ESPON

ADES
Airports as Drivers of Economic Success in Peripheral Regions

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List of abbreviation

ADES: Airports as drivers of economic success in peripheral regions
EU: European Union
GDP: Gross Domestin Product
FR: Final Report
SciR: Scientific Report

A Executive summary

In Europe in the last century the geography of settlements highlighted by the speed of connections has fortified some territories and marginalized others. These are processes that have directly involved the spaces, lives and imaginations of the public. In other words, these are new urban facts that have, in some way contributed to establishing a postmodern idea of change for which it's not production, but connections that create the essential conditions for the economic growth of a territory.

This belief creates a direct relationship between the future of local communities and the myth of infrastructure development. It steered major European financial policies toward territorial cohesion and major investments in the physical shapes of settlement expansion with the idea of *super-infrastructuring* territories.

This vision of growth is essentially founded on three axiomatic principles.
The first is deterministic: infrastructure produces economic development in peripheral areas. The second is complementary to the first and states that economic development can't exist without new infrastructure. For the third axiom, development of infrastructure networks establishes and gives value to a new kind of landscape that holds speed and permanence together: cathedrals and shopping centres, the metropolis and the sprawling town, the traces of history and the uncertain, magma-like shapes of dispersion and change. Today, none of these axioms seems functional, not even the last one.

Huge flocks of sheep, hundreds of rabbits, business parks, metropolitan parks, leisure parks, high-tech networks, airport network. What they have in common with airports? Sometime these are the most frequent visitors of airports recently constructed in Europe. These are the new ways of living an airport and connecting it to its context.

Since the late Nineties, many airports recalibrate their fundamental function through the integration of air traffic transportation facilities together with activities that regenerate their life and the surrounding territories. Several secondary airports have been incorporated into the low-cost airport network, generating a renewal of both infrastructure and function, and in the growth of activities not limited to air transportation. The strategy of re-use small airports became also crucial on a local scale because it generates a rapid transformation of land use and of the infrastructure network relative to land transportation: the airport becomes a landmark in the territory and an important element for the local economy.

Even more in this tumultuous period of economic crisis, building new infrastructure does not reveal itself as the most sustainable strategy, considering sustainability as an aim in relation to social and territorial changes. So, it is very important to analyse and propose alternative strategies to improve infrastructures and services in small regional airports.
This is the context in which the present target analysis aims at offering alternative options to the excessive construction of new infrastructure: explore

the leverage effect of existing infrastructures in boosting local economies. **The recycling of obsolete infrastructure** (see examples of Re-cycled airports in *SciR _Chapter 1.3*) and the re-use of this structure, in order to optimize their potentialities, becomes the most sustainable and desirable solution. To re-think not only the abandoned and unused infrastructure in search of a new identity, but to recycle all those infrastructures those are already active but poorly operating and unproductive.

The ADES research case studies - *Jyväskylä Airport*, City of Jyväskylä, Central Finland; *Araxos Airport*, *Aktion Airport*, *Andravida Airport*, Region of Western Greece; *Villanova d'Albenga Airport*, Province of Savona, Italy - show different examples of the widespread situation of underused airports stuck in a *pre-decline* phase. It is urgent to think about their future in order to transform airports' infrastructure into urban re-activators, before that the airport infrastructure arrives in its obsolete phase.

This ESPON project "Airports as drivers of economic success in peripheral regions" (ADES) started in November 2011 and ended in January 2013. It was elaborated by the Department of Sciences for Architecture – University of Genoa - Italy (Lead partner), BAK Basel Economics AG - Switzerland, KiNNO Consulting LTD – Greece, and Jyväskylä University School of Business and Economics – Finland.

The project is specifically targeted to the situation and needs of three stakeholder regions: Province of Savona – Italy, Region of Western Greece – Greece and the City of Jyväskylä – Finland.

The EU cohesion goal calls particularly for an improvement of the framework conditions of peripheral regions. Better accessibility is one of the means to move towards this goal. And regional airports are an option for improving accessibility.

Economic theory clearly states that **accessibility** is one of several relevant location factors. As it is quite obvious that it is hardly feasible for every region in Europe to have a large airport, the project will not only discuss the role of airports for economic and social development, but also in which cases (regions, cities) which type and quality of transport services (and infrastructure) best suit the needs of the population (airports, rail links, highways). In addition we will discuss the best use and development of existing airports.

ADES research has to deal with another relevant issue: the definition of **peripheral regions** (integrate in *SciR_Chapter 1.1*). Periphery is a condition everyday less related to a physical condition or to the distance. Although it is more related to the economical condition of territories, being *peripheral* is an ambiguous condition and it is continuously mutable.

For instance, the peripheral context of ADES airports is very different due to the heterogeneous contexts (geographical, economical, social). In fact, Jyväskylä in Central Finland is very central to Finland but very peripheral relative to Central Europe. As the economic centre of Finland is south of Jyväskylä, Central Finland is even more remote and Helsinki becomes a

natural gateway to “Europe” for the whole of Finland. Patras in Western Greece is also rather central to Greece, but Greece as a whole is at the southern periphery of Europe. Despite the fact that Patras is even closer to Central Europe than the capital Athens, almost all air traffic goes through Athens. The situation of Savona differs considerably. It is rather central in Europe, but very peripheral in an Italian context. The airports of Genoa, Nice, Turin and Milan are relatively close. Thus, the air link situation of the three stakeholder regions also differs substantially.

Furthermore, urban growth, in this moment of crisis, is very slow therefore making airports’ possible central role in urban development very difficult. It also evident that European peripheral regions encounter many difficulties to keep up or develop their competitiveness in this era of declining resources and generally poor economic development. In many cases, policy makers don't find a real convenience to strengthen schedule flights or improve technical and physical characteristics of these infrastructures. When it happens, airports dramatically burden on the regional economy.

In this socio-economic framework, what does it mean to transform airports’ infrastructure into urban re-activators?

These new infrastructures generate trade with landscapes but also allow us to see new landscapes. According to that, the airport becomes *a place to live* and not only a door to cross to go to another destination. From airports to reach and to fly ‘beyond’, a far away destination, to airports in which to go and stay in, as attractors of flows related to activities associated with the local area and the structure of the airport. In that sense, the ***airport osmotic infrastructure*** becomes *a place to live before a place to leave*. It is organized to satisfy not only one specific sector (flight operation) but it could adapt itself and its efficiency in relation to the surrounding context and business, it could exchange flows (physical and immaterial) with the surrounding territory and it could accommodate multiple functions.

This could be the operative strategy for these airports to recalibrate their fundamental function in their physical contexts: the integration of air traffic transportation facilities with activities that regenerate their life and the surrounding business. In that sense airport infrastructure for its dimension and relations with the territory, is a potential catalytic agent and an activator of contexts.

ADES Target Analysis suggests strategies of recycling obsolete airport infrastructure*.* Abandoned airports (*Andravida Airport)* and airports *on-hold* (*Villanova d’Albenga Airport, Jyväskylä Airport*, *Araxos Airport, Aktion Airport*) are the material on which the research deals with. Valuing and anticipating the correct strategy of re-cycling for airports is an increasingly urgent necessity, in order to anticipate the inevitable decline of these structures and to activate recovery processes in synergy with the different urban realities.

1 Analytical part and main results

Are airports drivers of economic success in peripheral regions, as the title of this project suggests? Of course, the answer is neither a clear “yes” nor a blunt “no”. As often in a complex world, the answer is closer to “it depends”.

The main results and findings of ADES project constitute a source of inspiration to formulate clear, coherent messages about the role of secondary airports with low or moderate levels of both passenger and freight traffic.

The main results indicate:

- that accessibility in general is an important location factor;
- that for some remote regions, airports with enough scheduled flights are crucial for economic development;
- that in these cases the bottleneck usually is not lacking infrastructure but lacking scheduled flights to relevant destinations;
- that the limiting factor (or bottleneck) for economic prosperity is often not accessibility but rather the availability of qualified manpower;
- that it is better to use a larger airport in a neighbouring region than to develop an airport of its own (if accessible within some three hours);
- that not all existing airports are needed – some of them can be closed and the territory used for something more efficient;
- that the airports still needed and used can very often be improved (to make them more attractive);
- that good policy can make a difference.

1.1 Background

It is relevant for regional policy makers to know about the role of regional airports and to what extent they can help making peripheral European regions grow. In this study we investigate the role of regional airports for regional economic development in European peripheral regions. As this issue is truly multidimensional in many ways, we apply a mix of several methods and eventually bring the results together into a coherent view.

Accessibility is generally accepted as a major factor of economic attractiveness of cities and regions. "Keep Europe Moving", the mid-term review of the 2001 White Paper on EU transport policy stressed that transport was a key factor in modern economies as it not only connects places and people but also facilitates economic growth. The Territorial Agenda of the EU (2007) claims that "Mobility and accessibility are key prerequisites for economic development of all regions of the EU".

While capital and other big cities usually have excellent national and international accessibility by highways, trains and airports, the situation for smaller cities is often much more difficult. This difference in accessibility tends to increase unequal growth and the imbalance of wealth between the big metropolitan areas and more peripheral areas. To narrow this gap (measured e.g. by GDP per capita) it seems to be essential to increase the accessibility of the more remote and less developed areas.

With growing globalisation, accessibility has changed dramatically. While for many centuries it used to be relevant to have a road to the next bigger city or a neighbouring region, it is today relevant to be connected to the whole world. Thus the role of airports has become increasingly important. To have a regional airport is an asset, which may be the decisive factor for attracting companies to the region or retaining talents in the region.

However, accessibility does not only depend on air transport and airports. Highways and – in the age of high-speed trains increasingly – rail links are for many regions realistic alternatives to airports (especially when they are not too far away from a big hub). Thus it is relevant to now about the role of regional airports and to what extent they can help making peripheral regions grow.

All through the history of mankind people have had the desire to be mobile, as space always played a certain role. Over time, technical abilities have made it considerably easier to move in space. Though, it is still costly both in terms of money and time to move from one point in space to another. Therefore it is relevant where in space a specific person, company or city is. It is more attractive to be close to the European economic gravity centre (which should be rather close to Cologne) than at the edge of the European continent. For the average European it is more costly to reach a Finnish or Greek province than Frankfurt or Milan. This is also the reason why accessibility is generally accepted as a major factor of economic attractiveness of cities and regions.

Of course, the mobility needs of people have changed according to the technical means, but they still stand at the cradle of each analysis on accessibility and traffic infrastructure. A simple model may illustrate the relation between the major variables (see figure 1):

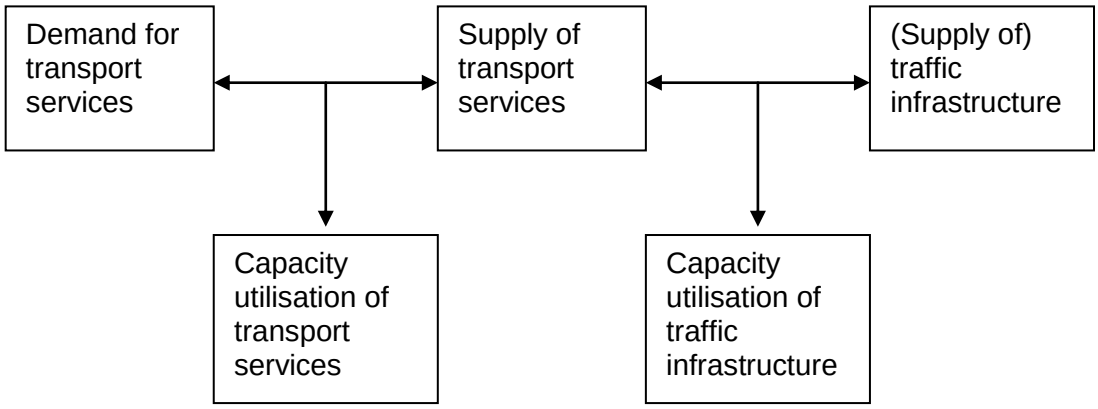


Figure 1: The markets for transport services and traffic infrastructure.

The mobility needs of people (including companies, be it for themselves or for goods) are the basis for the demand for transport services. Transport companies (e.g. air carriers) supply transport services. However, they only can provide such services as long as the (supply of) traffic infrastructure is sufficient. The supply of transport services generates at the same time the

demand for traffic infrastructure. Thus there are two capacity utilisations: one on the market for transport services (e.g. the percentage of seats occupied in a passenger train) and one on the market for traffic infrastructure (e.g. percentage of free slots in totals slots on an airport).

Demand for transport services is mainly private, demand for infrastructure, however, is primarily political. In most countries highways, rail tracks and airports are either publicly owned or at least strongly subsidised. Thus there are options for regional policy to be more or less active in this field. Politicians should just bear in mind that the law of diminishing returns also applies to infrastructure. Too little may be insufficient as for accessibility, too much will be inefficient. To build a large airport in a remote desert where hardly any plane wants to fly to is just wasting money. Thus there should be an optimal amount of infrastructure, depending on the individual circumstances of each region.

The situation is even complicated by the fact that traffic infrastructure is not a homogeneous good. Thus it is not only about the optimal quantity but also about the optimal mix of airports, highways and rail tracks.

In this targeted project we adopted a series of different **methods** to cope with the research questions and broad goal of the study:	
- Empirical methods:	- Panel causality tests
	- Structural regression analysis
	- Frontier analysis (DEA)
	- Benchmarking
- Case study analysis:	- Questionnaires
	- Interviews
	- Key economic indicators
- Maps:	- Descriptive maps
	- Concept maps
	- Vision maps

Given the many-sidedness and complexity of the research questions, we did not use a single approach, but rather a combination of several methods. A parallel or multiple approach should best be able to answer the research questions, also given the fact that ESPON explicitly asked for case studies, which, in turn, are not able to answer the more general research questions.

To better understand the relation between accessibility and economic performance, we distinguish two main transmission channels:

- Supply side effects: Good general framework conditions (including accessibility) improve the attractiveness of a region and thus attract both people and companies. Production and the supply of goods will grow. Therefore, accessibility will enhance economic performance.
- Demand side effects: When a region grows – be it more people or higher wages – the demand for travelling will usually grow. Thus, it will be interesting for suppliers of travel services to enlarge their supply. If there are bottlenecks in the infrastructure, such additional demand may lead to an improvement of the respective infrastructure. Therefore, economic performance improves accessibility.

In order to better understand ADES case study regions and to propose more appropriate strategies for future development, we analyzed them through the following characteristics (see *SciR_Chapter 3*): geographical localization; landscape; infrastructure and accessibility; economic trends; cultural and leisure services; tourism.

These information were supported and improved by the opinion of local actors gathered by questionnaire and interviews in local language (see *SciR_Chapter 3* and *Annex 2*). This part is supported by examples of other existing projects that transformed abandoned or obsolete airports into new urban centralities (see *SciR_Chapter 1.3c*).

1.2 Principal findings and key messages

From the extensive research results obtained we can conclude:

- that **supply side effects** do play a certain role, especially in peripheral regions. This means that better accessibility has a positive influence on the attractiveness of a region for people and business and therefore on economic performance.

- that **demand side effect** are rather strong in all regions. This means that a good economic performance leads to more demand for transportation services which in turn results sooner or later in better transport infrastructure, more transport services and better accessibility.

Summing up, supply side effects seem to be important. They are relevant particularly in the medium to long run. On the other side, demand side effects seem to be less relevant. They are rather relevant in the short term.

So, the analysis suggests strategies of *recycle* existing obsolete infrastructure rather than the construction of new infrastructure. The **REnewal operation of obsolete infrastructures** that have no longer a demands of traffic explores different visions for obsolete infrastructures and takes into account new opportunities and uses of theme.

Regarding the key research questions, the analyses allow the following **general conclusions**:

- What is the relationship between accessibility and economic performance? Accessibility has indeed a positive impact on economic performance. In some regions, bad accessibility is even a limiting factor for further economic development. Thus, supply side effects seem to be very relevant. On the other hand, also demand side effects have certain relevance, with better economic performance leading to higher accessibility.
- How important is accessibility for economic prosperity? The impact is indeed rather strong (and statistically significant). Other relevant factors

are tax burden and the availability of highly qualified manpower. The fact that the quality of transportation services is a limiting factor for economic growth in some regions proves the relevance of this issue.

- How relevant are airports in such a context? For really remote regions, airports are often the only windows to the world. In that sense, airport can be really crucial.

- What type of regions does need an airport (or airports)? For remote areas (where the next good airport is more than three or four hours away by rail or road) functioning airports with enough scheduled flights are very important. When there is a good airport rather close (up to three hours), then an airport for the region of its own is much less relevant.

- Which are the limiting factors for economic performance? The strongest limiting factor is the availability of highly educated manpower. But already on the second place is accessibility, indicating that insufficient traffic infrastructure and/or services are indeed limiting economic development in some regions.

- What is an optimal strategy for existing airports? The recycling of obsolete infrastructure, and the re-use in order to optimize their potentialities becomes the most sustainable and desirable solution. To re-think not only the abandoned and unused infrastructure in search of a new identity, but to recycle all those infrastructures those are already active but poorly operating and unproductive.

- What are the strategies to transform airport infrastructures into re-activators of territories? According to the diversity of the three ADES regions, the logic for intervention in various areas is obviously different. So the three strategies proposed for development and renewal of infrastructure (REload, REuse, Recycle) are specifically thought out for all regions in which each airport is located (see *FR_Chapter 2*).

- What is the device that will drive the renewal strategies? The device that drives these operations is the *osmosis.* The *osmotic devices* will establish a stronger relation between the infrastructure and their surrounding territories. At the same time they will gain an economic improvement and new uses for the airports (see *FR_Chapter 3.2*).

The main findings and results of the project have already been very useful to representatives of regional authorities in Central Finland and in Province of Savona by raising awareness on problems encountered in regional airports with low or moderate levels of both passenger and freight traffic.

2 Options for policy development

The research stresses the idea of **airport as a resource**. The airport is considered not only in its functional role but it is also consider as image of a territory, whose development has to be taken in account in the regional planning.

