large local market.	2
Adequate economic profile of the region, to fuel aviation node and potentiate non-aeronautical activities	Southampton is one of the largest economic centres within the central southern part of the UK and its economic profile is both stable and growing.	3
Available supply of highly skilled labour	Many graduates from Southampton universities settle in the city after finishing their degrees.	3

Table 2: Assessment of Southampton Airport against factors identified by Peneda *et al* (2011)		
Critical factor contributing to airport city status	**Analysis of critical factors at Southampton Airport**	**Degree to which critical factor is present (1 to 3) 3 – A lot 2 – Partially 1 – Not at all**
Connectivity		**15/21**
Excellent surface connectivity to the CBD and between different clusters	Very well connected by both road and rail to Southampton and other surrounding settlements via road, rail and bus.	3
Good air connectivity to the main industrial and business centres	Connected to some UK and European cities. However, the number of destinations is relatively limited with some European capitals not serviced yet.	2
Central location (geographic)	The Airport is located centrally along the south coast and within close proximity to Southampton and Eastleigh. The Airport is also located relatively centrally in terms of access west, east and north by rail and road.	3
Central location (aviation network wise)	The Airport is located away from the London air hub, on the south coast of England, but is well placed to serve European and British destinations.	2
Significant air cargo traffic	There is limited air cargo traffic currently due to the length of the existing runway and planning constraint on night flights. Limited opportunity at present to extend the runway. Technological improvements could overcome this barrier in the future.	1
Good intermodal freight connectivity	The Airport has good connections to Southampton port and by rail for freight cargo. However, the Airport itself is not optimised for cargo flights. Technological improvements could overcome this barrier in the future.	2
Frequent flights to the world's main capital cities	There are frequent flights to European capital cities, however the Airport has no direct connections on a global scale.	2

Table 2: Assessment of Southampton Airport against factors identified by Peneda *et al* (2011)		
Critical factor contributing to airport city status	**Analysis of critical factors at Southampton Airport**	**Degree to which critical factor is present (1 to 3)** **3 – A lot** **2 – Partially** **1 – Not at all**
Sustainable Development Context		**12/21**
Inclusion of the airport city development into national and regional strategic planning	There are currently no 'airport city' strategies within the PUSH documentation. Nationally, airports are required to produce masterplans, but there is no specific national plan at present to grow this Airport.	1
Zoning and planning policies to incentivise/enforce the location of airport oriented industries and businesses	The adopted and emerging Local Plan for Eastleigh Borough Council includes a specific policy for employment development to the north east of the Airport. Realisation of this is subject to provision of additional transport infrastructure, for which there is a recognised funding shortfall in the short term. The local policy does not specify airport-oriented industries of businesses but shows encouragement for development in this location.	2
Existence of a comprehensive plan that integrates transport infrastructure and landside development, both on and off the airports territory	Hampshire County Council transport plans and PUSH strategies make comprehensive reference to growth, the Chickenhall Link Road and improvements to rail connections. However, funding shortfall is recognised to impact on the ability to realise this infrastructure at present. No detailed plans appear to have been drawn up at this stage and are likely to have a long term timeframe for realisation.	2
Capability for expansion (airside)	Appears minimal due to surrounding physical constraints and dependent on technological advances.	1
Capability for expansion (real estate)	Some capability if existing uses were to be consolidated and the north east area of the Airport's land ownership were to be opened up.	2

Table 2: Assessment of Southampton Airport against factors identified by Peneda *et al* (2011)		
Critical factor contributing to airport city status	**Analysis of critical factors at Southampton Airport**	**Degree to which critical factor is present (1 to 3) 3 – A lot 2 – Partially 1 – Not at all**
Community engagement and acceptance	The Airport Management are required to report to Eastleigh Borough Council at the Southampton Airport Consultative Committee (ACC), which is open to the public and minutes are available online. The Airport undertakes community projects and supports local charity initiatives, such as the Airport Runway Run. The Airport are proposing community consultation on the emerging masterplan in 2018 which demonstrates intention to engage the community. Community acceptance is unknown, however, no noise complaints were received in September – December 2017 according to the February 2018 ACC minutes (Eastleigh Borough Council, 2018)	3
Joint and coordinated development of airside operations, and real estate at the airports surroundings	At this stage, the emerging Growth Strategy and coordinated approach of the Airport is unknown. As such, this category has remained unscored.	-
Consensual strategic guidelines among the different tiers of territorial authorities	At a national level, every airport is required to produce a masterplan. There is no 'National Plan' for Airports. Local policy for expansion of the business park and growth of the Airport. Currently there are no specific guidelines for the Airport, however with the release of the airport's strategic plan in Summer 2018, guidelines may come into play.	1

Table 2: Assessment of Southampton Airport against factors identified by Peneda *et al* (2011)		
Critical factor contributing to airport city status	**Analysis of critical factors at Southampton Airport**	**Degree to which critical factor is present (1 to 3) 3 – A lot 2 – Partially 1 – Not at all**
Commercial attitude of the airport operator		**3/6**
Active management by the airport operator (corporate organisation, aggressive marketing, and pro-active land acquisition)	The airport management has acquired the land to the north east of the runway. Whilst Airports have Compulsory Purchase Order powers, due to the physical constraints there is limited opportunity for further acquisition. The degree of marketing is unknown at this stage, however it is reasonable to assume that the Airport has a robust marketing strategy.	2
Creation of a development company (real estate division of an airport operator) where both the airport authority and public bodies are represented.	The Airport, to our knowledge, has not currently set up a development company. Due to the limited land available, it is unlikely this approach would be taken.	1

From the above tabular analysis, the Airport appears to score well with regard to the economic potential in the hinterland of Southampton Airport. The airport is well connected on a local level, with fairly good European and national links. However, due to physical constraints, the Airport is currently unable to operate directly on the global market, being reliant on other European cities to connect worldwide.

With regards to the sustainable development context of the airport, there is a foundation of strategies which seek to develop land at the Airport for employment uses, and the Airport has good relationships with Eastleigh Borough Council, which is important for growth aspirations. However, due to the financial costs of implementing the necessary transport infrastructure, comprehensive plans and further detail has not been commenced at the time of this report. Therefore, further work and funding is required before this development can be realised to support the substantial growth and profits associated with an Airport City.

With regard to the commercial attitude of the airport operator, the final key factor to an airport city, it was not possible to identify the extent to which marketing is undertaken, and whether this could be considered 'aggressive'. However, issues of land acquisition appears to be due to the constraints that are present at the airport and not the airport operator not wanting to venture into further aviation and non-aviation development.

5.0 CONCLUSION

The aim of this paper was to identify whether Southampton could become an Airport City of the future. From our research, it is clear that there are several physical and economic constraints to the development and future growth of the airport. Following a review of the factors identified by Peneda et al (2011), it is clear that whilst the airport has appropriate surroundings in terms of business parks and land that could be made available for further economic and employment development, the airport scores less well in terms of global connectivity and sustainable development context. Constraints such as the length of the runway limit the Airport's ability to expand to serve a global market, and financial and economic constraints exist for Southampton in terms of the expansion and improvement of the transport infrastructure surrounding the Airport. These constraints are recognised within strategy and provide a challenge to the realisation of plans to expand the Airport.

In the existing context, at this point in time, it would appear unlikely that Southampton could achieve Airport City status due to such constraints prohibiting substantial growth at the Airport. However, it is critical that technological advances could one day overcome some of the constraints to growth of the Airport, and unlock potential that cannot currently be realised.

Nevertheless, in the more immediate term, there could be potential for the Airport to become an economic hub, potentially through consolidation of the existing business parks or through the implementation of the Chickenhall Link Road. Through becoming an economic hub, this would support the growth of the Airport and its relationship with Southampton, however, this in isolation would not appear to be sufficient to reach Airport City status.

From this research, it would appear to be critical for other regional airport cities looking to achieve Airport City status, to have sufficient land and resource in order to expand and grow, as this is key to achieving substantial growth and profit. Furthermore, being well located in relation to a city, with fast connections, is important to create a combined economic powerhouse. Technology will also likely be key to many regional airports achieving airport city status, as runways are typically smaller than the national airports, such as Gatwick and Heathrow. Therefore, as lighter and quieter planes are commissioned, this will enable the regional airports to expand the number of flights and destinations that will facilitate growth. Finally, as can be seen in Table 1, there are a large number of stakeholders who have influence over future growth, or are important to be considered in any growth plans. It is important to understand which stakeholders are critical to achieving such growth and utilising their input to get local and wider buy in.

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SUSTAINABLE MOBILITY BETWEEN THE SPANISH CITIES AND ITS AIRPORTS: THE CHALLENGE OF STRATEGIC IMPLEMENTATION

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1. Introduction:

The role of airports has changed in the last decades deeply. They are the main intermodal connection points that underpin strong urban network integration across Europe, and now, also strategic centres of the promotion of economic activity. Most generated journeys to and from the airports are made by private vehicle. This is leading to congestion in the road network that links the airports with its area of influence. Accessibility issues between airports and its cities play a key role in the service quality that is offered to customers. Promoting a more sustainable and efficient integration of airports in the urban system of transports is therefore a great challenge for European cities nowadays. Accessibility to Spanish airports is carried out in diverse ways depending on their proximity to the main city. Car, taxi or buses are the most common modes of access to these transport centres from our cities. The proposed methodology of this study starts by discussing the advantages and disadvantages of each of them. Thereafter, the weakest and strongest points of each transport mode will be compared with the main policies and actions that are being carried out in the national territory to evaluate if they are suitable. The interest of this aspect lies in knowing if they had learned from the mistakes of their predecessors. The aim of this paper is to formulate a package of strategies derived from several existing experiences and a series of Spanish examples where some of these improvements are possible.

2. Context:

Transport accessibility is an essential aspect of human activity. Any profound transformation of transport system affects how a country functions. To that effect air traffic is essential in terms of human movement, and no city or urban area wishes to be deprived of this means of transport. Cities are almost always interested in offering new air links. At the same time, thanks to the growing role of air travel, airports today are of significant direct and indirect economic importance. Airports are therefore a priority in any territorial infrastructure policy. For this reason, cities with smaller populations and less service and industry sector activities want to offer their own air transport services, and many cities in Spain have in fact achieved this (SERRANO MARTÍNEZ and GARCÍA MARÍN, 2015).

The network of airports with exterior connections has significantly expanded for last four decades in Spain. The total number of airports has increased from 20 to over 50 (with 4 of them among the top 100 in the world). The airport-building process has been particularly vigorous in the last years, all within a framework of intensive construction of a transportation infrastructure as a basis for economic growth. In the case of airports, a desire to increase tourism stands out as a primary motivating factor for growth. Generous financial support, the liberalisation of the air traffic market, new organisational systems for air traffic, the rise of Low-Cost Carriers (LCCs) and a national decentralisation policy have also contributed to the airport building boom. But the recent economic crisis has significantly reduced passenger traffic in the majority of the small local airports in Spain. This crisis calls for a thorough reorganisation of the Spanish airport system, with a particular focus on these small local airports. Ultimately, the airport system should better serve the territorial urban network and reflect a more open and competitive aviation market (SERRANO MARTÍNEZ and GARCÍA MARÍN, 2015).

Anyway; the importance of air transport to Spanish economy is a crucial matter. Airlines, airport operators, airport on-site enterprises (restaurants and retail), aircraft manufacturers, and air navigation service providers employed 190.000 people in Spain in 2014. In addition, by buying goods and services from local suppliers the sector supported another 130.000 jobs. On top of this, the sector is estimated to have supported a further 76.000 jobs by paying wages to its employees, some or all of which are subsequently spent on consumer goods and services. Foreign tourists arriving by air to Spain, who spend their money in the local economy, are estimated to have supported an additional 1 million jobs in 2014 (OXFORD ECONOMICS, 2016).

The air transport industry is estimated to have supported a €27,5 billion gross value-added contribution to GDP in Spain in 2014. Spending by foreign tourists supported a further €70 billion gross value-added contribution to the country's GDP. This means that 8.2 percent of the country's GDP is supported by the air transport sector and foreign tourists arriving by air (OXFORD ECONOMICS, 2016).

In recent years researchers have focused on four main airports-related issues in Spain:

- A growing need for extending public transport from airports to urban centres in order to avoid an increased congestion in the road network near them (MAGAÑA and ROBUSTÉ, 2000).

- The possibility for an airport to generate an airport city, understood as a new kind of economic hubs. In this subject four hypotheses were made. First, airports are the central station of the 21st century. In this sense, the competition between the high-speed rail policy and airports in Spain is a blatant nonsense. Second, accessibility to the airport, Airport City and interchange node are strategies in combination. The huge investments in landside transport infrastructures can sustain the three of them ambitions. Third, Airport City should be a main issue and an urban planning task. Fourth, Airports Cities can no longer remain white spots in the development plans of municipalities and regions (GÜLLER GÜLLER, 2001).

- The rice of new small local airports before the last crisis and the possibilities they hold for the future (SERRANO MARTÍNEZ and GARCÍA MARÍN, 2015).

- The efficiency and profitability of Spanish airports. Specially linked with the fact in Spain that AENA is the owner of all the facilities available at most Spanish airports, it has the control of all financial resources generated by them, and it is responsible of the management of airports. This public company and the Ministry of Transport take all the relevant decisions regarding airports, including investments, prices, development of retail activities and the allocation of slots, check-in counters and gates to airlines. The privatization of AENA is currently in process but the maintaining of the centralized management has not been put into question by the central government (FAGERA and VOLTES-DORTA, 2012).

This paper focuses on the first of these topics the sustainability and efficiency of the accessibility and transport between the Spanish airports and its cities but tackling the other specific issues that Spanish airports are facing according with these researches.

3. Subject Description:

The role of airports has been profoundly transformed in recent decades. At the same time, it is an intermodal transfer points and a strategic centre of development of economic activity. Its accessibility in relation to where it is located, plays a fundamental role in the level of service it offers to its customers. Therefore, maintain an efficient and sustainable mobility to and from the airports and promote its integration in the transport system is a great challenge that modern cities are facing in this new century.

In Spain, since passenger air traffic began to increase, the figures have reflected the importance of international traffic. This air traffic has increased from 53.7% to 65.4% between 1970 and 2012. The importance of international traffic is due to the consolidation of an economic model in Spain in which tourism plays a significant role (SERRANO MARTÍNEZ and GARCÍA MARÍN, 2015). Hence, its airports and the connection with the main cities acquire an important dimension in this aspect due to lot of tourists have their hostels in the city centres. As a result, for our cases study we focused on the ten highest number of passengers' airports in 2017 and their relationships with the main city in their immediate surroundings. Their passengers are over 80% from the total number of passengers in all Spanish airports (see Table 1).

Airport Name	Spanish City	Passengers			
		National	International	Total	Percentage
Adolfo Suárez Madrid-Barajas	Madrid	14.865.008	38.517.540	53.382.548	21,45%
Barcelona-El Prat	Barcelona	12.713.493	34.540.201	47.253.694	18,99%
Palma de Mallorca	Palma	6.388.167	21.579.281	27.967.448	11,24%
Malaga-Costa del Sol	Málaga	2.465.581	16.125.753	18.591.334	7,47%
Alicante-Elche	Alicante	1.381.363	12.319.548	13.700.911	5,50%
Gran Canaria	Las Palmas	4.829.213	8.163.662	12.992.875	5,22%
Tenerife Sur	Santa Cruz de Tenerife	917.759	10.269.102	11.186.861	4,49%
Ibiza	Ibiza	3.005.249	4.889.195	7.894.444	3,17%
Lanzarote	Arrecife	1.996.538	5.387.715	7.384.253	2,97%
Valencia	Valencia	1.907.945	4.820.739	6.728.684	2,70%
Sub-total (10 largest)		50.470.316	156.612.736	207.083.052	83,20%
TOTAL SPANISH AIRPORTS		**73.238.514**	**175.655.507**	**248.894.021**	**100,00%**

Table 1. Data of passengers per airport in 2017
Compiled by authors based on data from AENA and INE

According to Instituto Nacional de Estadística data, Madrid is the airport most visited with 53.3 million passengers. It is also the most international of the airports. Barcelona stayed close with 47.2 million, and the third position was for Palma de Mallorca with 27.9 million. With these three airports half of the flights were served in 2017. The location condition of the insular provinces means that the best way to visit them is by plane. The Canary Islands received 43.6 million passengers, 17.52% of the total flights, in one of its six bigger airports (Gran Canaria, Tenerife Sur, Lanzarote, Tenerife Norte, Fuerteventura y La Palma). The other Spanish archipelago, the Balearic Islands, received 39.2 million passengers, 15.79% of the total flights, at one their airports (Palma de Mallorca, Ibiza and Menorca).

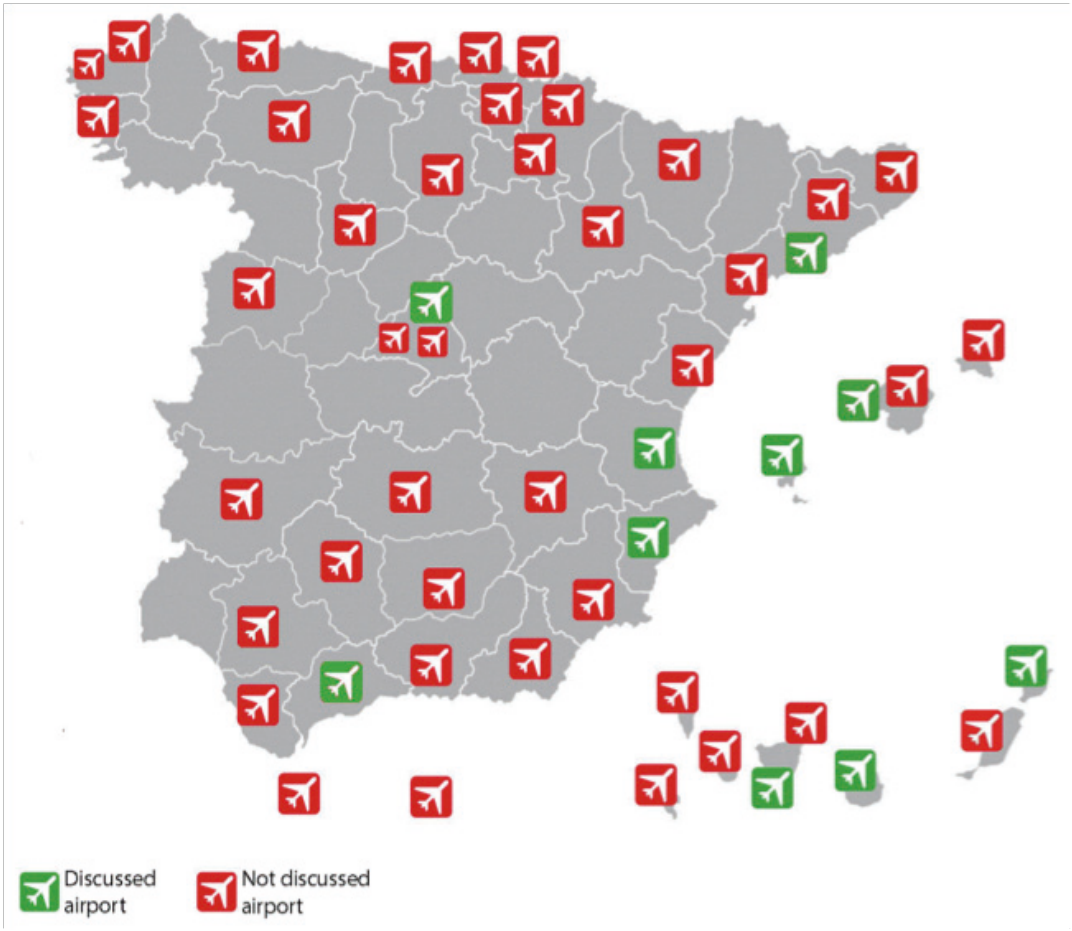

Figure 1. Localization of the Spanish airports discussed in this paper - Prepared by the authors

Figure 1. Contextual maps of Madrid, Barcelona, Palma de Mallorca, Málaga, Alicante and Valencia
Scale 1:300.000. Google Earth

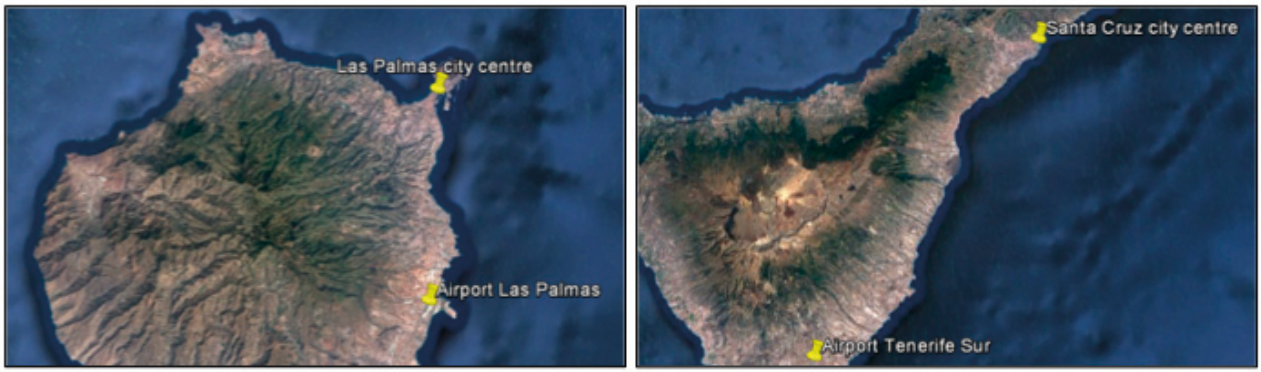

Figure 1. Contextual maps of Gran Canaria and Tenerife
Scale 1:1.000.00. Google Earth

Figure 1. Contextual maps of Lanzarote and Ibiza
Scale 1:150.000. Google Earth

In these images, we can appreciate the different physical relationships between the selected airports (the ten largest in passengers according to INE during 2017) and their respective cities / regions. The relations between these elements through mobility are analysed in the next section.

The natural, topographical and territorial conditions of the different islands or regions influence the relations of the airport and its communications with the rest of the island. It also happens with the main city, but in this case the more limitations are in the variety of means of transport mainly and no in the distances. Of the total number of airports chosen for our study, half are insular (Palma de Mallorca, Gran Canaria, Tenerife Sur, Ibiza and Lanzarote).

4. Analysis/Research:

All the airports try to have a wide and varied offer of means of transport that communicate them with the nearest city and adjust to the diverse needs of their passengers. Each means of transport maintains operating conditions that translate into advantages and disadvantages for its users, as shown in Table 2. These characteristics, the type of traveller and the purpose of the trip are some factors that determine a greater preference for some or other transport services.

Mode of transport	Positive aspects	Negative aspects
Private car (own or rent, passenger or driver)	- Maximum autonomy - Versatile and flexibility - Reduced travel time in door-to-door services (except in congested road corridors) - Great luggage capacity and more comfort	- Higher cost in journey and parking - Resulting in increased congestion in the road network and parking areas - Air pollution
Taxi	- Maximum flexibility - Maximum comfort - Reduced travel time in door-to-door services (except in congested road corridors)	- Highest cost - Resulting in increased congestion in the road network - Air pollution
City bus or special service	- Low cost (specially in urban services)	- Rigid routes - More journey time and waiting time - Reduced comfort - It can suffer the road congestion
Underground or train	- Low cost in contrast with car and taxi - Competitive travel time - Independence of the congested road network - High regularity	- Rigid routes - Medium comfort - Waiting time

Table 2. Positive and negative aspects of each mode of transport
MAGAÑA and ROBUSTÉ, 2000

This research is formalized through comparing different transport indicators. Each of them brings a different point of view about the most commons journeys (duration, prices, distances ...). Then, these indicators are collected under four axes that show some of the main aspect of the mobility to airports. In this way, basic elements of the service, intermodality, measures targeting airport workers and traffic management measures are analysed.

Some basics indicators are defined and quantified in the analysed biggest airports. In relations with the car option, the distance, cost, number of parking spots and normal and long-term parking fees are examined. Moreover, we assess the different taxi fares. With reference to public transport, we evaluate the cost, duration, opening hours and frequency of bus and train services available in each airport. These concepts are analysed below in the main means of transport. Most of the data used in the following study is part of AENA public database, the public company that manages airports of general interest in Spain.

As its show in Table 3, on average, 15 kilometres separate the airport and its city of reference. It is not a big distance for a car drive. Tenerife Sur and Gran Canaria are the furthest away from their cities. Their airports serve the islands entirely, territories of over 2,000 and 1,500 square kilometres respectively.

The average price of the car journey is around € 19.38, and all airports have a parking service. Their fee is about € 15 per day on average, quantity that is sharply exceeded by Madrid, Barcelona, Málaga and Alicante. The airports of the islands, except Mallorca, do not have a long-stay car park.

Airport (city or island)	Distance		Cost	Parking area	Parking spots	Parking fee	
						Normal	Long-term
	Kilometres	Minutes	Euros	Yes or No	Number	Euros / day	Euros / day
Madrid	19,3	18	€ 24,26	Yes	19.590	€ 19,95	€ 16,00
Barcelona	12,6	17	€ 15,84	Yes	19.679	€ 20,95	€ 14,00
Mallorca	10,6	17	€ 13,32	Yes	4.745	€ 11,00	€ 7,00
Málaga	10,9	15	€ 13,70	Yes	2.217	€ 20,00	€ 16,50
Alicante	11,1	16	€ 13,95	Yes	2.600	€ 19,00	€ 15,00
Gran Canaria	25,8	28	€ 32,43	Yes	1.802	€ 13,00	€ 13,00
Tenerife	61,7	39	€ 51,54	Yes	532	€ 13,00	€ 13,00
Ibiza	7,8	9	€ 9,80	Yes	496	€ 14,50	€ 14,50
Lanzarote	5,5	6	€ 6,91	Yes	1.262	€ 11,20	€ 11,20
Valencia	9,6	12	€ 12,07	Yes	3.679	€ 16,00	€ 15,00
Average	**15,42**	**20,5**	**€ 19,38**	**Yes**	**5.660**	**€ 15,86**	**€ 13,52**

Table 3. Indicators in relation with private car option
Compiled by authors based on data from AENA and Google Maps

An identical option in time is the taxi. This service works in all cities and is the most expensive in all of them. About € 22.00 are necessary to go to airport by taxi in the analysed cases. Only three of the cities have fixed rates in relation to travel between the airport and the main city. These cities are Madrid, Barcelona and Malaga, as it is viewed in Table 4. The cost-relationship between this transport (the most expensive) and the bus (the cheapest) is also displayed here. 1/5 is the average relation between the taxi fare and the cost of urban bus service. It increases to 1/3 in Mallorca and Tenerife.

Airport (city or island)	Taxi		Relation with bus service cost
	Stablished special fare	Fare	
	Yes or No	Euros	Taxi fare / Bus cost
Madrid	Yes	€ 30,00	6
Barcelona	Yes	€ 26,00	4
Mallorca	No	€ 17,47	3
Malaga	Yes	€ 19,00	6
Alicante	No	€ 19,00	5
Gran Canaria	No	€ 33,23	11
Tenerife	No	€ 27,40	3
Ibiza	No	€ 13,95	4
Lanzarote	No	€ 14,52	10
Valencia	No	€ 17,22	12
Average		**€ 21,78**	**5**

Table 4. Indicators in relation with taxi option
Compiled by authors based on data from AENA and Google Maps

If we try the communication by bus, on average, going to airport costs € 4.00. Madrid, Barcelona, Mallorca and Tenerife are above the average price. Málaga, Alicante, Gran Canaria, Ibiza, Lanzarote y Valencia are below it. In general, more than 35 minutes are necessary to get to the airport in the analysed cases. Tenerife has a perceptibly higher duration. This related to the major distance that its bus takes (more than 60 kms).

In the case of arrival or departure flights it is essential to know if the bus lines are still running. In many cities they are the only means of economic transportation at that time since the metro or train are closed. Alicante and Madrid are the only airports whose bus runs the service also at nights.

In this sense, all airports should provide accessible, concise and up-to-date information in relation with the public transport options. However, passengers must go outside the arrivals terminal to find information about bus timetables in most cases. That is something that does not happen very often with information about taxi service and rental car companies.

Airport (city or island)	Bus services							
	Main line	Cost	Stops	Duration	Opening	Frequency	Other lines	Workers line
	Name	Euros	Number	Minutes	Hours	Minutes	Yes or No	Yes or No
Madrid	A EXPRESS	€ 5,00	5	30	24 hours	15	Yes	No
Barcelona	AEROBUS	€ 5,90	4	35	05:00 - 00:30	10	Yes	No
Mallorca	L1	€ 5,00	12	27	05:30 - 01:00	15	No	No
Málaga	A EXPRESS	€ 3,00	10	35	06:25 - 00:00	25	No	No
Alicante	C6	€ 3,85	12	26	24 hours	20	No	No
Gran Canaria	L60	€ 2,95	6	35	05:25 - 02:45	20	No	No
Tenerife	L111	€ 9,35	28	60	06:30 - 22:30	30	No	No
Ibiza	L10	€ 3,50	15	25	06:20 - 00:20	20	No	No
Lanzarote	L22	€ 1,40	5	30	06:55 - 22:40	25	Yes	No
Valencia	L150	€ 1,45	28	30	05:25 - 22:00	20	No	No
Average		**€ 4,14**	**13**	**33**		**20**		**No**

Table 5. Indicators in relation with bus services
Compiled by authors based on data from AENA and different buses lines web services

The last analysed means of transport are underground and suburban train. Only four cases have any of these means of transport and only two of them coexist. Barcelona and Madrid have both local trains and underground (tube) services. Malaga has just train service and Valencia just underground (tube) service.