The political conclusion is that the improvement of **accessibility may help improving the economic situation of a region**. However, each region must carry out a thorough analysis what is the most efficient way to improve accessibility. In some cases (like in a remote area in Finland) this might be the strengthening of an airport (expansion of the structures and good offer of scheduled flights). In other cases (like in Greek regions), it might be the subsidy of scheduled flights to the next large hub. In few cases, it is recommended to completely abandon airport activities in order to transform it in an urban facility that will have stronger effects on the economic performance of the region. In even other cases (like in Italian regions) it might be best to integrate urban functions in the airport areas and to improve the highway or rail network system to better reach a nearby airport with a good offer of scheduled flights.

According to that, it wasn't possible to draw one general model to adopt in all Stakeholders regions. We propose three **strategies for development and renewal of infrastructure** and the peripheral region in which each airport is located. According to the heterogeneity of the three contexts, the logic for intervention in various areas is obviously different, depending on contextual analyzes conducted and results obtained.

The guidelines for the vision are based on three different strategies:

- Expansion of the existing airport, increasing the number of flights, adding new functions to neighbouring industrial and commercial (**REload**);
- Maintenance of airport operation, hybridization with insertion of the functions of existing activities and related to the local context surrounding integration of urban functions (**REuse**);
- Abandon the airport function in favour of a comprehensive recycling action, a reclaiming land from the old infrastructure, creation of a park and public facilities for the city's new urban development (**REcycle**).

The ***osmotic airport*** is *a place to live before a place to leave*. It establishes a stronger relation between the infrastructure and their surrounding territories. At the same time they will gain an economic improvement and new uses for the airports. The goal is to allow the economic growth of the territory without the construction of new big infrastructure and buildings.

In that sense, the *osmotic airport* is organised to satisfy not only one specific sector (flight operation) but it could adapt itself and its efficiency in relation to the surrounding context and business, it could exchange fluxes (physical and immaterial) with the surrounding territory and it could accommodate multiple functions, as in the *Postmodern* examples (see *SciR_Chapter 1.3*).

4 tools drive the osmosis process:

- (a.) Airport as environmental sensor
- (b.) Airport as services centre for local activities
- (c.) Airport as hub for local transportation
- (d.) Airport in network

2.1 Principal results for policy development

In general we have to distinguish between two types of regions: regions that are close (up to three or four hours way by rail or road) to a well functioning airport, and the rest.

For the former type, airport activities are not relevant for economic performance and thus airport infrastructures and activities are usually not the bottleneck. However, fast access to the "good" airport in the neighbour region often is a bottleneck. These regions do not need a functioning airport. Relevant is the time needed to relevant destinations, including the big European capital cities. To this end they need fast access to the next bigger airport with frequent scheduled flights to all relevant destinations (including all European hubs) by road and or rail.

For all other regions (which are more distant to the next well functioning airport), airport activities are relevant for economic performance. However, airport infrastructures are usually not the bottleneck; it is rather the availability of regular scheduled flights to relevant destinations. These regions do need a functioning airport. Relevant is the time needed to relevant destinations, including the big European capital cities. To this end they need an airport with adequate infrastructures, fast access to the regional airport, frequent scheduled flights to relevant destinations (among them at least one big European hub).

Regarding the three stakeholder regions, we come to the following results:

- **Jyväskylä**: The fast train to Helsinki takes some 3 and a half hours; thus, the plane is not faster on a city to city basis than the train. The plane is only faster, when people want to travel further and need to change plane in Helsinki. Thus, Jyväskylä is in the grey zone between the two types. Nonetheless, better direct flight services to a greater hub (like Stockholm or Copenhagen) should have a positive effect to economic development in the region. As such flight operations may not be profitable, national or regional subsidies to the airport or airline companies may be an effective tool to enhance the flight schedule.
- **Western Greece**: The estimated time between Patras and Athens International airport is approximately 2 and a half hours by car. So it is definitely more convenient than airplane or fast train (which takes some 3 and a half hours). However since the region is lengthy this does not apply for all places within it. Some of them will need definitely more than 4 hours to the nearest airport. To this end the airport of Aktion should increase its scheduled flights, not only in the summer time. Better direct flight services (more scheduled flights to relevant

destinations such as Athens, Frankfurt or London) should have a positive effect on economic development in the region. As such flight operations may not be profitable, national or regional subsidies to the airport or airline companies may be an effective tool to enhance the flight schedule. In addition, better other traffic infrastructure (better access to other regions by rail or road, e.g. to Athens) will have a positive influence on the attractiveness of the region for people and business and therefore on economic performance.
In that sense, regional efforts and investments should focus on just one regional airport with adequate flight density and public transport access: Aktion airport should be considered.

- **Savona**: The fast train from Savona to Genova just takes half an hour, to Milano and Nice it is two and half hours; thus, the train is faster on a city to city basis than the train. Thus, the province does not need an airport of its own. The existing airport in Villanova d'Albenga is not really relevant for the accessibility of (the province of) Savona. Thus, its future will hardly be an airport with scheduled flights. A renewal strategy is much more likely successful (and also effective for the region). These new activities – both in aviation and in other fields – may help to overcome the current weaknesses. However, better train links to Genova, Milano and Nice should increase the attractiveness of the region as a whole.

A special remark has to been done on Villanova d'Albenga Airport: it is already on its way to a new future. On 30th November 2012 it was officially signed the contract for the management society with Cannes and Nice airport and with Piaggio Aero Industries S.p.A. This small airport can be **the model of airport in the territory**. Its development plan and strategies could be the model for the other ADES case studies but also for other second and third tier airports in Italy and in Europe: it could be an example of territorial integration with the industrial and agro-food sectors. It and also be an example of cross-border network with neighbouring airports (Nice and Cannes airports). The relationship with the nearest Nice and Cannes airport is crucial because they will organize a network in which a high specialization of functions will decrease the competitively in favour of a synergy between airports. This will be the first Italian example (maybe also European) of **cross-border network** and it will create a relationship that strengthens and generates growth in a shared *European region*.

The main results and findings influenced the political agenda of Stakeholders Regions on strategies to revitalise small airports in decline and therefore boost growth and jobs. Besides, the possibility in Savona of developing cooperation agreements with other neighbouring airports is seen as a window of opportunities, especially in terms of commercial activities and market segmentation.

3 Need for further research

There are a few issues for further work. On the analytical side, this project focussed on accessibility in general and airports in particular. A further study field should be the **cooperation between different transport modes in the various regions**. The research question might ask for the optimal mix of transport infrastructure and services in a given region, including rail, road, and air.

Further research could develop the ***Recycle strategy*** applied on other types of infrastructure: abandoned railways but also underused harbours or roads. The renewal of this infrastructure could be analyses as process to reactivate urban transformation, growth of mobility, development transport and communication networks, and increase the availability of landscape and places in which to live.

In order to gain better insight on developing regional policies our work can be expanded and replicated in order to include **a methodological model** that will take into consideration different and unique transformational aspects of each European region. This model must not only examine air transport but also take into consideration both commercial, business and cargo transfers needs in order and provide guidance to developing regional policies related to transportation. This model can be supported by both archival data but also by more in depth cases that will take into account considerations and expectations of the local population. The model can also support national policies if applicable to all relevant regions in the decision making process.

Other research can also be done related to the updating of empirical methods. The methodology can still be developed and applied to **different time periods and regions.**

In a dynamic view, future research should **include also prices** for both transport services and for the use of the traffic infrastructure and account for the impact of high capacity utilization not only on prices but also on the supply on the respective markets.

Another extension is on the geographical scale. The present study was executed only for regions in Western Europe (in the borders of 1989). Due to path-dependency, regions in Eastern Europe and Western Europe start from different levels and structures at the beginning of our data set period and then follow different performance patterns during the period of analysis. Technically speaking, regions in Western Europe and in Eastern Europe do not belong to the same population and should, therefore, not be analysed at the same time. However, it should be interesting to make a similar analysis for peripheral regions in Eastern Europe (including data, empirical analysis and case studies).

Further research could provide **a set of guidelines** for small regional airports in Europe. The research of a new research could be a catalogue of renewal strategies for secondary airports in Europe. It could be an operative tool that each politicians or local actors could consult to afford the problems of obsolete

airport infrastructure. This investigation will improve the added value of the project and raise awareness about the role of regional airports as drivers of economic growth and development opportunities.

In further research it would be appropriate to **follow-up the development of the case study regions**, particularly in terms of medium and long-term perspectives, but also on the success of the actions and recommendation given to regional authorities to improve accessibility and economic growth. For instance a potential need is related to the possibility that ADES results will be up-dated in near future (for instance after 5 or 10 years) and compare the situation and development to the present one.

It will be also extremely important the **cooperation with other territorial projects** dealing with similar issues: it could be very usefulness to compare theses results and findings with other European or National research programme focused on similar issues in order to understand better the role of airports and accessibility in general and to the a long-term strategy for the development of this region.

B Report

Introduction

The EU cohesion goal calls particularly for an improvement of the framework conditions of peripheral or remote regions. Better accessibility is one of the means to move towards this goal. And regional airports are an option for improving accessibility.

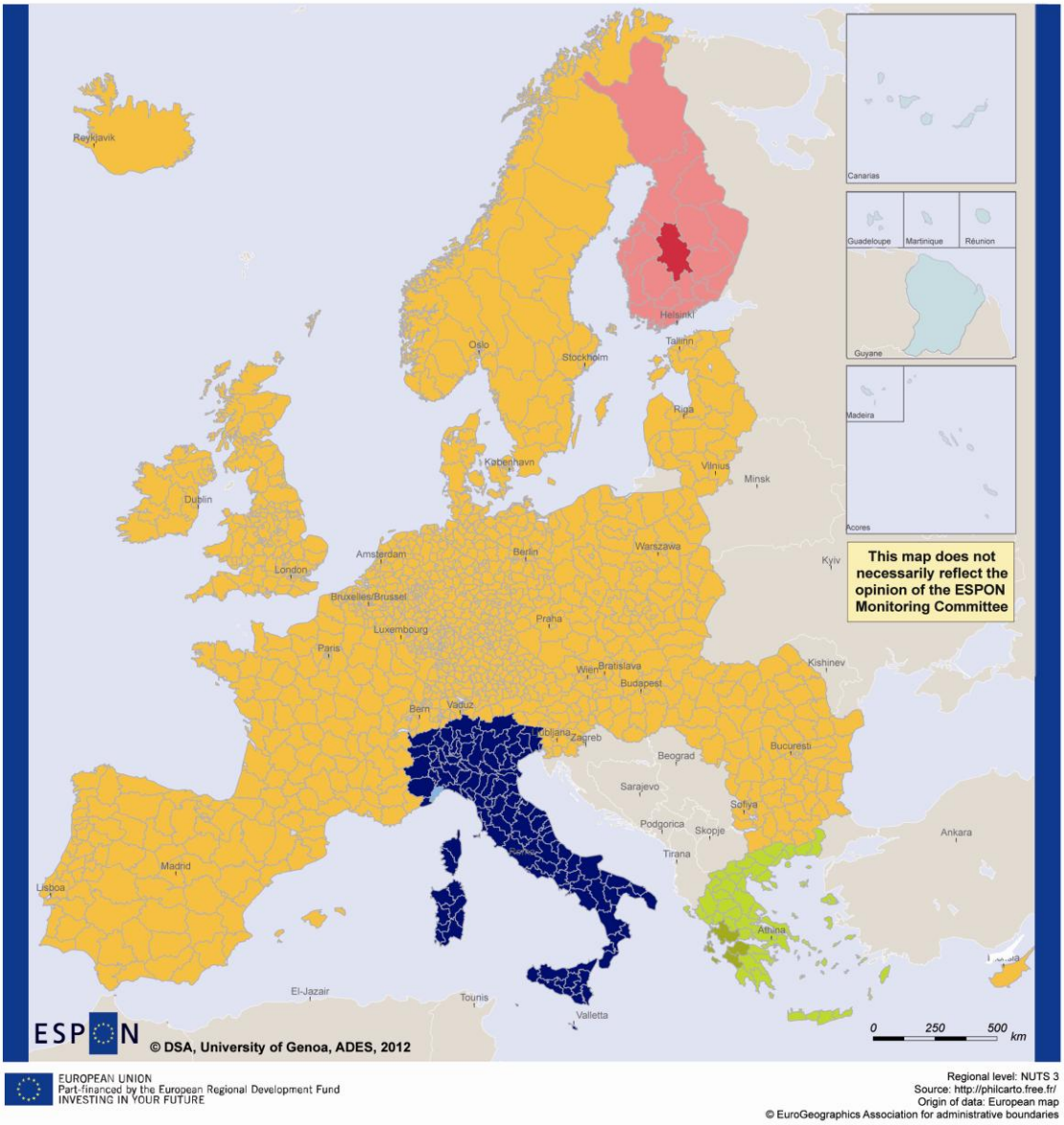
Economies of scale and agglomeration effects in favour of large cities are generally acknowledged. However, it is widely accepted that there are also diseconomies from rising cost to industry, due to increasing cost of land and labour, traffic congestion, crime etc., which make smaller cities and city nets more valuable than very large cities. Measured in pure terms of GDP per capita, the effect of a polycentric territorial development is likely to be underestimated. Even when looking at growth, GDP per capita growth figures will tend to be biased in favour of larger cities as they ignore negative external effects which prevail in large conurbations.

Measures of level or changes in well being would – were they widely available – clearly be in favour of smaller cities and peripheral regions, as such measures take the negative externalities into account. As a consequence, growth policy in the sense of maximizing human wellbeing in Europe should focus primarily on peripheral or remote cities and regions. This will also help establishing a more balanced territorial development.

Economic theory clearly states that **accessibility** is one of several relevant location factors. As it is quite obvious that it is hardly feasible for every region in Europe to have a large airport, the project will not only discuss the role of airports for economic and social development, but also in which cases (regions, cities) which type and quality of transport services (and infrastructure) best suit the needs of the population (airports, rail links, highways). In addition we will discuss the best use and development of existing airports.

ADES research has to deal with another relevant issue: the definition of **peripheral regions** (integrate in *SciR_Chapter 1.1*). Periphery is a condition everyday less related to a physical condition or to the distance. It is more related to the economical condition of territories. It is commonly agree that it is better to have places easier reachable. But, at the same time, it is clear that every place could reach the worldwide by a connection to the network. In that sense, the peripherality is an ambiguous condition. It is continuously mutable. A place could be peripheral in the middle of a metropolitan territory as well a place could be extremely central in the border of the connection network.

ADES Stakeholder Regions in Europe



Legend

- Finland
- Central Finland
- Greece
- Western Greece
- Italy
- Provincia di Savona

Map 0. ADES Stakeholder regions in Europe

This is profoundly changing not only contexts and topics, but also the way to project infrastructures. It happens at architectonic, urban and landscape scale. It subverts the axioms of *super*-infrastructure according to three reasons:

I. The *peripherality* in the European territories today is an ambiguous condition, perhaps more a social issue than a geographical question. It depends from the development processes that are not necessarily related to the intensity of physical connections and material flows of people or things. There are peripheral areas in the heart of large metropolitan areas and it is possible to identify important centralities in remote areas. Furthermore some territories economically well developed limited their accessibility and connections: an *enclave* territory as an affirmation of local identity. For example the Alto Adige or the surrounding areas of Cuneo are the richest and most developed regions of the Italian territory but the accessibility is limited. Also some Greek islands, those suffering less the crisis, are classified as economically peripheral areas in the European Union only because they don't have a high development of infrastructures and they are far from the main flows of traffic.

II. In the European *neverending city*, the periphery as a physical space does not exist by definition. Each place can be at the same time the central or peripheral with respect to the various immaterial networks of relationships that structure the settlement around the world.

III. Somehow the physical space of the major material networks in Europe is saturated. The physical infrastructures are already built and there are no more funds for all new interventions that were planned. The European funds planned for the period 2014-2020 are geared towards the development of interconnections with the networks of corridors minute local, the creation of new hubs light to the government of the effects on cities.

Therefore questioning the nature of the infrastructure, with particular attention to airport infrastructure, becomes a key consideration in the approach to this research topic. Airport infrastructure for its dimension and relations with the territory is a catalytic agent and an activator of contexts: airports as generators of development in peripheral regions but also as generators of a new image for the area and of themselves.

1 Main results, trends, impacts

There is a special relationship between airports and economic performance in peripheral European regions. Regions with a strong airport (in the sense of frequent scheduled flights to many destinations) usually also have a strong economy (in the sense of above average production and income per capita), while regions with a weaker economy (below average production and income per capita) usually only have small airports (if at all) with only few scheduled flights. In the framework of cohesion policy we can also say that those regions in need of good accessibility often have small airports while prosperous

regions often dispose of a larger airport, although it should be desirable the other way round.

In the light of these stylised facts it is relevant for policy design to know more about the relationship of accessibility and economic performance (especially for peripheral regions in Europe) on the one hand (see *Chapter 1.1*), and on the optimal development of existing airfields in peripheral European regions on the other hand (see *Chapter 1.2*).

1.1 Relationship between accessibility and economic performance in second and third tier airports

What is the relationship between accessibility and economic performance of European regions? Why is it relevant to study this issue? Policy decisions should stand on firm theoretical and if ever possible also empirical grounds.

This is especially true when policy measures are expensive as it is the case in the area of traffic infrastructure.

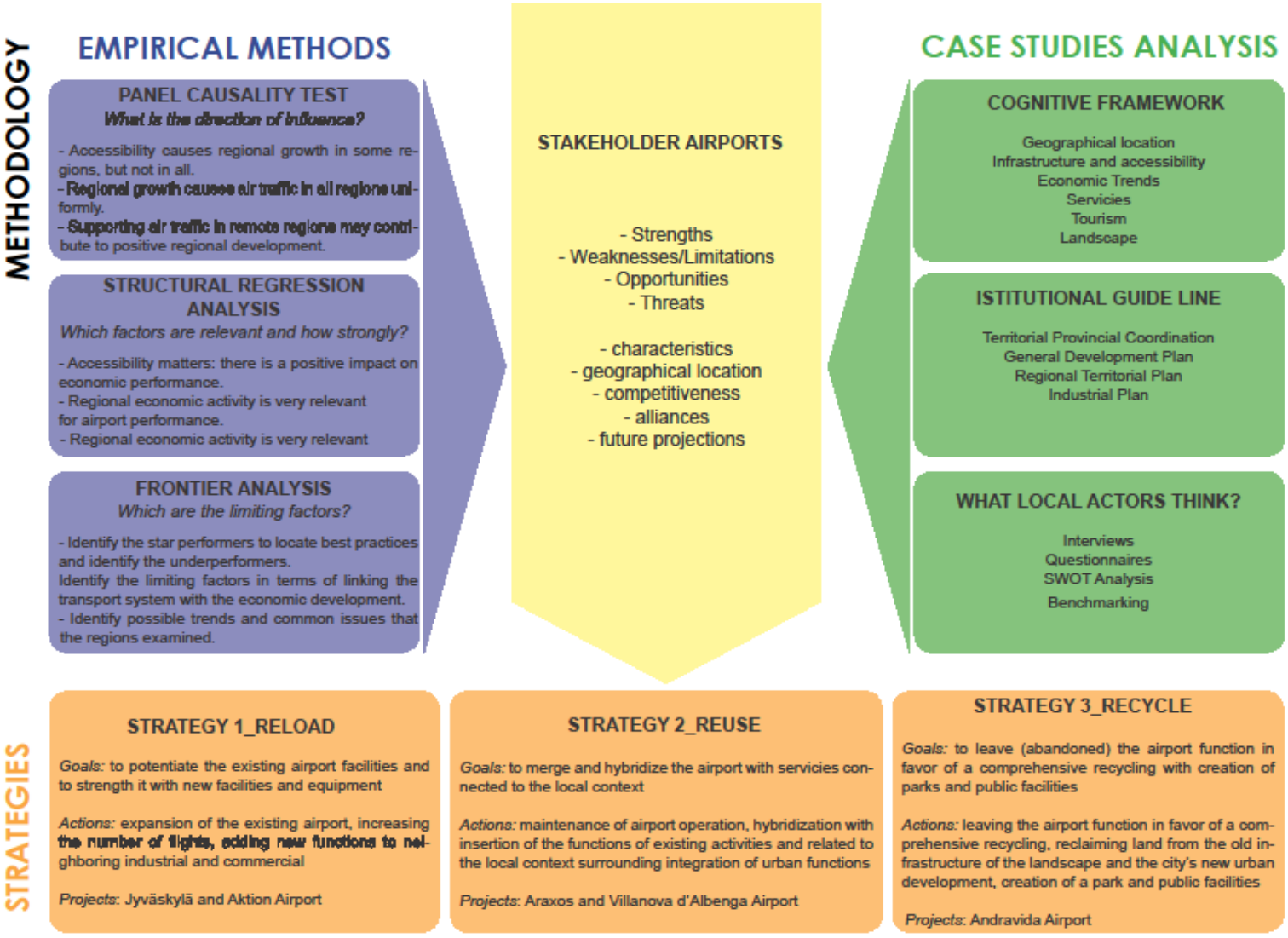


Figure 1. Methodology map

The **key questions** in the current context are:

- What is the relationship between accessibility and economic performance? Does better accessibility lead to higher economic performance or is it the other way round (better economic performance leading to higher accessibility)?
- How strong is the impact of accessibility on economic performance of a region? How strong is this impact relative to other factors of influence? Is such an impact statistically significant?
- Which are the limiting factors for economic performance? Is an insufficient traffic infrastructure a limiting factor for the economic development of a region?

From a theoretical point of view we can distinguish two main **transmission channels:**

(a) Supply side effects: Good general framework conditions (including accessibility) improve the attractiveness of a region and thus attract both, people and companies. Production and the supply of goods will grow. Therefore, accessibility will enhance economic performance.

(b) Demand side effects: When a region grows – be it more people or higher wages – the demand for travelling will usually grow. Thus, it will be interesting for suppliers of travel services to enlarge their supply. If there are bottlenecks in the infrastructure, such additional demand may lead to an improvement of the respective infrastructure. Therefore, economic performance improves accessibility.

Thus we can rephrase the key questions as follows: Do supply side effects or demand side effects dominate the relationship between accessibility and economic performance? As both effects are feasible from a theoretical point of view, empirical analyses shall give answer to the key questions above. In order to detect whether supply side or rather demand side effects are empirically relevant, we adopt three different empirical tools, which are briefly described in the box below (for more details see the corresponding chapters in the scientific report).

Using a common database covering several hundred regions, we use three different econometric methods to catch different dimensions of the same issue: What is the relation between accessibility and economic performance? Using various methods highlighting different aspects augments the chance to capture the relevant issues and structures in a holistic way.

(1) Causality tests focus on the question whether the direction of influence goes from accessibility to economic performance emphasising supply side elements, or whether it rather goes from economic activities to accessibility emphasising demand side elements.

(2) While these results are qualitative (though based on quantitative model estimates), the structural regressions estimate numerically the size of such influences (also based on quantitative model estimates). Thus, it is possible to

see how relevant the impact of accessibility is relative to other regional location factors.

(3) The frontier analysis finally will show the degree of production efficiency of each region and highlight the limiting factors. This will answer the question of whether an insufficient traffic infrastructure is a limiting factor for the economic development of a region.

Box 1: Empirical tools applied

In the following paragraphs we shall present the results from the three different methods used to unveil the relation between accessibility of a region and its economic performance.

The **causality tests** show (for more details see the corresponding chapter in the scientific report):

- Accessibility has a positive impact on economic performance. There is a strong positive impact from theoretical accessibility (whether used or not) both on GDP growth and employment growth. However, there is also a strong positive impact from the number of air passengers (thus the amount to which accessibility is actually used) both on GDP growth and employment growth. This means that supply side effects are indeed relevant.

-The above findings (for accessibility and air passengers) are particularly true for peripheral regions and much less so for more centrally located regions in Europe. This means that supply side effects are more relevant for GDP and jobs in peripheral regions.

- The impact from economic performance (both GDP and employment growth) on accessibility and air traffic, however, is only small. This means that demand side effects are less relevant.

The results present evidence of causal processes in these relationships and suggest that air transportation is more than a facilitator in remote regions. In these regions, in addition to regional growth causing airport activity, air activity appears to boost regional development. Supply side effects are, thus, important for distant regions. In core regions only the reverse is true: airport activity does not cause regional growth, but regional growth causes airport activity.

The political implication resulting from the causality analysis is quite clear: good accessibility enhances economic performance; air activity boosts regional development in peripheral regions. Thus the message for regional policy makers is apparent: there are good reasons to defend regional airports and scheduled air services since they are important for the development in remote regions.

The **regression analysis** shows (for more details see the corresponding chapter in the scientific report):

- Accessibility matters: Accessibility is a relevant factor for explaining economic performance of European regions. There is a positive impact on economic performance. Faster transportation allows people being in

more places in a given time span. Thus, better accessibility (be it by rail, road or air) improves productivity, as we would expect from economic theory. Higher productivity leads to higher GDP and thus higher GDP per capita. Higher accessibility also yields a higher participation rate in the labour market, thereby reducing (official and hidden) unemployment. This means that supply effects are indeed relevant for economic welfare.

- The positive impact of accessibility is higher for output (GDP) and labour productivity and lower for the participation rate (jobs). However, this is not surprising, as the effect on participation and on productivity add in some way to the overall effect on GDP. This means that impact of accessibility is highest for GDP.
- When dividing total accessibility into the geographical accessibility, which measures the geographical location (or remoteness) of a region, and the transport accessibility, which measures the transportation efforts (transport infrastructure and services) of the region, it turns out that the impact of geography and of transport services add up to the impact of overall accessibility, and that transport accessibility is more relevant for economic performance than geographical accessibility. This means that man-made supply side effects (i.e. transportation policy) are relevant for economic performance.
- The long term impact of accessibility on economic performance is much higher than the short term impact. This result is in line with economic theory. If there is a substantial improvement in accessibility, it is usually known quite in advance. Thus, additional economic activities (such as construction) may already start well before the opening of new transport services. On the other hand, it also may take some time until activities adjust to the new accessibility level. This means that improvements in accessibility need some time to deliver the expected results.
- The differences in accessibility between regions (from the cross section models) have a much higher impact than changes over time (from the panel data models). This effect implies that changes in accessibility over a certain period take some time for economic activities to adjust. Thus, the estimated effect is lower. This means that the higher regional effect is likely to estimate equilibrium (and thus long term) effects.
- The positive impact of accessibility (on economic performance) in peripheral regions is only slightly bigger than in more centrally located regions in Europe. However, there is one exception: While the impact of accessibility on the participation rate is on average substantial, it is close to zero for peripheral regions. This means that remote areas profit primarily through higher productivity.
- The number of commercial passengers (thus the use of airports) is strongly affected by economic performance. The participation rate has a higher positive impact on passengers than productivity. This means, the higher the density of people working in a region, the higher the demand for flight services: Demand side effect are relevant as well.

- An interesting detail: while there is a tendency of convergence in economic performance of the regions, there seems to be a divergence effect on the airport passenger data. This means that larger airports (hubs) tend to grow faster than smaller (and peripheral) ones.

The results present evidence of a strong positive impact of accessibility on economic performance also in peripheral regions of Europe, suggesting air transportation being more than just a facilitator in remote regions. Better accessibility (which is in remote regions almost per definition by air transport) leads to an improvement of economic welfare. Air activity appears to boost regional development: supply-side effects are, thus, important for peripheral regions.

By dividing the total accessibility into geographical location (which is fate) and transportation efforts (which rely to a large extent on transport infrastructure), the latter is shown to be more important than the exogenous geographical location. This effectively means that the disadvantage of peripherality can be made up by good transport connections. This is good news as transport services can be shaped by politics, while geographical accessibility is just fate.

The political implication of the results of the structural regression analysis is quite clear: good accessibility enhances economic performance and regional development also in peripheral regions. Thus the message for regional policy makers is obvious: there are good reasons to care for good transport infrastructure (including regional airports) and good transport services (including scheduled air services) since they are important for the development in remote regions.

The **frontier analysis** shows (for more details see the corresponding chapter in the scientific report):

- Most regions are not on the efficient production frontier, but rather below. This means that they use their resources in an inefficient way. They either could produce the same output (like GDP) with less resources (input factors) or could produce with the same resources more output.
- As the various input factors (resources) are not perfectly substitutable, some of them turn out to be limiting factors. Increasing a limiting factor in a region should result in an increase of output (e.g. GDP). The most limiting factor is highly educated labour force (people with tertiary education). The second important limiting factor over all regions is already accessibility. This means that accessibility is a limiting factor to economic growth in many regions in Europe.
- When looking at the reasons why efficiency is well below its potential, high tax rates for both, people and companies, turn out to be the most relevant factors. This means that lower tax rates can lead to a more efficient use of resources and increase efficiency.
- In all three stakeholder regions, transport accessibility seems to be a

limiting factor for economic development. Also the geographical accessibility is limiting growth in two of the regions (Jyväskylä and Western Greece, but not Savona). This means that an improvement of the transport accessibility should lead to higher economic performance.

The results present evidence that accessibility is indeed a critical factor for economic development. In many regions (including our three stakeholder regions) bad accessibility is a limiting factor for faster economic growth. Apart from highly qualified labour force, accessibility seems to be the most important factor explaining why regions do not grow faster, which is particularly relevant for peripheral regions. Again, accessibility appears to limit or boost regional development: supply-side effects are, thus, important for peripheral regions.

The political implication of the results of the frontier analysis is quite clear: While geographical accessibility is exogenous (in the sense of fate), transport accessibility can be influenced by policy. As transport accessibility seems to be a limiting factor in our stakeholder regions, its improvement should help boosting economic performance. Thus the message for regional policy makers is apparent: there are good reasons to defend regional airports and scheduled air services since they are important for the development in remote regions. In other cases better surface transport links may be of more value.

Regarding the key questions at the beginning of this chapter, the three analyses allow the following **general conclusions**:

- What is the relationship between accessibility and economic performance? Accessibility has indeed a positive impact on economic performance. In some regions, bad accessibility is even a limiting factor for further economic development. Thus, supply side effects seem to be very relevant. On the other hand, also demand side effects have certain relevance, with better economic performance leading to higher accessibility.
- How strong is the impact of accessibility on economic performance of a region? The effect is indeed rather strong (and statistically significant). Other relevant factors are tax burden and the availability of highly qualified manpower. The fact that the quality of transportation services is a limiting factor for economic growth in some regions proves the relevance of this issue.
- Which are the limiting factors for economic performance? The strongest limiting factor is the availability of highly educated manpower. But already on the second place is accessibility, indicating that insufficient traffic infrastructure and/or services are indeed limiting economic development in some regions.

Summing up, supply side effects seem to be very strong. They are relevant particularly in the medium to long run. On the other side, demand side effects seem to be less relevant. They are rather relevant in the short term. Given the results above, we can summarise our conclusions in the following table:

	Supply side effects: Accessibility enhances economic performance	Demand side effects: Economic performance improves accessibility
Causality analysis	YES, but only true for peripheral regions	YES, for all regions, but rather weak
Structural regressions	YES, mostly positive effects (especially for GDP)	YES, strong positive effects (especially for the participation rate)
Frontier analysis (DEA)	YES, it is one of the limiting factors (following qualified labour)	YES (but this seems to be less relevant)

Table 1: Summary of results of the empirical analyses

In the light of these results and under special consideration of the respective situation in the three stakeholder regions we come to the following **special conclusions**:

- Jyväskylä: The problem (apart from the large distances) is not the airport per se, but rather the limited number of scheduled flights (only three times a day to Helsinki) which are a bottleneck for economic development. Better flight services to a greater hub (like Stockholm or Copenhagen) should have a positive effect to economic development in the region.
- Western Greece: The bottleneck for economic development is not the lack of airport infrastructures, but rather the limited number of scheduled flights. Better flight services (more scheduled flights to relevant destinations such as Athens, Frankfurt or London) should have a positive effect to economic development in the region, especially in a time when decentralization is becoming a trend in Greece. In addition, improved other traffic infrastructure (better access to other regions by rail or road, e.g. to Athens) will have a positive influence on the attractiveness of the region for people and business and therefore on economic performance.
- Savona: Here, airport infrastructures and the absence of scheduled flight services are not a bottleneck for economic development. The existing airport in Villanova d'Albenga is rather a bottle to be filled up with all sort of new activities. However, better train links to Genova, Milano and Nice should increase the attractiveness of the province of Savona.

Summing up, the improvement of scheduled flights should be positive for some regions. Other regions shall think of reusing their existing airport infrastructure in a more efficient way and improve, instead, their traffic links by rail or road.

The three different types of empirical analysis present **evidence** that accessibility is relevant for most European regions. From a political point of view, we can state as follows:

1. Airports do matter (in most regions in Europe, particularly in peripheral regions).
2. Supply side effects are indeed relevant (and sometimes the limiting factor for economic growth).
3. Demand side effects are relevant as well (but of lower importance).
4. Policy can make a difference (when effectively used).

The political implication of the results is quite clear: good accessibility enhances economic performance. As supply side effects are important particularly in remote regions, traffic and infrastructure policy does matter. However, policy actions may not be limited to airports, and may also include more frequent and/or faster connections. More systematically, **options** include:

- better airport infrastructure (like higher passenger capacity or longer runways)
- better flight services (more scheduled flights to relevant destinations)
- better transport infrastructure to airports (improvement of rail or road infrastructure)
- better public transport services to airports (improvement of rail or bus services)
- better other traffic infrastructure (better access to other regions by rail or road)
- better interregional transport services (more trains or bus services to relevant destinations)

Regarding remote or peripheral regions in Europe, airport infrastructure is seldom a bottleneck and thus the enlargement of passenger capacity or runways seldom a feasible option. However, there are good reasons to defend regional airport companies and airlines since they are important for the development in remote regions.

The traditional challenge with many small regional airports is that they and/or the flight services are not financially sound which has led to the provision of financial support to airports and flight companies. Although subsidies often distort competition or are said to be wasted money, our results suggest that there indeed is a case for them if the result is increased regional growth and welfare.

Thus the message for policy makers of remote or peripheral regions is apparent: identify the bottleneck regarding transportation and then choose from the list above. Be aware that the mere physical existence of an airport (runway etc.) does not guarantee any flight operations. In such a case

financial incentives for more scheduled flights to relevant destinations (particularly the next big hub) may be an effective mean for improving regional economic performance.