In Madrid, the suburban train is cheaper than the underground, but in Barcelona it changes and is the opposite. In both cases, the train disadvantage is the diversification of the network of lines, which is less than in the underground network. Nevertheless, the suburban train is faster to get to the city centre.

Airport (city or island)	Underground services (Metro)					Train services (Cercanías)				
	Main line	Cost	Duration	Opening	Frequency	Main line	Cost	Duration	Opening	Frequency
	Name	Euros	Minutes	Hours	Minutes	Name	Euros	Minutes	Hours	Minutes
Madrid	L8	€ 5,00	50	06:00 - 01:30	5	C1	€ 2,60	37	6:00 - 23:30	10
Barcelona	L9	€ 4,50	54	05:00 - 00:00	7	R2	€ 5,90	26	5:00 - 23:30	30
Mallorca										
Málaga						C1	€ 1,80	15	05:20 - 23:30	20
Alicante										
Gran Canaria										
Tenerife										
Ibiza										
Lanzarote										
Valencia	L3	€ 3,90	30	05:27 - 23:57	15					
Average		€ 4,47	45		9		€ 3,43	21		20

Table 6. Indicators in relation with train option
Compiled by authors based on data from AENA and different train and metro lines web services

In general, all transports to and from airports must comply with a series of minimum conditions or basic elements of the service that guarantee their quality. These aspects are common and independent of each of the means of transport previously analysed. The following aspects are considered of special interest:

- The information system in an airport must indicate all the options clearly: modes, routes, stations and periodicities. This information must be in all the centres of attention to passengers. In this respect, improvements must be made in all analysed airports. Information on public transport services tend to be installed just at the bus stops with no indications from the departure terminal from them. About train services, we can just find direction signals but no timetables, routes and frequencies in real-time.

- Adequate equipment to leave the luggage.

- Universal and permanent accessibility.

- Entrances to services bus or train stops must be protected and near to the airport terminal. Walking distances must not exceed to 350 meters. This is also a requirement that must be improved. Just as an example, in Madrid we need more than 10 minutes to take the tube from landing location.

- The services must cover the peak demand periods, the weekends and offer a high coverage to workers in the morning and to passengers at night. As we said before, Alicante and Madrid are the only airports whose bus cover the service also at nights and there are no train services at this period in any airport.

- The services must be regular and on time. Therefore, frequencies and running speeds should ensure a maximum traveling time considering the connection points in route. Given the time it would take for accessing to the public transport, this delay should be offset by a regular traffic speed -twice the speed of any private car-.

- The services require a high regularity to be effective. At least four services per hour are needed to avoid waiting times of more than 15 minutes. In this respect, bus services need to be further bolstered in Málaga, Alicante, Valencia and 4 of 5 island airports all but Mallorca .

- Public transportation fares must be set according to the kind of offered service and should allow payment with credit cards and significant international currency. A competitive fare should be lower than 1/3 of the taxi medium fare.

- Train consolidated as the best option in airports with over 10 million passengers. This is also our case in Madrid, Barcelona and Malaga; but not in Mallorca, Alicante, Gran Canaria or Tenerife. Public transport is more popular when the main city is further away from the airport and train is an option.

The intermodality seeks to integrate different modes of transport, constituting a source-destination chain, in which each of them operates in its most efficient economic area under market conditions. In this context, the different means of transport should be complementary modes in what affects their respective potentialities. In the airport transport there are some assertions to consider:

- An efficient accessibility to airport demands a comprehensive framework of the different transport modes all around the urban region. This is a challenging issue specially in island airports. They are in relation to tourists and no strictly linked with a city but with the tourist offer of all the island.

- Transhipments should be avoided to cover the most important locations from the airport.

- High-speed trains network has been designed in competition with air transport for the last years. Major efforts were made to converted it into an alternative mode. Instead, a complementary approach should be made to integrate both. Madrid, Barcelona, Valencia, Málaga and Alicante count on this kind of trains, but without a proper relation with airports.

Airport (city or island)	Mobility Plan	Pedestrian connectivity	Bicycle connectivity
	Yes or No	Yes or No	Yes or No
Madrid	No	No	No
Barcelona	Yes	Yes	Yes / Internal
Mallorca	No	No	No
Málaga	No	No	No
Alicante	No	No	No
Gran Canaria	No	No	No
Tenerife	No	No	No
Ibiza	No	Yes	Yes
Lanzarote	No	No	No
Valencia	No	Yes	No

Table 7. Indicators in relation with the airports sustainable mobility integration
Prepared by the authors

The last axis considered as a primordial one to address in the case of the sustainability of transport in airports are the traffic management measures. In this regard, just Barcelona, Ibiza and Valencia have started to take actions on developing these measures as is view in Table 7.

The measures targeting airport workers may also be of special interest, given that they are daily users of the facilities and not occasional users such as the travellers in whom airport mobility policies focus on. About 38 per cent of total journeys to European airports are done by their workers (MAGAÑA and ROBUSTÉ, 2000). It is necessary to know their mobility patterns if we are to fully meet their needs. Special services for workers or maintaining subsidies in public transport for workers are some measures which have been already taken. Any studied airport introduced this measure. Concerning this matter, it is crucial to have better data on mobility if we want to understand reality and propose structural improvements.

5. Conclusions:

Traffic congestion in the road network and parking areas near airports is a constant factor in biggest Spanish cities with the rise of car journeys. Promoting public transport for airport users is fundamental to limit the serious effects of this congestion. To this end, it is essential to ensure a high-quality service that satisfies all different users' needs. And, of course, this must be competitive in terms of time and cost.

In this paper we have seen some common measures which are easy to apply such as more accessible and clearer information, higher regularity of services, higher clock frequency and a further promotion of intermodality on airports. Moreover, Spanish airports need an innovative approach to improve their sustainably, they should be a main issue for the urban planning tasks. They can no longer remain white spots in the development plans of municipalities and regions.

Just Madrid and Barcelona airports have all the means of transports analysed in this paper. The offer of transport to airports gets increased as the number of passengers and the size of the city of reference. Moreover, mobility options are better designed when the airport is located in the same municipality on which the nearest city is. Due to this, airports in insular territories have more problems to cover the transport to their main cities. While town planning has a strong insertion in Spain, territorial planning policies still needs to be implemented in an effective way.

The bus is the only mean of transport which covers all the analysed airports. Bus fare in relation to taxi fare is really competitive in Valencia, but the opposite happens in Barcelona and Mallorca. Regarding the coverage of the services, Alicante and Madrid are the only cities with bus to airport at nights.

Among the measures of possible implementation by the Spanish airports, the following could be worked:

- Private car deterrence policies as parking fees increase. And, the reinvestment of profits in public transport options.
- Pedestrian and bicycle connectivity with the vicinity. In this sense, a better insertion with the surrounding neighbourhoods, industrial sites or agricultural areas should be attempted. Connectivity with airports is just focused on motorised means. This has resulted in airports as isolated island surrounded by key motorways absolutely impervious to any other flows.
- Special approach, to implement a better and more sustainable mobility, through a specific airport mobility plan or through its clear integration in a sustainable mobility plan for the whole region. In this sense, an increasing support for clean energy sources and improving energy efficiency are fundamental.
- Changing the existing paradigm from airports as isolated connection nodes just in terms of transport to airport cities as hubs of activity.

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BALANCED PLANNING FOR METROPOLITAN AREAS OF INTERMEDIATE CITIES WITH AIRPORT

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Abstract

The metropolitan areas of cities collect a diversity of uses linked to different needs generated by urban development, including airports. The transformation of land use modifies the identity of the consolidated city´s peri-urban areas through the consecutive incorporation of monofunctional plots.

The objective of this research is to propose a methodology that allows defining an intervention strategy to integrate uses linked to urban activity in the metropolitan area of cities with airport, at the same time as its identity and landscape are enhanced.

The methodology is based on three concepts: pre-existence (looking for elements in the past that can be recovered as present solutions); built (identifying opportunities of the present) and containment (minimizing interventions). Firstly, it is necessary to assess the characteristics of the physical environment and to identify the principal identities of the territory. Based on them, the relevant thematic areas are chosen and the opportunities and problems of the intervention area are analysed. Next, proposals are made to improve the environment and balance the uses in the metropolitan area. Finally, the general lines of intervention that define the strategy are obtained.

The utility of the methodology is verified through a case study; the city of Valladolid, a territorial centrality with an historical, industrial and agricultural identity. Its airport is located within the metropolitan area but in another municipality, creating a link between the rural and urban areas.

Through the implementation of the methodology in Valladolid, specific proposals are developed to consolidate existing and historical uses, obtaining the intervention strategy in various topics such as agriculture and mobility among others, and its link with the airport.

The methodology is efficient as a tool to identify and strengthen the identities of the metropolitan area of cities with airports, defining a thematic intervention strategy that balances and integrates the different uses.

1. Introduction

The metropolitan areas of intermediate cities support the economic activities linked to the needs of their urban centres. These areas often become degraded and unattractive landscapes as a result of an urban planning focused mainly on solving economic demands, and due to the lack of value placed on them by its citizens. The metropolitan area is defined as the territorial unit that is configured by a city and the population centres and surrounding areas. They are considered as a joint functional unit due to their proximity and their high economic, social and morphological synergies. The hypothesis of this research is that metropolitan areas of intermediate cities with airports can develop their economic activities and land uses in a balanced way, through the enhancement of specific characteristics associated to them. The objective is to propose a methodology, and verify its usefulness through a case study, which allows to define an intervention strategy for the integration of the territorial uses development, and build a unique landscape in metropolitan areas of intermediate cities with airports. The methodology designed and applied is based on the analysis of existing problems and opportunities to develop proposals that balance the land occupation of economic activities. Based on the proposals, the general strategy for the intervention in the field of study is obtained. This strategy proposes recovering local agriculture, relocating and updating the industrial uses, improving economic corridors between cities and airports while conserving and restoring the environmental elements that define the territory of metropolitan areas.

2. Context

2.1. The metropolitan areas and their configuration

Cities need to be supplied with different raw materials and services that are located outside their physical or administrative limits. The economic activities that take place in urban areas occupy their peripheral territory in an extensive way. This is the situation of the metropolitan areas, where the economic activities of the city are settled. In general, they are spaces designed to meet the demands of the city but are not considered places with their own identity designed for coexistence. In metropolitan areas, the uses are urbanized in a progressive way, its growth based on the addition of large monofunctional plots which are strongly sectorized and do not take into account the aptitudes of the land to accommodate specific anthropic activities. This morphological chaos usually hinders the recognition of these areas as places of interest, and are therefore perceived by the population as the back door of cities.

2.2. Economic activities and territorial identities in metropolitan areas

Paradoxically, it is precisely in metropolitan areas where the territorial identities associated to urban economic activities are most clearly represented. Taking as an example a large part of the European intermediate cities, initially they had a strong agricultural activity in their peripheral territory from which they were supplied. With the arrival of the industrial revolution, its metropolitan areas were transformed to house industrial areas and new infrastructures, eliminating or displacing agricultural activity at a greater distance from consumption points. With the subsequent decentralization of European industrial activity to other continents, the decline of the sector began and led to investment in the service sector. The population´s recognition of the identities linked to the economic activity transformed progressively from an agricultural identity, to an industrial identity and finally to the one referred to

services. The superposition and invasion of the most important uses in each historical moment has generated an unrecognisable and undervalued peripheral landscape.

Airports are identified as one of the main materialisations of land uses linked to the tertiary sector in metropolitan areas. The high impact of its activity on the territory prevails over the economic activities that occupied the space previously.

2.3. Degradation of metropolitan areas and the need to place value on them

The metropolitan areas reflect the booms and busts of the cities, and link them with their territorial identities. Currently, they are perceived as degraded areas due to the previously presented reasons derived from the massive occupation of territory, the superposition of economic activities, the lack of planning for coexistence or the absence of a link between the aptitudes of the land and its uses. There is no intention to build a high-value landscape of transition between the urban and the rural, and therefore there is a progressive loss of interest and a lack of awareness of the possibilities and the importance of conserving an environment that is linked to its territorial identities.

3. Subject description

3.1. General characteristics: Valladolid, the Alfoz and its airport

Valladolid is the city chosen to apply a projective methodology that can balance the land uses of its metropolitan area and enhance its landscape. With a population of 299,751 inhabitants (INE, 2017), this city has different characteristics that make it a paradigmatic example of intermediate cities with airports. Valladolid is a Castilla y León region`s territorial centrality at an economic and administrative level. Its strong territorial attraction has generated an extensive metropolitan area, called the Alfoz of Valladolid, where 35 municipalities surrounding the city are integrated into policies and joint actions (Diputación de Valladolid, 2018). The centrality of Valladolid as a territorial administrative node has led to the construction of an airport that serves the entire region, expanding its area of influence to nearby provincial capitals such as Palencia, Zamora or Salamanca. The airport is located within the Alfoz, but outside the municipality of Valladolid.

3.2. General characteristics and problems of the metropolitan area

The main characteristic that make Valladolid a paradigmatic example to apply a methodology for the projection of the metropolitan area of intermediate cities with airports, is that it has historically supported the three economic activities that have transformed its environment and defined its territorial identity: agriculture, industry and services. If we add to this situation, the strong identity link that exists with its peripheral environment, Valladolid becomes an appropriate field of study.

The consecutive superposition of these identities has not been balanced or desirable. Nor has it helped the citizens to place value on the metropolitan landscape. The landscape (urban, rural and natural) is an important part of a city´s identity, since its function is to create meaningful inhabited spaces. Issues such as the transition from rural to industrial cities, or the overlapping of services such as the creation of new shopping centres in the peripheries, generate changes in the lifestyle of Valladolid citizens and modify the subjectivity and identity of its inhabitants.

Valladolid has historically had an identity as an administrative and service centrality that has adapted itself over time. However, there are other activities that have been major throughout its history. The economic and social link with the agrarian activity is characteristic of its urban development in the past. The city´s surroundings were modified and large extensions of land were transformed into crops. With the arrival of industrial investments, the agrarian activity decreased and lost economic weight. Valladolid began its industrial development during the 19th century, reaching its peak in the 20th century (PGOU de Valladolid, 2003). To this end, new communication infrastructures were built and crops were transformed into industrial land around the main roads and the urban area. A large part of the city´s periphery was occupied with industrial complexes that interrupted the connection between the urban and the rural environment. With the globalization of the economy and due to the decrease of industrial activities in Spain, the industrial sector slowed down its development in Valladolid. The tertiary activity is currently being promoted as the main economic source, increasing its centrality and the development of its services.

As economic activities developed and occupied spaces in the metropolitan area, territorial identities became established or disappeared. New diffuse, sectoral and monofunctional environments were created, where an economic activity replaced the previous one occupying land of economic interest. The land´s physical characteristics and its aptitudes to house different uses were not taken into account, thus degrading the natural physical environment of Valladolid.

In Valladolid´s metropolitan area the economic activities overlap each other without any coexistence between them and without a balancing strategy. After the industrial crisis, these areas are currently in a phase of redefinition and reorientation. The design and implementation of actions and strategies to balance the historical overlap of economic activities in the territory facilitates the construction of a significant landscape that is recognizable by citizens, where the airport space is another element that provides identity to the territory.

4. Analysis / research

4.1. General methodological aspects

The application of the work methodology to project balanced metropolitan areas of intermediate cities with airports, is based on concepts and concrete perspectives that seek to create a specific territorial model. The starting point for the development of the strategy is based on three basic concepts that guide the proposals: pre-existence, built and containment.

The pre-existence is understood as those situations, characteristics or realities that existed in Valladolid that are currently in decline or have almost disappeared, and that are considered relevant to recover or enhance as solutions. Built refers to the situations, characteristics or realities that operate in the present.

The strategy aims to create a territorial model of containment that is understood as the accurate adjustment of the minimum possible interventions and the expected performance in relation to the needs generated by the different environmental, social, economic and cultural realities.

The methodology used to develop the intervention strategy is based on the identification of the problems and opportunities existing in the different thematic areas. The diagnosis based on this analysis is the guide for the proposal of specific interventions that will have the objective of generating the maximum impact with the minimum interventions. These interventions will be the basis to elaborate the general strategy for the planning of the studied metropolitan area, which will be comparable with those in other locations with similar contexts.

The field of study includes the municipality of Valladolid as its core, the airport and a representative area of Alfoz and its diverse landscapes. The subjects of analysis, from which the strategy is obtained, are referred to the economic activities it supports (agriculture, industry and services) and the physical and natural environment as the basis that sustains them all.

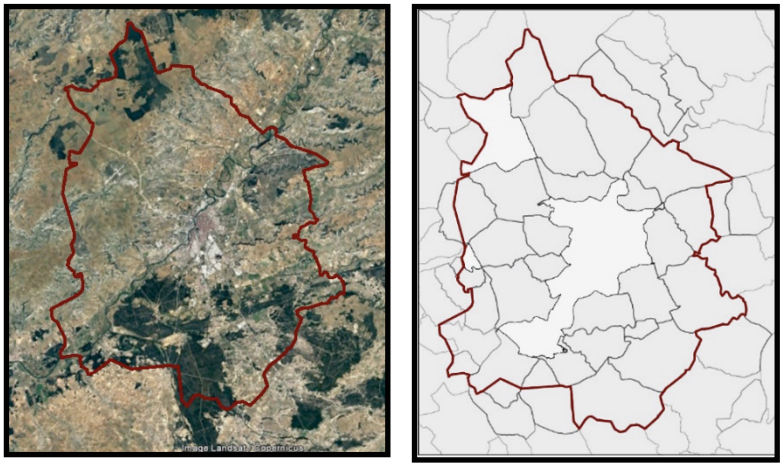

Figure 1.- Field of study. Valladolid and the Alfoz. Source: elaborated by the author using Google Maps and data from the Autonomous Community of Castilla y León

4.2. Analysis and problems detected

The key aspects that shape the territory and the existing problems are identified based on the analysis of the field of study.

Firstly, the conditions of the physical and natural environment are analysed. The feature that stands out among other aspects of the analysis, is the strong presence of anthropic activities that occupy most of the territory. Despite this, the primary configurator element of the territory is the hydraulic system formed mainly by the Duero and Pisuerga rivers among other rivers, streams and canals that form the network. The hydraulic system structures the territory and determines a strong directionality for both natural and anthropic activities. In the case of Valladolid, the main influence is caused by the Pisuerga river, which determines a strong SO-NE directionality and presents an occupied and degraded riverbank as it passes through the city. However, anthropic activities that have been implemented since the arrival of the industry have not considered the physical values of the territory to choose their location. Whereas agriculture is closely linked to the possibilities offered by the physical environment, the rest of the activities have been located based on economic values which are disconnected from the natural support. Despite the negative impacts of these activities, the hydraulic system has a strong potential as an ecological corridor at a territorial level. The main areas of natural protection are located on the riverbanks, leaving other isolated vegetation masses in other parts of the territory. Most of these vegetation masses are protected by some legal figure, although some of them do not have any type of protection.

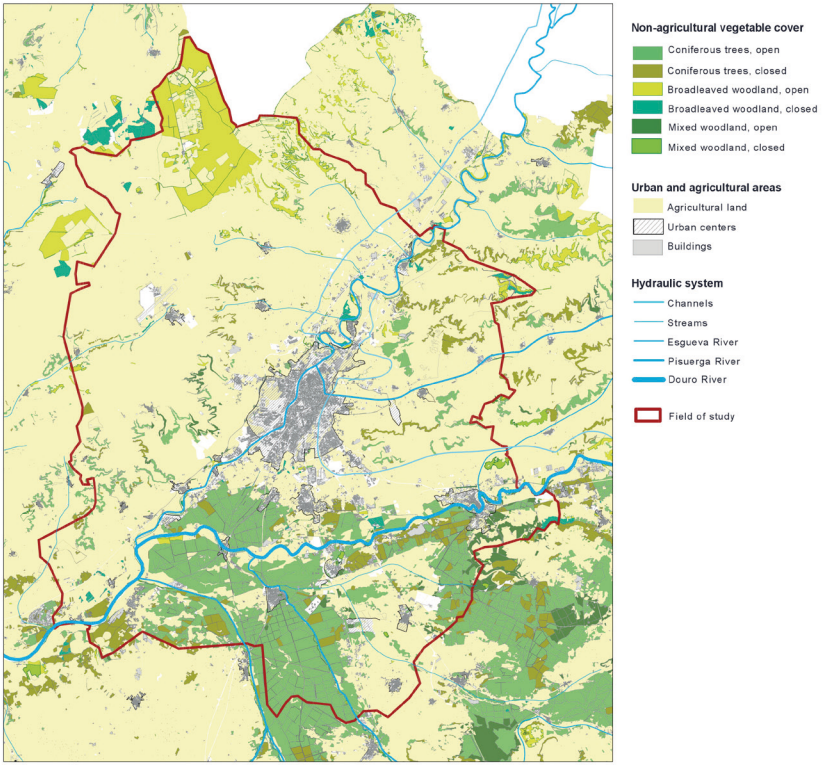

Figure 2.- Current state of the physical and natural environment. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

Agriculture stands out as the activity that occupies the greatest part of the territory, and its location is determined by the hydraulic system. At the same time, there is a strong disconnection between the rural and the urban area of Valladolid city, due to elements that split and divide, such as the strong presence of transport infrastructure.

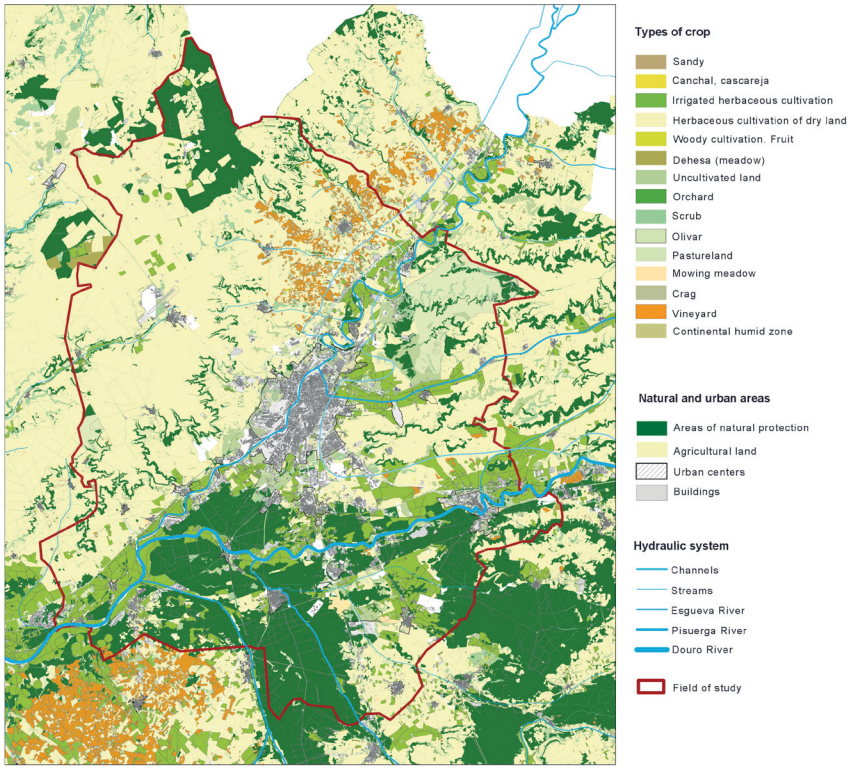

Fig. 3.- Current state of agricultural activity. Source: elaborated by the author using data from the Autonomous Community of Castilla y León.

Industrial activity reinforces this disconnection, as it is mainly located on the border between Valladolid city´s constructed area and the non-built environment. The location of industrial monofunctional plots provokes a strong rupture with the urban development. At the same time, some industrial areas have a negative impact on the landscape when located near the rivers or areas of high ecological value.

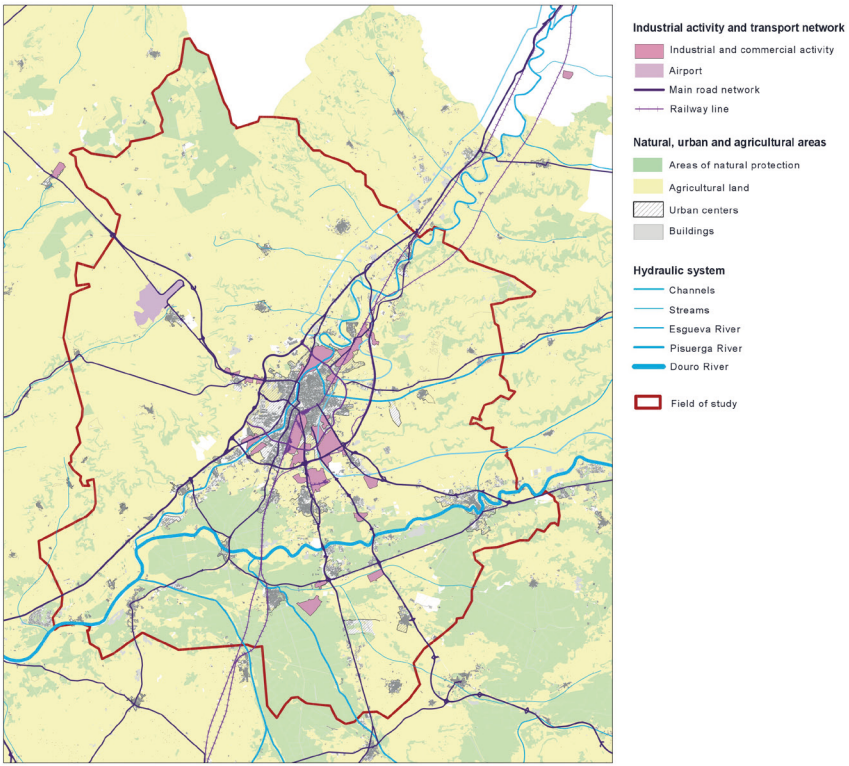

Figure 4.-. Current state of industrial activity. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

Economic activities linked to the tertiary sector are mainly located in Valladolid city´s urban area. The airport is the main tertiary economic activity that occupies territory in the metropolitan area. In addition, other uses such as Valladolid´s landfill, large recreational areas such as golf, equestrian or sports clubs and new peripheral shopping centres located near the road network, such as the Rio Shopping Centre or the Decathlon, are identified. These new shopping centres compete directly with Valladolid city´s traditional shops.

The tertiary sector does not yet occupy a large area of the metropolitan area, unlike industry or agriculture. The airport is located in the municipality of Villanubla, 15 km away from the city centre, on the M-601, main road that connects Valladolid with the northwest axis (León-Gijón). The airport is located at a long enough distance from the urban area not to have a strong effect on urban development. On the other hand, its presence midst a predominantly rural and

agricultural area attracts activities that have no yet materialized into a powerful economic corridor between Valladolid and its airport.

4.3. Opportunities

At a territorial level, different opportunities to improve the environment are identified. Regarding the physical environment, the presence of fluvial valleys as ecological connectors, together with the protected natural areas, are the basis to create a territorial network. At the same time, the existing territorial pedestrian network of Royal Ravines and cattle trails connects the entire territory.

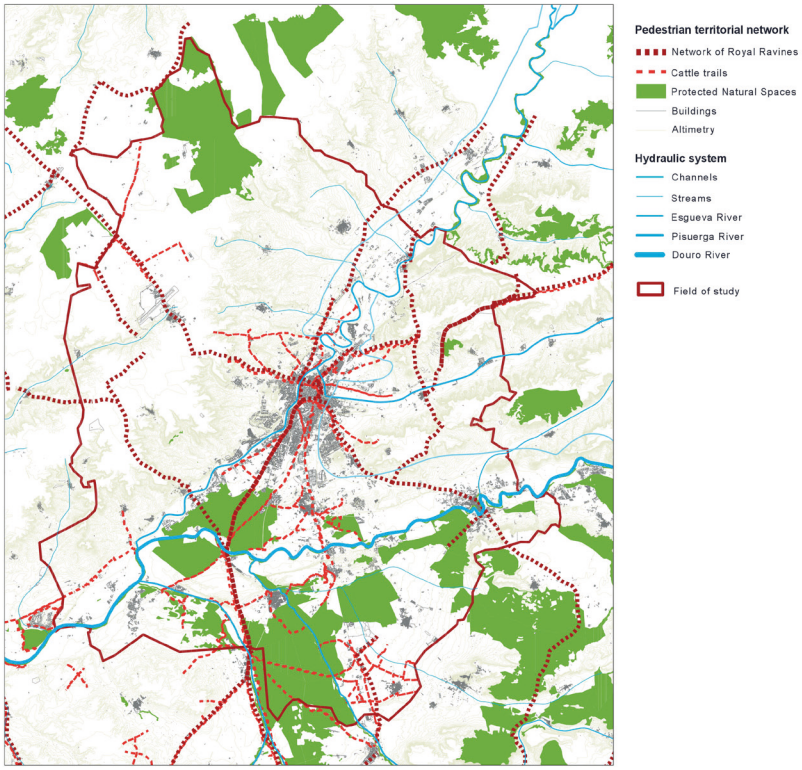

Figure 5.- Existing opportunities related to the physical environment. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

Regarding agriculture, among the opportunities found, the one that stands out is the sustainability of crops when located according to the hydraulic system (main element that supports this activity). The wine production (with the Cigales denomination of origin) is found to be the most relevant product with the greatest projection. The importance of these products can enhance the rural areas and recover the close link that existed in the past, which is currently perceived as old and outdated. In this sense, the improvement of the territory and the landscape plays an important role, creating a new awareness among the city´s inhabitants.