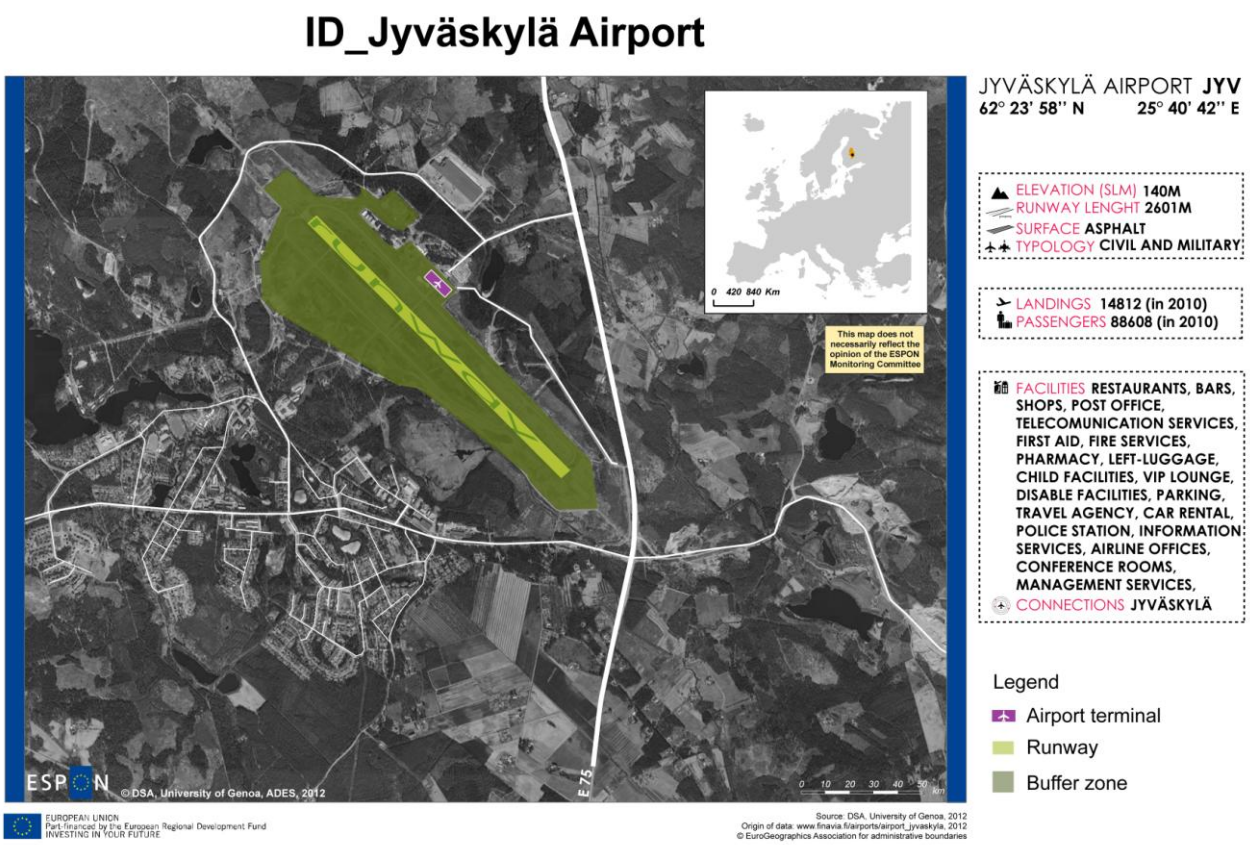
1.2 The recycle of secondary airports and new opportunity for the territory

Throughout the world, there are hundreds of second and third tier obsolete airports stuck in a pre-decline phase. It is urgent to think about their future, in order to transform airports' infrastructure into urban re-activators, before that the airport infrastructure arrives in its obsolete phase.

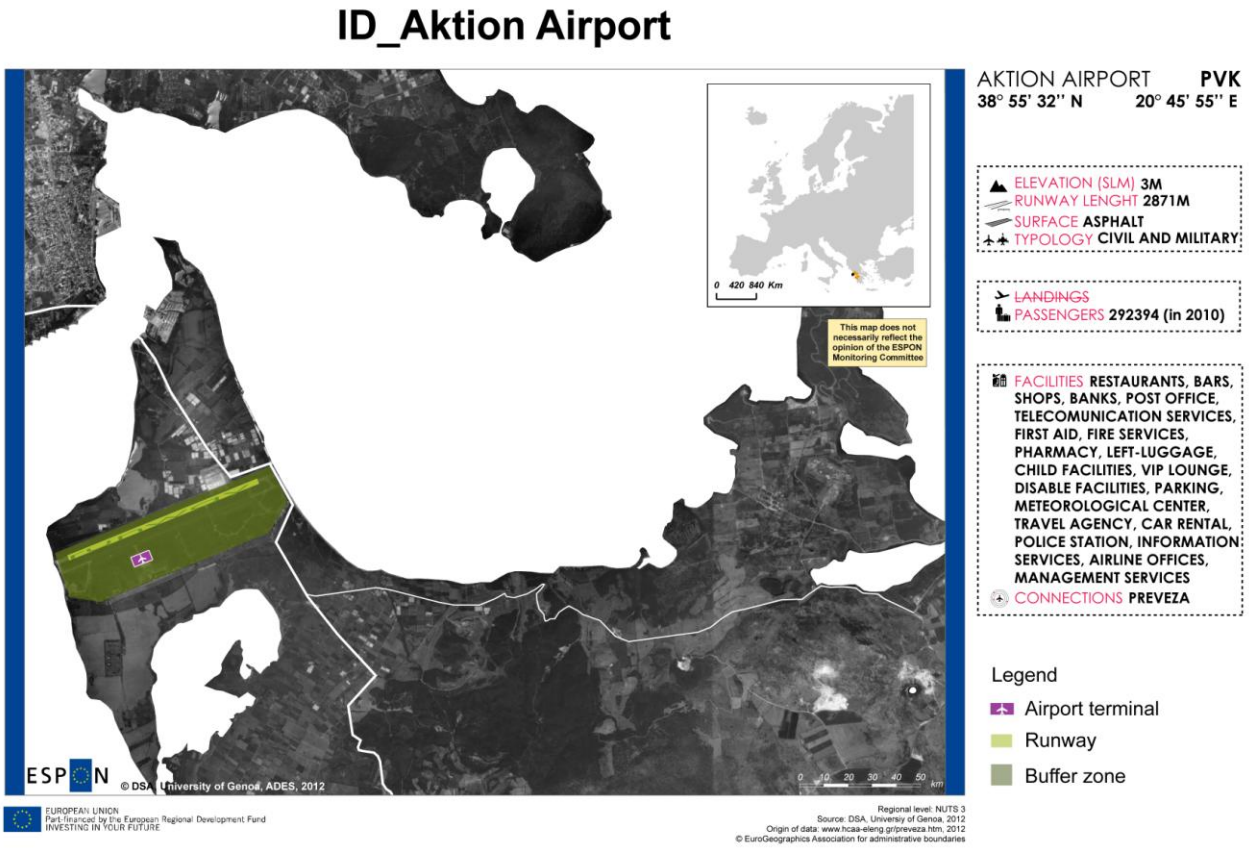
The ADES research case studies are: *Jyväskylä Airport*, City of Jyväskylä, Central Finland; *Araxos Airport*, *Aktion Airport*, *Andravida Airport*, Region of Western Greece; *Villanova d'Albenga Airport*, Province of Savona, Italy. These airports show different examples of the widespread situation of underused airports structures that have never managed to reach their potential or have lost their central role.

a. *On Hold* Airports

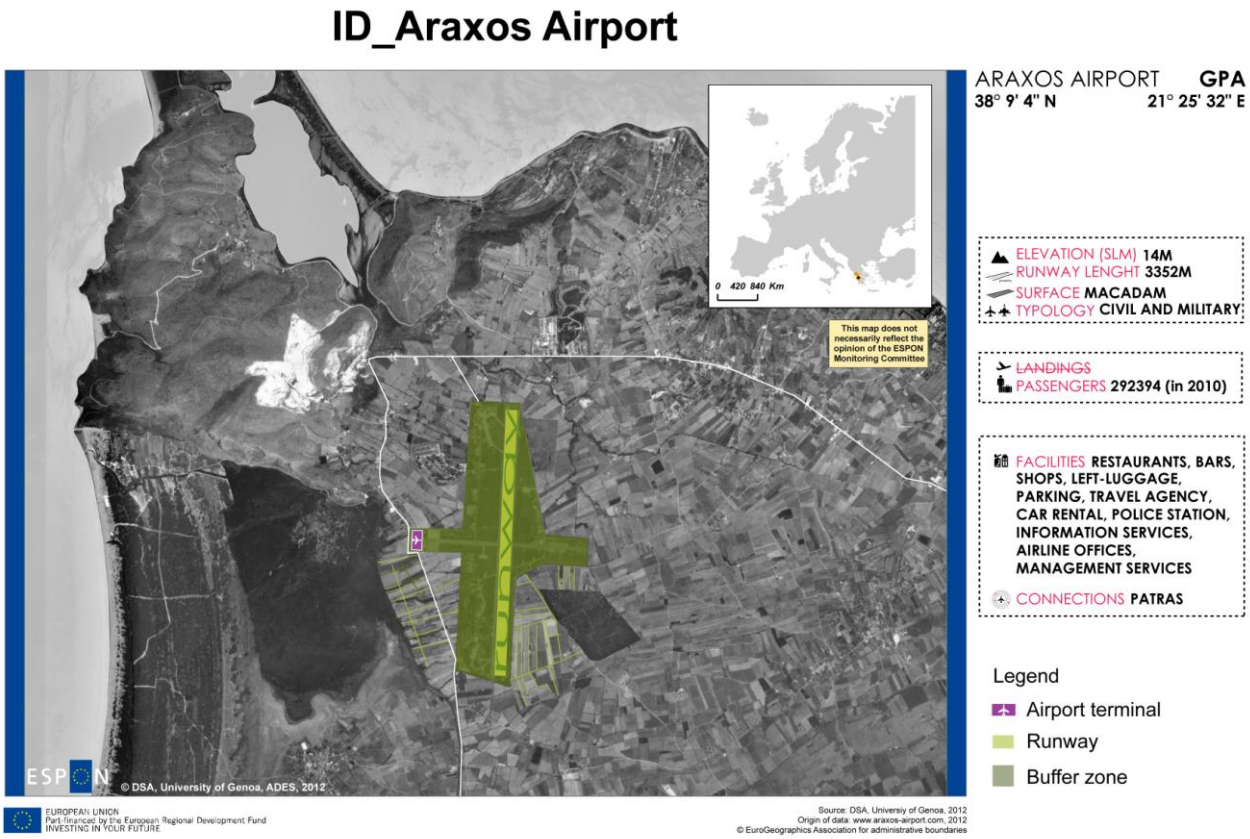
It is necessary to approach the everyday dimension of the airport's life. It is necessary to think in airports at the present time, with the current socio-economical condition. In that sense, the research suggests an operation of *recycling obsolete infrastructure.* Abandoned airports (*Andravida Airport)* and airports *on hold* (*Villanova d'Albenga Airport, Jyväskylä Airport*, *Araxos Airport, Aktion Airport*) are the material on which we are working on.



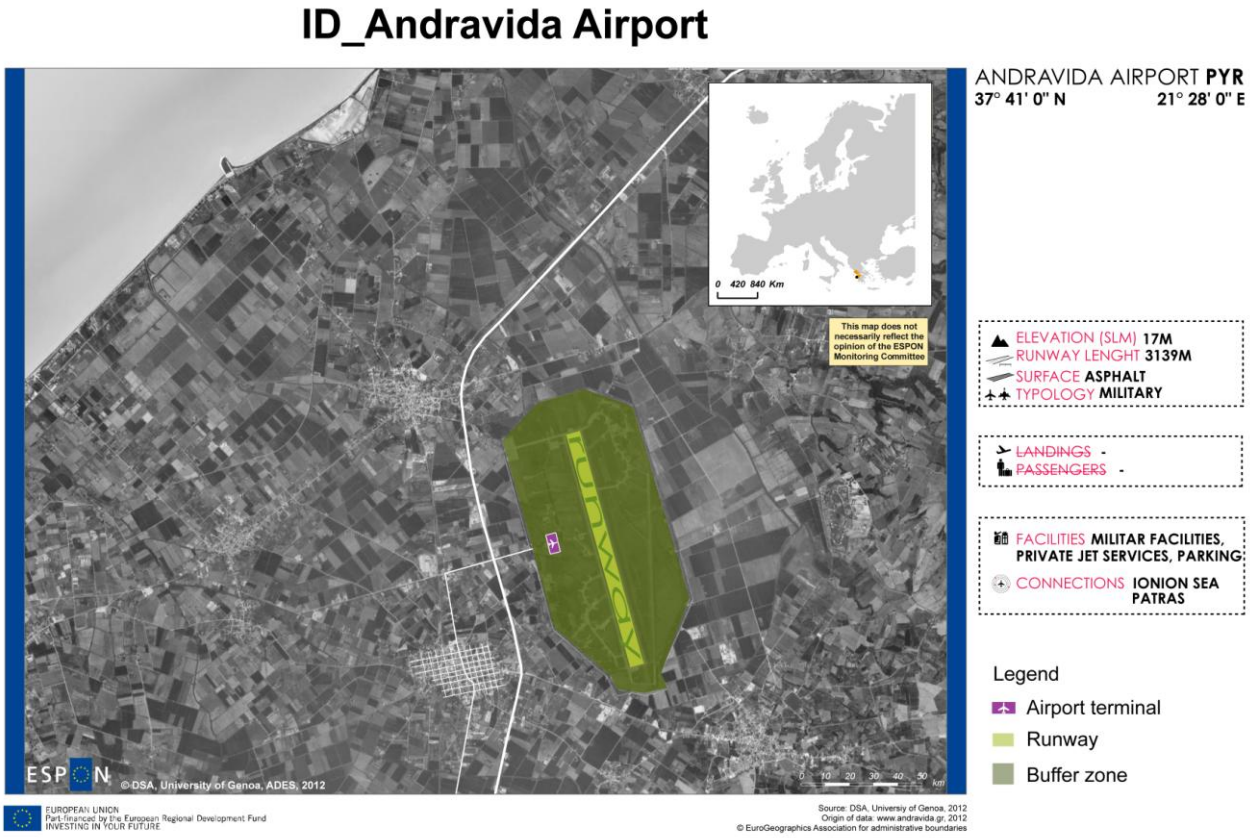
Map 4. ID_ Jyväskylä Airport characteristics



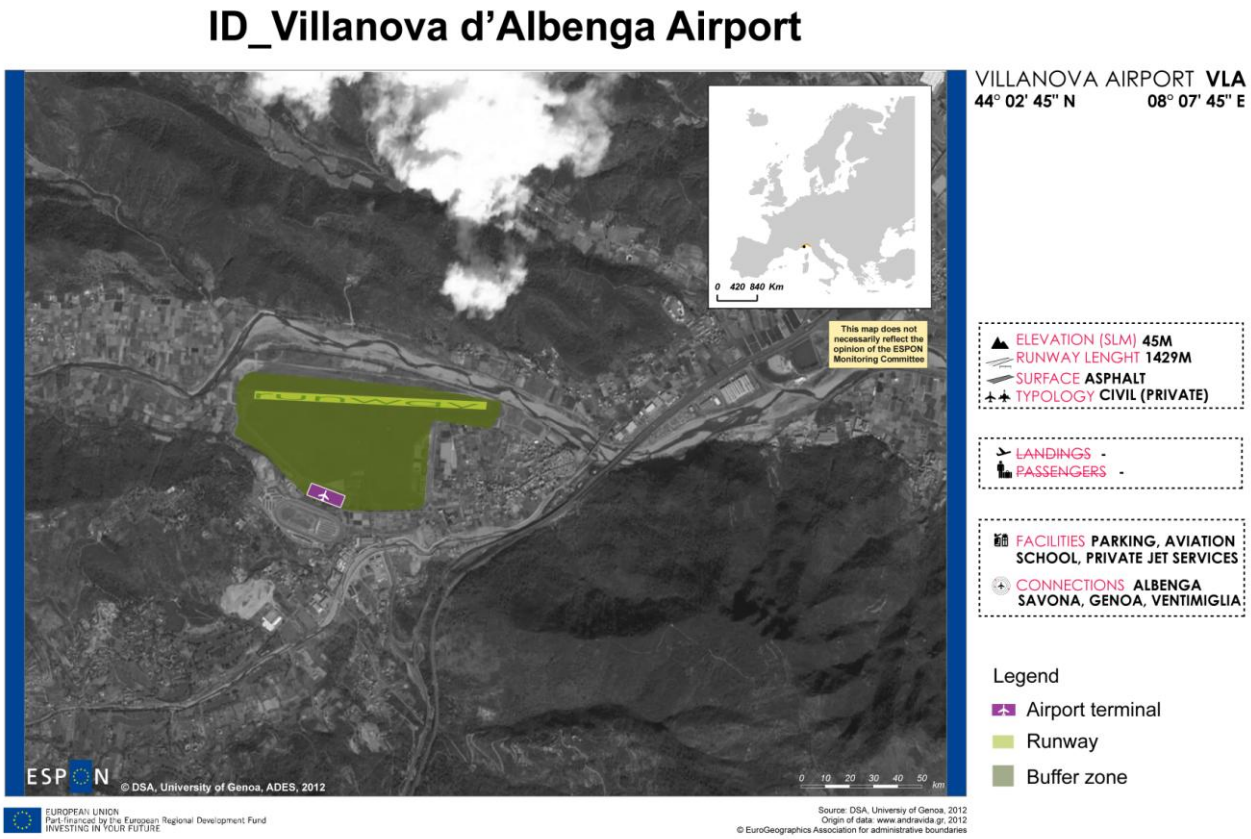
Map 5. ID_Aktion Airport characteristics



Map 6. ID_ Araxos Airport characteristics



Map 7. ID_ Andravida Airport characteristics



Map 8. ID_ Villanova d'Albenga Airport characteristics

b. Recycle strategy

Building new infrastructure, ever more today, in this moment of crisis, does not reveal itself as the most sustainable strategy, considering sustainability as an aim in relation to social and territorial changes. The European Commission's White Paper (2001)[1] indicates that it is an absolutely necessary strategy to interrupt the connection between increased mobility and economic growth.

This is the context in which this research wants to offer an alternative to the excessive construction of new infrastructure: don't build new roads but strengthen the existing public system. At the same time, don't build new airports, but to reuse the existing airport infrastructure and use them as activators of the economies and local contexts. **The recycling of obsolete infrastructure**, and the re-use in order to optimize their potentialities becomes the most sustainable and desirable solution. To re-think not only the abandoned and unused infrastructure in search of a new identity, but to recycle all those infrastructures those are already active but poorly operating and unproductive.

Around the word, exist a lot of examples of Re-cycled airports (see *SciR _Chapter 1.3*). After their decommission, many former military airports were not re-used and they remain in an abandoned state for years. But due to the growing population and the high demand for new houses, many of these airports could be re-developed as a new part of the city. Starting with the transformation of the air connection infrastructure (runway, technical street)

[1] *The European transport policy for 2010*, COM(2001) 370. Reviewed in 2006 by the Council Commission Communication and the European Parliament.

into urban main roads and street, and continue this new urban development with houses, public services, commercial and business areas.