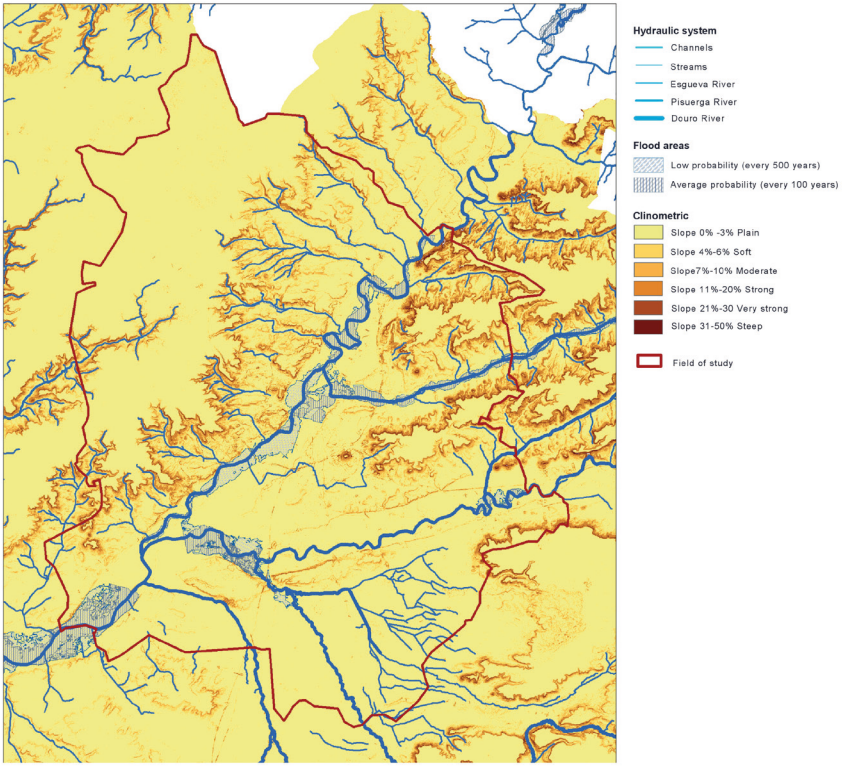

Figure 6.- Existing opportunities related to agricultural activity. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

With respect to the industrial activity, the existing high quality transport network and its great displacement absorption capacity stands out as an opportunity. This situation makes the location of the industry in different areas

possible, since these areas are not limited to a specific well-connected location. At the same time, there is a large amount of land available for construction, that can be used to house industrial activity in adequate locations.

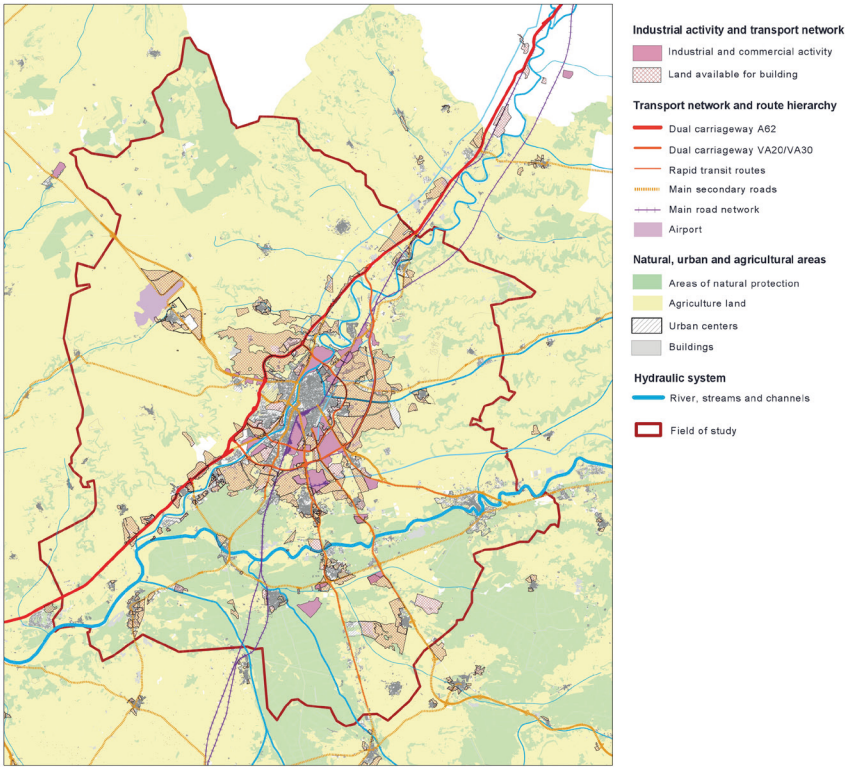

Figure 7.- Existing opportunities related to industrial activity. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

Regarding the activity of the tertiary sector, the presence of a consolidated commercial and service network in Valladolid, and its high capacity to cover the demands of the metropolitan areas´ population, must be highlighted. The road network enables the direct connection of the Alfoz municipalities, and opens the possibility to decentralize services that can be relocated in other areas in an effective way. As for the Valladolid airport, the M-601 road is identified as a potential economic corridor that can gather different activities in a balanced way, taking advantage of the existing road infrastructure and preserving areas of natural interest.

4.4. Diagnosis

Based on the analysis, the diagnosis of Valladolid´s metropolitan area is as follows.

- The location of anthropic activities along the study area does not consider the aptitudes of the land for the specific land uses. This dynamic has deteriorated the physical and natural environment, reducing natural spaces to isolated areas of natural protection.

- The hydraulic system is the main element that shapes the territory. Despite this, it is degraded and invaded in different sections impeding a natural development that would configure the territory in a continuous and more ecological way.

- The natural protected spaces are not connected forming a network throughout the territory.

- The historical territorial pedestrian network formed by the Royal Ravines, the cattle trails and the Camino de Santiago, is protected and has a strong presence. However, this network is not thoroughly connected.

- The agricultural sector is in decline and is the activity with less economic importance despite being the most extensive. There is no proximity agriculture to the city of Valladolid. Agriculture does not take advantage of all the possibilities offered by the Pisuerga Rivers´ hydraulic network.

- The industrial activity is located around the urban area of the city of Valladolid, interrupting the historical link between the urban and rural areas. Its location is sectoral and monofunctional, without a complex network of land uses and, in some cases, it occupies areas of natural interest.

- The activity of the tertiary sector in the metropolitan area is concentrated mainly in the airport and, in second place, in the new shopping centres and recreational areas.

- The new shopping centres do not favour the urban-rural connection of Valladolid, and increase the dependence on vehicles.

- The airport has the capacity to attract economic activities that have not been clearly materialised. The M-601 corridor which connects the city of Valladolid and the airport has remarkable characteristics for the location of economic activities that are not compatible with residential use.

4.5. Intervention proposals

The proposed interventions are based on the problems, the key topics, the identified opportunities and the diagnosis made, prioritizing the conservation of natural areas, the promotion of agriculture and the relocation of industrial activity and its balance with the tertiary sector.

In relation to the agricultural sector, the reclassification of the land available for housing construction is proposed, as to adjust it to the real needs associated to population growth. The reclassified land will be dedicated to the agricultural

development and the generation of new enterprises. For these enterprises to be sustainable, the priority areas of certain crops are identified according to the possibilities offered by the hydraulic system. Wine production is promoted as a priority crop capable of creating a recognizable landscape which is well-valued by the resident population, while raising the economic activity.

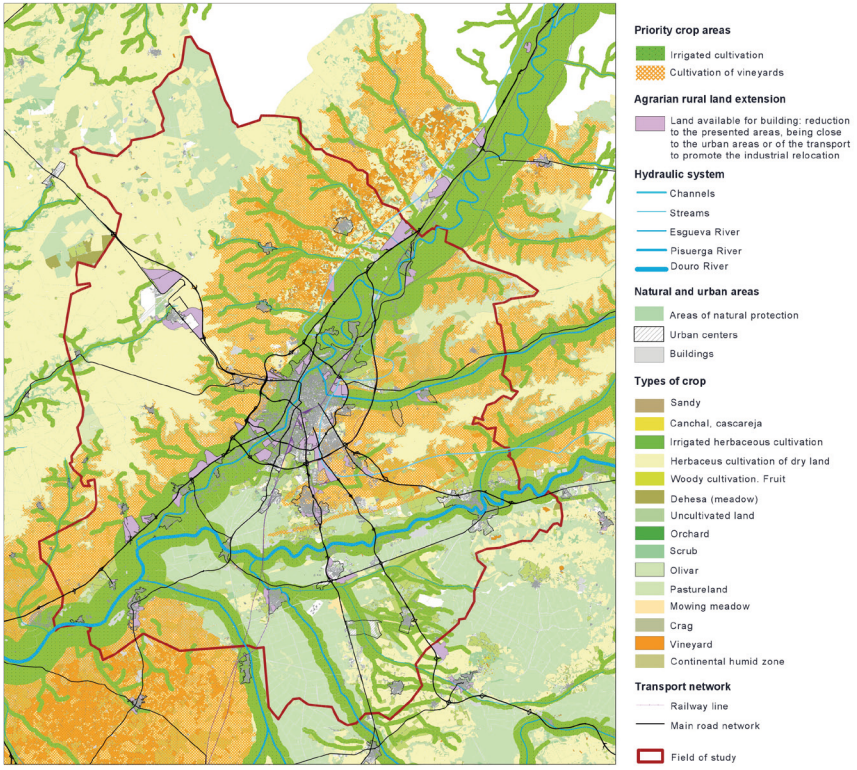

Figure 8.- Interventions for agricultural activity. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

Relative to industrial activity, the impact of the location of existing industrial areas is assessed based on its proximity to the hydraulic system and the natural environment, its proximity to the transport network and the impact on the natural and urban landscape. According to these parameters, the existing land available for urban development which is most appropriate for industrial uses is identified. The new enterprises should be located in these areas depending on the type of industry. The existing industry´s locations which are identified as harmful should move to these areas or transform their activity so that it is adapted to its environment. This relocation is not mandatory in the short term, but the long-term industrial activity or the change of company will not be allowed, using these situations to execute the transfer or the change of activity.

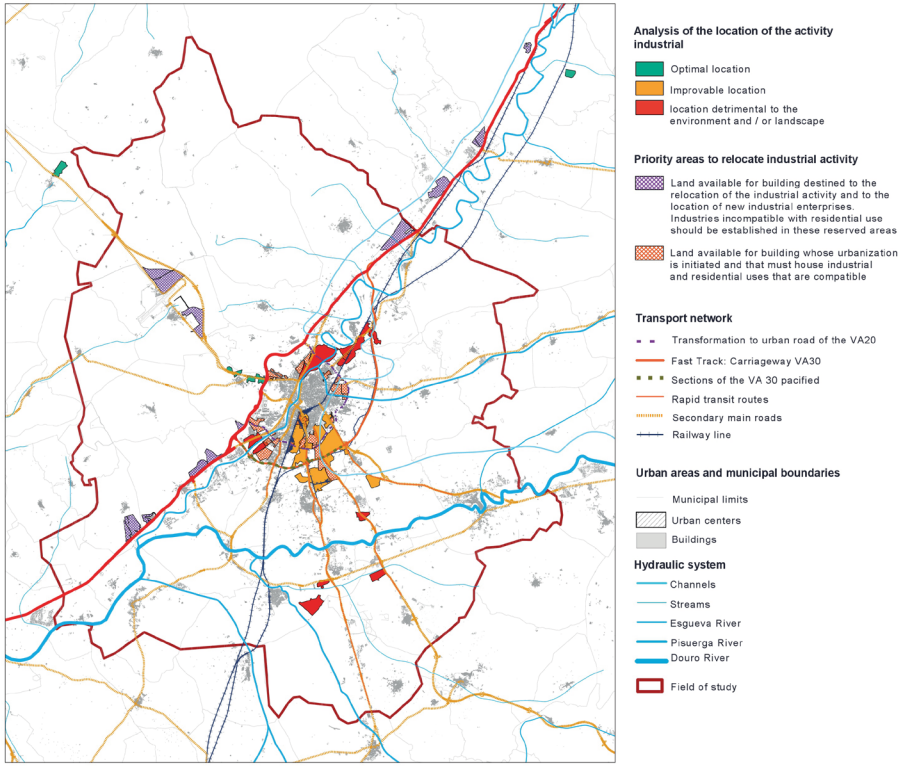

Figure 9.- Interventions for industrial activity. Source: elaborated by the author using data from the Autonomous Community of Castilla y León.

The proposals for the tertiary sector are concentrated in two main lines. On the one hand, the promotion of the businesses in the urban area of Valladolid is proposed, at the expense of the new construction of shopping centres in the periphery. A balanced distribution of the commercial activity favours the urban activity. At the same time, spaces for the sale of agricultural products grown in proximity must be considered. On the other hand, the airport must be integrated to its surroundings through interventions in the access route from Valladolid. In this route, different sections exposed to different situations are identified. The area of the Pisuerga riverbank should be predominantly natural, the land identified as suitable for industrial activity could be developed, and agricultural activity enhanced, thus creating an economic corridor balanced in uses that offers an interesting route for the citizens through the pedestrian routes and cycle paths.

At an environmental level, it is considered convenient to expand the network of protected natural spaces including all those zones of non-agricultural vegetation masses of environmental interest, protecting them from possible destructive economic actions. The riverbanks of Duero and Pisuerga are the spaces required to be protected as elements that shape the territory, and the activities in each section must be specified. At the same time, the connexion of these spaces with the urban environment in a physical and social way is considered of great importance. In this sense, the completion of the network of Royal Ravines and cattle trails that currently exist would be desirable, as it would enable the accessibility of the urban to the rural and natural environment.

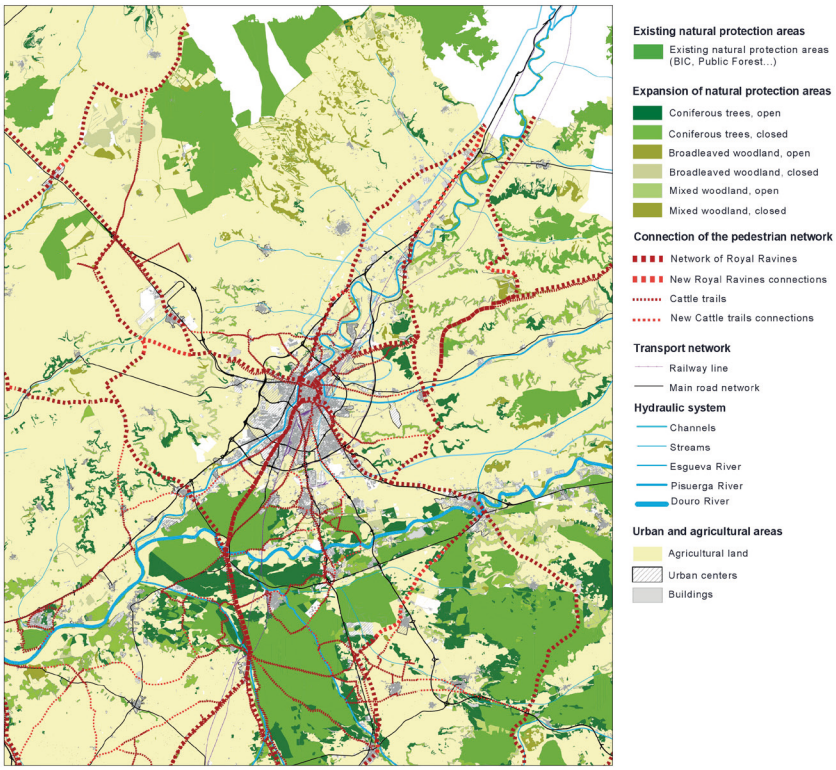

Figure 10.- Interventions in the physical and natural environment. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

As shown in figure 11 Intervention strategy in the metropolitan area of Valladolid, the territorial proposal seeks the adaptation of human activities to the physical and natural environment, taking advantage of existing elements and their value.

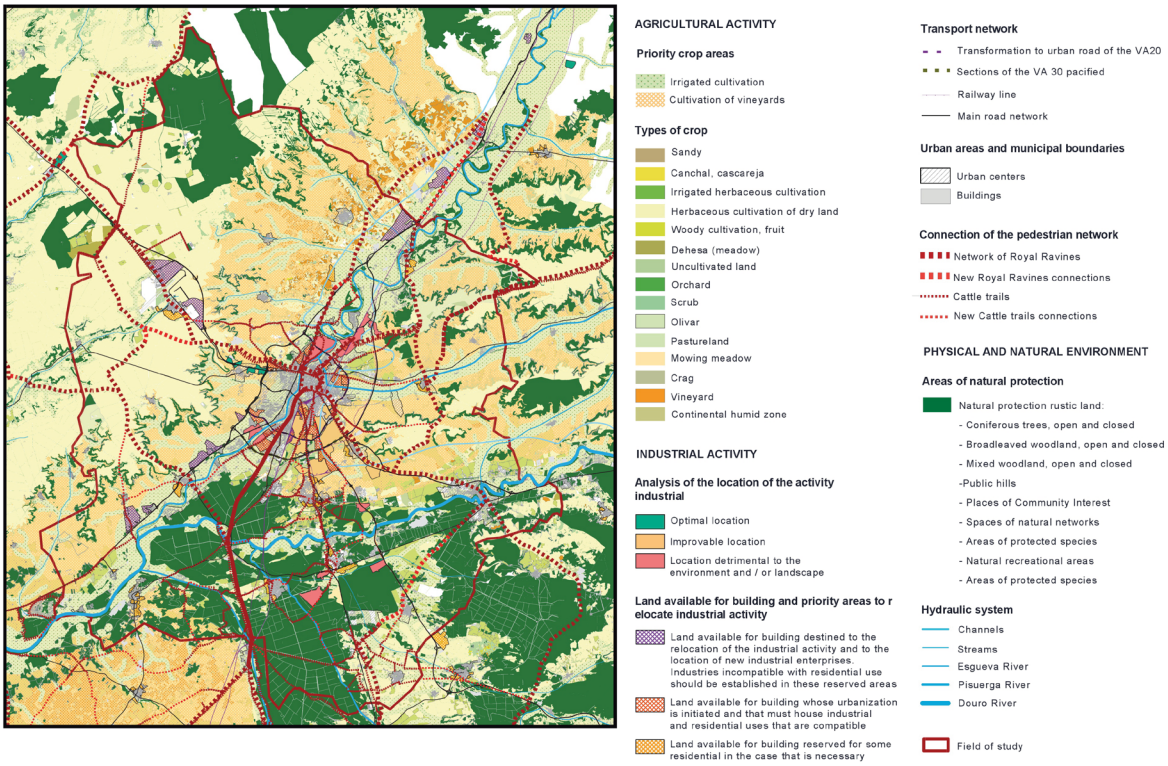

Figure 11.- Intervention strategy in the metropolitan area of Valladolid. Source: elaborated by the author using data from the Autonomous Community of Castilla y León

4.6. Intervention strategy in Valladolid

Based on the proposals developed, the intervention strategy for the metropolitan area of Valladolid is defined in relation to agricultural, industrial and service activities as well as the physical and natural environment.

The strategy for Valladolid´s agricultural activity aims to promote the production of proximity to the urban environment, based on the existing hydraulic system of the river Pisuerga, Duero and Esgueva to establish the most suitable crops. The wine sector will have a special treatment as a quality local product that will add value to the area and the rural landscape.

The industrial activity of Valladolid must be relocated and planned in areas that converge with the main transport infrastructures while respecting the natural environment and allowing a greater distribution of economic activity in the territory. In urban environments, a mixed model that allows the coexistence with residential use should be promoted, creating neighbourhoods with a greater variety of uses.

The university and leisure centres and infrastructure that require wide areas for development are the only pertinent tertiary land uses identified for their location in the metropolitan area, suppressing the peripheral commercial centres as a sustainable commercial option. The main economic corridor proposed connects the city with the airport, offering a mixed combination of economic activities that create a common landscape with the rest of the metropolitan areas of the city.

Finally, it is necessary to conserve and recover the riverbanks of Duero, Pisuerga and Esgueva as elements of ecological connection that determine the natural territorial directions and the implementation of anthropic activities. At the same time, the network of protected natural spaces must be expanded and connected to the urban area through a pedestrian network and bicycle lanes, taking advantage of the existing paths, Royal Ravines and the cattle trails.

5. Conclusions

The conclusions of the investigation focus on two main aspects. On the one hand, the research itself is analysed through the verification of the starting hypothesis and the fulfilment of the objective, as well as the usefulness of the applied methodology. On the other hand, conclusions on intervention strategies for metropolitan areas of intermediate cities with airports are obtained.

5.1. Conclusions of the methodology

Through the application of the methodology the initial hypothesis is demonstrated, as it is shown that the enhancement of the specific characteristics of the metropolitan areas of intermediate cities with airports, enables a balanced development of its economic activities and the land uses. At the same time, the stated objective is met by proposing a methodology to integrate the development of territorial uses and build a unique landscape. It is concluded that the methodology is useful to identify intervention strategies, verifying it through a representative case study that gathers the main characteristics of intermediate cities with airport, and with a metropolitan area that contains the three types of economic activities.

5.2. Conclusions of the strategy for the intervention in the metropolitan area of intermediate cities with airports

Based on the results of the case study, it is concluded that the land use distribution of metropolitan areas of intermediate cities with airports can be planned in a balanced manner through a strategy based on the following points:

- The agricultural activity should recover its space of production and sale of proximity to the cities, with the purpose of generating a model of production and distribution that is more sustainable in the long term. At the same time, the establishment of strategies to enhance the advantages provided by the physical environment is recommended, generating a recognizable landscape that improves the quality of the rural environment.
- The spatial distribution of the industrial activity should avoid the formation belts that surround the consolidated city, allowing a greater porosity with the rural environment. For this purpose, a mixed model of coexistence with residential use in urban areas could be developed, and its relocation to preferential areas identified at a territorial level could be promoted. These preferential areas respect the natural environment, are well connected to the transport network and decentralize economic activity to the rural environment.
- It is desirable to locate the tertiary activity outside the urban area of the city, as long as they can operate properly in their new location. The economic corridors generated to house this uses must balance the mix of uses so as not to become monofunctional, and maintain the essential landscape characteristics of the territory.
- The physical and natural environment must be enhanced through the conservation of existing natural spaces; the improvement of the rural and urban link; the recovery of the natural elements that are main configurators of the territory and making it accessible for the population´s benefit.

The metropolitan areas of intermediate cities urgently need to be planned to balance the land uses that give service to the cities, without renouncing to the construction of a unique and meaningful landscape that enhances the values of the territory that has transformed itself responding to the predominant economic activities. The proposed strategic planning process facilitates the elaboration of interventions that balance territorial uses, building a recognizable landscape based on the specific characteristics of each study area. The result integrates the agricultural activity of proximity, the industrial activity and the service sector with special consideration of the connexion with the airports.

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“PILLAR” OR “OBSTACLE”? – THE DYNAMIC RELATIONSHIP BETWEEN AIRPORT AND CITY, USING FORMER KAI TAK AIRPORT IN HONG KONG AS A CASE STUDY.

By Jeffrey Ng

1. Introduction

Airports traditionally are defined as the cluster of commercial, industrial and transportation facilities and services linked with the airport (Blanton, 2004; Freestone & Baker, 2011). Nowadays, airports are an important functional nodes in economic development, shape new urban forms beyond the airport fence (Freestone & Baker, 2011) and support regional economies, such as employment and airport traffic (Brueckner, 2003; Green, 2007; Kasioumi, 2015).

Since 1998, Hong Kong International Airport has been relocated from Kai Tak to Chak Lap Kok. It implies that strategic planning is important in airport planning. However, Kai Tak Airport was developed without proper strategic planning. This paper attempts to discuss this dynamic relationship between airport and city from the perspective of strategic planning, by using the case of the former Hong Kong Kai Tak International Airport. Other major developed cities, such as Taipei and London, are also having a discussion about their city airport. Therefore, this paper aims to examine the importance of strategic planning and the implications from a case study of Kai Tak Airport.

2. Context

Figure 1 Hong Kong Territory (BBC, 2018)


Figure 2 Pearl River Delta Region

Hong Kong is located at the Pearl River Delta (PRD) Region and is formed by Hong Kong Island, Kowloon Peninsula and the New Territories. Hong Kong Island and the Kowloon Peninsula were ceded to the British Government in 1842 and 1860 under the Treaty of Nanjing and the Treaty of Peking respectively. In 1898, the New Territories were leased to the British Government for 99 years rent-free under the Second Convention of Peking.

2.1. From Residential Proposal to Airport

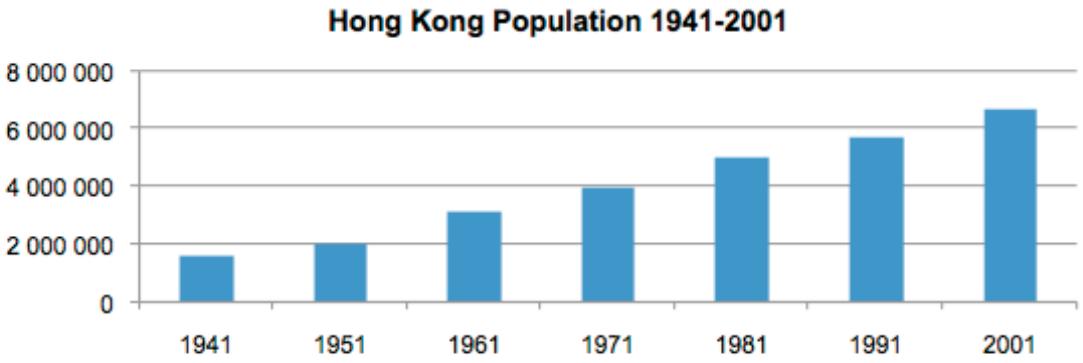
Kai Tak was located at the heart of Kowloon Peninsula. Kai Tak was named after Ho Kai, who was a barrister, physician and writer and Au Tak was an entrepreneur. The site was originally developed in a private upper-class residential area, which was called "Kai Tak Bund". However, the residential development failed due to economic difficulties. The site was then bought by the Hong Kong Colonial Government. Kai Tak was rented to an aviation school and later it became the military base for the Royal Air Force. Hong Kong was occupied by Japan during World War II and the Japanese army extended the runway.

Figure 3 The first Scheduled air service arrived at Kai Tak on 24 March 1936 (Civil Aviation Department, Hong Kong Government, 2008)

Figure 4 Kai Tak Airport in 1947 (Civil Aviation Department, Hong Kong Government, 2008)

2.2. First Discussion on the Relocation of Kai Tak

After World War II, more than 1.5 million refugees fled to Hong Kong during the break out of civil war in Mainland China between 1945 and 1950. These refugees helped increase the population and also provided an adequate supply of labour for manufacturing industries. Since the 1950s, Hong Kong has become one of the most important industrial centres in the world.



The Hong Kong Colonial Government also planned to relocate the Kai Tak Airport to support the economic growth of Hong Kong. However, the plan was abandoned in 1951 due to financial and political reasons and the Government decided to expand Kai Tak Airport. In 1954, the master plan for airport development was approved to develop Kai Tak Airport into an international airport. The discussion on the airport relocation demonstrates that the Government foresaw that Kai Tak Airport could not support the growing aircraft traffic in Hong Kong in the long run.

Figure 6 Viewing platform of the terminal building and Aircraft parking upon in 1962 (Civil Aviation Department, Hong Kong Government, 2008)

Figure 7 The old Kai Tak Terminal Building was demolished in 1965. The new Terminal Building in the background (Civil Aviation Department, Hong Kong Government, 2008)

2.3. Second Discussion on the Relocation of Kai Tak

With the continuous growth of the Hong Kong economy, there was an increasing demand for airport capacity. Since the 1970s, the relocation of Kai Tak Airport was back on the agenda. The Hong Kong Colonial Government earmarked Chak Lap Kok as the designated site for the new airport but the plan was shelved again in 1983 due to a drop in air traffic growth forecasts the political uncertainty over the future of Hong Kong.

2.4. Opportunities and Challenges from the Development of the Pearl River Delta Region

The development of Hong Kong has been influenced by the economic reform of Mainland China. In 1978, the People's Republic of China (PRC) Government announced the Open Door Policy and the PRD Region was one of the key development areas, including Guangzhou, Shenzhen (the first Special Economic Zone in China), etc. Factories in Hong Kong were relocated to Mainland China. Hong Kong was therefore developed from an industrial centre into an international financial and service centre and became the gateway for foreign investors to enter the Chinese market. Nevertheless, cities within the PRD Region were also keen to develop major aviation infrastructure, for example, Guangzhou Baiyun International Airport, Shenzhen Bao'an International Airport (commenced in 1991), etc., to support the rapid economic growth in the Region. These nearby airports with modern facilities within the PRD Region become the major competitors of Kai Tak Airport in Hong Kong.

2.5. The Future of Hong Kong and the Influence from the Chinese Government

In the 1980s, there was a confidence crisis on the future of Hong Kong after the 1 July 1997 due to its political uncertainty after 1997. In 1984, the Sino–British Joint Declaration was signed and accepted that the PRC Government would resume the sovereignty over Hong Kong after 1 July 1997, while Hong Kong would become a Special Administrative Region of the PRC but would retain a high degree of autonomy under Chinese sovereignty except for foreign and defence affairs. The PRC Government became one of the key stakeholders in relation to the development of Hong Kong as well as airport development. Political dispute between the PRC Government and the Hong Kong Colonial Government dominantly influenced the future of Kai Tak Airport and the development of a new airport in Chak Lap Kok. The discussion was revived in 1987 but the relocation proposal was strongly opposed by the PRC Government who considered that the new airport would become a significant financial burden for Hong Kong.

In 1989, the Hong Kong Colonial Government undertook the Government's Port and Airport Development Strategy, which is also known as the "Rose Garden Project" to relocate the airport from Kai Tak to Chak Lap Kok in order to meet the growing demand in airport capacity. In late 1991, the PRC Government finally gave the Project a formal support through a Sino-British Memorandum of Understanding and a Consultative Committee.

Figure 8 Formation of the Airport Platform from the original Chak Lap Kok Island (New Airport Projects Co-ordination Office, Hong Kong Government, 1998)

Figure 9 New Airport (New Airport Projects Co-ordination Office, Hong Kong Government, 1998)

2.6. Closure of Kai Tak and the New Airport in Chak Lap Kok

To cater for an increase in air traffic at Kai Tak Airport before the availability of the new airport in Chak Lap Kok, the Hong Kong Colonial Government improved and expanded Kai Tak Airport, including a new terminal building for the Hong Kong Air Cargo Terminal to provide an annual air cargo handling capacity of 1.5 million tonnes per annum in 1991, the expansion of the apron area to provide additional aircraft parking. In July 1998, the new Hong Kong International Airport in Chak Lap Kok was completed with a cost of HK$160.2 billion. In the same year, Kai Tak Airport was officially closed and the land was released to support the urban development in Kowloon Peninsula.

2.7. Kai Tak Development

Figure 10 Development of Kai Tak (Civil Engineering and Development Department, Hong Kong Government, 2017)

Figure 11 Kai Tak Cruise Terminal completed in 2013

After the closure of the airport, Kai Tak tends to develop into a new development area. Although the first draft plan for Kai Tak Development was launched in 1993 and a feasibility study of Kai Tak Development was completed in 1998, the Hong Kong Special Administrative Region (HKSAR) Government had to undergo the planning review with "zero reclamation" as the starting point due to the Protection of the Harbour Ordinance, which came effective on 27 June 1997 and the court case of the Central and Wan Chai Reclamation project. On 8 May 2003, Madam Justice Chu of the High Court laid down three tests before commencing any reclamation at the entire area of Victoria Harbour, which include:

- Compelling, overriding and present need
- No viable alternative
- Minimum impairment

In 2004, the HKSAR Government finally commissioned the Kai Tak Planning Review. The cruise terminal and two public housing estates, which were the first development projects in Kai Tak, were commenced in 2013.

3. Subject Description – Kai Tak Airport

Obviously, there is a lack of comprehensive planning consideration when developing Kai Tak into an airfield. Kai Tak was originally a residential development project and the failure of this project provided an aviation school a vacant land at the heart of Kowloon Peninsula. Kai Tak then became the military base for Royal Air Force. The first expansion of Kai Tak Airport was commenced by the Japanese Army when they intended to extend the runway during the Japanese occupation period. After World War II, the Hong Kong Colonial Government had already considered that Hong Kong required a new airport in the long run to support the economic growth. Due to the financial reason, the plan for a new airport was abandoned and Kai Tak was then firstly recognised as an airport when the master plan for airport development was approved in 1954. The name Hong Kong International Airport was officially adopted for Kai Tak Airport. It was easily assessable as it was located at the heart of city centre. However, its location also limited the expansion of the airport capacity and created aircraft noise issues to the surrounding residential areas.

Year	Major Development
1941 – 1945	The expansion of the runway by the Japanese Army
1958	The completion of the northwest/southeast heading 2529 metres runway
1962	The completion of the passenger terminal
1975	The runway was extended to 3,390 metres
1976	The completion of the Hong Kong Air Cargo Terminal
1981	The completion of Stage 4 development of the passenger terminal
1988	The completion of Stage 5 development of the passenger terminal
1991	The completion of the Terminal 2 of the Hong Kong Air Cargo Terminal
1992	The expansion of the East Apron
1994	The expansion of the South Apron

Table 1 Major Development of Kai Tak (Civil Aviation Department, Hong Kong Government, 2008)

3.1. Airport Capacity

Since 1941, Kai Tak Airport was expanded several times to support the increasing demand for airport capacity. The design capacity of Kai Tak reached 24 million passengers per annum in July 1998. However, it handled more than 24 million passengers and 1.56 million tonnes of commercial cargo. Kai Tak Airport became the third busiest airport in the world in terms of the number of international passengers received and the first in the world for international cargo throughput.

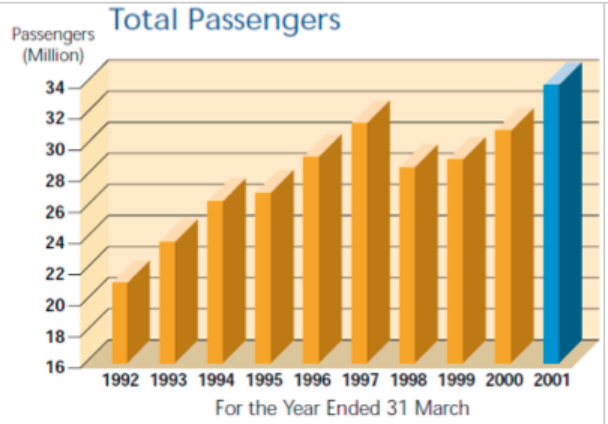


Figure 12 Total Passengers
(Airport Authority Hong Kong, 2001)

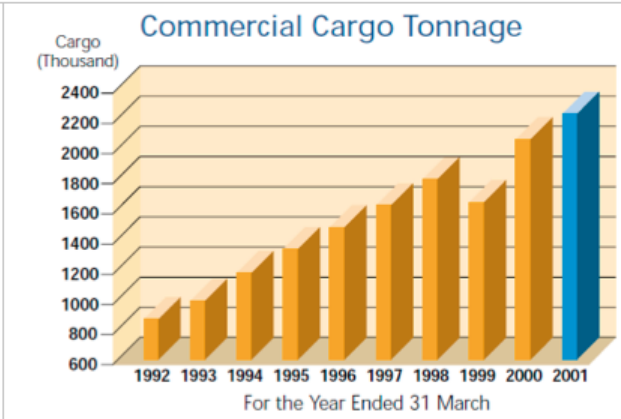


Figure 13 Commercial Cargo Tonnage
(Airport Authority Hong Kong, 2001)

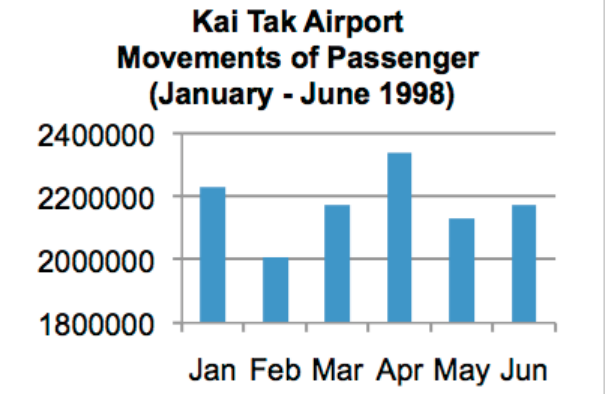


Figure 14 Kai Tak Airport Movements of Passenger
(Civil Aviation Department, Hong Kong Government, 2008)

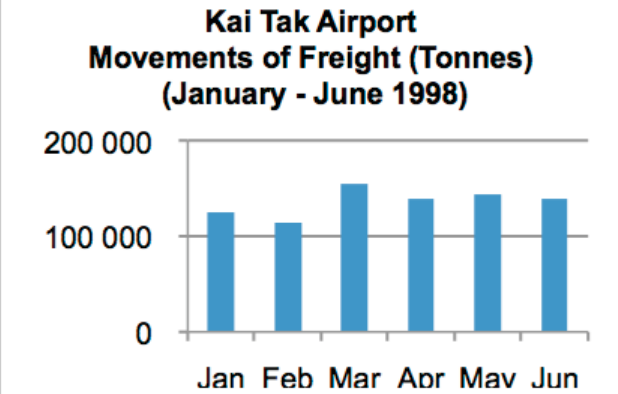


Figure 15 Kai Tak Airport Movements of Freight (Civil Aviation Department, Hong Kong Government, 2008)

3.2. Aircraft Noise

Aircraft noise was also a key issue on sustainability of Kai Tak Airport. Due to its location, more than 380,000 people were resided within the areas at or above 25 Noise Exposure Forecast (Environmental Protection Department, Hong Kong Government, 2005). In order to restrict aircraft noise, the Hong Kong Colonial Government had adopted several measures to limit the airport operation of Kai Tak Airport which include restricting operation of aircraft engines above ground idle power during 9pm to 7am, limiting landing or taking off between11.30pm to 7am and rescheduling of evening flights (Ng, 1994). However, this also limited the operation of Kai Tak Airport.

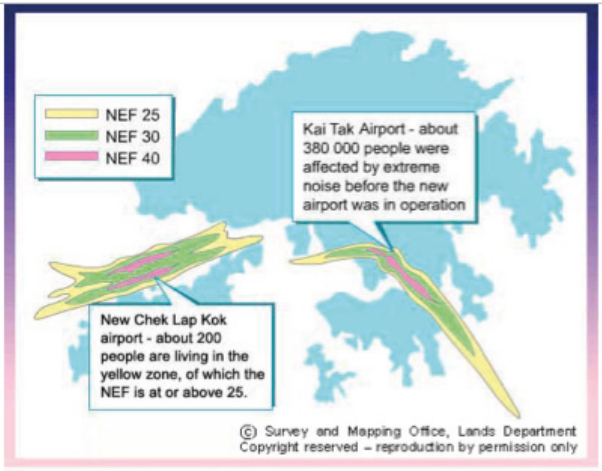


Figure 16 Noise Exposure Forecast for Hong Kong Airports (Environmental Protection Department, Hong Kong Government, 2005)

Figure 17 Aircraft noise was a big problem to residents living near the Kai Tak Airport

4. Analysis – Strategic Planning

This paper analyses Kai Tak Airport from the perspectives of strategic planning as the uniqueness of the case study of Kai Tak Airport was the role of strategic planning outlines both the territorial and regional planning. It is also considered that discussing Kai Tak Airport from this perspective comes across the themes identified at the Workshop: Airport-City strategic planning in its relations with the Region and the Metropolis.

Figure 18 Hong Kong Kai Tak Airport landing layout and its surrounding areas

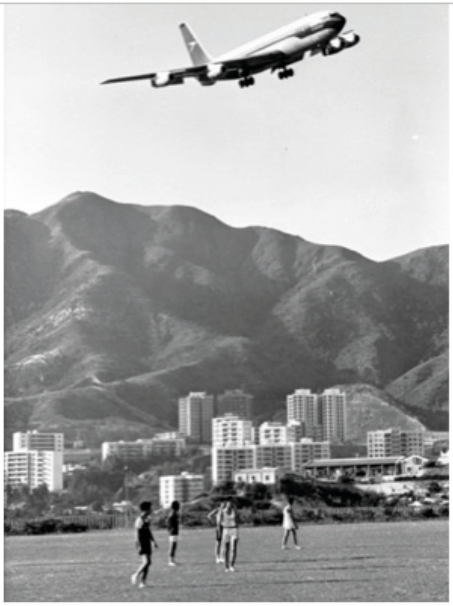


Figure 19 An aircraft was heading to the Kai Tak Airport (Civil Engineering and Development Department, Hong Kong Government, 2017)

4.1. Territorial Planning

Planning, in theory, is to ensure that land of the right type is available in the right places and at the right time. However, it is always a challenging question in the reality as the city is changing from time to time. Although Kai Tak was developed from an unplanned airfield used by an aviation school, Kai Tak Airport had played an important planning role in reshaping the city. The Hong Kong Colonial Government developed Kai Tak's surrounding areas, such as Kwun Tong, Kowloon Bay and To Kwa Wan, into industrial areas. Although the airport was relocated, Kwun Tong and Kowloon Bay are still one of the major industrial areas in Kowloon until the HKSAR Government announced to develop Kwun Tong and Kowloon Bay as another Central Business District (CBD). Kowloon City was famous for the low-rise buildings development pattern as the building restriction imposed. The closure of Kai Tak Airport lifted the height restriction of Kowloon City and more high-rise buildings can be found nowadays.

The relocation of Kai Tak Airport can also help support the development of Hong Kong by releasing the valuable land in the urban area, especially for the housing supply. Since the 1990s, Hong Kong was suffered from high property prices before the Asian Financial Crisis in 1997. On the other hand, inadequate land supply is also one of the key challenges for the HKSAR Government when having development. Undoubtedly, the former airfield land is considered an instant land supply after the relocation of airport.

Kai Tak is clearly not an ideal location to develop an airport as the Hong Kong Colonial Government had already made a relocation plan after 1945. However, the high cost of relocation lets Kai Tak Airport remain in position. Since the economy of Hong Kong was still under recovering after World War II, it was not financially sustainable for the Hong Kong Colonial Government to relocate an airport, when comparing the cost of improving and expanding the only existing airport in the city. Although several expansion and improvement projects were then commenced in Kai Tak, the relocation discussion was back on the agenda in the 1970s as there was a great demand for airport capacity. Chak Lap Kok was also firstly identified for the designed site for the new airport. However, the relocation plan was abandoned again because of political uncertainty over the future of Hong Kong. The Hong Kong Colonial Government undertook the Government's Port and Airport Development Strategy and confirmed the relocation plan in 1989, but the objection from the PRC Government suspended the relocation plan until late 1991 after the formal negotiation between the British Government and the PRC Government through a Sino-British Memorandum of Understanding and a Consultative Committee.

Figure 20 Kowloon City before the relocation of Kai Tak Airport

Figure 21 Kowloon City after the relocation of Kai Tak Airport

4.2. Regional Planning

As Hong Kong was a British Colony in the PRD Region, there was no regional corporation or development in the PRD Region. However, the Region was changing after the announcement of the Open Door Policy in 1978. The Policy not only restructures the economy of Hong Kong, but also reshapes the PRD Region.

Being the only international airport, Kai Tak Airport still played a strategic role in supporting the development of the PRD Region in 1980s. New flight routes to the Mainland China created development opportunities for Kai Tak. Nevertheless, the limited capacity and restricted operation of Kai Tak Airport, however, limited the development of new flight routes.

In order to support the regional development, airports have been upgraded or developed within the PRD Region. Guangzhou Baiyun International Airport and Shenzhen Bao'an International Airport are the two largest airports in the PRD Region. With modern facilities, such as dual runway system and the establishment of new flight routes available, Kai Tak Airport was no longer the only international airport within the Region. Passengers are no longer required to travel to other cities in the world via Kai Tak Airport. Given that the limited capacity of Kai Tak Airport, it is considered that there is a need for Hong Kong to develop a world-class international airport to enhance its competitiveness within the PRD Region.

Figure 22 Guangzhou Baiyun International Airport

Figure 23 Shenzhen Bao'an International Airport

5. Conclusion

This year is 20 years after the closure of Kai Tak Airport. From Kai Tak Bund to Airport, Kai Tak is now developing into a new metropolitan area but still remains as a gateway for international tourists, i.e. the Kai Tak Cruise Terminal. More importantly, this section summarised the experiences learnt from Kai Tak.

Figure 24 Overview of Kai Tak

Figure 25 Kai Tak Outline Zoning Plan (Civil Engineering and Development Department, Hong Kong Government, 2008)

5.1. Territorial and Regional Airport Planning

The absence of regional airport planning of Kai Tak was due to historic and political reasons. Cities within the region are keen to corporate and make a regional development plan. Airspace congestion and the strategic position are considered to be two key challenges when adopting an airport planning strategy. Cities should seek opportunities to corporate and to share a common vision for sustainability so as to illustrate clearly the strategic position of different airports internationally, regionally and locally.

5.2. Long-term Airport Planning

The development and relocation of Kai Tak were influenced by the political change and it led to the change and delay in development and planning. This paper does not intend to discuss the pros and cons of different political systems but to ensure that the airport development policy should be consistent as airport planning is a long-term process.

In order to reduce the public expenditure and minimise the impacts from the political change, airport management should be commercialised, instead of military or bureaucratic leadership (McNeill, 2010). The Airport authorities are considered to form a partnership with state airlines to enhance the competitiveness and the sustainable development of the airports.

5.3. Post-use Planning

The delay on the development of Kai Tak was due to legal and political reasons. The Protection of the Harbour Ordinance which was passed on 27 June 1997 and the court case of the Central and Wan Chai Reclamation project quashed the draft plan of Kai Tak Development adopted in 1993 and the Kai Tak Planning Review was finally commenced in 2004, which is six years after the closure of Kai Tak Airport. Cities should therefore make sure that the former airfield areas should be well-planned before the closure of the airports.

Authors

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THE EDGE OF AN AIRPORT CITY

Karla Santos Zambrano

ABSTRACT

Urban development for airports and its surrounding area presents an operational and spatial challenge for planners. The exchanges between an airport and the main location it serves are primarily of an economic nature and carry a mechanical approach to development; most airports are surrounded by industrial parks filled with office spaces and storage centres, while this is the reality of companies benefiting from import and export activities, there is a great amount of the population that is entirely left out of the edge: the space between an airport and the city. Besides office spaces, car parks, storage facilities, the edge consists of endless motorway scenery with some cities offering rapid-ground connectivity—where others only offer public transportation (buses) as a means of access. Granted, it has been long established that this is how the edge works, as it has done from the inception of these airport cities, however, given the rise of airports serving as physical interface to business, where the global meets the local, perhaps more can be done in order to make these places more human. These petite-cities built around airports do not offer the vibrancy that a full city could. How can planners and the planning system work towards offering a similar character to an area which is often left out of certain distinctiveness? A petite-city outside the global meeting point can have more to offer than car parks, express hotels and office spaces. This review aims to shed a light on land uses around an airport and which is best suited for the Edge of an Airport City, also how these spaces may offer a sense of vibrancy and allow for instant recognition of a destination: a promenade to the Airport City.

1. Introduction

It is logical, not to mention efficient, to allow for complementary uses, services and amenities to be in close proximity to one another, this is done to benefit the entire area and promote local, regional or national growth, depending on the circumstances. Many challenges placate the world of planning, and it is urban development around airports—and the airports themselves—which present both an operational and spatial challenge. The reason behind it might be due to the intrinsic nature of airports being gateways to international markets, promoting high-value import and export activity.

Considering the dual functionality of an airport—as a "transportation node" and also an economic growth pole—development is a definite challenge with most of the land around the edge pertaining to business and industrial parks filled with office spaces and storage facilities. The view taken on this research is in regards to land use and which is best suited for the Edge of an Airport City, the space between an airport and the city it is most likely to serve.

By means of a theoretical framework, using a qualitative approach which allows for understanding and observing of the policy set in place, the research aims to establish a connection between the factors which contribute to the striking difference between the edges of the city and the airport, the variety of land uses, and rezoning of certain areas. The integration between the analysis of policy documents and regulations, with the inclusion of four Case Studies, each with a distinctive character in nature, will provide an answer as to what is needed from planners or the planning discipline. It is important to note that, in the case of Cork International Airport, the planning language has remained dry, with few specification or strategic objectives for development.

Even if the correct allocation for business or industrial parks is near an airport, from a logistic and strategic point of view, there is room for a more exciting approach involving the urban form around an airport and furthering the activities that may serve the entire population, not only for airport users or airport-related businesses.

2. Background: Airport Interactions

When discussing the edge around an airport it is easy to imagine what it looks like: a highway filled with scenery that might not even reflect the city; this is how it works in most cases. However, it may be possible to make these spaces more human, to promote a physical, more established, approach to the global meets the local, to treat these spaces as petite-cities that can offer a sense of vibrancy and allow for instant recognition of a destination.

The role of airports nowadays has come a long way from the past few decades, previously staging a simple transportation hub to catering for business and a global market. It is in Hakfoort et al (2001) that we get an updated look at the main functions an airport may appear to serve—although, the complexity of this type of development allows for far more activities and functionality than the traditional ones—however, the use of this space is primarily for transportation. The categories in which markets are presented consist of three different types of passengers: the "local

residents" of the serviced area who happen to visit other regions or cities, "other passengers" who do not inhabit the area but travel to it, and those in-between: "transfers", whose destination and origin differ altogether. The edge would be the stage for those who are either coming to the region or leaving it.

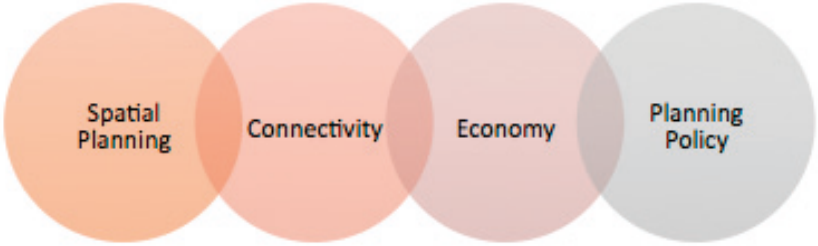
This brings us to a second function of the airport which "concerns the role they play in, and their interactions with, the regional economy" (Hakfoort et al 2001, p.596). The impact it could have on the economy depends primordially on the interactions with the area.

> *[…] airports are shaping urban space in the twenty-first century much as highways did in the twentieth century, railroads in the nineteenth century, and seaports in the eighteenth century.*

(Freestone and Baker 2011, p.265)

Amidst a turnover to a healthier and cleaner environment, the importance of an airport location is vital. They act as anchors for centres, with a boundary between them and the surrounding territory resembling seamless, devoid of identity, urban landscape of business parks, warehouses, logistic complexes, hotels, factories, and so on. The notion of "survival of the fastest" stated by Freestone and Baker (2011) relates to the economic and corporate aspect of the interactions between an airport and its edge.

Goods flows, investments (public and private stakeholders, optimal for rich development scenarios) and employment will simply improve the growth prospect, causing further development for space-demanding areas such as the edge. It is worth to note that creating a favourable economic environment is as important as creating a sustainable one in the long run, keeping in mind land use and airport accessibility in the scheme.



3. An Unintentional Airport City

The study of Cork International Airport has given rise to curiosity and questioning of what does an Airport City entail, and its function to the region. Cork is not an airport city itself, unlike Shannon—home to Shannon International Airport—which was explicitly developed as an airport city (Keohane and Kuhling 2014). However, it is suggested it may have, unintentionally, started to become one as further businesses locate near the airport. Whether the cause is related to the city or simply favouring airport locations, the edges have been expanding to the greenbelt set around it and this could threaten liveability and economic growth in the city centre.

Steady erosion of the greenbelt around the edge of both the airport and the city: office locations suddenly moving from city centre facilities to industrial parks, which brought hotels and so on to the area, not intended for this use.

When offices started to close at the city centre and moving near the airport that was a significant vote that the city was no longer fit for purpose, in this regard, more is said about the city's policies than airport-related ones, but the fact remains that an area surrounding an airport should have airport-related land uses, not those more appropriate for a city centre location. The airport itself does not have to compete with the city. Its purpose is a different one.

The research aims to establish a connection between the factors which contribute to the striking difference between the edges of the city and the airport, the variety of land uses and rezoning of certain areas. This is vital and significant when dealing with a supposedly strict Greenbelt policy. If there is a greenbelt gap between the edge of the city and the airport, and if the location is fit for a greenbelt gap, then the number one priority is that it remains as such, that it fulfils its purpose as unbuilt land. To what extent is the space between the airport and the city under threat?

Figure 1. The role of Cork Airport within the different settlements (Source: CASP 2001)

4. The Edge of an Airport City: Of Land Uses, Expansion and Connectivity

It is already established that airports are "employment generators [...] and magnets for development" (Robertson 1995, p.81), but there is also the highly profitable activity of tourism. When it comes to successful airports, they ought to provide with a full range of air services and have enough activity to support and help in the improvement of an economically-depressed area. Tourism has been exceptional to the regeneration of urban areas—namely the High Line, in New York City, is a great example of urban regeneration attracting tourists and locals alike—it has a wider beneficial impact on the region as a whole.

Renovation and regeneration, not solely on the built environment but on the economic market. The goal is to keep operations moving forward by providing a changeable atmosphere that allows the market to flow without having major affectation on the land uses presented for the edge.

A primary concern is one which relates to a 'cease of activity' for an airport or if an 'airport city' stops acting like one but all surrounding activities are related to it. This is one of the reasons why developing the edge with other non-airport dependent uses becomes vital. It is a chance to make the edge a destination where possible.

Office, business, and industrial uses can prove to be more appropriate because they keep bringing footfall to the area, therefore maintaining its integrity and livelihood; should anything happen and the airport activities cease or diminish, the structures will be in place to house different uses, so it's best not to rely on airport business but facilitate connectivity to the local area and overall region instead.

Objective No.	**Appropriate uses in the airport complex**	
LUS 5-1	It is an objective of this plan to identify appropriate uses and activities for the airside, terminal and landside components of the airport complex, in a sustainable manner, as follows:	
Operational uses/ activities		**Ancillary activities**
Airside		
Aircraft areas: runways, taxiways, aprons, aircraft parking stands		Aviation fuel storage, parking for passenger buses
Aircraft routine maintenance facilities/ hangars / engineering shops.		
Air traffic control / meteorology.		Staff parking
Flying School / General Aviation aircraft base.		Passenger and employee parking
Security/ police, fire service etc.		Parking for vehicles
Airline and handling agents		
Terminal		
Cargo handling facilities.		Ancillary office space and staff parking
Passenger terminal: customs checkpoints, immigration, concessions (duty free shopping, cafés and restaurants, bar etc.), car hire front desks, tourist information counters.		Airline/ operator ancillary offices.
Air catering		
Landside		
Kerbside areas: set down/pick-up, taxis, buses, coaches.		
Short term multi-storey car park.		
Car hire holding areas		
Long term car parking		Kiosk, sheltered walkways, shuttle bus shelters.
Staff Car Parking		
Hotel, petrol filling station, local convenience retail		
Aviation Fuel storage		

Business Parks - The letting success of the Cork Airport Business Park helps to demonstrate the demand for business park space in the area. Business parks are most likely to be edge-of-town, and future business park developments should be able to offer a choice of transport (including public transport links) and good access to the airport. This is likely to be more achievable in locations that are reasonably accessible to key transport nodes and existing settlements.

County Development Plan Objective
EE 4-2: Enterprise Development

Promote 'Enterprise Development' in appropriate locations including Ballincollig, Cork Airport, the Cork Science & Technology Park and Midleton through the Local Area Plans.

Protect areas of 'Enterprise' development from other inappropriate development, such as industry and retailing, which could adversely affect the specialised function of these areas.

Figure 2. Several land use objectives for Cork Airport (Source: Cork County Council)

4.1 A Strategic Edge of Business: Economic Growth

The scale and types of jobs being offered by an airport city and the accessibility to the local residents is a contributing factor on economic growth, especially the local one. These benefits should be widely spread across the area for significant impact, as it is best that the airport location contributes to the economic regeneration of its surroundings than have a negative impact on the local economies.

We know each city, each location, reacts differently, which is why the local economy is vital for development.

> *Attracted businesses are businesses that do not rely directly on the airport for their operation, but which value location near an airport because of its prestige, air services and accessibility of location for visiting customers and employees coming by air.*

(Weisbrod et al 1993)

In terms of business, the edge should not be too dependent on the airport economy, yet be a part of it as well. Oftentimes, people—architects or designers in particular—are attracted to places based on what the built environment has to offer, comparisons between places can help with innovation and creativity, by seeing first-hand how other cities were able to attain the unattainable and study their approach.

In order to take a sustainability approach, it is necessary to consider business which not only relate to the airport economy, but principally those which do not. It is not entirely a risky solution if we consider that a non-successful airport would cease to operate having a detrimental effect on the existing airport-related industries in the edge.

There is the case of the Amsterdam Airport Schiphol, informally known as Schiphol. It was first built with the purpose of operating as a military base back in 1916, but it found its way with civilian use after the First World War (Hakfoort et al 2001) as other airports have done in the past. With a single-terminal concept, similar to Cork International Airport, it is noted as the primary airport for the Netherlands.