In other cases, many problematic airports no longer present themselves in the potential range for urban expansion. These airports, which were once peripheral, have now been engulfed in the urban context, becoming physically central in the city. This simplifies their re-conversation into urban park space. These case studies propose the transformation into public urban parks as the suitable solution for the re-use of abandoned airports.

Therefore, the main question for the project seems to identify strategies of *recycle* existing obsoletes infrastructure rather than the construction of new infrastructure. The experimentation of different tactics, that are defined case by case, offers a network of paths in the landscape rather than it presents one-way routes that strongly limit the way of living in the territory[2].

c. *Osmotic* device

The preliminary results suggest the impossibility to propose one singular strategy for the airports' development. The diversity of the territories and the complexity of the problems drive the TPG to think on multiple proposals of future development strategies. These strategies will propose new operations. **The device** that drives these operations **is the *osmosis***[3]*.*

The *osmotic devices* will establish a stronger relation between the infrastructure and their surrounding territories. At the same time they will gain an economic improvement and new uses for the airports.

From an infrastructure 'tube' to an *osmotic infrastructure*, in osmosis with the surrounding area. Consider the infrastructure as a place of permanence and not just a transition, a biological material originating from the surrounding area and an integral part of the new housing situation. Through this *osmotic membrane* it could be possible to design infrastructure in a different way, as a place to stay and not only to cross. No longer like a tube that connects faraway places, but as a biological material which is part of the new housing situation. The *osmotic membrane* gives a new relevant value as multi-functional infrastructure. At the same time, a spine that holds up a fragmented and dispersed urban structure, and an *osmotic membrane* that promotes trade and exchange between infrastructure and landscapes along the way.

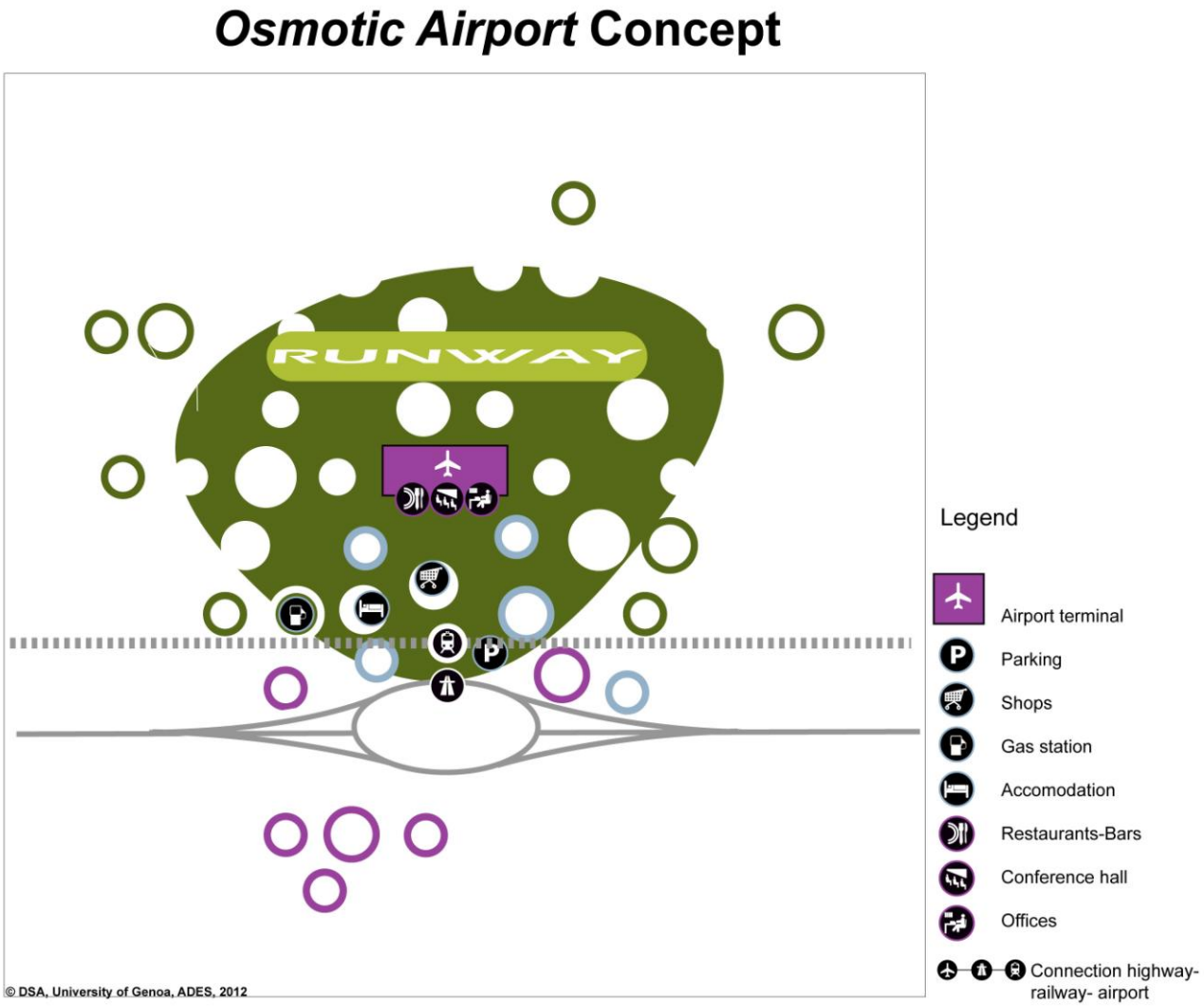
Infrastructure that generates trade with landscapes but also allows us to see new landscapes. The airport becomes a place to live and not only a door to cross to go to another destination. From airports to reach to fly 'beyond', a far

[2] Cfr. Mirko Guaralda, *Le infrastrutture viarie dismesse o declassate ed il progetto di paesaggio.* Libreria CLUP Soc. Coop., Segrate (MI), 2006.

[3] Osmosis is the net movement of solvent molecules through a partially permeable membrane into a region of higher solute concentration, in order to equalize the solute concentrations on the two sides. It may also be used to describe a physical process in which any solvent moves, without input of energy, across a semipermeable membrane (permeable to the solvent, but not the solute) separating two solutions of different concentrations. Cfr. *Osmosi*, www.wikipedia.org.

away destination, to airports in which to go and stay in, as attractors of flows related to activities associated with the local area and the structure of the airport.

In that sense, the ***airport osmotic infrastructure*** becomes *a place to live before a place to leave*[4]. It is organised to satisfy not only one specific sector (flight operation) but it could adapt itself and its efficiency in relation to the surrounding context and business, it could exchange fluxes (physical and immaterial) with the surrounding territory and it could accommodate multiple functions, as in the Postmodern examples (see *SciR_Chapter 1.3*).

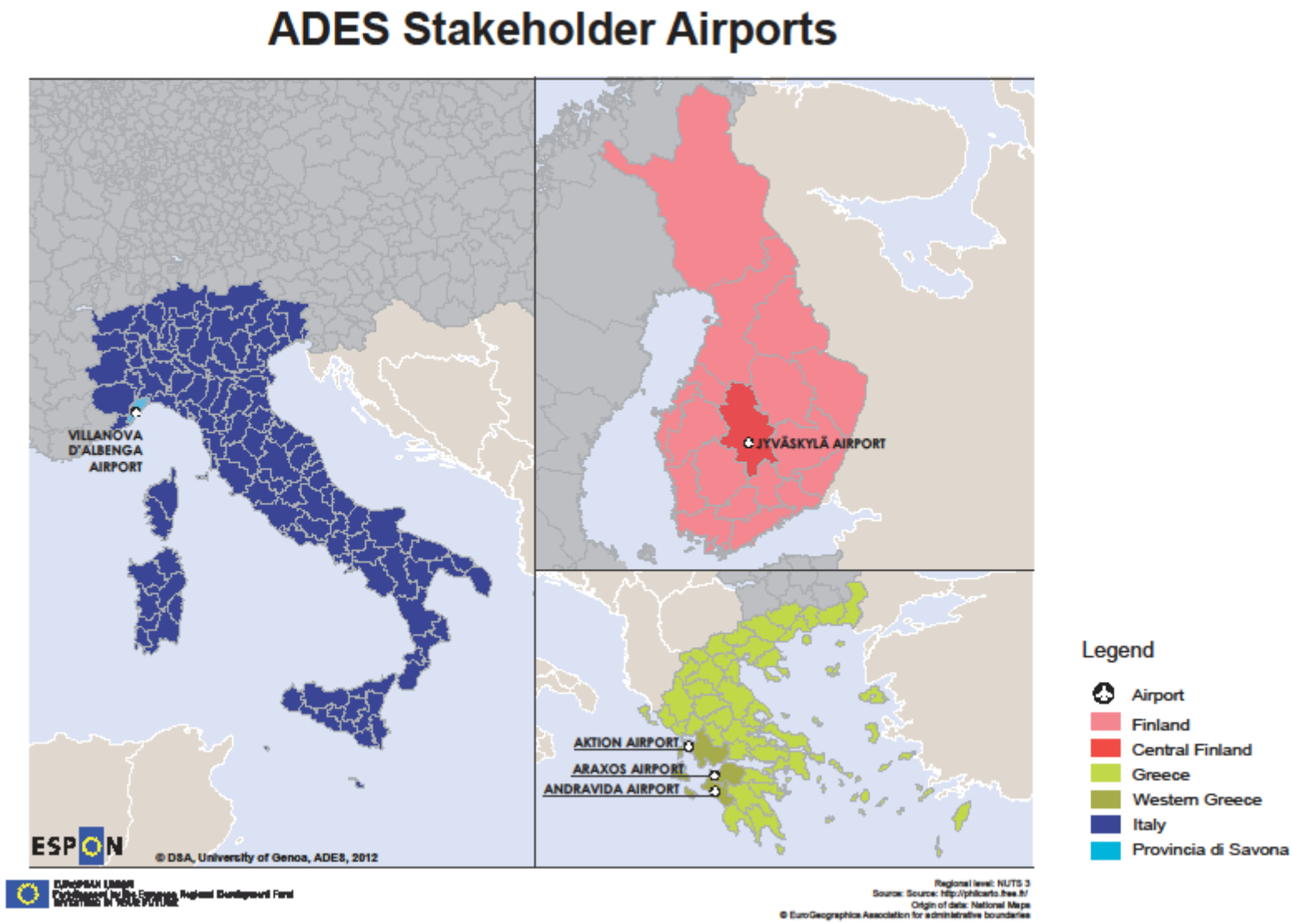


Map 9. *Osmotic Airport* concept

[4] Ricci M., Favargiotti S., (2012). *The Re-cycle of secondary airports and new opportunities for the territory - ADES Research (ESPON 2013 Project). AIRDEV 2012*. Airport Development Conference. Conference Proceedings. Edit by Rosário Macário. ISBN: 978-989-20-3071-5.

2 Options for policy development

Urban growth, in this moment of crisis, is very slow therefore making airports' possible central role in urban development very difficult. Furthermore, in many cases, politicians don't find a real convenience to strengthen schedule flights or improve technical and physical characteristics of these infrastructures. When it happens, the airport dramatically graves on the regional economy. And this is what happens in the majority of ADES cases studies (Map 7).



Map 10. ADES Stakeholder airports

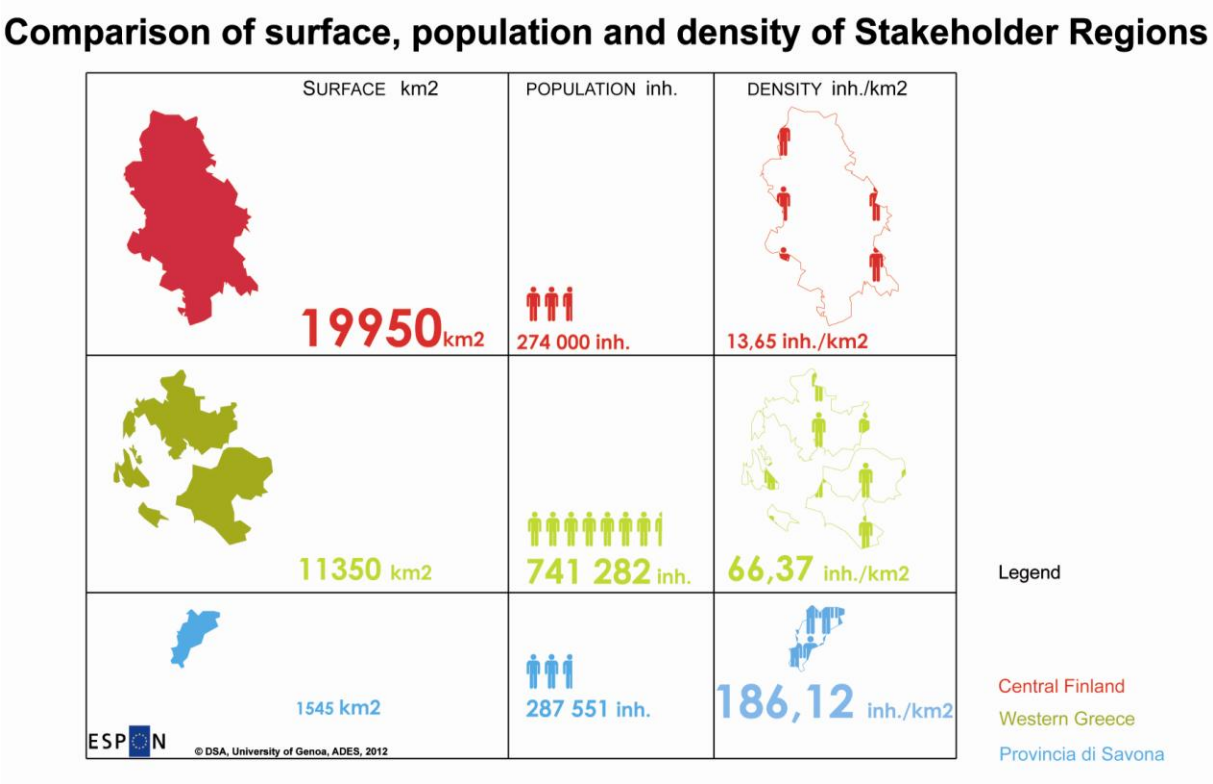
According to that, the recycling of airports could become an operative strategy for other urban transformations. The reconversion of airport infrastructure will increase quality and development of the surrounding urban and social condition: from airports on hold to airports catalytic of processes. The re-significance of this infrastructure could activate processes of growth of mobility, to develop transport and communication networks, to lose a physical precise cities' connotation, to increase the need of landscape and places in which to live in and recognize themselves. This could be the operative

strategy for these airports to recalibrate their fundamental function in their physical contexts: the integration of air traffic transportation facilities with activities that regenerate their life and the surrounding business.

In that sense, the political conclusion is that the improvement of accessibility may help improving the economic situation of a region. However, each region must carry out a thorough analysis what is the most efficient way to improve accessibility. In some cases (like in a remote area in Finland) this might be the strengthening of an airport (expansion of the structures and good offer of scheduled flights). In other cases (like in Greek regions), it might be the subsidy of scheduled flights to the next large hub. In few cases, it is recommended to completely abandon airport activities in order to transform it in an urban facility that will have stronger effects on the economic performance of the region. In even other cases (like in Italian regions) it might be best to integrate urban functions in the airport areas and to improve the highway or rail network system to better reach a nearby airport with a good offer of scheduled flights. A preliminary description is captured in the following chapters.

2.1 Strategies and tactics for ADES case studies

The research stresses the idea of **airport as a resource**. The airport is considered not only in its functional role but it is also consider as image of a territory, whose development has to be taken in account in the regional planning.



Map 11. Comparison of Surface, Population and Density of ADES Stakeholder regions

Studying the three contexts, we realized the difference and the similarities between ADES case studies. The contexts – geographical, economical, social – are extremely heterogeneous that didn't allowed to define an airport model to adopt indistinctly in all regions.

In fact, the geographical situation of the three stakeholder regions is very different (Map 8). Jyväskylä in Central Finland is very central to Finland but very peripheral relative to Central Europe. As the economic centre of Finland is south of Jyväskylä, Central Finland is even more remote and Helsinki becomes a natural gateway to "Europe" for the whole of Finland. Patras in Western Greece is also rather central to Greece, but Greece as a whole is at the southern periphery of Europe. Despite the fact that Patras is even closer to Central Europe than the capital Athens, almost all air traffic goes through Athens. The situation of Savona differs considerably. It is rather central in Europe, but very peripheral in an Italian context. The airports of Genoa, Nice, Turin and Milan are relatively close. Thus, the air link situation of the three stakeholder regions also differs substantially.

The main economic indicators, the industry structure and regional contexts characteristics have compared in the three stakeholders regions. This provided important topics for reflection on the cognitive framework for socio-economic and territorial aspects that define the potential economic impacts of airports. More detailed and fundamental information have been provided by in-depth interviews and structured questionnaires (see *SciR_Chapter 3* and *Annex 2*) carried out in local languages with key relevant stakeholders (at least five interviews per Region covering policy advisors, experts in different fields and policy makers).

According to that, it wasn't possible to draw one general model to adopt in all Stakeholders regions. We propose three **strategies for development and renewal of infrastructure** and the peripheral region in which each airport is located. According to the heterogeneity of the three contexts, the logic for intervention in various areas is obviously different, depending on contextual analyzes conducted and results obtained.