A comparative approach between the airports would seem contradictory, particularly when it comes to airport traffic for each one, but the fact is that both have had an impact on the economic development of their own regions. The ability to attract businesses in the case of Schiphol, relates to its connectivity and busyness status, not to mention the infrastructure it possesses allows for this. In terms of land uses, both have agriculture and industrial or airport-related services around the edges, which appears to be the ideal fit for a proper zoning of these areas.

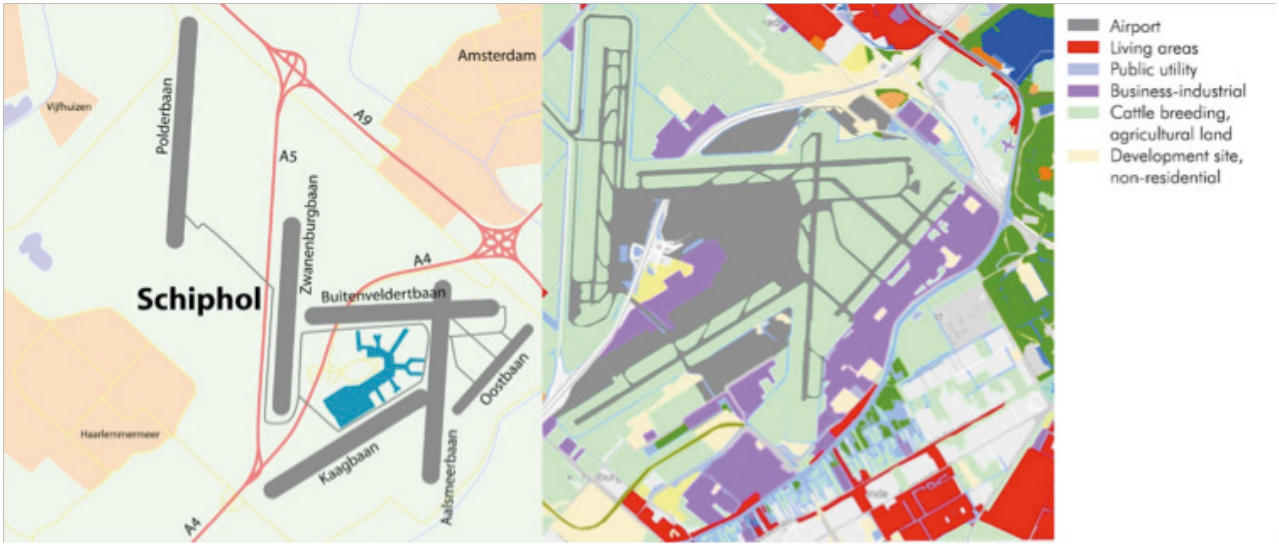


Figure 3. Zoning map for Amsterdam Airport Schiphol (Source: City of Amsterdam)

Cork International Airport is the second largest between the three main international airports in the Republic of Ireland, but fourth on busyness terms in the island. Further expansion plans exist for both airports mentioned in this section, it is yet to see whether the Cork expansion will have a positive contribution for the economy, and if the intensification of uses is not detrimental to the area.

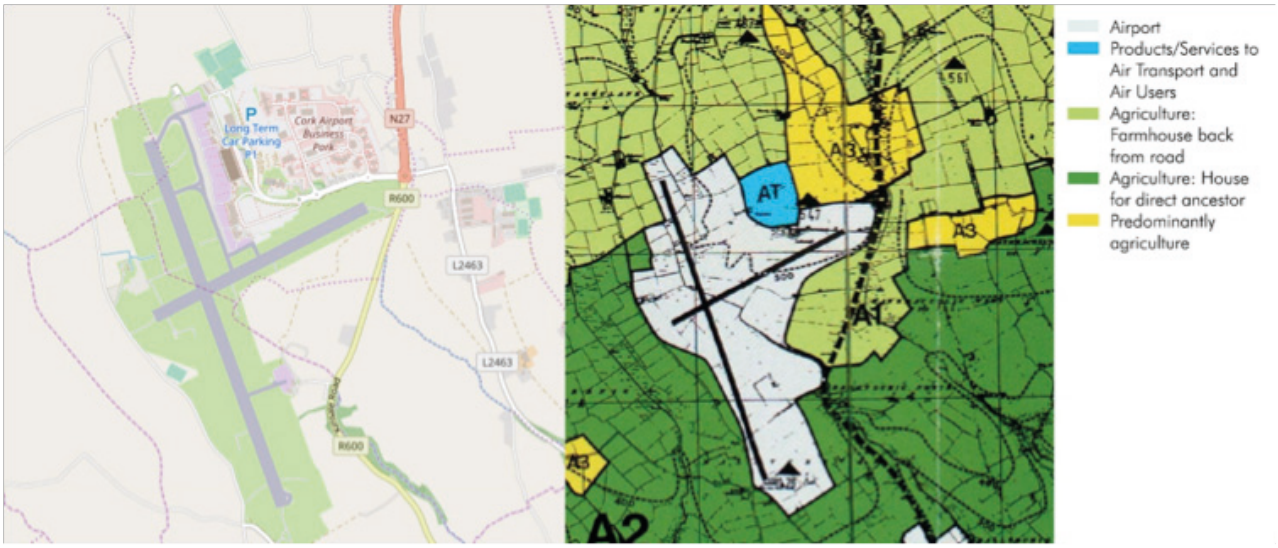


Figure 4. Zoning map for Cork International Airport (Source: Cork County Council)

4.2 A History of Connectivity: Focus on Expansion

Airports have been rather exceptional with their futuristic architecture and technology, but have resulted in being quite damaging to the environment and the population as well. Air pollution, water pollution, the psychological pollution that comes in the name of 'noise' are real challenges for people living and/or working near airports, but an appropriate design could help mitigate these issues than simply adding noise-blocking windows to the office buildings in the business parks or in residential apartments.

An airport's impact on climate, ecology and health, can be overturned by the development of the edge. If the edge becomes less airport-dependent, the cultural or leisure activities to be proposed for the edge may render a different picture of the area, promoting technological and natural solutions to a cleaner environment.

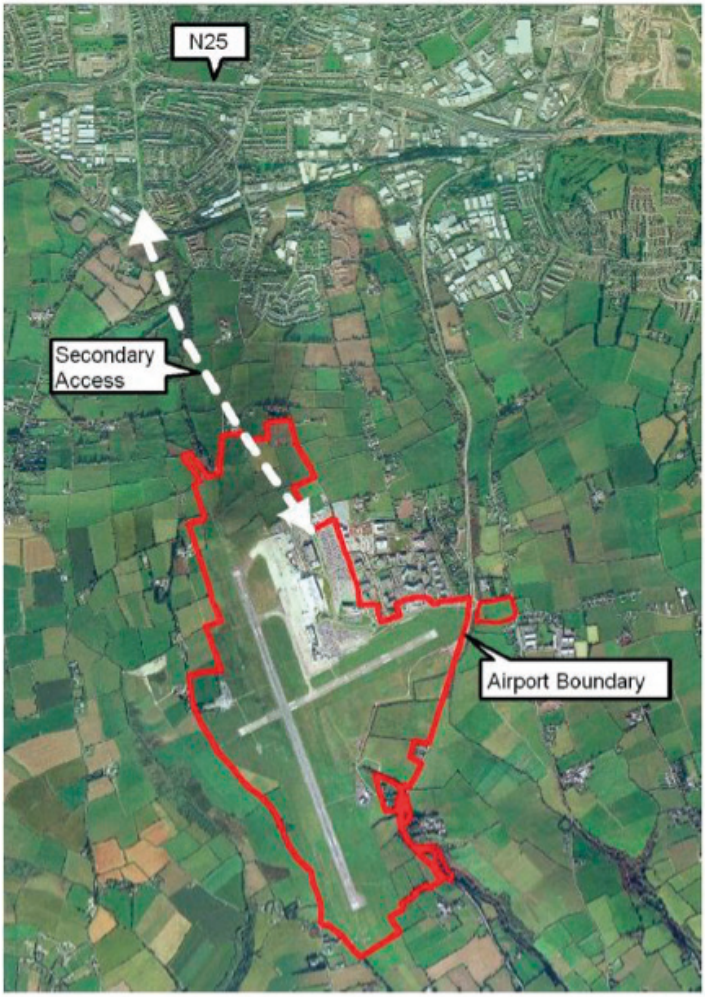
> *[…] there's the energy conservation of a complex where all the buildings are combined into one, and where it's all insulated by earthen embankment. The whole airport could be built on one-third of the land, at one-half the cost, with lower operating cost, and a cleaner environment—which also means the airlines and other airport-related businesses could operate a lot more profitable. It's like designing a city, really; the more compact design is more energy-efficient, more materials-efficient, and more pleasant to be in.*

(Ayres 2001, p.32)

Alongside Cork International Airport, there is the case of Shannon International Airport, which carries an interesting history of being an actual Airport City itself, this main difference makes it exceptional in its approach but it is worth to point out the adaptability of land it took for the airport and the city to be built from ground zero (Clare County Council 2012). Its location next to an estuary delayed the construction for some years but by 1945 it was fully operational for its purpose, a mid-stop for transatlantic flights.

Connection to the town and its environs is primordial when dealing with an Airport City, especially when the uses surrounding the area belong to airport services. However, the particularity of Shannon is that the residential areas around the edge provide the footfall and liveability needed for the scheme to operate. International connectivity, of course, is vital for the success and maintenance of the town.

The infrastructure at the edge tends to be one of the best, however, it can fail to connect some areas that are prone to need access to it by limiting access to business parks only, for example; then land which can be suitable for other uses related to tourism might lead to an alteration in the existing infrastructure, and sometimes the cost is far too high to take the risk. And this is a fact for Cork International Airport, while the airport is well-connected to the city with a timeframe of 30 minutes or less (traffic and transport method dependent), there is an objective in mind to diminish transportation time via bus to 15 minutes with an offer of a service every quarter of an hour. The need for accessibility and connectivity is present in the development plan for the area, with improvements to the existing network and a proposal for new access routes.



Airport

The development and expansion of Cork Airport is crucial to the development and future prosperity of Cork. The economic development of the region will depend on inward investment and in-migration of labour. Continued improvements in air links and ease of access to the UK and European hubs is essential to fostering and promoting the Cork region as a high quality destination for inward investment and tourism.

Strategic Guidance: Airport

Measures to improve the range and quality of air services at Cork Airport should be supported.

Road and public transport access to the airport should be improved.

Objective No.	**Specific Objective**
DES 5-1	It is an objective of this Plan to promote and encourage a high standard of design and environmental quality in any new development proposal at the airport. Planning applications for new developments shall be accompanied by a detailed design statement, landscaping proposals and site appraisal which shall be in accordance with the principles of sustainability.
DES 5-2	It is an objective of this Plan that within the area designated for future airport development, any new buildings shall be designed so as to promote the design principles of sustainability including energy efficiency, passive solar design measures, water conservation, use of renewable energy and reduced lighting demand.

Figure 5. Map of planned interventions (left) and development objectives for Cork Airport (right) (Source: Cork County Council)

The current route to access the airport is also a Scenic Route S56 (Cork County Council 2014) the road between Frankfield and Ballygarvan Townland, and envisages protection by law. The plans for expansion aim for an upgrade of the national road N27, which is the path deemed as a Scenic Route, this upgrade consists of two lanes and a bus lane for city-bound traffic. An underpass is proposed for the airport roundabout as well. With the existing environmental policies, it will be of interest to follow up on the restructuration and improving of the road infrastructure.

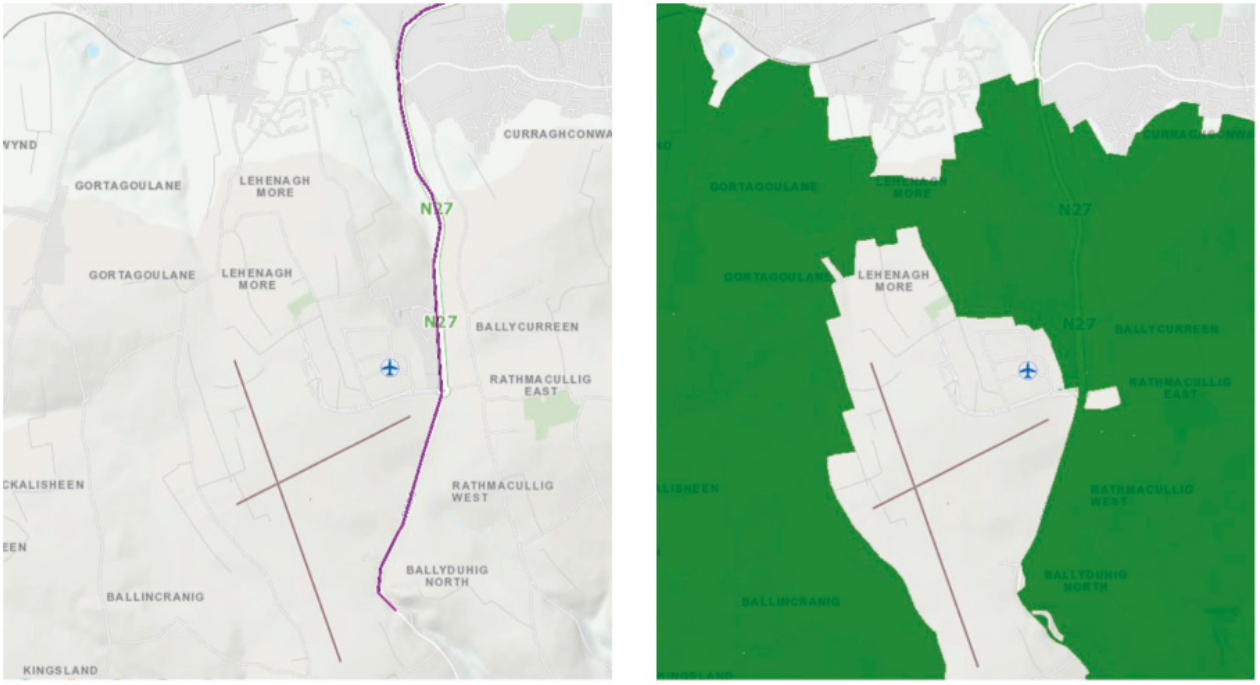


Figure 6. Scenic Route S56 (left) and Metropolitan Greenbelt (right) (Source: Cork County Council)

A greenbelt policy not only helps to prevent sprawl around the edges of the city, but also aims to promote a healthier greener way of life, having an impact on the climate, ecology and population of the area. Considering there is a plan for expansion of the Cork International Airport, which consists of relocation for several of their structures, the north expansion may contravene the greenbelt policy set in place. This depends, of course, on the size of the expansion, but it is suggested the terminal is aiming to take some part within the green belt, according to draft plans of the expansion.

Shannon International Airport also has a zoning in place for agricultural lands but it acts more like a greenbelt for its west side, to the east is where the industrial and business areas are located, the similar approach taken by Cork, Amsterdam, and many others.

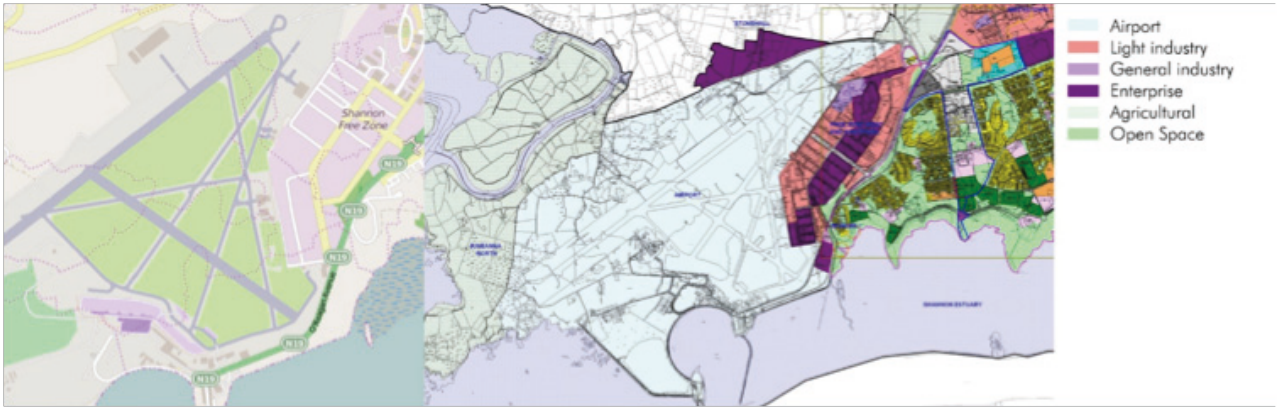


Figure 7. Zoning map for Shannon International Airport (Source: Clare County Council)

4.3 A Complex Public Space: For a Greener Environment

In order to make the edge of this airport city more human, the elements of diversity, spontaneity, and maybe even surprise, need to be present. An urban experience near the airport area that is not attached to a motorway scenery, but offers more to the people.

Greenways and pedestrian access zones—treated for noise mitigation—to these parks, could make a destination out of the edge itself and an improvement on human health. A substantial reduction on noise is imperative. The aim is for the edge to become a public space, open to the city and its inhabitants, a place to be enjoyed by all.

> *The importance of aviation in a globalized world is inescapable; its differential impact on the quality of urban life, influence on urban form, and thus implications for urban planning, are profound. Airports, along with shopping malls and museums, are one of the definitive "public" spaces of the contemporary city and have become design, economic growth, and city branding hotspots, albeit not without considerable controversy.*

(Freestone and Baker 2011, p.263)

Albeit a rather exceptional case based on its special location, the way Barcelona-El Prat Airport has dealt with its edge is rather inspiring. Taking advantage of the natural resources surrounding the Llobregat Delta, the authorities have constructed a series of greenway paths and viewpoints which not only serve to watch the bird species of the area and to take in the natural landscape, but also for public enjoyment.

The renovations and expansions it has undergone, and still is, have help build up an area worthy of an Airport City designation; the land uses which pertain to the edge are agricultural and airport-services related, with varied transport

connectivity to the towns and cities nearby. The offerings include rail, bus, metro, particular vehicles, all easily accessible and within reach.

Its natural reserve is readily accessible as well, mainly connected by a bus and cycling network alongside a road infrastructure with minimal impact to the landscape. Beach access is also advantageous, and connected by the same network throughout the year.

Currently, the airport is being subjected to some political discussions relating to management and control, mainly due to the revenue the airport generates, not about planning-related issues.

> *City planning is too immersed in the administration and survival of housing, environmental, and energy programs and in responding to budget cuts and community demands to have any clear sense of direction with regard to city form.*

(Jacobs and Appleyard 1987, p.521)

It may be deemed luxurious to be discussing green parks or natural reserves when there are other issues, which appear as more pressing matters, such as housing, infrastructure, economic development and so on, but while Cork International Airport answers to a greenbelt policy (Cork County Council 2014), it is possible to follow part of the Barcelona example by improving the green infrastructure it has been considered in the past.

The city has spread somewhat, but the airport city has only reached the boundary of the business or industrial parks it serves. An urban environment that breaks from traditional moulds by settling beside an airport. An integration of activities for those living and working near or adjacent to the airport would be best, where the global meets the local there is great opportunity for cultural exchange and growth, which in turn will improve worldwide tolerance towards others and more collaborative processes between disciplines.

> *It is the mix, not just the density of the people and uses, that brings life to an area, the life of people going about a full range of normal activities without having to get into an automobile.*

(Jacobs and Appleyard 1987, p.526)

Figure 8. Zoning map for Barcelona-El Prat Airport (Source: Área Metropolitana de Barcelona)

5. Conclusion

Appropriate land planning is an understatement when it comes to airport areas. In the paper presented by Weisbrod et al (1993), it is already mentioned how there were large areas surrounding airport lands were left vacant for several years, even decades, as they were reserved for further development. A development that clearly did not come right on time. Other areas simply grew too fast and ended up choking the roads with traffic and saturating the existing infrastructure.

This exploration has shown that market orientation offers the possibility to develop an edge area that is characteristic of the airport city and the main location the airport is servicing. Trade and distribution headquarters, high-tech specialisation, aerospace and aviation, these all can still be a part of it. A centre for regional or national corporate offices will offer the right incentive for private investment.

What can be done is evaluate the specificity of the airport by, first, compiling all data relating to it and what has been done in similar locations or cities somewhere else. Then, by identifying the local economy, urban development and infrastructure, there is a scope for what is locally viable.

An active, collaborative, process among public and private stakeholders is necessary—in all aspects of planning—for development to be successful, this is no different. It is simply a bigger challenge when the airport area comes to mind, because it belongs to no one in particular. At a macro level, it can be tough to manage as some elements belong to differing authorities.

The clear need of a greater collaboration project between airport and city planning might just be what the Edge of an Airport City should be all about. Balancing the local vibrancy, sustainability, economy and finance, and world dynamics, is the actual task.

> *The discussion of governance, indeed of all these sustainability dimensions, inevitably raises the issue of contested airport area development, one strand of the broader controversy that routinely envelops the development of new airports, the expansion of existing ones, and indeed the whole question of increased aviation activity.*

(Freestone and Baker 2011, p.272)

With an emphasis on policy and regulations, documents are useful when comparing the process that goes through their publication and further analysis of their particular cases and settings. If an undesired outcome for any urban development is arising then there is a vital need to revise these documents and their approach.

In terms of possible transferability and adaptation to other settings, there is a certain universality the planning system has to offer that has a tendency of welcoming the use of proven scenarios. In this paper, the comparisons seem to lead to a single approach for airport-related planning, which involves land uses complementary to airport services and a strong greenbelt or open green space which acts as a barrier to the city. The only issue that remains is how this barrier can offer a successful interaction between the airport, the city and its inhabitants, ceasing to exist as an imaginary barrier. The belief of a promenade to the Airport City, enjoyable by the public, is still possible and may be contested in the future.

The opportunities the functionality of airports can offer in terms of interaction, labour, learning, innovation, creativity—by opening up new worlds and connections—needs to be supported by a well-supplied network of infrastructure and communication.

Compactness is imperative, and a prevention on sprawl a must. Improving greenbelt policies to be more specific in regards to what is allowed in the area, as opposed to simply keep it green, or unbuilt, perhaps aim for a public open space which enhances the edge of the airport city, and the city it serves.

The topic of urban development surrounding an airport area—in this particular case referred to as Airport City—proves to be a highly promising subject for further research. The intention of this work is not to point out an ideal model for development or regeneration of the boundaries around “airport cities” but to represent their different scenarios, however, it is important to note that the approaches are very similar given the particularity of the chosen case studies.

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AIRPORTS AS A "RESERVE FORCE" OF COUNTRIES IN TRANSITION: CASE STUDY OF FORMER MILITARY AIRPORT IN KOVIN - SERBIA

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After World War II, Military had great political and economic influence, power and land resources, while airports, as a military infrastructure, were considered as a valid asset for the bigger and, at the time, more important image of urbanization and modernization. This paper aims to explore potentials of underused military infrastructure perceived as a critical aspect of the image, quality of place and sustainability in the contemporary globalized world. The focus of the research is on the marginalized military airport in Kovin, city located in the Danube region, northeast part of Serbia.

Having in mind that airports, no matter of their initial character (civil or military), demand substantial areas regarding land use it is especially important to explore the potential of former military airports that are not active anymore. As such former airports represent great spatial potential and need to be explored from various aspects. Focus of this research will be on former military airport in Kovin - Serbia, and authors will explore its potentials and restrictions for further development and influence on surrounding areas. Context of the research is on Serbia, country in transition and its military infrastructure that belonged to former Yugoslav National Army (YNA). During Yugoslav period military buildings and areas were strictly controlled and forbidden for civilians until the 1990s and breakup of Yugoslav state. As such airports are important property both to the state and army and to local municipalities in which they are located.

Development opportunities, strengths and weaknesses possible solutions for the present problems will be analyzed through case study of student project, realized during 2017/18 school year, at the design course at the Master studies at University of Belgrade, Faculty of Architecture. The main assignment for the course was to develop spatial and functional model, while creating a landscape that establishes a connection between the overlooked military infrastructure and its possible civilian use in peacetime conditions. The results of this paper come in form of providing appropriate strategies and possible outputs for urban transformation of military infrastructure to secure high quality of living, promoting and enhancement of cultural and environmental values of the specific site.

Introduction

This research aims to explore potentials of underused military infrastructure perceived as a critical aspect of the image, quality of place and sustainability in the contemporary globalized world. The focus of the research is on the marginalized military airport in Kovin, city located in the Danube region, northeast part of Serbia. The aim of the study is to research of the potentials and restrictions of the abandoned military infrastructure for the urban development of the surrounding area in the peacetime period

The methodology that will be used is the case study of the student projects, done as a part of the Master studies of Architecture, University of Belgrade-Faculty of Architecture, school year 2017/2018.

The expected result is creating strategies and possible outputs for urban transformation of military infrastructure in order to secure the high quality of living, promoting and enhancement of cultural and environmental values of the specific site.

Context

The context of the research is on Serbia, a country in transition and its military infrastructure that belonged to former Yugoslav National Army (YNA). During Yugoslavia, military buildings and areas were strictly controlled and forbidden for civilians until the 1990s and breakup of the Yugoslav state.

The socialist period between the years 1945 and 1992 should be regarded as the most intense period of this part of Europe, whose influences are still present and noticeable in the present days. The importance of the Yugoslav National Army in the new socialist state was founded on the idea of the Army as a safeguard of the whole political and societal system. Enjoying the special status, followed by the property regulations parallel to state-owned land, the building industry of military objects was blooming. In the light of wider political events, such as the Cold War, establishing of the Non-Aligned Movement, and the political departure from Stalin's politics, the strengthening of the military infrastructure was one of the main aims of the urban development of socialist Yugoslavia. During this time, the vast areas of land in the proximity of urban settlements were strictly controlled by the military force and had a status of the forbidden places for the civilians.

Fig. 1 Geographical position of Kovin municipality in Serbia; Fig. 2. Fig.3; Relation between military airport and city area of Kovin

After 1948 and the split from the USSR politics, the new-formed geopolitical situation has put Yugoslavia on the third side of the Cold War, as one of the founders of the Non-Aligned Movement in 1961., Yugoslavia has positioned itself as an important actor in a new political world map. Despite its formal political neutrality, positioned between Eastern and Western block, the state had to constantly enhance the defense forces. In such condition, building the military infrastructure had a crucial role in maintaining peace, safety, and readiness of the community to react in the case of the sudden destabilization of the international relations. Balancing between the East and West, the famous quote of the president Josip Broz Tito describes the scale of the ideology and propaganda considering the state in which Yugoslavia was in the: "Work as there will be hundred years of peace, prepare as the war could be tomorrow."

With the break up of Yugoslavia and the overall economic weakening of the state, the Army lost its privileged status. The political disturbance during the 90s and the democratic changes following the political fall of Slobodan Milosevic after 2000, deprived the Army of its previous advantaged positions in the political scene of Serbia. The economic disempowerment of the Army was the result of the new regulations defining the role of the military forces in the new pro-European political climate of Serbia. Such was the adoption of the law disbanding the obligatory military service for the civilians, which meant the serious drop in the capacity, cuts in the budget and the creation of the redundant spaces and land properties. The process resulted in the creation of the vast abandoned zones near and within the urban areas.

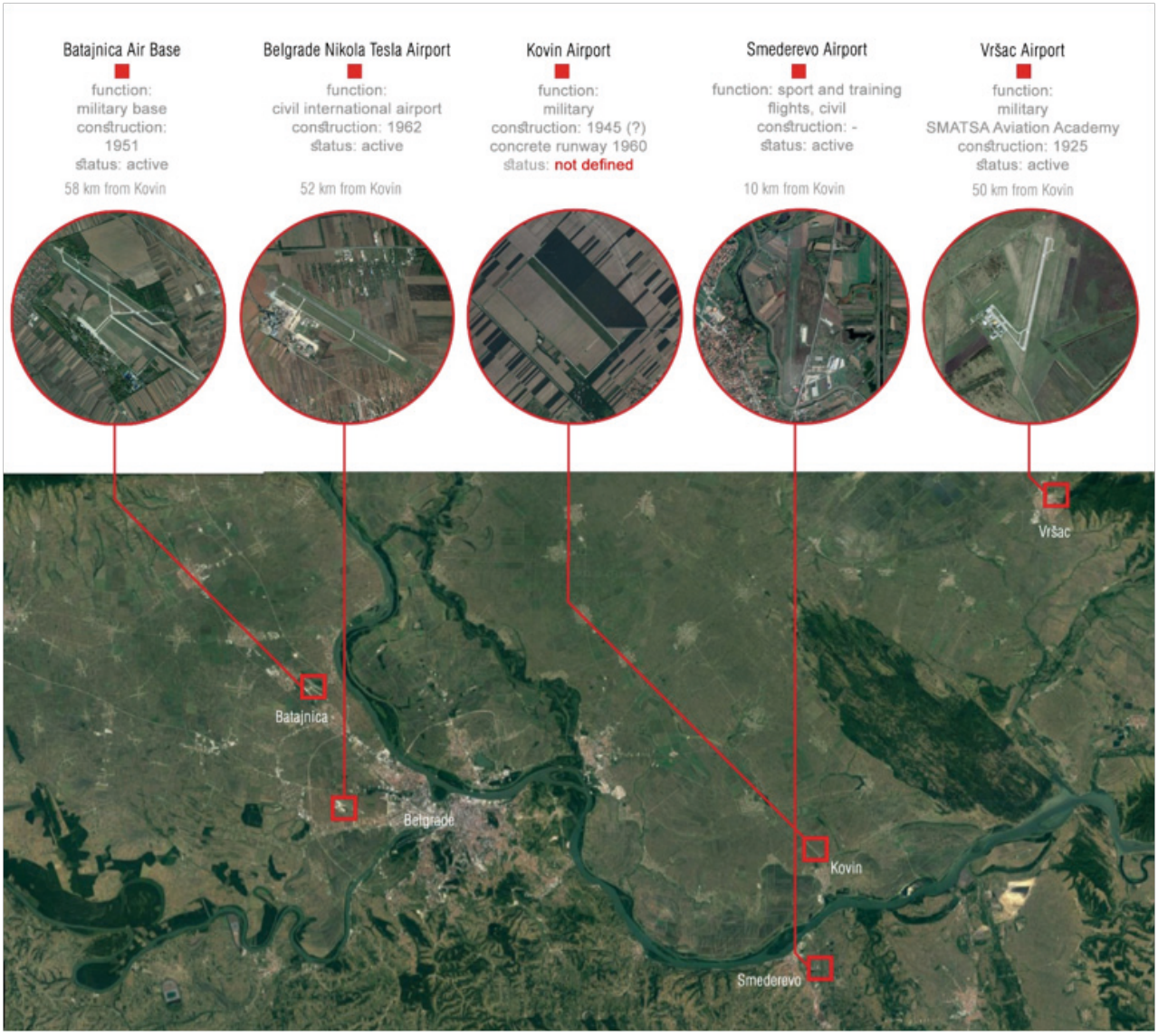

Fig. 4. Relation of Kovin airport and four other airports in the radius of 50 km

There are 10 military airports currently in the Republic of Serbia, 3 of which are actively used for its original purposes. (Batajnica, Vršac, Bor). Kovin airport is located in the southeastern part of Vojvodina region, 45 km from Belgrade.