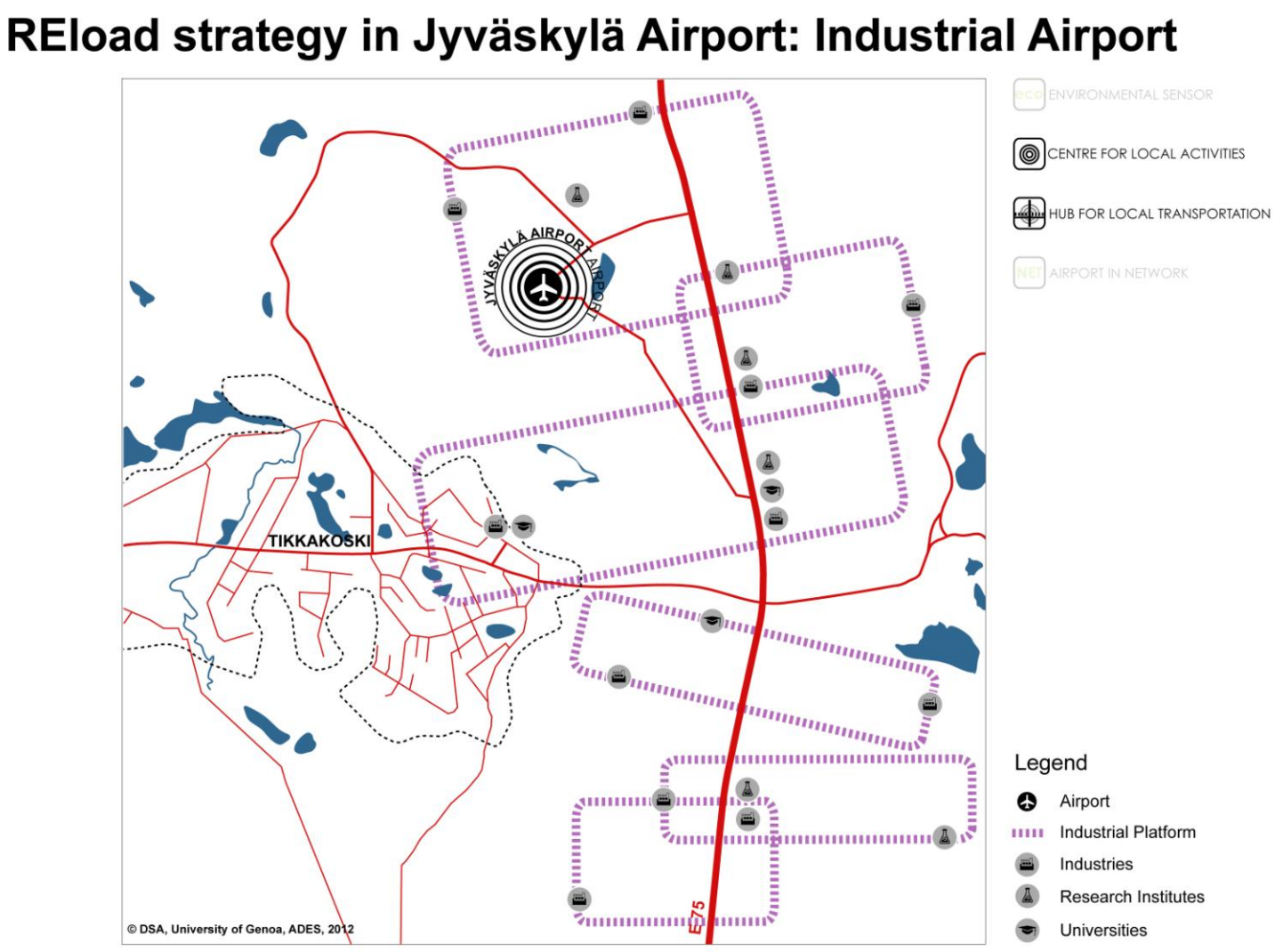
The guidelines for the vision are based on three different strategies:

- Expansion of the existing airport, increasing the number of flights, adding new functions to neighbouring industrial and commercial (**REload**);
- Maintenance of airport operation, hybridization with insertion of the functions of existing activities and related to the local context surrounding integration of urban functions (**REuse**);
- Abandon the airport function in favour of a comprehensive recycling action, a reclaiming land from the old infrastructure, creation of a park and public facilities for the city's new urban development (**REcycle**).

a. REload

This design strategy provides for the maintenance of existing airport facilities and strengthen it with new facilities and equipment. In particular, it's proposed the development of the potentials found in the analysis, in an attempt to enlarge the airport and ensure economic growth in the local context.

In Central Finland, military traffic has a strong role and will secure the good conditions also for the commercial air traffic in the future. Moreover, the development of Jyväskylä air traffic will concentrate on the international connections (and transfer passengers). At the same time, the rail transportation will be developed (domestic travel). ***Jyväskylä airport*** aims to become to be an important junction for Central Finland.



Map 12. REload strategy in Jyväskylä: vision of Industrial Airport

Aktion airport, instead, points to a strengthening of existing airport facilities to support the tourist traffic in summer and increasing the number of flights during the summer. This airport could become a strategic hub in the airport connection, especially connected to the tourism. Tourism, even if is not taken in account as a data in the algorithmic formulas, has a fundamental role in the development of the Greek region. According to that, Aktion could become an airport for Low-cost carriers. In that sense, it is realistic to think an enhancement of the attractiveness of the airport hub (terminal and surrounding territory), especially with the connection to the port of Lefkada and to the others port that bring to the Mediterranean islands

Map 13. REload strategy in Axtion: vision of Touristic Airport

For these reasons, the **REload strategy** is approached to the cases of ***Jyväskylä*** and ***Aktion*** **airports**.

b. REuse

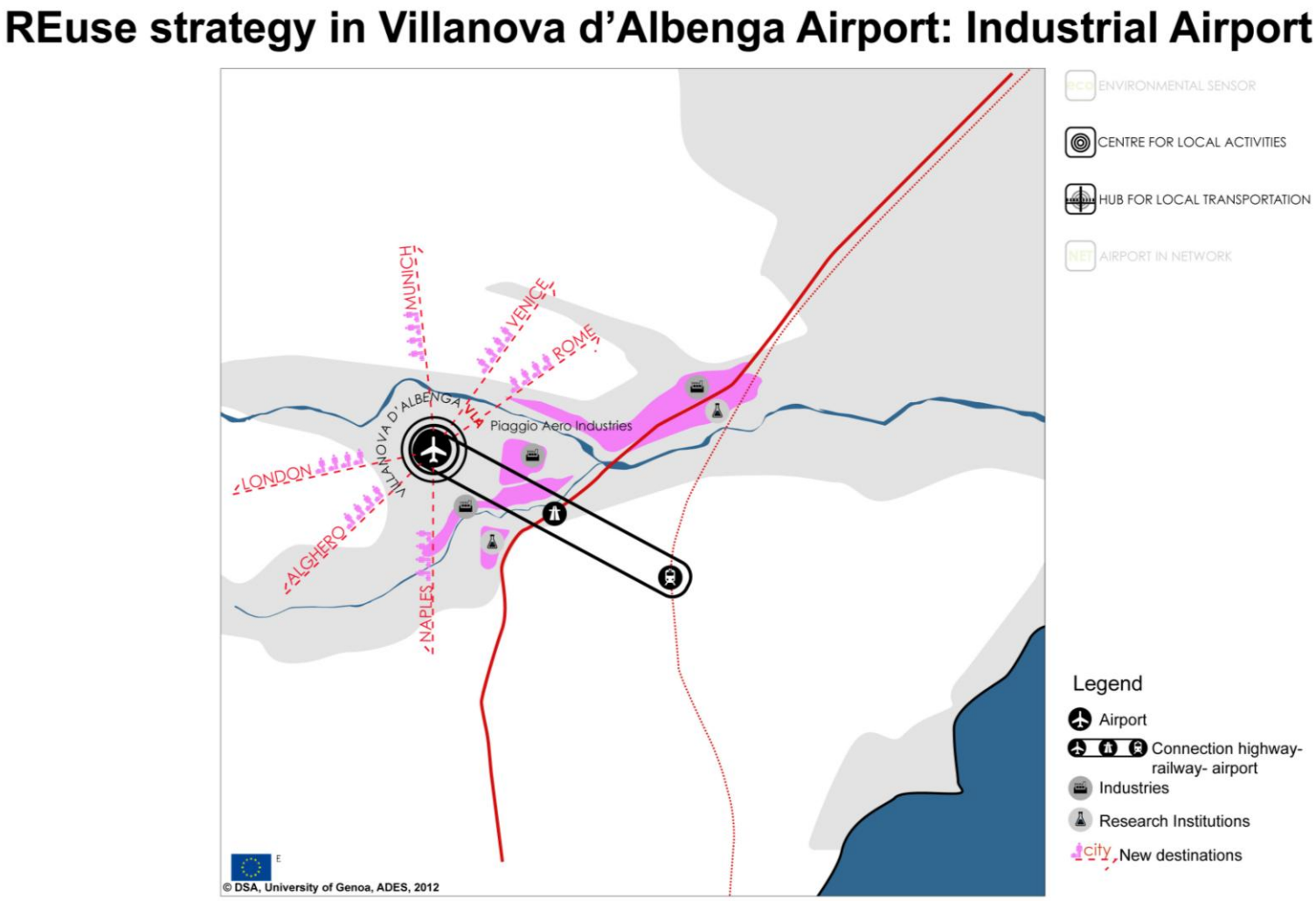
This design strategy provides for the maintenance of airport operation and hybridization with insertion of the functions of existing activities and related to the local context surrounding integration of urban functions. In particular, it's proposed the development of the potentials found in the analysis, in an attempt to merge the airport with the local context.

Araxos airport (next to Patras) is a typical airport that can work when and if is required. In the sense that it will a better solution to integrate with the city of

Patras trough the de-localization of activities from the city (eg. The University, and research institutes) to the airport. Even more today, with the good connection between Athens and Patras, it seems not so relevant to transform Araxos airport in a big hub of airport connection. In this way, it provides that structure activity lasts all year and provides the local context new areas of economic growth and productive equipment. The air traffic, in this case, will be concentrated during the summer and connected to tourism in the region.

Map 14. REuse strategy in Araxos: vision of Platform Airport

Villanova d'Albenga airport is "an essential qualitative piece to strengthen of the infrastructure system in the Province of Savona"[5]. The manufacturing and technological activity is qualified, the characteristics of the territory, the agriculture, the alimentary sector are growing sectors with a strong component of foreign trade (20% export), and the relevance of the tourism. In this airport the traffic peaks have always been linked to the most important events and activities of Cannes, Monaco and Côte d'Azur.



Map 15. REuse strategy in Villanova d'Albenga: Industrial Airport

The transport is a consequence of the creation of a question. In the future it could be possible that new tourists will arrive with new flights carriers. However, tourists are not bringing by the creation of new flights. The creation of a touristic offer, the offer of hospitality, the promotion in Europe and in the world will attract tourists.

[5] L. Pasquale, President of Unioncamere, Liguria.

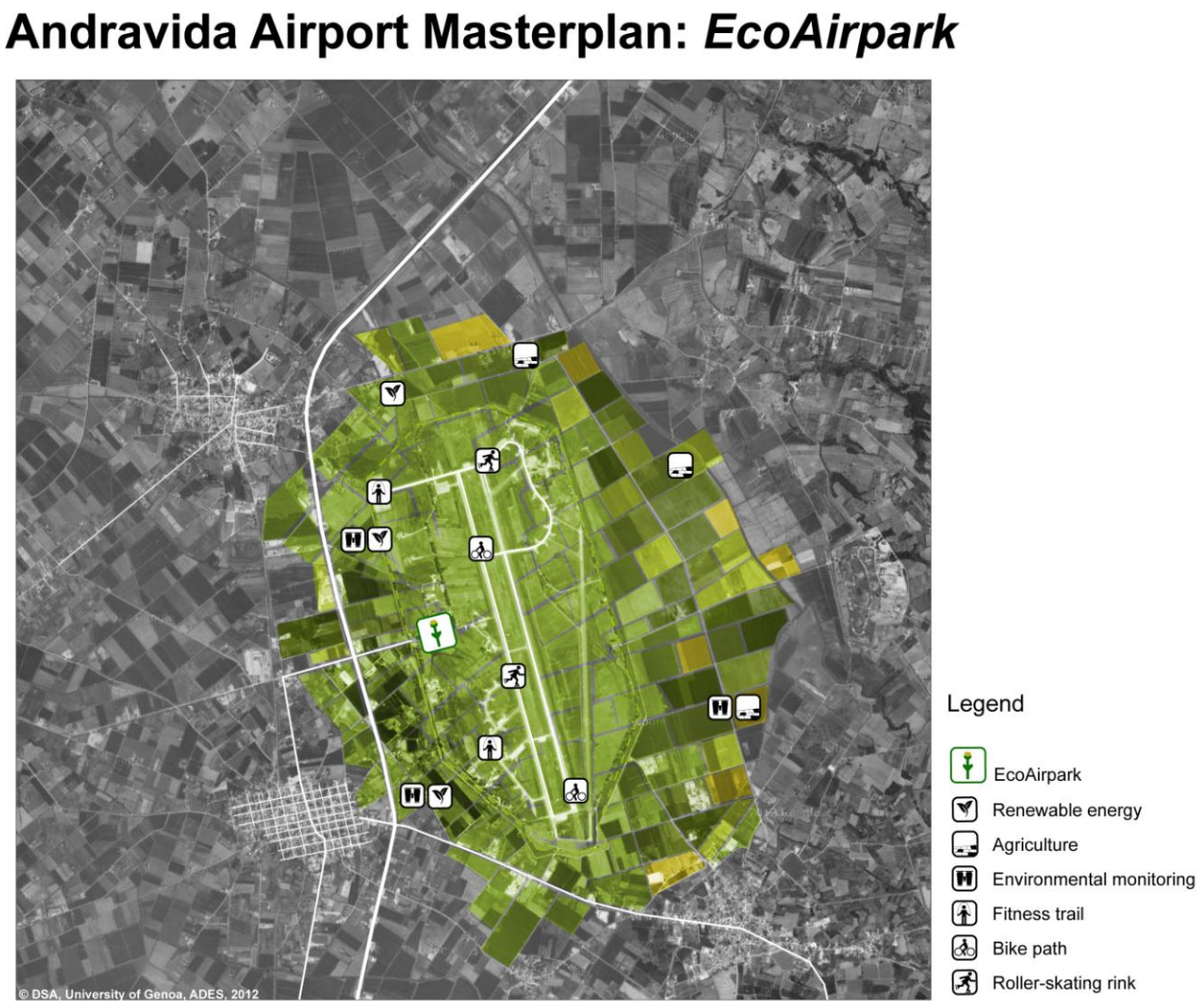
According to that, the development strategies of Villanova d'Albenga airport stress two directions. On one side, the possible further development of the airport is only in business aviation, or executive jet, because of the impossibility of accept all typologies of aeroplanes. On the other side, it's possible imagine that land is used to cultivate flowers and agricultural products by the society, in a further vision in which there is synergy between agricultural and touristic sectors (e.g. open air exhibition in the land; contemporary art events; etc.). Another interesting vision could be to work with the industrial sector that could find its localization in the flat land of Albenga. In this way, the growth of the airport could generate new possibilities to know the surrounding territories and enrich the poor local context. At last, the relationship with Nice and Canne airport is crucial because is a cross-border network and it will create a relationship that strengthens and generates growth in a *European region*.

According to that, the **REuse strategy** is approached to the cases of ***Araxos*** and ***Villanova d'Albenga*** **airport**.

c. REcycle

This design strategy provides for leaving the airport function in favour of a comprehensive recycling, reclaiming land from the old infrastructure of the landscape and the city's new urban development, with creation of parks and public facilities. In particular, it's proposed the development of the potentials found in the analysis, in an attempt to recycle the airport and give back to the city.

The primary aspect related to the recycle of small airports is the requalification and development of a good level of accessibility, allowing these to become dynamic centralities for the surrounding territory. In fact, more accessible larger scale national and international trade has often overshadowed these territories. Accessibility is therefore fundamental and central resource for territories, helping them to attract and re-activate diverse incoming flows, such as tourism, but also activities related to commerce, culture, education, health, agriculture, energy or high-tech technology. Value and anticipate the correct strategy of recycling airport is an increasingly urgent need to anticipate the inevitable decline of these structures and to activate recovery process in synergy with the different urban realities.



Map 16. Andravida Masterplan: *Eco Airpark* (REcycle strategy)

Andravida airport offers only military transport services. It is located in a strategical position in the Region of Western Greece. This area is ranked among the privileged areas of Greece in terms of existing natural, cultural and tourism advantages. In particular, it take advantage from the countless natural attractions of the inland and the mountainous areas, the large areas and the purity of the sea, the rich and rare ecosystems, the monasteries, the modern sports facilities, the convention centres, the growing and modernized tourist facilities compose a variety of comparative advantages. The growth potential of both industries (agriculture and tourism) is high if the airports development is combined with local development projects. Such projects, in terms of tourism can be hotels and thematic tourism attractions, and combined transport services and usage of modern cultivating methods for agriculture. Moreover the strategic position of the region can foster international collaboration of local agricultural producers and touristic agents to neighbouring EU countries. Furthermore, two airports already support the

Region of Western Greece. It doesn't really need a new airport for transport operation.

In the possibility that the military activity will abandoned Andravida airport, the more realistic and desirable vision for the future of this airport is the complete recycle of it. Andravida airport could be the privileged place to be transformed a new natural attraction and urban facility. It has to be abandoned from the flights aviation in favour of a transformation of the land into a urban park, with the localization of recreation facilities, in order to improve the value of the surrounding territory.

In that sense, the **REcycle strategy** could be approached to the cases of ***Andravida* airport** as a long-term future vision.

2.2 Recommendations for secondary airports in Europe

When it comes to recommendations, we have to distinguish between lessons for the regions on the one hand and lessons for the airports on the other hand (despite the fact, that in some regions the airport are owned or even managed by regional authorities).

a) Regional authorities

One of the strongest results of this study is that accessibility indeed matters. Thus, it is important for each and every region to be accessible. This is relevant for both people and companies, as well as from the region when travelling outbound as from other regions when travelling into this region. General **options** for peripheral regions to improve their accessibility and thereby their economic situation include:

- better airport infrastructure (like higher passenger capacity or longer runways)
- better flight services (more scheduled flights to relevant destinations)
- better transport infrastructure to airports (improvement of rail or road infrastructure)
- better public transport services to airports (improvement of rail or bus services)
- better other traffic infrastructure (better access to other regions by rail or road)
- better interregional transport services (more trains or bus services to relevant destinations)

Obviously, there is not one single recommendation for all regions. Our analysis shows that we have to distinguish several types of regions. We should distinguish two types of regions, of course being aware that the separating line between the two types is more a grey area than a clear solid line. The distinction depends on the localization of second and third tier airports with regard to major airport hub.