According to the information gained from the Museum of Aviation in Belgrade, the airport in Kovin was a reserved for the forced landing of the aircraft from currently the largest international civil airport in Serbia, Belgrade Nikola Tesla Airport in Surčin. In 1998 one of the planes from the JAT Airways made forced landing at Kovin airport. Since then the airport has been predominantly and informally used for public purposes, as it had been abandoned after the decline of the military power. In addition, the airport directorate asked the Army of Serbia for a permission to open the area for public use, as it was the part of the wider government plan for the conversion of the former military infrastructure back in 2006. The airport consists of the asphalt and grass runway, dimensions 2184x30 meters, and it is connected with two regional roads. It is predominantly operating as a multipurpose public space, is the shortcut for the transportation traffic and car drivers passing on their way from Belgrade and Vojvodina to Vršac, Smederevo, and Romania, or as a practice site for the local drivers. Nowadays, in the light of the recent political events, the airport is regaining its former military function, hosting the international military exercise called "Slavic brothers", organized by Serbian Army in collaboration with the Russian and Belorussian Armies in 2016 and 2017.

Subject Description

After the democratic changes in the first decade of 2000, a switch in the planning practice for these areas on different levels took part. The conversion of the military land and objects and its functional transformation has been an ongoing process in Serbia, part of which is having former military bases transformed into residential areas. Although taking vast areas inside and outside of urban settlements, these infrastructural objects are functionally and symbolically lost in the contemporary cultural context. Being the places of reverence and places deprived of permanent function and barriers, the military infrastructure will be reexamined in this paper through questioning its role in the contemporary cultural, societal and ideological context. Starting from the theoretical standpoints, the aspects of the analysis of the abandoned military infrastructure will be defined and applied to critical reading and comparison of the Case studies (Student design proposals). It is expected to understand the strengths and weaknesses of different approaches to urban planning and transformation of former military infrastructure and how they may be further developed and enhanced.

Analyzing the problem of abandonment of military airports in a modern context, with the focus on the case of Kovin airport, the general and specific characteristics of the abandoned places will be emphasized in reference to the relevant contemporary theoretical discourse. General characteristics include spatial and functional fragmentation of the neglected zone of the periphery of the city, free infrastructure as a certain unused capacity, and character of indeterminacy as a result of the loss of the primary function that makes it free for new interpretations and appropriations. As a specificity, we can distinguish the identity of the space retained in design and aesthetics that testify to the time and the ideology in which the airport was established.

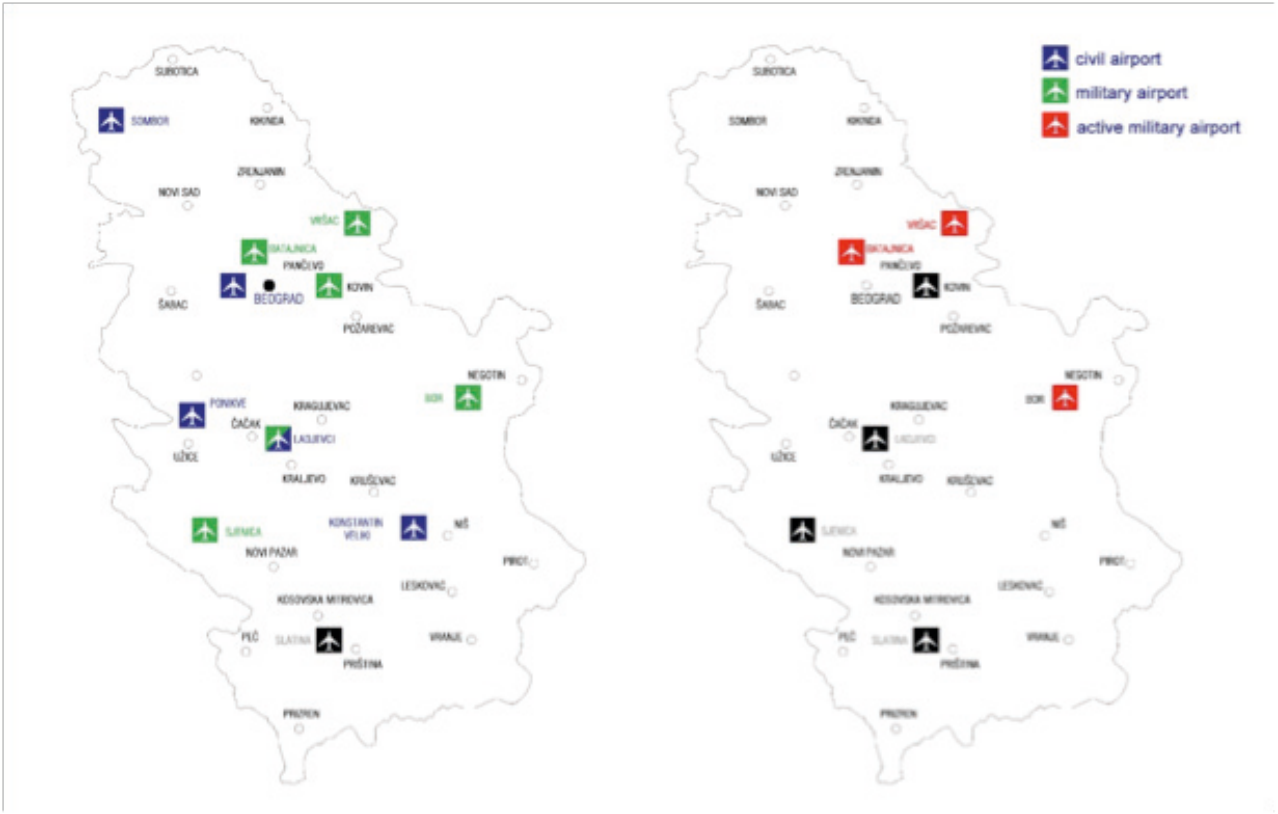

Fig. 5. The map of active and inactive airports on the state level

Analysis/Research

Fragmentation and infrastructure

According to Lefebvre, segregation in society and space can act simultaneously and successively, and it can be spontaneous (directed by income or ideology), voluntary (forming of separate spaces), programmed (enacting the law and plans). (i) The phenomenon of segregation from the ecological point of view refers to the economic and physical degradation of parts of the city, while from a formal aspect refers to the decline of the power of the city's significance and degradation of urban character. By losing the previous sense caused by the change of ideology, the military airport remains a separated fragment of the city, indexing the failure of its past. (ii) In the context of contemporary urban planning, the aforementioned problems could become potentials. With the spread of spectacular, thematic spaces for relaxing and shopping, empty spaces as visually specific dominant, are suitable for a new urban

understanding of the environment (Gottdiener 1997). (iii) Empty vacant spaces are underused infrastructure prepared to support any activity, according to Castles, leaving enough space for its redefinition by urban planning and architecture according to the modern context. (iv)

Fig. 6. Economic and physical degradation

Indeterminacy and freedom

By reflecting on the majority of abandoned sites in the post-socialist context, the reason for their negligence could be also found in the absence of the awareness and the passive relation towards these urban voids. Despite the negative connotations, the theory recognizes the positive sides of this problem, selecting the indeterminacy as a huge potential of historic places. (v) The absence of interest makes these sites underused in the spatial sense, providing them at the same time with a certain predominant semantic void. De Sola-Morales notices the strengths of the space which are unused, unclear and uncertain in its indeterminacy and freedom which comes with it. (vi) That way these spaces deprived of the concrete role in the new urban surrounding (but also its new ideological surrounding), give its users the opportunity not only to passively use them through the mere observations and sublime, but also to stimulate the active usage, through creative approach, freedom of use, appropriation, reaction and experimentation. (vii)

Fig. 7. Freedom and apropriation of the abandoned space

The identity of the space

Identity, as a category readable in the appearance of historical sites, is the testimony of the ideology of the time in which it remains trapped. The appearance of past time evident in spatial and aesthetic characteristics encourages the idea of acontextuality and otherness as a value in the contemporary environment that Foucault explains with the term heterotopy. (viii)

Although they are present in a modern context, they remain experientially absent through the inability to identify with the environment. These spaces accumulate time and are perceived as lost and untouchable. The character of indeterminacy is further emphasized by the sensual and emotional properties of the state of decay. Accordingly, the poetic experience is not only the result of values readable in the aesthetics of ruins but also the accumulated time that generates the memory as a method of a new experience.

Apart from being perceived as absent and different, these spaces incorporate time which provides them with multilayered meanings. (ix) Their insufficiently known past, as well as the adaptability to the present, make these spaces vague, and therefore open to new interpretations. (x) As such, according to Lefebvre, they carry the potential of understanding the past, constructing the present and suggesting the future presenting tools, which at its very core offers the idea of multiple reading of the cityscape. (xi)

Fig. 8. Reading the hidden layers of identity

Development opportunities, strengths and weaknesses possible solutions for the present problems will be analyzed through the case study of the student projects, realized during 2017/18 school year, at the design course at the Master studies at the University of Belgrade, Faculty of Architecture. The main assignment for the course named The Architecture of Peacetime: the Urban transformation of Kovin airport was to develop a spatial and functional model while creating a landscape that establishes a connection between the overlooked military infrastructure and its possible civilian use in peacetime conditions. The results of this paper come in form of providing appropriate strategies and possible outputs for urban transformation of the military infrastructure to secure the high quality of living, promoting and enhancement of cultural and environmental values of the specific site.

The task of the students was to first establish relationships with context elements, through an analytical approach, and explore through an integrated approach the relationship of potential stakeholders and resources that can contribute to the creation of a comprehensive strategy for the urban development of the site.

The Case Studies

From the theoretical potentials, the research recognizes crucial aspects that have focused concepts:

Fragmentation and infrastructure - infrastructural aspect; indeterminacy and freedom - environmental aspect; the identity of the space - cultural aspect. In this way, they identify the aspects that through the individual projects explore the overall importance of the site for the transformation of the local environment, and they will be grouped in this study according to the following criteria:

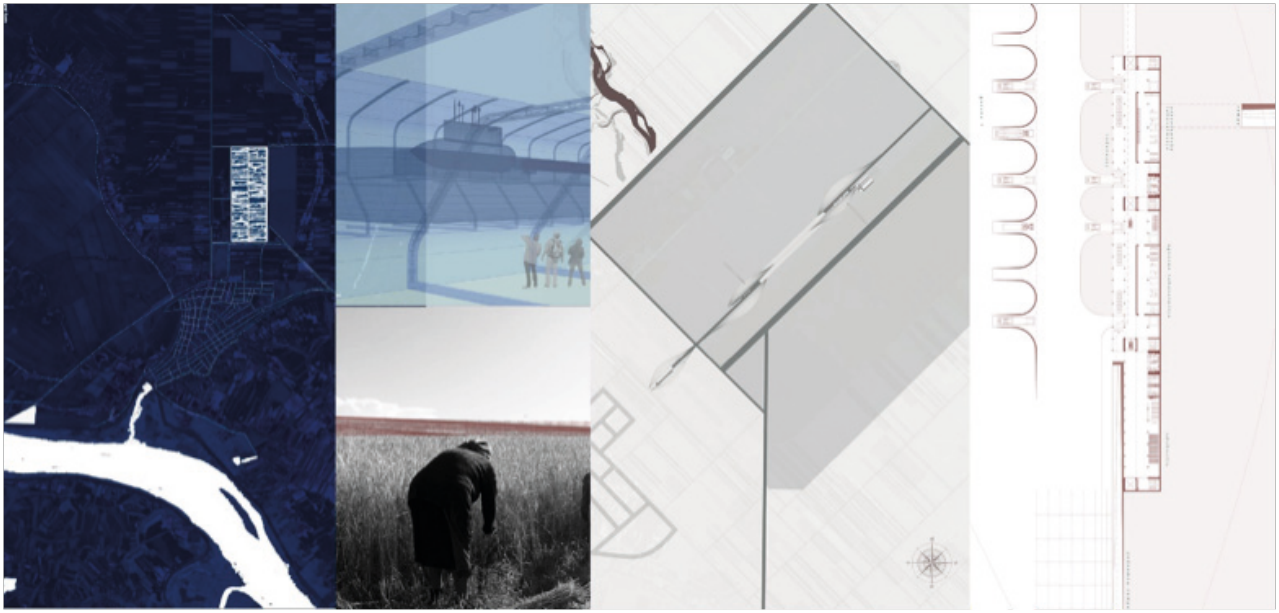

Fig. 9. Infrastructural transformation (students: Katarina Dimitrijević, Slaviša Berać)

1. Infrastructural aspect: this group contains works that directly use their site's potentials in relation to its significance in the wider region while retaining its original function of the airport. Within this criterion, the work for the establishment of a river fleet of the Republic of Serbia could be categorized, as it is exploring the importance of the international waterway and the proximity of the Danube River to the urban development of the city of Kovin. It uses the existing network of irrigation canals and ponds to connect the abandoned airport with the river and underwater coal mine. Also, we can include a work dealing with the analysis of the potentials of the agricultural land for the establishment of a food supply system for the needs of commodity reserves. By referring to the fact that the 20% of the Kovin population is working in the processing industry, the project proposes the solution for the enhancement of the transport, production, and storage of the food stocks.

2. Environmental aspect: this group analyzes works dealing with the idea of using existing natural resources of the site, such as arable land, water, wind, geothermal sources, for the design of the system and the way of exploitation, but also the solution of the hazardous situations that historically accompany the surrounding region (floods, fires). Additionally, such projects consider establishing a new public service, a firefighter's academy with the practice site, which addresses the frequency of fire in the summer period on the Balkan Peninsula and uses Kovin airport as a strategic place. Furthermore, in this group we could include a work that proposes a forming of a regional research center for the protection of rare plants and endangered species from the province of Vojvodina, transforming the occupied function of the airport into a public garden. By planning a network of indoor and outdoor green areas, the project transforms the abandoned airport into a public landscape for leisure, recreation, education, and art.

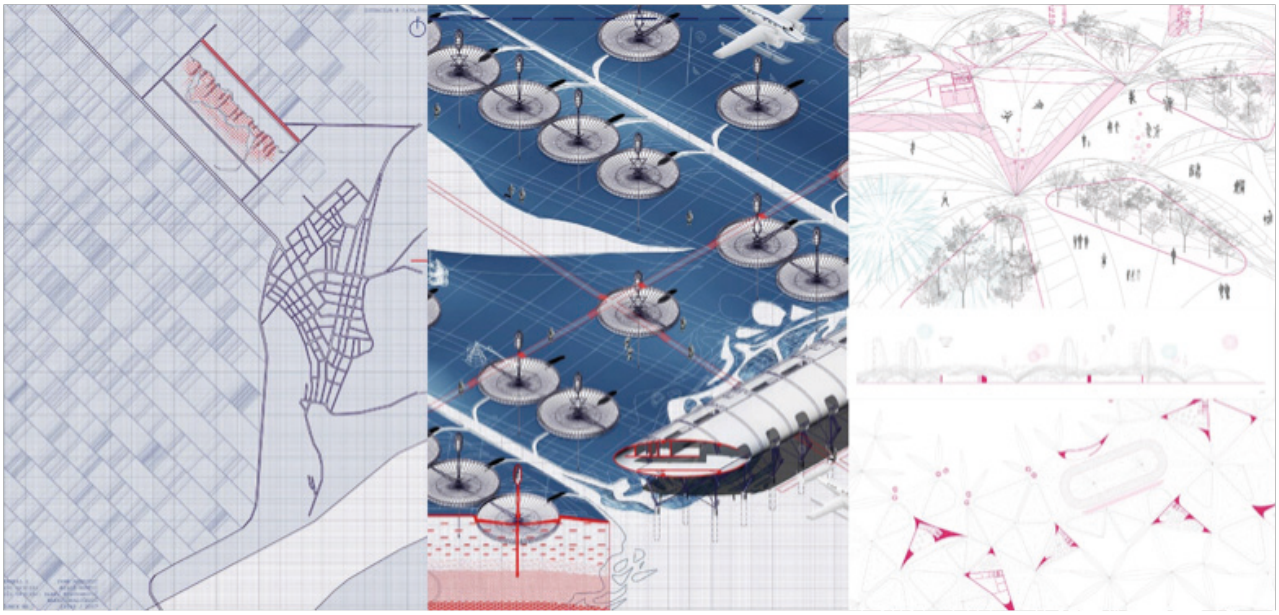

Fig. 10. Environmental studies and exploitation of resources (students: Dezire Tilinger, Dušica Pašić)

3. Cultural aspect: The projects which could be classified in this group base their research on the significance of the location for the local community and planning the activities that could directly affect the revival and integration of the airport into the life of the city. Works dealing with the research of historical layers of the site, starting from the remains of the Roman border town of Contra Magnum, through medieval fortifications and the History of the Banat military border, to the establishment of an open-air park with the recreational zone, referring to the Museum of Aviation in Belgrade. Also, these group of projects symbolically interprets the current political and social situation, transforming the airport into the reception centers for migrants, dealing with the issues of social housing and housing in transit. In these group, we could also classify the projects which are linking the transformation of this city fringe into a innovation and technological center, regarding the current IT industry and distribution of power. These models of development include a temporal dimension, proposing the successive sprawl of the urban areas, relating it to the growth of the nearby regional and national centers (Smederevo, Pančevo, Vršac, Belgrade).

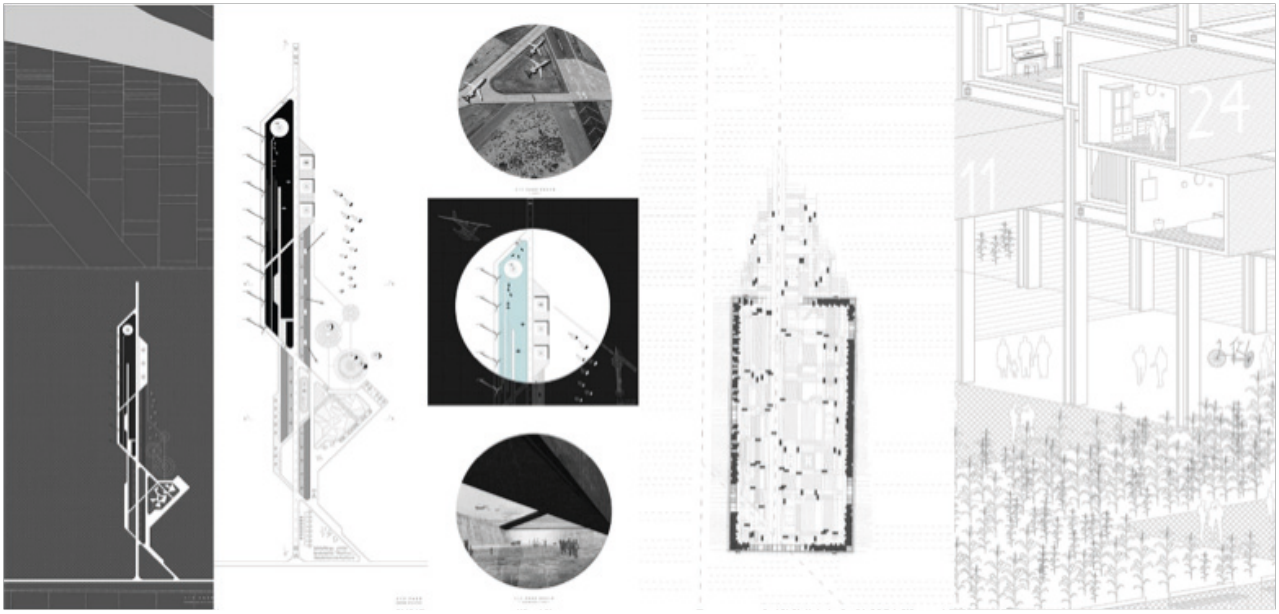

Fig. 11. Culutral redefinition of the airport (students: Danica Pavićević, Đorđe Đurica)

Conclusions

By analyzing the general characteristics of the problem of abandoned spaces of the city, the theory sets out the potentials that make them affirmative in the contemporary context. In addition to the aforementioned, taking into account the specificity of the analyzed area of the Kovin military airport, with emphasis on the characteristics of military architecture, the position in the peripheral part of the city and a strong ideological background, the method of research through the project reveals new possible roles of the analyzed infrastructure in the field of urban planning and the possibility of transformation of similar spaces in contemporary context.

Student works suggest the introduction of new public functions, which contribute to the use of the infrastructure potential of abandoned space and its redefinition. By comparing the student proposals, one can recognize the certain absence of limitations when it comes to relating the airport to its immediate surrounding. Since the current demographic trends imply that the current number of dwellers (33 722) is about to drop in the future, what should be further discussed is the sustainability of the projects which rely their program solely on the activities of the locals. Moreover, having in mind the proximity of two big civilian airports, in Belgrade and Timisoara (Romania), the projects which propose maintaining the original function should reexamine the economical aspect of such proposals according to the fluctuation of passengers on both airports.

On the other hand, projects which address the redefinition of this area as a wider public recreational zone, with the new public functions, should be further developed. Through integral planning, these projects link the leisure, tourism and innovation sectors in a way to redefine this indetermined area as an open space for its citizens, which offers them rich and versatile content. Furthermore, the projects having the local resources used for addressing the acute problem of hazardous situations, are at the same time raising the awareness of such situation and imply directions for future planning practices in the area.

In conclusion, the subject of work is not necessarily limited to exploring the local context of the Kovin settlement, but also defining the importance of the airport in relation to the wider region. Urban and architectural research of students is important as it in a pragmatic way questions the future conversion of military infrastructure, asking several important questions: meaning and treating the cultural heritage in a contemporary context, the importance and attitude towards the built and the natural environment, as well as the relationship of the former and current socio-cultural context through the research of the behaviour and the need of the user. Also this specific methodology that combines student projects with real life problems, such as abandoned military areas, could be used to develop various models for future interventions not only in Serbia but also on more regional level. Having in mind that the question of former military infrastructure is and its contemporary use is present in many countries in this region, these models could be of great use in future regional and urban planning.

Footnotes

(i) Lefebvre, H. (1996). *Writings on Cities*. Blackwell Publishers, Oxford.

(ii) Accidental heterotopias of suggestive antimodern heterogeneities index the failure of the cities past, Dawdy, S. L. (2010). "Clockpunk Anthropology and Ruins of Modernity". *Current Anthropology,* 51/6, 761-793.

(iii) Gottdiener, M. (2001). *The Theming of America: media fantasies and timed environments*, Colorado, Oxford OX2: Westview Press

(iv) Space as a material support of the time-defined social and space as neutral background through which the elements are moving. Castelss, M. (2009). "Prostor protoka, prostor mesta: Materijali za teoriju urbanizma informacionog doba". Further reading: Đokić, V., P. Bojanić (ur.). *Misliti grad*. Univerzitet u Beogradu – Arhitektonski fakultet, Beograd. 204-218.

(v) Borret, K: The Void as a Productive Concept for Urban Public Space. U: GUST (Ghent Urban Studies Team). The Urban Condition: Space, Community and the Self in the Contemporary Metropolis, GUST, Rotterdam 1999, 236-251.

(vi) De Sola-Morales Rubio, I: Terrain Vague. U: Davidson, C. (ur.). Anyplace. MIT Press, Cambridge 1995, 118-123.

(vii) Landry, Ch: The Art of City Making. Sterling, VA: Eartscan, London 2006. Spaces outside of the realm of public perception, as a free zone liberated from market and political demands become a freeground for the experimental thinking.

(viii) Foucault, M: Of the Other Spaces". Diacritics, 16/1, 22-27,1986.

(ix) Bachelard, G: The Poetics of Space, Orion Press :New York 1964. Defines a features of space through the relationship between man and specific perception of the space in memories.

(x) Edensor, T: Sensing the Ruin, Senses & Society, 2/2, 2007, 217-232.The spaces belonging to the past theorists define as palimpsest, spaces that incorporate time and carry multi-layered meanings.

(xi) Lefebvre, H: Writings on Cities, Blackwell Publishers, Oxford 1996.

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Foucault, M. (1986). Of the Other Spaces". Diacritics, 16/1, 22-27.

Gottdiener, M. (2001). The Theming of America: media fantasies and timed environments, Colorado, Oxford OX2: Westview Press (za njega gore pise da je 1997, al ja to ne mogu da nadjem u literaturi…ovo sam nasal pa promeni gore u 2001.)

Landry, Ch. (2006). The Art of City Making. Sterling, VA: Eartscan, London.

Lefevbre, H. (1996). Writings on Cities. Oxford UK, Cambridge, MA: Blackwell publishing.

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Illustration sources: Museum of Aviation, Faculty of Architecture – University of Belgrade (Student projects), Forum of the Former Yugoslav Army Members

TO PLAN AN AIRPORT DEVELOPMENT IN THE HEART OF A METROPOLITAN AREA – A CASE OF LONDON CITY AIRPORT'S CITY AIRPORT DEVELOPMENT PROGRAMME

Oscar Wong

Oscar Wong is an urban planner at London City Airport, assisting the delivery of the airport expansion scheme, City Airport Development Programme (CADP). Prior to joining CADP, Oscar worked at Transport for London (TfL) planning team, assessing major planning applications and providing policy inputs for city-regional and local policies. He achieved a distinction in MSc in Mega Infrastructure Planning, Appraisal and Delivery at the Bartlett School of Planning, UCL. In addition, he was involved in a UCL East campus research project led by the UCL Urban Lab and was selected as a Global Leadership Initiative (GIL) Fellow contributing to UN Habitat III conference and a researcher at the University of Sheffield. Through joining the ECTP-CEU young planner workshop, he hopes to share his experiences working on the airport expansion scheme and to exchange urban ideas with other planners from other practices, places and backgrounds.

Abstract

Airports are not just places for planes taking off and landing but the physical infrastructures themselves have extended into local businesses and urban developments with environmental impacts and social implications that evolve into metropolitan areas (Freestone, 2009). They are hugely spatially concentrated but multi-functional infrastructures that attract high levels of public attention and political interest (Bertonlini and Salet, 2007). Given these natures, they act as complex agents of change with critical implications on the surrounding context that evolve over time and space (Dimitriou et al, 2013). Airport developments therefore have always been controversial, raising critical conflicts between the wider economic benefits and the direct adverse social and environmental impacts to a locale (Cwerner et al, 2009).

To reduce the conflicts, this paper explores what role of planning plays in airport developments to help mitigate the adverse impacts and achieve some wider benefits, by employing a case of City Airport Development Programme (CADP) of the London City Airport, an airport expansion scheme in the heart of East London. Although the scheme has sparked controversy through its central location and the potential increase in aircraft noises and local traffic which leads to a refusal of planning decision in the first instance, many planning strategies that offer a strong case of economic growth as a catalyst of East London regeneration and a package of planning obligations and measures to adverse impacts gain a planning permission for the appeal scheme.

While airport developments are full of complexity with implications which go beyond the nature of a general urban development projects (Dimitriou, 2007), the scope of this paper highlights how planning helps minimise attrition in social and environmental disturbance to the surrounding context while maximising aircraft movements in the sky as well as other benefits for spatial development and mobilisation on the ground.

Contents

1. Introduction

1.1 Airports, Cities and Urban Developments

Airports are not just places for planes taking off and landing but the physical infrastructures themselves have extended into local businesses and urban developments with environmental impacts and social implications that evolve into metropolitan areas (Freestone, 2009).