The first type defines regions far away from the next good airport (offering frequent flights to all relevant destinations) such as four or more hours by train or car. For these regions, the general findings include:

- Airport activities are relevant for economic performance
- Airport infrastructures are usually not the bottleneck
- Often a bottleneck are regular scheduled flights to relevant destinations

The second type includes regions rather close to the next good airport (offering frequent flights to all relevant destinations) such as three or less hours by train or car. For these regions, the situation is completely different and the general findings include:

- Airport activities are not relevant for economic performance
- Airport infrastructures and activities are usually not the bottleneck
- Often a bottleneck is a fast access to the “good” airport in the neighbour region

Thus, it is important for authorities of peripheral regions to know whether they belong to “type one” or “type two”:

- Type one: regions far away from major airport hub: They need a functioning airport. Relevant is the time needed to relevant destinations, including the big European capital cities. To this end they need an airport with adequate infrastructures, fast access to the regional airport, frequent scheduled flights to relevant destinations (among them at least one big European hub)
- Type two: regions next to major airport hub. They do not need a functioning airport. Relevant is the time needed to relevant destinations, including the big European capital cities. To this end they need fast access to the next bigger airport with frequent scheduled flights to all relevant destinations (including all European hubs) by road and or rail.

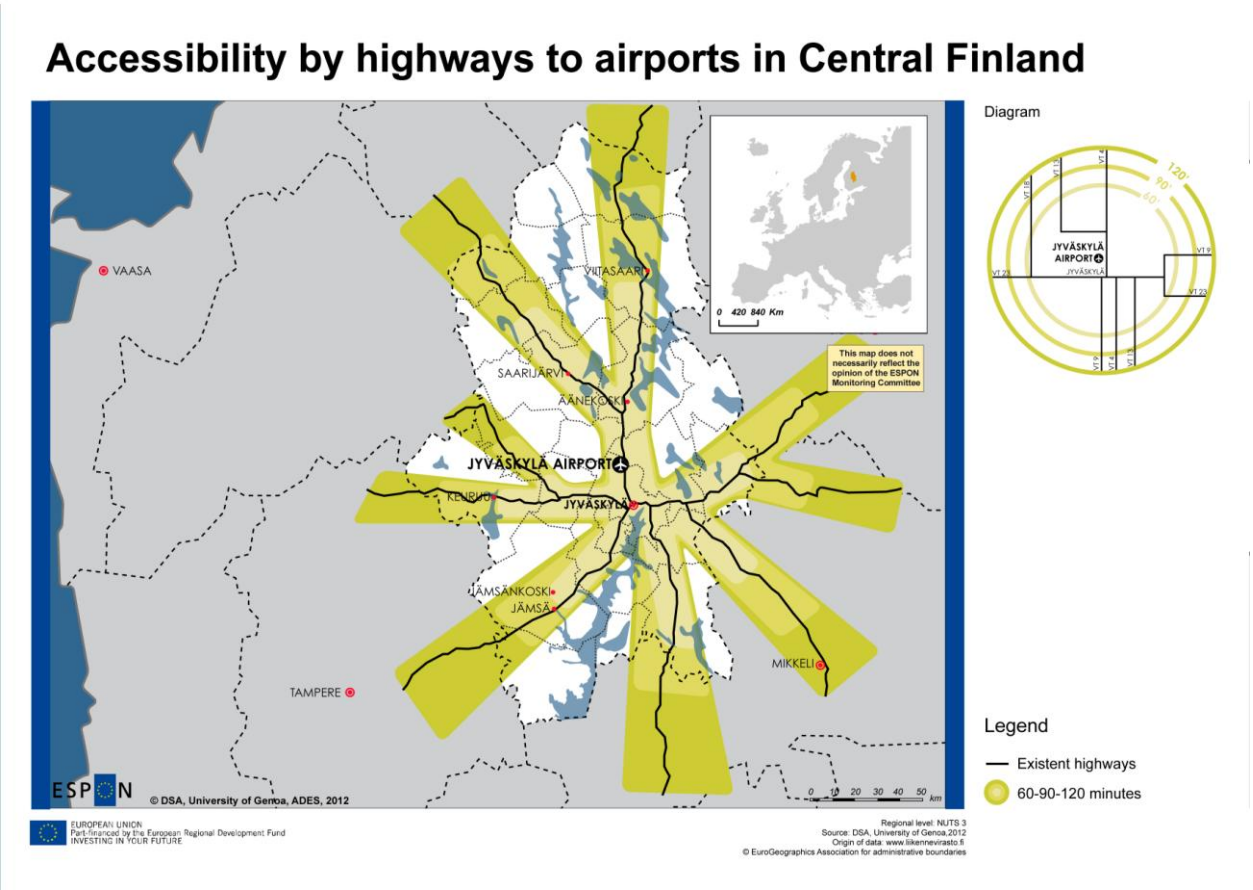
Regarding the three stakeholder regions, we come to the following results:

- **Jyväskylä**: The fast train to Helsinki takes a bit more than 3 hours; thus, the plane is not much faster on a city to city basis than the train. The plane is only faster, when people want to travel further and need to change plane in Helsinki. Thus, Jyväskylä is in the grey zone between

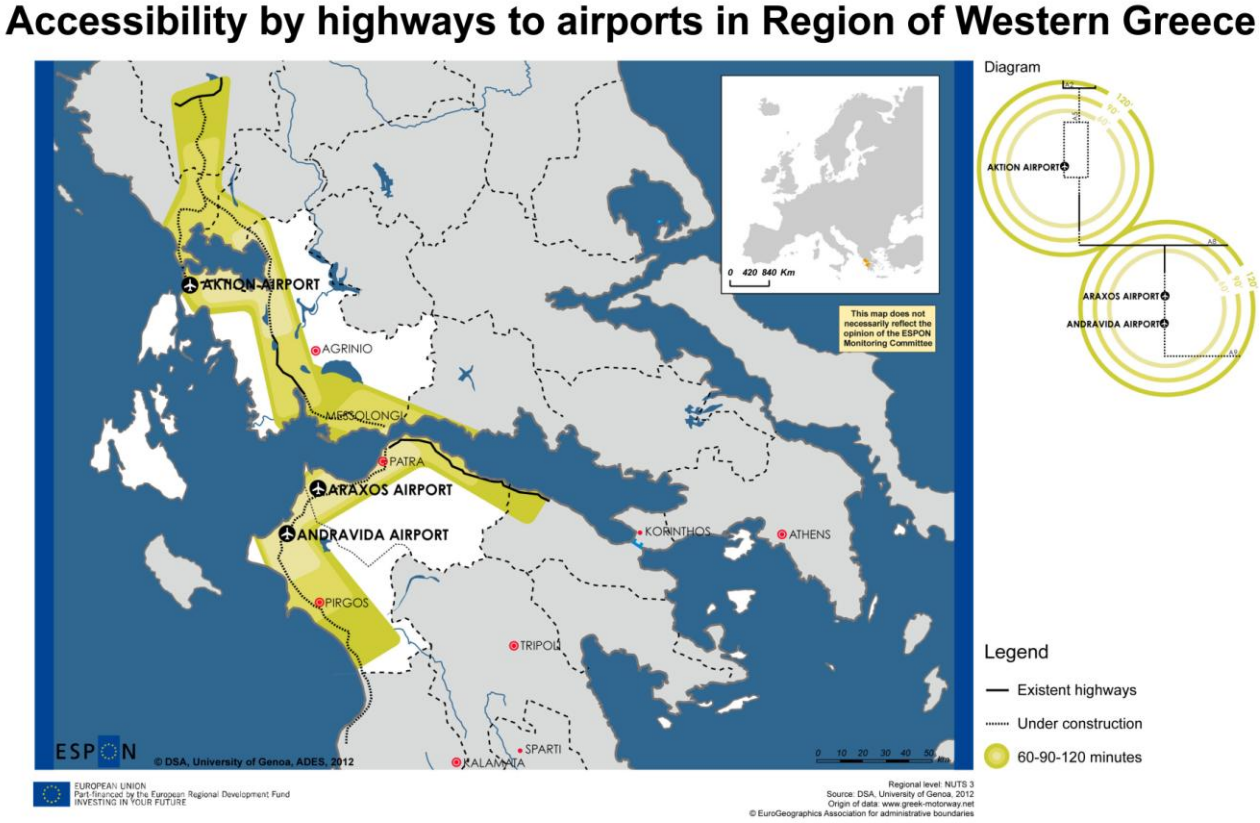
the two types.
Nonetheless, better direct flight services to a greater hub (like Stockholm or Copenhagen) should have a positive effect to economic development in the region. As such flight operations may not be profitable, national or regional subsidies to the airport or airline companies may be an effective tool to enhance the flight schedule.

- **Western Greece**: The estimated time between Patras and Athens International airport is approximately 2 and a half hours by car. So it is definitely more convenient than airplane or fast train (which takes some 3 and a half hours). However since the region is lengthy this does not apply for all places within it. Some of them will need definitely more than 4 hours to the nearest airport. To this end the airport of Aktion should increase its scheduled flights, not only in the summer time. Better direct flight services (more scheduled flights to relevant destinations such as Athens, Frankfurt or London) should have a positive effect on economic development in the region. As such flight operations may not be profitable, national or regional subsidies to the airport or airline companies may be an effective tool to enhance the flight schedule. In addition, better other traffic infrastructure (better access to other regions by rail or road, e.g. to Athens) will have a positive influence on the attractiveness of the region for people and business and therefore on economic performance.
  In that sense, regional efforts and investments should focus on just one regional airport with adequate flight density and public transport access: Aktion airport should be considered.

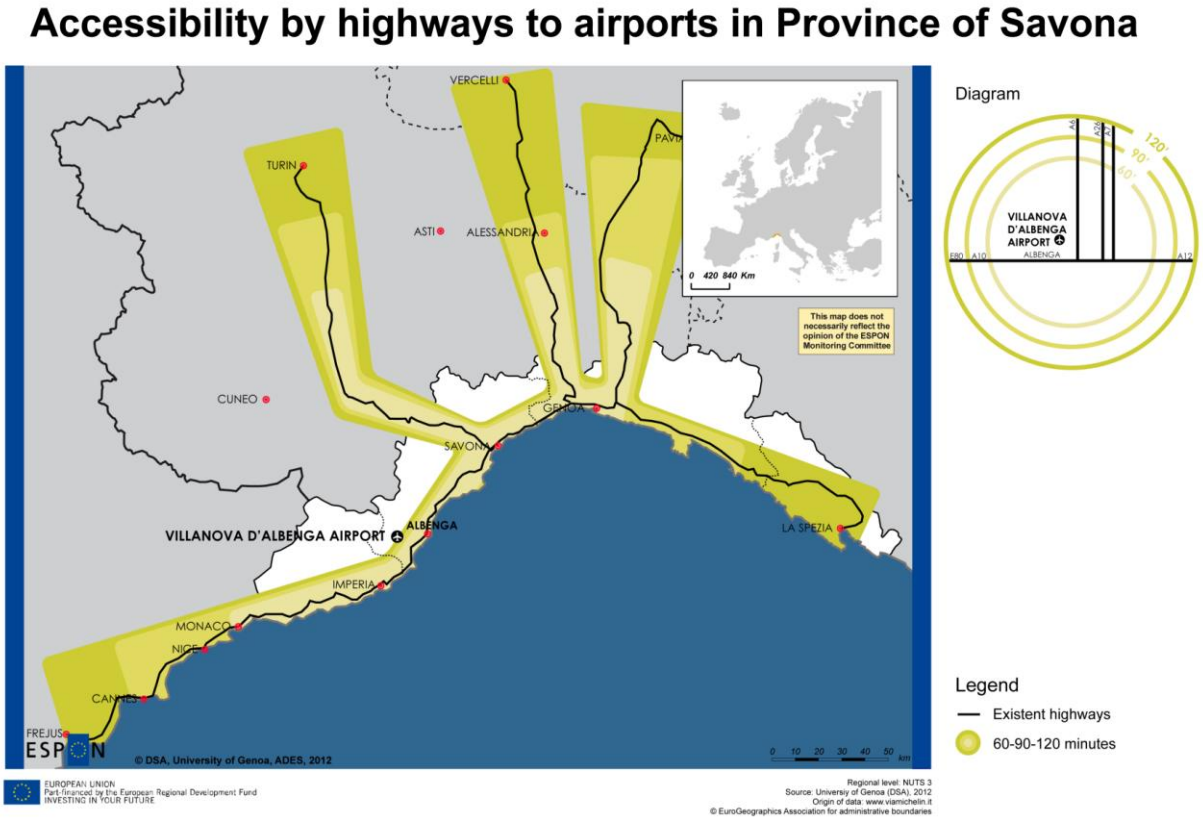
- **Savona**: The fast train from Savona to Genova just takes half an hour, to Milano and Nice it is two and half hours; thus, the train is faster on a city to city basis than the train. Savona belongs to type 2.
  The existing airport in Villanova d'Albenga is not really relevant for the accessibility of (the province of) Savona. However, better train links to Genova, Milano and Nice should increase the attractiveness of the region.



Map 17. Accessibility by highways in Central Finland



Map 18. Accessibility by highways in Region of Western Greece



Map 19. Accessibility by highways in Province of Savona

b) Airport authorities

For airport representatives, the situation may differ from the situation of the regional authorities, particularly when their airport belongs rather to the second type (regions next to major airport hub).

- Airports in type one regions: improvement strategy: These airports are important for the accessibility and economic performance of the respective regions. Thus, number of scheduled flights to relevant destinations should be augmented to improve the accessibility of the whole region. Actions may include talks with airline companies as well as talks with regional and national authorities to get subsidies for destinations which are interesting for the region but tend generate losses for the airlines.
- Airports in type two regions: renewal strategy: These airports are not important for the accessibility and economic performance of the respective regions because the accessibility is granted by nearby airports in neighbouring regions. Thus, existing airports cannot expect to be subsidised and have to look for something else. They can stay an airport for private aviation or charter flights, or they can convert to something new (see the renewal strategies in the previous chapter).

Regarding the three stakeholder regions, we come to the following results:

- **Jyväskylä**: The problem is not the technical airport capacity, but rather the limited number of scheduled flights (only tree times a day to Helsinki) which are a bottleneck for economic development. Better direct flight services to Helsinki and to a greater hub (like Stockholm or Copenhagen) should have a positive effect to economic development in the region. As such flight operations may not be profitable in the short run, temporary subsidies from the national or regional authorities may be an effective tool to enhance the flight schedule.
- **Western Greece**: The bottleneck for economic development is not the lack of airport infrastructures, but rather the limited number of scheduled flights. Better flight services (more scheduled flights to relevant destinations such as Athens, Frankfurt or London) should have a positive effect to economic development in the region. As such flight operations may not be profitable, subsidies from the national or regional authorities may be an effective tool to enhance the flight schedule. In addition, an extension of charter activities may help to improve the profitability of the infrastructures.
- **Savona**: The existing airport in Villanova d'Albenga is not really relevant for the accessibility of (the province of) Savona. Thus, its future will hardly be an airport with scheduled flights. A renewal strategy is much more likely successful (and also effective for the region). All sort of new activities – both in aviation and in other fields – may help to overcome the current weaknesses. As displayed in *SciR_Chapter 3.6*, Villanova d'Albenga is already on its way to a new future.

Summing up, the situation for peripheral regions is often not easy. Low accessibility is a disadvantage for economic development, and weak economic activity leads to weak demand for transportation services and low accessibility.

From the extensive research results obtained (see *Chapter 1.1* above and *SciR_Chapters 2.3-2.6*) we can conclude, that supply side effects do play a certain role, especially in peripheral regions. This means that better accessibility has a positive influence on the attractiveness of a region for people and business and therefore on economic performance. This seems to be relevant particularly in the medium to long run.

Thus, increasing accessibility of a peripheral region is a good means to promote the economy and enhance welfare. However, airport infrastructures are usually not the bottleneck for better accessibility. Many peripheral regions dispose of appropriate infrastructures including runways and airport buildings. The bottleneck is rather the availability of adequate flight services, i.e. frequent scheduled flights to relevant destinations.

In addition, we have to distinguish, whether a region needs a functioning airport of its own as it is far away from a major airport (or hub), or whether it does not need an airport of its own as it is close enough to a major airport. In the former case more scheduled flights should be a valid option, in the latter it is better to reduce travel time (be it by rail or road) to this major airport. Though, in both cases it is about improving accessibility.

3 Key analysis / diagnosis / findings and the most relevant indicators and maps

3.1 Maps

Maps are a powerful tools to visualise spatial data but they can be also a useful instrument to help decision makers to choose and define the best strategies for local development. They are essential implements of communication with the local context, and were developed to be instructions for use, in service of political actors and institutions in general.

Maps are divided in three groups:

- **Descriptive Maps**: to show the current situation
- **Concept Maps**: to represent the project essence and the *manifesto*
- **Vision Maps**: as a support for further development process

a. Descriptive Maps
The objective of *Descriptive Maps* is to visualize statistical information. For each region, *Descriptive Maps* outline the current situation. They show both the present situation and the changes over the last years in the three regions. The maps focus (among others) on the spatial profile and accessibility as well as regional transformations, new centralities, environmental mitigation and compensation. In the Final Report were included the most representative maps to better explain and understand contexts or strategies. All the map are included in ***Annex 3 _Book Map.***
The set of maps has been envisioned according to a precise structure, through which is possible understand the logical path of construction of each context and every consequential vision. In particular:

- **Europe**
  It is an overall image of Europe in which are juxtaposed ESPON maps of accessibility and GDP per capita. The comparison between these two maps is used to introduce two fundamental issues around the research work: economy and accessibility of each area. From these maps is possible to understand how seemingly inaccessible areas, can have, instead, a high level of production and economic. In contrast, regions well connected and equipped with infrastructure networks, reach rather low values of GDP. This situation leads to reflect on the importance of local contexts and the need to make insights at the regional scale.