> «Airports are not just nodes in the global network of flows; they are sites of major environmental impact that highlight the tension between international connectivity and local liability»
>
> Short (2004)

They are hugely spatially concentrated but multi-functional infrastructures that attract high levels of public attention and political interest (Bertonlini and Salet, 2007). Given these natures, they act as complex agents of change with critical implications on the surrounding context that evolve over time and space (Dimitriou et al, 2013). Airport developments therefore have always been controversial, raising critical conflicts between the wider economic benefits and the direct adverse social and environmental impacts to a locale (Cwerner et al, 2009).

1.2 Aims and Key Questions

To understand the value of spatial planning in metropolitan airport developments, it is crucial to start with the context of both the airport and the metropolitan area. The overall aim of this paper – is to clearly identify the opportunities and challenges of airport developments in spatial planning terms and how planning could add values to these opportunities and challenges – will lead to two main questions.

1. What are the key opportunities and challenges of an airport development in the heart of metropolitan area?
2. What are the roles of planning to maximise the opportunities and mitigate the challenges?

Finally, a concluding analysis will offer some key implications on how an airport development could be planned in the metropolitan area spatially and strategically.

1.3 Methodology

In order to promote a more thorough understanding of the planning roles in metropolitan airport developments, a brief literature review would help build a good foundation of knowledge around this topic. However, to get closer to the reality of the complex airport development, this article will employ a case study of London City Airport located in the heart of Royal Docks metropolitan area. Although it is acknowledged that the author has been involved in the delivery phase of the selected case study, two other research methods of documentation reviews and expert interviews will help remain the most possible objectiveness throughout the analysis. A wide range of approved documents as well as the details in the planning permission of the selected expansion scheme will be reviewed and analysed. Moreover, the expert interviews with professionals who are directly involved in the selected project will deepen the richness of the data and analysis.

2. Literature Review: Airport Developments in Metropolitan Areas

2.1 A Growing Demand of Airport Developments

In 21st century, air transport has been one of the world's most influential industries with a growing trend of air traffic demand (Kasarda, 2006). The growth in aviation activities has been steadily upward in recent decades, leading directly to a growing need of airport developments. Indeed, airports are 'space of flows' (Castells, 1996) that lead to the emergence of other airport hubs and reinforce global city status (Freestone, 2009). They reflect the attractiveness and importance of a city in the global rank of transport and communication (Hanley, 2004). They also facilitate tourism and business mobilisation by reducing restrictions on the movement of passengers and goods across borders, intensifying the development of social and economic networks with long-lasting effects (ATAG, 2014). As such, the majority of demands in airport developments rely on economic growth.

2.2 Perspectives – Airports in the Metropolitan Area

The trends of growing air traffic and airport developments have reinforced the significance of airports in their regional context, and the airports have now become central to the operation and development of metropolitan areas (O'Connor & Scott, 1992). The influence of airport access on urban structure has not been just in close physical proximity but also at metropolitan scale defined by time contours (Schaafsma et al, 2008). In addition, new aviation guiding philosophy is to make the airport a destination in its own right, which airport cities on extensive sites liberated from the physical constraints for further urban development growth opportunities (Freestone, 2009). As such, Brueckner (2003) rightly concludes that there is a strong correlation between metropolitan growth and aviation. Airports shapes business location and urban development (Kasarda, 2006). They have evolved through a typology of urban forms in concert with the rising demand for air travel accompanying urban population growth. This catalytic effect results in greater concentrations of job opportunities and business revenues (Banister and Berechman, 2001).

2.3 Opportunities and Challenges for Airport Developments

Since airports have major economic and spatial impact, they are seen as powerful economic stimulus where other non-airport developments are attracted to the surrounding of the airport because of their accessibility and prestige. Harris sees airports as the peripheral model of metropolitan areas, highlighting the new airport cluster alongside other new suburban forms such as shopping malls and corporate campuses. Many city and regional governments also see airports as prestige investments (Forsyth, 2007) because they are where the economies of conjunction are (Grets and Kasarda, 1997). Hall (2001) recognises the importance of airport in regional economic development that airport is key development catalyst as cities metamorphose into polycentric urban realms. The acknowledgement of wider spatial impacts through support for aviation related business clusters and the potential roles of airports in urban regeneration. With the growth of the neighbouring urban development, it would be beneficial to local communities through job creation and other business opportunities.

However, the dominant discourse in the aviation industry is growth, which underpins the advocacy of airport expansion. The new airport endorses the inevitability of an extensive sprawl and scatter pattern of land use development. It may present an unsustainable urban form, which intensifies already existing externalities of noise pollutions and traffic congestion locally. Like many other major infrastructure developments, classic Not in My Backyard (NIMBY) campaigns protest against the developments by targeting various local concerns such as the

increase in noise and the loss of biodiversity. These protests reflect the ambivalence between the global aviation growth and the local environmental concerns. A well-known NIMBY's protesting slogan, 'you fly we die' (Gifford et al, 2010) underlines their disappointments to the lack of mitigations. Therefore, the key challenge for both the planning authority and the airport developer in airport developments is to strike a balance between the needs of aviation growth and the living quality of the local residents (Faburel and Levy, 2009).

2.4 Airport Developments as Agents of Change

Major airport developments have multiple spatial, economic and environmental implications as agents of change (Dimitriou et al, 2013). They are large 'multi-functional' and spatially concentrated infrastructures (Bertonlini & Salet, 2007). At the national/trans-national level, the airport creates infrastructure hubs and nodes making cities become nationally and globally interconnected, which emerge what Castells (2000) calls the 'network society'. At local and regional level, the role of a key infrastructure hub facilitates some other wider objectives in almost every aspect of developments (Owen, 1964). However, Castells is concerned that cities are globally connected but locally disconnected given the local connections could be interrupted by the project delivery. His concern reflects airport developments may not necessarily achieve sustainable agents of change. Airports have experienced revolutionary change in their operational and strategic environments in the process. Therefore, the UK Town and Country Planning Association (2006) advise that airport development should be fully integrated into the planning and development of sustainable communities.

3. Case Study: The Context of London City Airport (LCY)

3.1 The Expansion Scheme: City Airport Development Programme (CADP)

The following analysis will employ a case study of London City Airport's expansion scheme, City Airport Development Programme (CADP). Although LCY has operated for 30 years, the first major recent expansion proposal of the airport was granted planning permission in 2009. With a growing aviation demand, the airport further proposed the CADP scheme with £480 million private investment comprising seven aircraft parking stands, an extended terminal building, a new eastern passenger pier and associated works on a platform (see figure 3.1.1). The CADP will enable up to 111,000 aircraft movements per annum and 6.5 million passengers to use the airport per year by 2025. It will benefit passengers' experience by offering new terminal facilities and facilitating a greater frequency of flights. It will also unlock the opportunity to accommodate quieter and more fuel-efficient 'next generation' aircraft. In addition, it will deliver potential direct contributions to the UK economy of £1.5 billion by 2023.

Figure 3.1.1 CADP Key Proposed Works

3.2 Geographical Context of LCY

LCY is the only airport actually located in London (see figure 3.2.1). It is in an urban setting, located in Royal Docks in London Borough of Newham (LBN) not far from two main central business centres (CBDs), just six miles from the City of London financial district and half that distance from the Canary Wharf banking hub. It is highly accessible and well connected directly by Dockland Light Railway (DLR) from 2009 and indirectly by Crossrail from 2018, connecting London Underground and wider national rail network. Alongside Excel exhibition Centre and Chinese Business Park, LCY and its surrounding areas have been identified as Royal Docks & Beckton Riverside Opportunity Area, where the Great London Authority (GLA) strategically target at delivering regeneration objectives including housing and employment opportunities. On one hand, because of the airport is located at the heart of the metropolitan area, it is pictured as a catalyst of regeneration on the East London map. On the other, because of its proximity to the residents, the airport requires a large number of essential mitigations to the adverse impacts. Hence, the geographical context of LCY itself has been both opportunities and challenges.

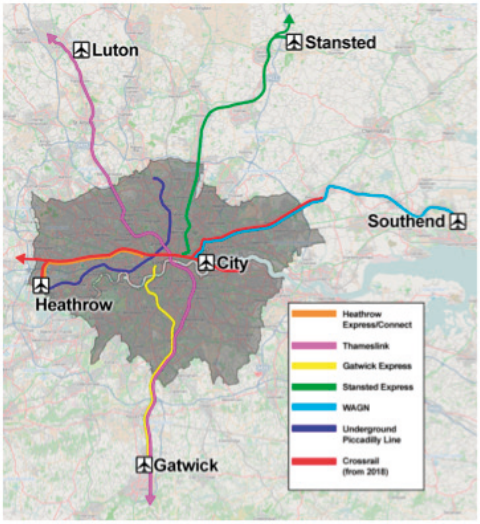

Figure 3.2.1 LCY is the only airport actually in London

Figure 3.2.2 the proximity to CBDs and other crucial urban developments

3.3 Political Context of CADP Proposal

Positioning at the sensitive location, the CADP expansion scheme was rather politically controversial. Despite a planning approval was recommended by the Local Planning Authority in February 2015, the decision was overturned in the following month by the former Mayor of London, Boris Johnson, principally on the ground of an increase in noise. During the mayoral election in 2016, the CADP proposal, particularly its environmental impacts, became a heated debate, causing much public attention. However, in the post-election, the succeed mayor, Sadiq Khan, approved the scheme on a basis of conditions to help limit the noise disturbance and other adverse impacts. CADP attracts high levels of public attention and political interest, which mirrors the high level of controversy and complexity around those planning and environmental challenges. It also reflects not only the significance of economic benefits, but also essentially the mitigations to adverse environmental impacts to the local communities.

3.4 The CADP Planning Permission

Given the sensitive location and complicated political context, the CADP permission include a high level of planning controls with 97 conditions and around 100 new obligations in the planning obligation agreements. One of the most powerful reasoning of the permission is that 'the significant socio-economic and employment benefits that would result from the proposal would outweigh the harm that the applicant has identified due to increased noise […], when taking account of the controls and mitigation that would be provided under planning conditions and the Section 106 Agreement' (CADP1 para26). There are two key points here: first, the CADP proposal demonstrated 'significant socio-economic and employment benefits; and two, the planning conditions and obligation agreements show adequate and appropriate controls that mitigates the harm. Therefore, by looking into the CADP, it may provide some useful findings

to answer the identified research questions – how planning maximise the opportunities and minimise the challenges in metropolitan airport developments.

4 Analysis

4.1 CADP as Agents of Change

The objectives of CADP are to improve connectivity with new destinations and increase its current passenger capacity by upgrading the airport infrastructures and overcoming existing infrastructure constraints. It is estimated that the benefits to the wider national and global network and connection would be significant. By employing Castells's (2000) holistic view, when LCY is nationally and trans-nationally connected to more new destinations in Europe and beyond, it links up a wider and stronger 'network society'. Nonetheless, although LCY is a relatively small airport in terms of its scale and size, it is spatially concentrated and multi-functional infrastructure that will offer more jobs and business opportunities in the region and will unlock the regeneration opportunities in East London. In the socio-economic sense, LCY plays as an agent of change that connects cities regionally and globally.

However, CADP will possibly increase the noise level and air pollution, implying that some local residents may become 'losers' in the changing context. These local concerns of negative environmental impacts attract high levels of public attention and political interest (Bertonlini and Salet, 2007). Given these natures, the airport act as a complex agent of change with critical implications on the surrounding context that evolve over time and space (Dimitriou et al, 2013). As such, LCY has become a place where global and local interests interact, the further growth desire of CADP has also become controversial, raising critical conflicts between the wider socio-economic benefits and the direct adverse environmental impacts to a locale (Cwerner et al, 2009).

4.2 Maximising the Opportunities

Localised Planning Focus - Local Employment and Procurement

The planning process of development management reflects the UK planning principle of localism and ensures local stakeholders are not isolated from the decision-making. During the pre-application, the local planning authority, LBN, emphasised the importance of local employment opportunities. The provision of employment opportunities is essential to all local residents and the wider ambitions of the regeneration in East London. According to York Aviation, a report projected that the CADP will provide approximately 2,100 jobs, which strongly support the local economy and urban regeneration process. To secure these opportunities for the local residents, LCY takes initiatives to provide jobs to LBN residents as agreed in the planning obligation. LCY is committed to achieve a target of 50% of job provision for LBN residents. Moreover, a new employment Partnership Board between LBN and LCY was established to work jointly to deliver the initiatives and increase employment opportunities for Newham residents. The Mayor of London Sadiq Khan commented that the expansion would bring «much-needed new employment» to the area (Evening Standard, 2016). It is the planning agreements, which drive the delivery of the aspiration and associated targets to share the economic benefits with the local residents. Furthermore, LCY is committed to create more business opportunities specifically for local businesses as committed in the planning obligation agreement. For example, LCY held 'Meet the Buyer event' to connect large national buying organisations with local businesses in the area. As evidenced in a large number of S106, the power of planning regulations ensure that the local stakeholders could be part of the CADP delivery process and share the success of development outcomes.

Strategic Planning - Catalyst of East London Regeneration

LCY is a major infrastructure hub, but it also functions as a catalyst of other urban developments. Other developments especially office buildings and regional corporate headquarters may benefit from the proximity of the airport as an international gateway. In the case of LCY, apart from the existing strong links between the previously mentioned CBDs and the airport, the proximity to the airport help justify many business cases of commercial developments in the Royal Docks Opportunity Area (OA). One of the best examples would be the Advanced Business Parks (ABP) development at Royal Albert Dock. Alongside the Excel Exhibition Centre and many proposed hotels developments, these urban developments form a cluster of Royal Dock Enterprise Zone, which is anticipated to achieve a 'new business heart' in East London. Airport proximity is a magnet for businesses which operations require frequent inter-city travel to do face-to-face meetings (Freestone, 2009). The airport in this sense helps encourage the investment in the Enterprise Zone with surrounds the site. As such, the CADP reflects the role of the airport as economic stimulus to 'render development to a large surrounding hinterland' (Sit, 2014). The significance of airport development perhaps is to bring all other urban development projects forward and together. From a higher-level strategic planning perspective, the further growth of the airport also accelerates the progress of urban regeneration in East London by attracting more developments and associate business opportunities to the region. More importantly, these additional businesses would offer employment opportunities that help realistically deliver homes to meet the OA Planning Framework's housing target. Therefore, Jo Johnson, Minister for London and Minister of State for Transport, quite rightly articulates that LCY will play a key role in serving growth in East London.

Strong Mobility – Connection to the Wider Public Transport Network

Having understood the significance of strategic planning in urban regeneration, strategic transport planning has reinforced the connection between the 'airport door' and the city. LCY has been keen to enhance the accessibility of the airport particularly in public transport. This results in the highest proportion of passenger public transport use of 68% in 2017 compared to other airports around Greater London. The high percentage use of public transport should ascribe to the Dockland Light Railway (DRL), which was extended to LCY before the CADP proposal (see travel time to and from LCY in 4.2.1). LCY is keen to enhance the DLR service by agreeing a planning obligation payment of £5.6 million in the CADP S106 agreement. The head of Transport Planning from LCY also reveals that the airport desires to lobby Crossrail for an additional stop at a new Slivertown Station, which would have been beneficial to the airport passengers as well as future residents in the new housing developments in Slivertown Quay. As a result, CADP, in line with London Plan Policy 6.6, aces in promoting access to the airport by sustainable transport modes.

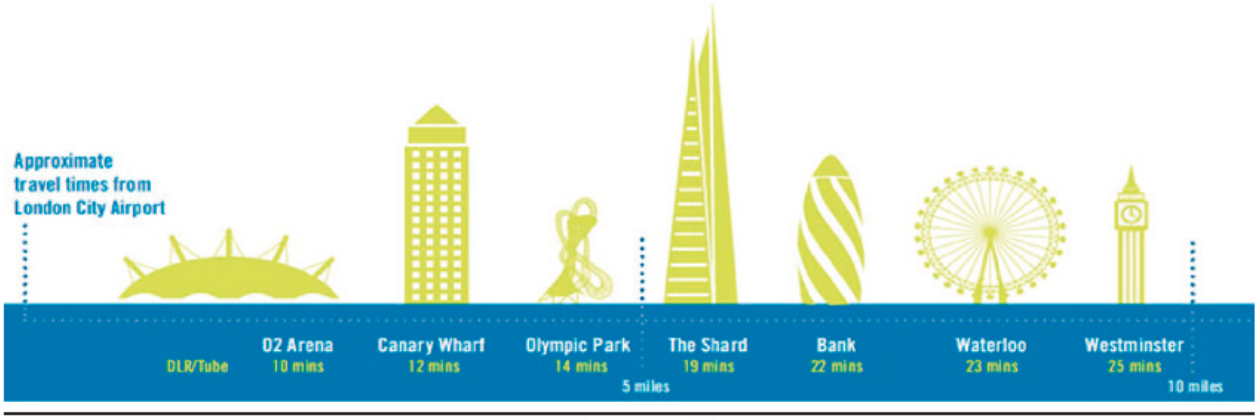

Figure 4.2.1 Travel Time to and from LCY

In addition to the connection to the rail network, the CADP also proposes to enhance its alternative sustainable transport modes in achieving to become one of the 'greenest' airports in the country. LCY promotes walking and cycling by working with the city and local government on delivering cycling enhancement studies and schemes. In line with Mayoral and Local transport planning policies, the airport is committed to increase the number of cycling parking spaces at various accessible locations. Moreover, it will provide an adequate number of Electric Vehicle Charging Points in supporting the use of electric vehicles. The CADP itself has also been a prime opportunity for redesigning the forecourt areas where provide a more open and inclusive public realm.

4.3 Mitigations to the Challenges

An Inclusive Stakeholder Participation Process

In any major infrastructure projects, the oppositions from NIMBY campaigns have always been a key challenge - CAPD is not an exemption. Given the sensitive geographical and political context, planners have been mindful in considering all stakeholders especially local communities throughout the whole planning and development process. One of the most efficient ways to achieve this is to be as transparent as possible and to share all possible and available information. Since the 2009 planning permission, LCY has funded a full-time Airport Monitoring Officer (AMO) employed with the local planning authority to oversee the planning compliance with the planning obligation agreement and the planning permission. Furthermore, to demonstrate that LCY is a responsible and responsible neighbour, LCY has also invested extensive resources to share the most relevant information and prepare Annual Performance Reports so that the public would be able to access to the relevant information monitoring the airport development. The availability of the data reflects the transparency of the airport performance. In addition, there is an independent committee panel, London City Airport Consultative Committee, which provide an inclusive and interactive platform to discuss all airport planning and development matters (LCACC, 2018). Although these measures may not fundamentally shift the position of NIMBY from against to support the project, the core principle of inclusive planning here plays a crucial communicative role by providing a platform for discussions and better understanding NIMBY's concerns, and hence to help deliver the most appropriate mitigation measures to the affected residents.

Planning Compliance to Mitigate Adverse Impacts

Given LCY is at the heart of the metropolitan areas and its proximity to the local residents, the adverse environmental impacts have always been the most challenging constraint to the development scheme. The NIMBY campaigns fight against the CADP mainly on the ground of increase in noise level, which form the key reasoning of the first CADP planning refusal in March 2016. The airport demonstrated that they will use reasonable endeavours to limit noise levels and offer additional protections of noise for local residents.

The airport had made significant effort in lower the noise disruption to local residents. Appropriate mitigation measures have been agreed and secured by a number of overall 97 planning conditions and over 100 planning obligation commitments including limitations on aircraft noise and ground engine running noise. These planning agreements secure many innovative methods of noise management such as the Aircraft Noise Categorisation Scheme (ANCS). The ANCS uses manufacturers' independently assessed noise certification data to categorise each aircraft, which will mirror the approach adopted by other UK airports to control noise at night. As LCY does not operate night flights, it will become the first UK airport to adopt this method for daytime flights. No noisier aircraft then currently operate at the Airport will be allowed to do so in the future under the ANCS. These regulations reflect the value of planning that they legally enforce the airport to deliver the adequate and appropriate mitigation measures.

Nonetheless, the CADP will indeed enhance the airport's capacity to a maximum 6.5 million of passengers per year. It will enable the airport to accommodate the new generation of quieter aircraft by offering a new taxiway and larger aircraft stands. LCY required airlines to discontinue the operation of old and noisy aircraft. For example, the old RJ100 will be replaced by the new CS100, which is quieter and more fuel-efficient. It is anticipated that quieter aircraft will replace the noisy and old aircrafts such as E190. Therefore, aircrafts are, in fact, technologically quieter and less polluting than their predecessors are. Although it could arguable that these improvements are being offset by the escalating growth in air travel (Graham and Shaw, 2008), the airport is committed to deliver further mitigation measures such as Sound Insulation Scheme (SIS) to protect residents from the increasing noise level. The SIS provides noise reduction to the nearby households where eligible dwellings will be installed with additional glazing and mechanical ventilation equipment to minimise the noise impacts. Although it is indeed local residents may experience the increasing noise level if they refuse the SIS offers, the value of planning is to provide appropriate mitigations and to minimise the adverse impacts to those affected.

The Delivery of Sustainable Strategies and Action Plans through Planning

The CADP is an opportunity to motivate the LCY business as a whole to work towards the goal of the 'green airport'. As LCY has been in operation in East London for 30 years, many facilities and regulations are not up-to-date in fulfilling the progressive aspiration of operating a sustainable airport. Apart from the proposed larger aircraft stands that will accommodate new aircrafts, a number of environmental action plans and strategies have been carried out by the planning agreements. For example, the Sustainable and Biodiversity Strategy (Condition 56) targets to achieve and maintain Level 4 – Carbon Neutrality by 2020 seeking to reduce its climate impacts. In fact, aviation is the first industry to seek to achieve carbon–neutral growth (IATA, 2013). In conjunction with other plans and strategies secured in the planning conditions, these help minimise any negative environmental impacts for local citizens as a mean of environmental protection. Airports are complex infrastructures that rely on many small steps of plans, actions and

measures to achieve a more sustainable future of growth. As such, planning compliance can be seen a driver of making commitments and targets happen, which slowly but progressively lead the airport going towards sustainable goals.

4.4. Implications – The Importance of Planning

In the case of LCY, the role of planning has been particularly crucial in demonstrating the airport as a reasonable neighbour by sharing the success of the airport with the local communities and delivering appropriate mitigations to the adverse impacts. Some key implications have been emerged reflecting some crucial role of planning in balancing the maximisation of growth and the minimisation of adverse impacts:

1. **Strategic planning** – Airport development does not only require robust aviation strategy and wider economic benefits, but it also requires spatial planning strategies to integrate the infrastructure hub into the existing urban areas.

- Functioning as a catalyst of urban regeneration in the metropolitan area;
- Embracing localism as a planning principle;
- Communicating with all stakeholders throughout the planning process.

2. **Strong Mobility** – Given LCY is located in the urban setting and at the heart of the metropolitan, it is essential to provide the connection to public transport. DLR and its connection with the wider London Underground network has been a key to enhance the accessibility to the airport.

- Enhancing the use of public transport;
- Providing financial obligation to public transport connection;
- Investigating options and investing in connecting the airport to a wider rail network and more direct transport infrastructure.

3. **Environmental Mitigations** – Urban development and growth will inevitably create adverse environmental impacts. The key here is to provide mitigation measures and minimise the adverse impacts.

- Enforcing commitments to various environmental action plans secured by planning conditions;
- Adopting appropriate measures to mitigate adverse environmental impacts to local residents;
- Providing available information and being transparent.

Taking account of the complex context of LCY, although the airport development itself is controversial, planning add essential values to help maximise the opportunities through strategic planning and minimise the adverse impacts through planning regulations. The analysis does not imply whether the CADP has been successful or not. Instead, by reviewing various approved planning documents and interviewing with planning professionals, it outlines a number of planning strategies and mitigation measures, reflecting the role and value of planning in airport developments in metropolitan areas.

5. Conclusion

Airports not only represent the 'network society' that connect people, places and businesses (Kasarda and Linsdays, 2011), but they are also engines for local and regional urban developments (Freestone and Baker, 2011; Upham et al, 2003). In metropolitan areas, airports need to be strategically planned as a catalyst for wider regional urban development to unlock various associated opportunities particularly in business and employment at a local level. Instead of developing the airport on its own, strategically connecting the infrastructure hubs to the city via sustainable transport modes would be equally important to unlock the wider socio-economic benefits on a city and regional level. However, in the majority of metropolitan areas, the proximity to the local residents would be a key challenge to deliver the airport development because of a number of environmental challenges including noise and air quality constraints. Therefore, the airport developers should embrace the core planning principle of localism that share economic benefits with the local citizens and provide appropriate mitigation measures to the local residents.

In the case of LCY, the CADP expansion scheme demonstrated the key opportunities and challenges of an airport development in the heart of metropolitan area. LCY acts as a catalyst to bring forward other urban developments, leading a clear progression in regeneration in the Opportunity Area and a successful boost of investments in the Enterprise Zone. With a clear sustainable transport vision, the airport joins up the city via the strong public transport connections, maximising its geographical strength of locating at the heart of East London. Although, like other major infrastructure development, there have been protests against the CADP particularly concerning the increasing noise level, a considerable number of mitigation measures and action plans has been secured by the planning agreement and enforced by the Airport Monitoring Officer and of course by the existing strong planning regulations. The role of planning in CADP has been vital that it facilities the delivery of socio-economic benefits to both local and wider context and the protection to the local citizens from adverse environmental impacts.

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FROM ZERO TO HERO: RE-THINKING THE CURRENT SITUATION AND HOW SMART WAYS OF PUBLIC TRANSPORTATION FROM THE METROPOLITAN AREA TO THE BUD AIRPORT CAN BE IMPROVED

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Boglárka Pécsi

Bálint Vara

1. Introduction

One of the fastest growing transport sectors in the 21st century is aviation. This tendency can also be examined in our city's Budapest Liszt Ferenc International Airport. This essay is based on our own research. The purpose of this study is to present the current situation and its insufficiency and to highlight the future possibilities of a more sustainable way of public transportation. The main problem is that the passengers' demand does not meet the service providers' supply. To the above mentioned issues we have used forms asking passengers about their habits of reaching the airport. To show the results of the questionnaire we have made several maps and graphics. An interview has been initiated with the BKK (Budapest Public Transportation Company), and with a transportation expert, who is also the former leader of BKK, to get an insight to the service providers' side. According to the responders, the following major inadequacies came to light. The frequency of the vehicles is not sufficient, the countryside is not connected to the main traffic hubs of the city, the Buda side is not represented in the public transportation reaching the airport. Passengers promote the idea of the extention of the subway and the railway line to the airport. To fulfill the idea of smart mobility, the changing in the mentality of the people towards a more shared transportation is also needed (carsharing, public transportation). To sum up: Common thinking can create better ways of future transport.

2. Context

Budapest, and Budapest Airport itself represents an outstanding importance of aviation from Hungarian perspective. The Budapest Airport was built during two years, in 1942-1943 for multifunctional purposes: on one side for military, and the other side for commercial aviation. As a result of massive destruction during World War II the whole airport needed to be rebuilt in 1950, but this time only for civil usage. Since then it has become the main airport in the country for international travelling. In 1950 the number of passengers per year was 49 955 (bud.hu, 2018), to the year 2017 it has grown to 369 901.(Ksh.hu, 2018)The metropolitan area around the Budapest Airport is set up of Budapest, the Budapest Airport and the agglomeration of Budapest, that consists of 81 settlements. In the form we made 17 are mentioned. From the centre point of Budapest (47.498427, 19.040463) the distance to the airport is 20 kms, the distances from different settlements of the agglomeration are moving on a scale from 10 to 40 kilometres. When Budapest Airport was established the only route by which it was accessible from the city centre was route number 4, but as time passed by a lot changed.

Fig.1.: Budapest Airport (Property-Forum.eu, 2018)

Today there are several additional options to reach the airport, but the accessibility is varied according to the passengers location. From the metropolitan area the only opportunity to reach the airport by public transportation is to get inside the administrative boundary of Budapest first, where passengers can find traffic junctions connecting to airport lines. If we only observe the capital city, public transportation service BKK (Budapesti Közlekedési Központ) is the only service provider. Passengers can get access by bus direct (line 100E), with a combination of metro and bus (metro line 3 + bus line 200E).The airport also accessible by taxi, by airport shuttle microbuses, or by car.

The challenges that the metropolitan area faces are coming from three facts that are representing the current situation. The first one is that the condition of infrastructure leading to the airport is deteriorating. Route number 4, which was mentioned above, is densely covered with potholes. Metro line 3, to which one of the two airport buses go to has been running for 48 years. The rail, the subway trains and the stops are in a bad condition, but it is under reconstruction at the moment.The second issue is the descending quality of public transportation services; the partly aging public transportation vehicle park and lack of capacity.

The final issue that makes the public transportation non-sustainable is that the demand of passengers and the supply from the side of public transportation service provider do not meet.

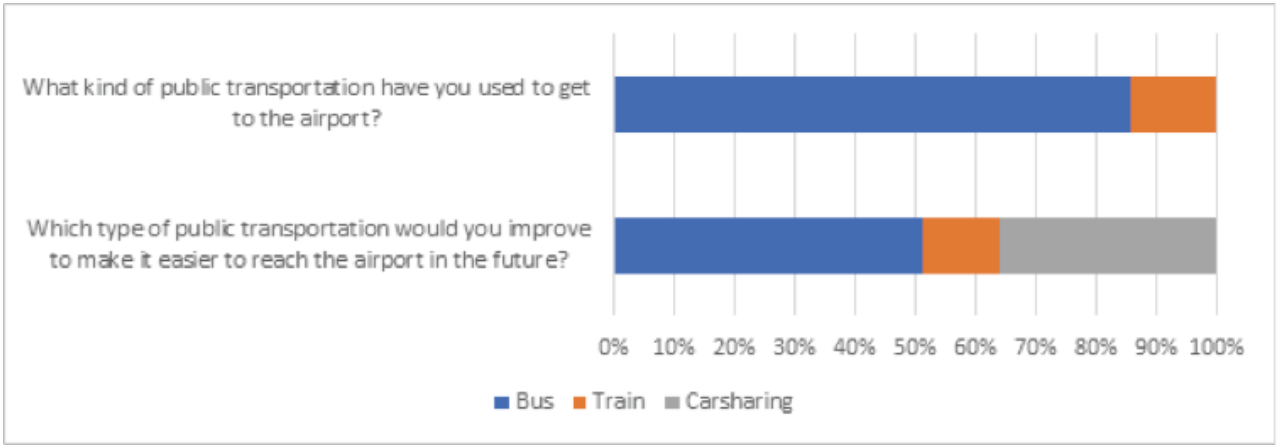


Fig.2.: Transportation usage and improvement needs of passengers (own form)

The figure shows the way of transportation the passengers choose. It is clearly visible that nearly 90% decide to go by bus, as this is the most accessible method of travelling to the airport. The second bar shows that if the same people could decide what to improve, 36 % of them would definitely develop the accessibility of carsharing services.

Though it has several challenges to beat, there could be also found future opportunities for smart ways of public transportation from the metropolitan area to the BUD airport. Just as the passengers feel the absence of a carsharing service available to the airport, do the MOL too (Hungarian multinational oil and gas company). Fortunately, they scheduled the implementation of their carsharing service, MOL Limo, to the airport as well, by spreading the coverage of the service till the end of the third quarter of 2018.(e-cars.hu, 2018)

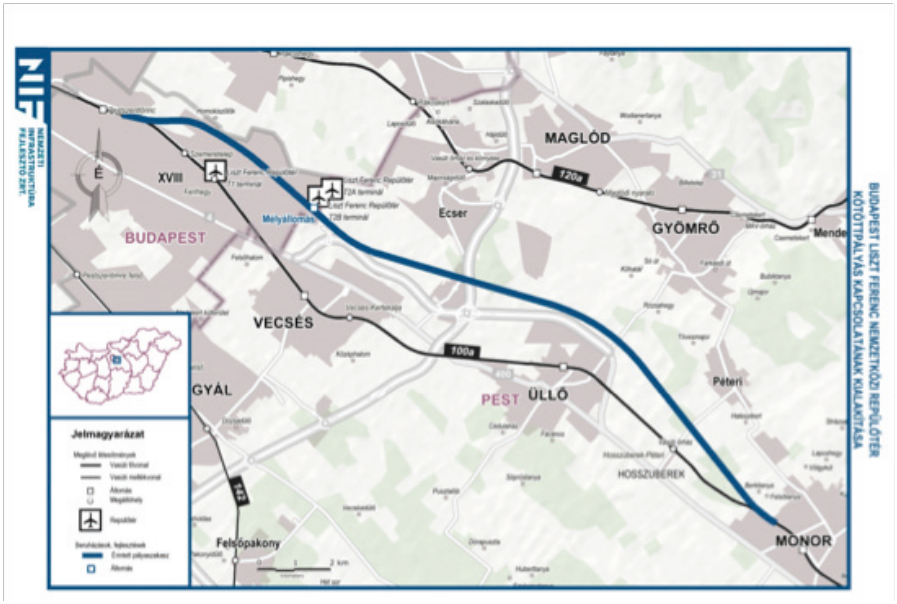


Fig. 3.: Plans of the direct railway line to Budapest Airport (Nif.hu, 2018)

Further opportunity for improvement is to densify the available patches, and to add an additional stop at Astoria to the bus network. The last, but not least an outstandingly important change that should be done is to extend the railway line to reach the airport(Vitézy, D. 2018). This means an approximately 21,9 km of extention. For this there is an existing plan by NIF (Hungarian Infrastructure Developer Ltd.), that is under preparation right now. (Nif.hu, 2018)

3. Subject Description

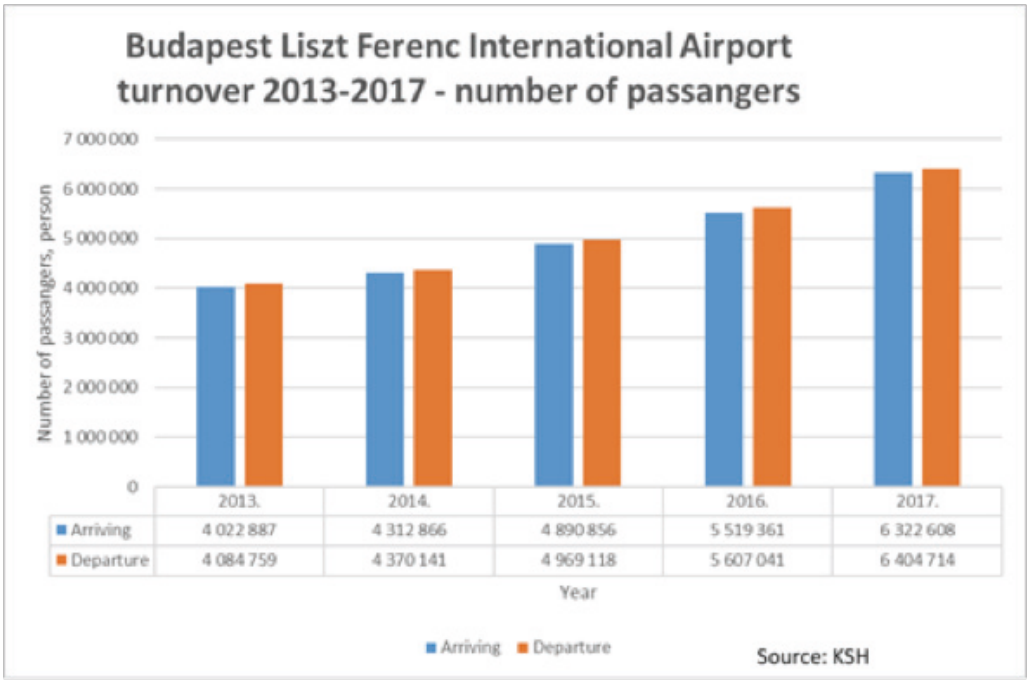


Fig.4.: Source: Own Form

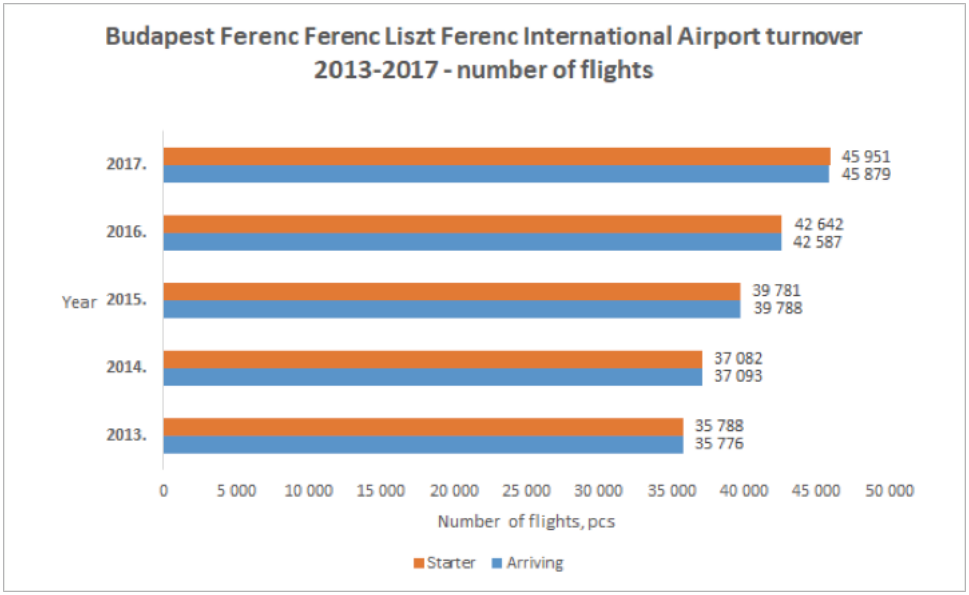


Fig.5.: Source: Own Form

In our modern word the role of aviation is ever growing, and the increase in passenger numbers are having a notable impact on traditional transportation methods. This results in a need to both increase capacities on the ground and to look for new, innovative solutions for the passenger traffic. The topic of our research is the Hungarian capital and its relationship with its downtown. We choose it for its relevancy: the BUD airport traffic over 4 years grew by 56%, and with the upcoming infrastructure investments this growth is expected to continue uninterrupted. It is important to note that the increase in flight numbers was only 28%, which means the efficiency of the airport saw a significant raise. To address the increased air traffic during the 2017 World Aquatics Championships temporary an express bus connection was commissioned, which due to its popularity and efficiency became a permanent option, but on its own it cannot address the growing passenger traffic.

One important aspect of public transportation is the quality of the service, but without proper investment in its current form the road network cannot provide a fast and unhindered answer. In the capital the main road to the airport is road No. 4, which has in its middle a separated lane for the direct traffic, but the quality of the road is lacking and a renovation is long overdue. Another issue is that since the high speed segment of the road is separated with a barrier from the rest any accident in it can cause a traffic jam, rendering the road almost useless. The 100E bus, which is another cornerstone of public transportation to the airport got very popular right after its commission, making it overcrowded and sparsely departing to be considered high quality.

In 2017 September the bus had a daily traffic of 2700-2800 person, which in short notice grew to 3500-3800, peaking over 5000 person at special occasions. To address the growth the initial 30 minute departure times were lowered to

20, but that was a partial solution. (index.hu, 2018) Dávid Vitézy the chairman of BKK between 2010 and 2014 during interviews stated that there is a need for further interventions and more travel options to solve the situation. One such project is it's in planning phase, which aims follow the example of other European cities and construct a train station under the airport, which will provide fast and convenient connections to the downtown and other transportation hubs. The problem that this projects is at least 5 or 6 years from realization, and until then changes in the bus lines is the only way to address the connectivity issue as a temporary fix. In the long run with the ever growing passenger numbers it is clear that the train station is the only efficient solution, making it an even more crucial project. (Vitézy, 2018)

4. Analysis

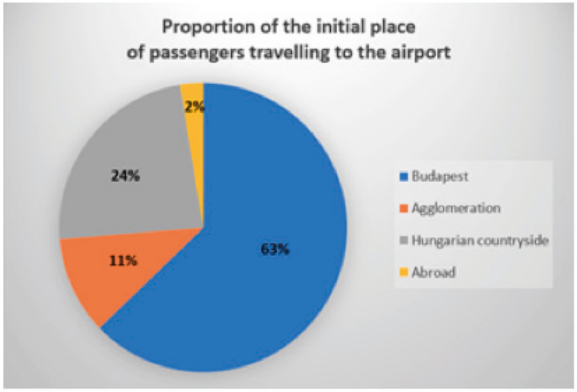
4.1 Evaluating BUD Airport public transportation from the customers' side

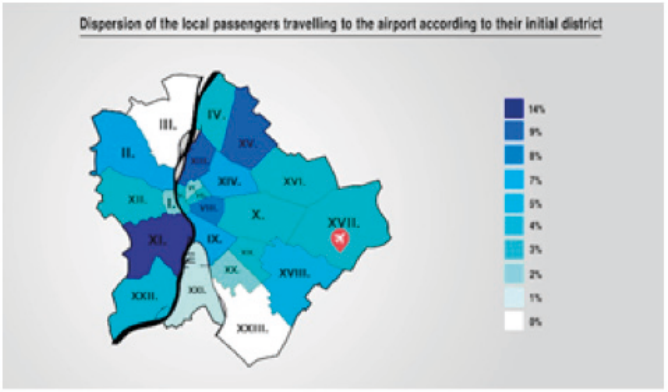
Airplanes have become one of the most popular ways of transportation to abroad. As tourism has been increasing, students study far away from their home countries, business people travel to meetings and for many other reasons the number of passengers has been growing from year to year. The charts below show the user side of this process. Our group of three have made our own research. This consists of a form among the travellers using the Budapest Liszt Ferenc Airport (BUD), maps, interviews and eventually we finished the research with a qualitative analysis.

The form shows that approximately 40% of the passengers use the BUD airport once or twice a year, around 30% three times, 15-20% four or five times. About 23% visit the airport six to 10 times a year, and 3% more than ten times. We can assume that the people travelling to the airport more than five times a year are probably airport workers (indicated by the fact that several respondents visit the BUD airport more than a hundred times yearly).

Asking the passengers about their initial place we can state that more than 70% of them are coming from the Budapest Metropolitan Area. 24% of them are from the Hungarian countryside and around 2% is from abroad. From the 74% coming from the metropolitan area, 11% is from the surroundings of the city, and 63% comes from Budapest directly.

The dispersion of the local passengers is shown on the map below. The main initial districts are on the north and on the Buda side. Unfortunately there is no direct route from the Buda side to the BUD airport although there would be a demand.





Most of the passengers travel by buses or cars (31-31%) to get to the airport. Also a significant amount of them uses the underground. Fewer people (7-7%) travel by train or taxi, and only 1-2% of the passengers tried carsharing airport transfer or other options. The reason why people use different types of transportation is the following: The most important factor is the price. The cheaper ways are buses, trains and subways. The demand of comfort is fulfilled by cars and taxis. Cars, taxis and trains are chosen because they are fast. Availability appears at carsharing, which means that this is a flexible way of transport. Sustainability is not the most important factor, but if yes, then it is the underground for the passengers.

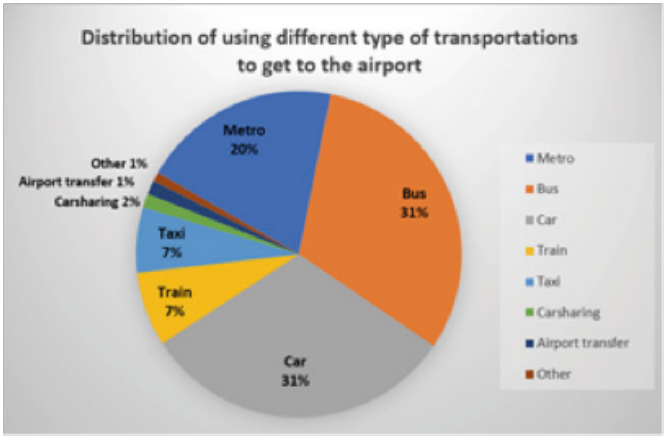


Fig.8.: Source: Own Form

The quality of the ways of transport has been evaluated on a 1 to 5 scale where 5 is the best. People travelling by taxi have the best experience (4.43), followed by carsharing and subway (4.25). Using car (4.14) or train is less popular (4.08)

and the bus is the least preferred (3.48) - through by public transportation this is the only direct way of reaching the airport right now.

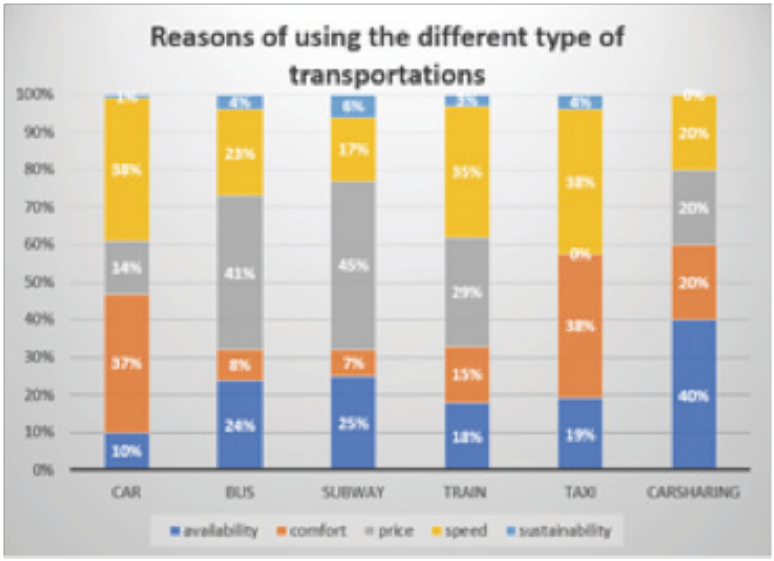


Fig.9.: Source: Own Form

Further answers of the questionnaire show that more than 70% of the passengers have tried public transportation to get to the airport, and from them around 80% would chose this way to arrive there again. About the accessibility of the airport, we can state, that although 82% of the passengers have heard about bus number 100E, only 21% of them use it. This means that the advertisement of bus 100E could be improved. Furthermore, carsharing has a bright future as flexibility gained popularity among the passengers.

We have also been thinking about future possibilities to improve the accessibility of the BUD airport by public transportation. Therefore we have asked the passengers, where an ideal end station of a hypothetical new future airport bus would be. The places of the end stations can be seen on the two maps and the reasons why they have chosen it are shown on the picture below. The most important argument was-as said above- that the new station should be next to significant transport hubs. Around 33% of the passengers advised this option and 22% of them want the new bus to make connection with the countryside. Also a lot of them thought that a connection with the Buda side and with the underground should be built and that it would also be essential to reduce the number of transfers by the new line. About 10% of the passengers wanted the bus to stop near their home. We have given the title to this option with a latin quote, meaning everyone is pursuing their own benefit. 8% emphasizes the international connection and a

few people (3-3%) would improve the connection with the night transportation of pick the places of the new stations so that they can cover the city.

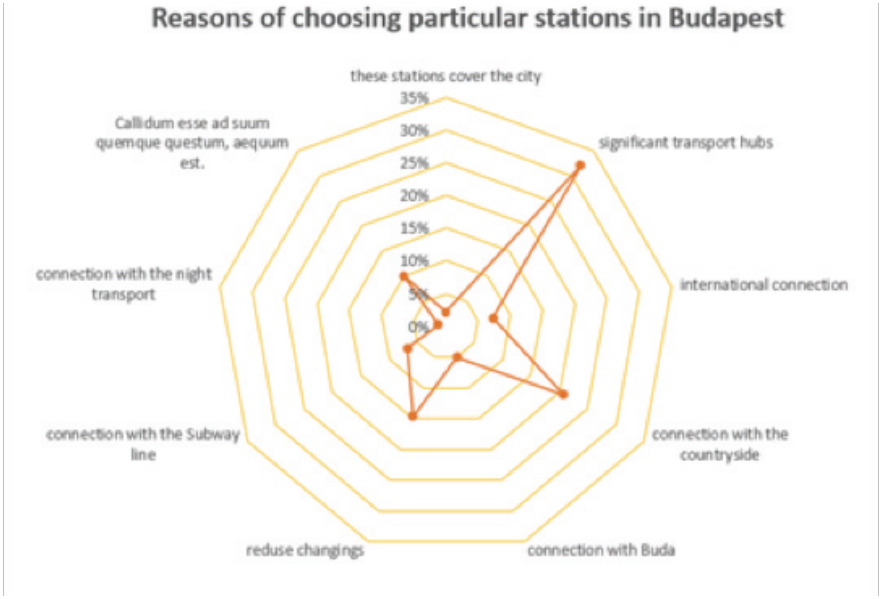


Fig.10.: Source: Own Form

4.2 Evaluating BUD Airport public transportation from the service providers' side

The BKK which runs the capital city's public transportation and the MÁV (Hungarian National Rail) provide three options to reach the airport. Between the available options there is one bus line by which passengers must transfer from metro line three or transfer from a railway station laying next to its track. Besides, last July they released an airport express bus which is the easiest way to travel to the airport without transfer.This bus, called 100E, is the most important element of the network. It departs at Deak square, which is one of the biggest public transportation junctions in Budapest. Three of the four subway lines in the city are accessible from there. Two of them are the longest and mostly used lines: M2 and M3. These lines are providing accessibility to the biggest bus and railway stations, which are collecting all arriving passengers from the countryside, due to the centralised structure of Hungarian railways. Considering their location they are also in the soul of the downtown, but in different dispositions of the city.

As the table shows one of the three stops of 100E is located at Kalvin square, from where travel time is about 35-55 minutes, which is the fastest available option to get to the airport without transfer.

Traffic hub	Distance	Metro line	Airport bus		car	Difference
			200E	100E		
Keleti pályaudvar	20,1 km	M2	59	50	31	19
Déli pályaudvar	23 km	M2	62	50	38	12
Nyugati pályaudvar	22,1 km	M3	56	48	41	7
Széll Kálmán tér	23,9 km	M2	60	48	41	7
Népliget	16,2 km	M3	41	no data	20	21
Kelenföld pályaudvar	23,2 km	M4	60	49	39	10
Örs vezér tere	16,8 km	M2	59	58	27	31
Puskás Ferenc stadion	19,4 km	M2	59	no data	28	31
Újbuda központ	21 km	M4	59	55	31	24
Árpád híd	24,8 km	M3	63	57	38	19
Boráros tér	19,2 km	-	57	63	28	29
Közvágóhíd	19 km	-	56	63	28	28
Kálvin tér	19,8 km	M3, M4	no data	32	35	-3
Kőbánya-Kispest	12,1 km	M3	29	no data	14	15
Oktogon	21,3 km	M1	60	50	38	12
Kossuth Lajos tér	22,2 km	M2	58	45	42	3
Jászai Mari tér	23,7 km	-	58	50	39	11

Fig.11.: The difference between car and public transport options at 2 pm

- First column: the biggest traffic hubs in Budapest
- Second column: the distance between this point and the airport in km
- Third column: what metro line is available here
- Fourth column: the distance between this point and the airport in time with 200E airport bus
- Fifth column: the distance between this point and the airport in time with 100E airport bus
- Sixth column: the distance between this point and the airport in time with car
- Seventh column: the difference between the fastest public transport and car in time

Source of data: maps.google traffic datas, and futar.bkk.hu (public transport planner application)

The second bus line, which have been available for decades under different names, is bus 200E. It is not an express version, it was designed to serve the local needs next to the speedway leading to the airport. It has a connection to M3 metro line at its departure station located in Kőbánya-Kispest. As a result of a huge amount of stops, bad route quality and heavy traffic in average, the line greatly suffers from lack of speed, offering practically the same travel time as the 100E, despite being 4.3 km closer to the airport.
The third option is situated along the 100a railway line, which is a station called Ferihegy (Terminal 1), that was built to divert airport traffic generated by T1, but with the shutting down of it six years ago it has been rendered obsolete. Now to reach the operating terminal(T2) by train a person has to change at this station to the aforementioned 200E bus, which has a bus stop located there. The viability with this direct train connection between the airport and Nyugati railway station with its 20-25 minute traveling time was significant, but as the railway doesn't reach the airport, and T1 was closed, furthermore passengers need to change to bus, this advantage is all but gone.

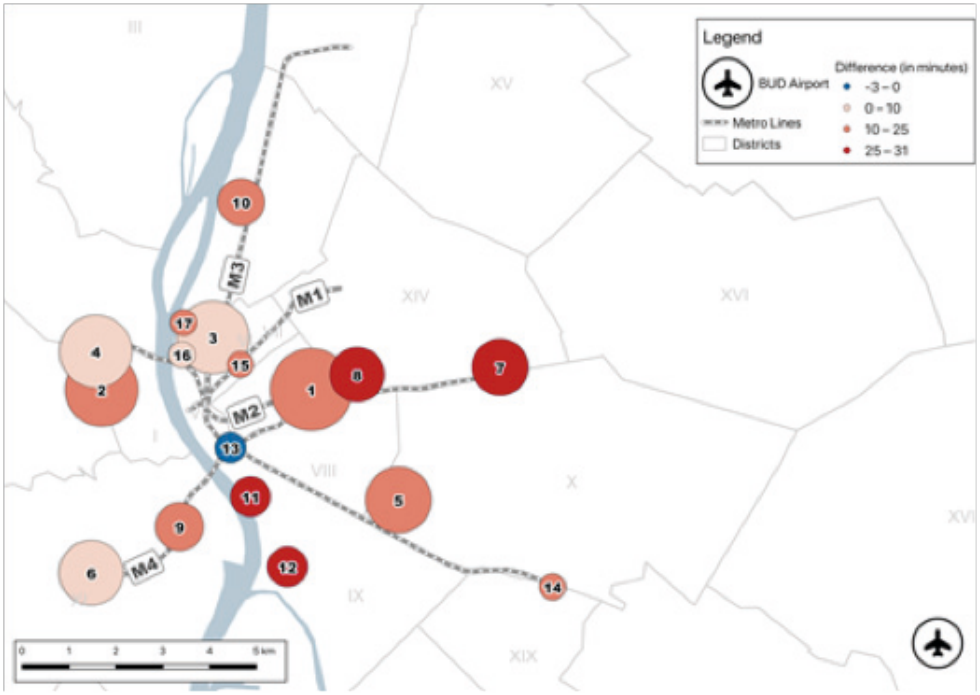


Fig.12.: A difference in time between car, and the fastest public transport

(1 – Keleti pályaudvar; 2 – Déli pályaudvar; 3 – Nyugati pályaudvar; 4 – Széll Kálmán tér; 5 – Népliget; 6 – Kelenföld pályaudvar; 7 – Örs vezér tere; 8 – Puskás Ferenc stadion; 9 – Újbuda-központ; 10 – Árpád híd; 11 – Boráros tér; 12 – Közvágóhíd; 13 – Kálvin tér; 14 – Kőbánya-Kispest; 15 – Oktogon; 16 – Kossuth tér; 17 – Jászai Mari tér)

On the 12th figure we can clearly see where the biggest difference is between the fastest public transportation and cars. The following two cases are spectacular examples showing the points where the public transportation suffers a great disadvantage. Interestingly, from these points the airport is more reachable by car than by other means, despite their locations. The first numbered examples (number 11 and 12) are Boráros square and Közvágóhíd, which are nearer than most of the examined points, but the airport can only be reached by switching vehicles multiple times, making traveling more time costly. The second similar example (number 7 and 8) is the Puskás Ferenc Stadium and Örs vezér tere. On these points the airport bus is available for the public, but despite this fact taking a car is still preferred because the bus does not take a straightforward path, significantly adding to traveling time. A speciality according to the official data is Kálvin square where it is a good idea to choose the public transportation over the car. This occurrence can be explained by traffic density, but most likely in practice the difference is negligible since the path is exactly the same and the bus does not stop at any point.

Fig.13.: The form results for new starting points

In the 13th figure you can see which public transport points the audience sees the most necessary to be included in the 100E network as a new terminal. The majority of the requests came to the main railway stations (mostly to Keleti railway station), as it is easy to connect the agglomeration and the regions from the rural areas to the network with as few transfers as possible.

5. Conclusions

Summarizing the major findings of the research we managed to collect several relatively important points, that contribute to a smart and sustainable, or at least a well serving public transportation network connecting the metropolitan area with the airport. First of all public transportation service providers should emphasise collecting information from passengers. This can easily reveal the issues of their service, or help in fine-tuning in connection with timetables for instance. As in Budapest, it could bright the light on the inadequacies of the network. In our case the Buda side, especially the 11th district should be also joint.

There are also other blind spots, like Keleti railway station, which are those key public transportation hubs that should be connected to one of the airport lines. Another finding is that a crucial structural element is a direct rail-mounted accessibility of airports, which is a key element of a modern airport transportation. These means of transportation could deliver a great amount of passengers in a relatively fast way, and could also be connected with incoming rails from the countryside. Right now, though the plans and construction is under process, this function is missing in Budapest, and have been missing for about ten years. Related to direct bus lines optimization of timetables is essential. The number of passengers in different times of the day and week should be evenmore taken under consideration when defining the frequency of scheduled departures. In the case of Budapest, this is happening in 2018, one year later, when the direct line was launched. (Index.hu, 2018) During this one year disasterous timetable conditions (two departures in an hour) and overwhelmed buses were typical, providing inconvenient experiences and better not to remember memories to passengers.

More flexibility and faster reactions are expected from the side of the service providers. Related to smart mobility, passenger information system should be accurate and easily understandable. Referring back to the case of 100E direct bus line the system needs development, as now the way how they do that is that two employees of BKK are standing in the stops selling tickets and communicating between each other through mobile phone. This method is nothing but obsolete. Add to these to maintain a smart and sustainable transportation system in the metropolitan area, a continuous improvement is the heart of the topic. If a new mean of transportation, like carsharing, appears in the market, and it is implementable to the existing system in a sustainable way, serving the customers needs, than the service providers should pay special attention to it.

In Budapest, carsharing service providers realised the need of extending the coverage of their services to the airport as well, and has already announced the extension that is going to be carried out in 2018.(e-cars.hu, 2018) We would also highly recommend establishing a new institution to handle the metropolitan area's transportation, as BKK itself is right now, or soon is going to be run out of capacity. All in all that would be ideal if local contributors to airport transportation service providers, sustainability and transportation experts, spatial planners and the leaders of local projects should seek for development opportunities, and try to do their best through collaborations and partnerships to maintain and improve facilities.

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