- **Nation**
  In these three maps, one for each nation, are represented at national level the position of the main national airports. Airports are catalogued by the flow of passengers per annum (in reference to 2010 in particular). In this way there is an immediate image of the main airports hubs for each region. In particular, flows of passengers range from a maximum of 35 million in a year (e.g. Roma Fiumicino, Italy) and minimum of 100.000 in a year (e.g. Araxos, Western Greece).

- **Region**
  The first regional-scale map shows the three main statistical data on the peripheral regions in the studio: surface, population and density. The comparison of these data provides an interesting insight into the sheer diversity of the three territories: Central Finland has a surface of 19950 kmq and a population of only 274.000 inhabitants, Western Greece has a surface of 11350 kmq and a population of 741.282 inhabitants, Liguria, finally, has a surface of only 5420 kmq, but also a population of 1.616.788 inhabitants. The most significant is the density: 13,65 inhabitants/kmq for Central Finland, 66,37 inhabitants/kmq for Western Greece and even 298,3 inhabitants/kmq for Liguria.
  Below, was prepared a series of maps on a regional scale, for each region, represents the current environment through their specificity. In particular: infrastructures (highways, secondary roads, train, harbours, airports), industry and commerce (industrial districts and shopping malls), landscape heritage (parks and natural reserve, beaches, blue flags, orange flags, monuments), public services (sport complex, hospitals), education and research (universities, research institutions). Each system is rational and is interpreted through conceptual and synthetic diagrams.

- **Airports**
  In this structure the connection between Descriptive Maps and Vision Maps is realized through the introduction of three maps on the airports, themes of the research. They are like ID cards and contain all the basic information on the airports of Jyväskylä, Andravida, Araxos, Aktion and Villanova d'Albenga. In particular, surface, number of employees, flows of passengers, length and characteristics of the track, etc.

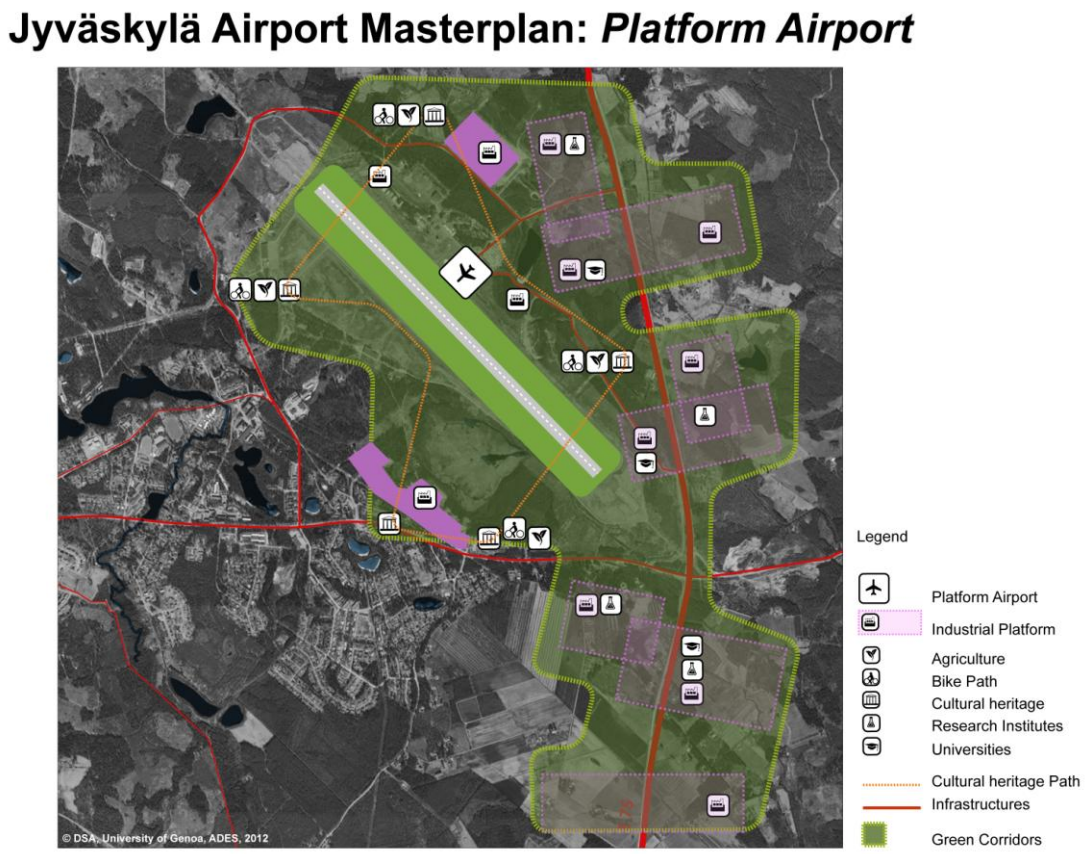
b. Concept Maps

The *Concept* of *osmotic airport* introduces this group of maps. The concept is an abstract image describing the inner nature of the project and at the same time represents its essence and manifesto. Through one icon-image, the *osmotic concept* clearly defines the ways to describe the transformation of physical space: it establishes a stronger relation between the infrastructure and their surrounding territories. At the same time the territories gain an economic improvement and new uses for the airports.

c. Vision Maps

The objective of *Vision Maps* is drawing a set of images that visualise potential futures and possible further development, specifically of the transportation system. Vision maps explore potential new assets; they use design as analysis and methodological support for strategic processes.

Airport infrastructure for its dimension and relations with the territory is a potential catalytic agent and an activator of contexts: airports as generators of development in peripheral regions but also as generators of a new image for the area and of themselves. As introduced above, the logic for intervention in various areas is obviously different, depending on contextual analyzes conducted and results obtained.



Map 20. Platform Airport_ Jyväskylä _Masterplan

Aktion Airport Masterplan: *Touristic Airport*

Map 21. Touristic Airport_Axtion_Masterplan

Villanova d'Albenga Airport Masterplan: *Logistic Airport*

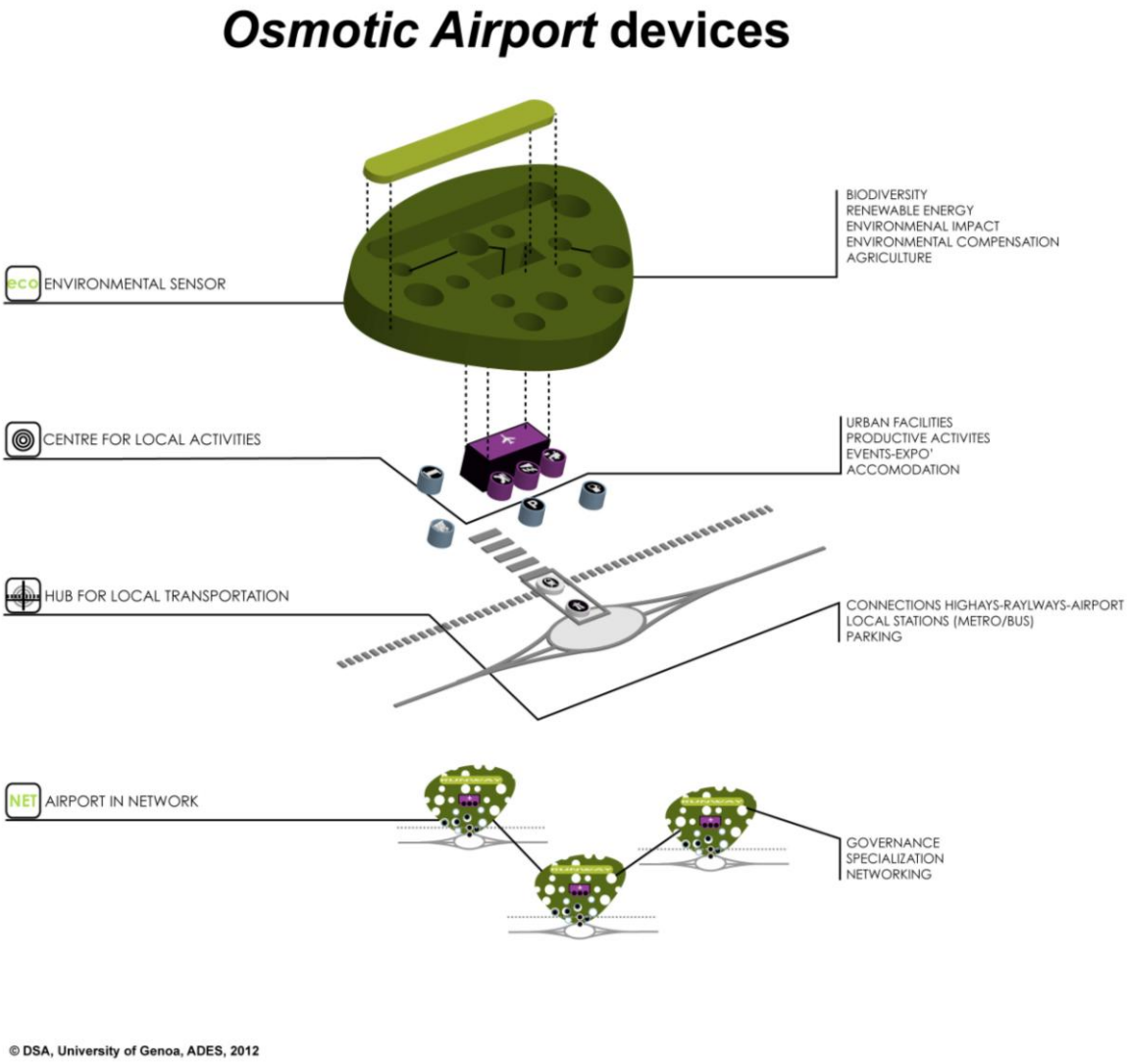
Map 22. Logistic Airport_Villanova d'Albenga_Masterplan

3.2 *Osmotic Airports*: 4 devices

The ***osmotic airport*** is *a place to live before a place to leave*. It establishes a stronger relation between the infrastructure and their surrounding territories. At the same time they will gain an economic improvement and new uses for the airports. The goal is to allow the economic growth of the territory without the construction of new big infrastructure and buildings.
In that sense, the *osmotic airport* is organised to satisfy not only one specific sector (flight operation) but it could adapt itself and its efficiency in relation to the surrounding context and business, it could exchange fluxes (physical and immaterial) with the surrounding territory and it could accommodate multiple functions, as in the *Postmodern* examples (see *SciR_Chapter 1.3*).

4 tools drive the osmosis process:

- (a.) Airport as environmental sensor
- (b.) Airport as services centre for local activities
- (c.) Airport as hub for local transportation
- (d.) Airport network



Map 23. *Osmotic Airport* devices

a. Airport as environmental sensor
The first tool deals with the environmental and landscape implication of airports, such us mitigation of impacts and risks. An airport is an environment detractor. Its impacts are produced by the ground structures - land use, light pollution, interference with wildlife and vegetation - and by the aviation activity of the airport - pollution emissions and interference with the birds.
Conformity to the regulations and standards imposed by current legislation, *osmotic airport*, for its dimension and its relation with the territory, is develop as a landscape operation.

This tool defines an environmental code in order to invest on policies of environmental protection. In that sense, the project becomes a project of landscape, where noise barriers, new green areas, re-permeable soils (e.g. runways in grass), are no longer considered mere technical devices, but an integrated piece of a new landscape. This also allowed to reduce the consumption of recourses and the protection of biodiversity, especially trough the preservation and integration of green corridors. The buffer zone is a filter/barrier but it is also the place to reconnect parts of the territory through environmental linear infrastructure (ecological corridors) and heterogeneous and punctual elements (stepping stones). According to this device, the airport hosts the technologies for the production of renewable energy - wind, biomass, solar, photovoltaic.

b. Airport as services centre for local activities
This tool stresses the integration of the airport in the territory, by including services connected with the local production. In that sense, a priority is to improve the airport as a logistic hub. In fact, the development of economies, businesses and settlements, will enhance the attractiveness of local contexts.
Regional offices of big companies and institutions, representative offices of categories, centres for conference and business meetings (consulting, advertising, legal and financial, informational, commercial, administrative, firms), technology and communication industries, high-tech research centres could settled in the airport territory: so, it becomes more valuable in the market, and therefore it is a resources and specificity for the region.

This tool defines an integrated process to increase the functions in the airport. This is refers not only to the flight operations (for example: storage for planes, production of planes, business aviation, school of aviation), but also to include productive functions in the airport that allow to use the airport as **a new territorial centrality of local production** (as explained through examples in *SciR_Chapter 1.3*). This will gain the opportunity to have benefits from the airport also when it is not use for flight operation.

Currently, Villanova d'Albenga Airport is already in progress the collaboration with the Piaggio Aero Industries. Piaggio has located one of its industries in the land owned by the airport. This industry is specialized in designing, producing and testing mechanical part for aircrafts. It has now 700 employees and it supposed to be the main plant of this industry in Liguria.

c. Airport as hub for local transportation

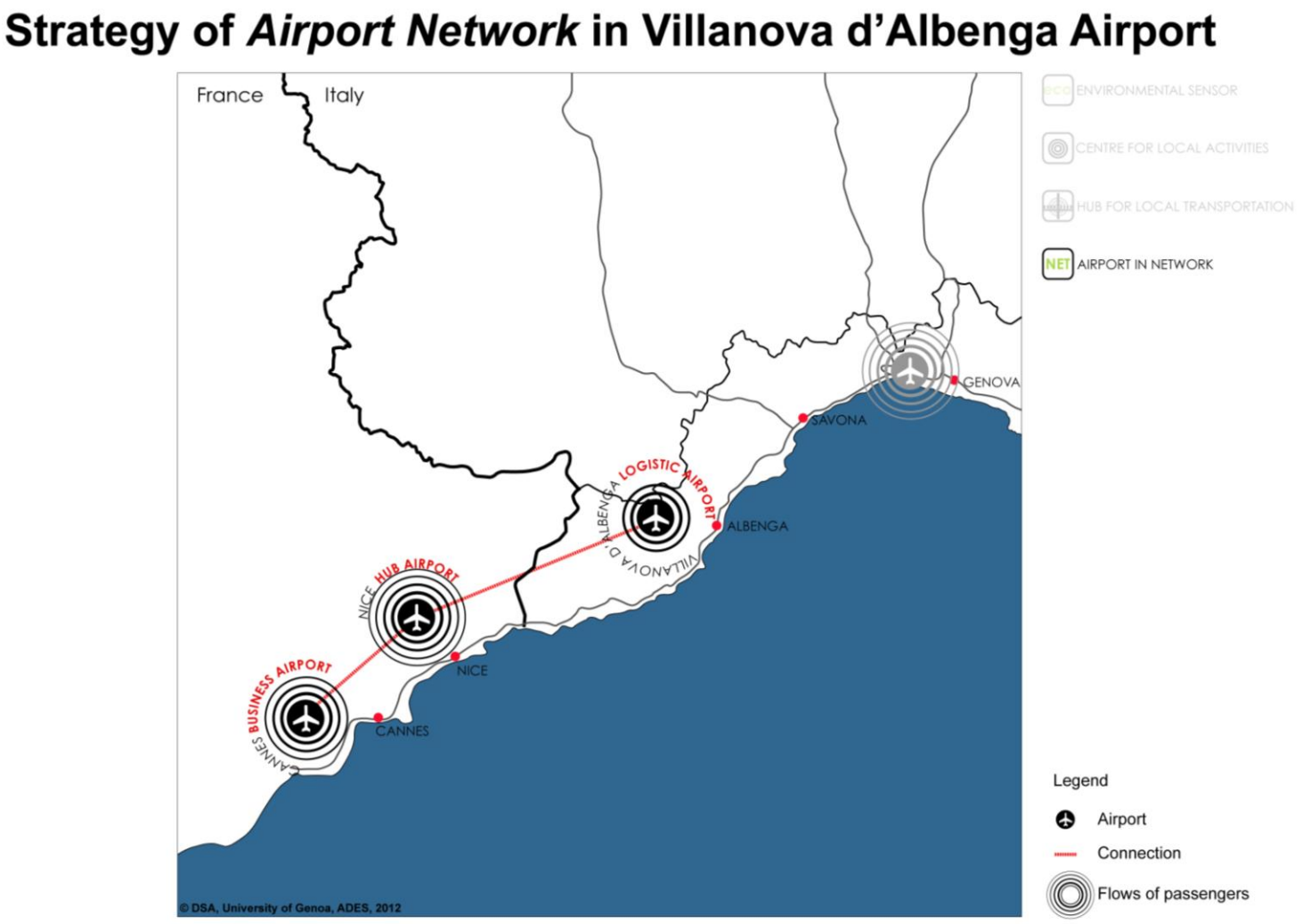
Around airports and along the infrastructure system of accessibility there is a growing concentration of activity that develops new forms of urban settlement. The airport and the immediate area are themselves trading centre and transport media that induce new territorial dynamics and influence new landscapes.

According to the guidelines of the European infrastructure development plan for 2014-2020, is to increase the airport connections with smaller networks of the surrounding territory, in order to bring the airport in better condition and to improve the organization in network. In that sense, this device proposes the **integration with local transport systems such as railways and local buses.** This provides an integration with the planning of local infrastructure system. Better train links to the nearest main cities should increase the attractiveness and the accessibility of the airport and, indeed, of the region.

d. Airport network

A territorial synergy (networking) between nearby airports drives a cooperation of airports. It will increase complementarities and, at the same time, specialisation of each airports. The *airport network* strengthens and creates growth opportunities in a European point of view. A governance of systems will drive this cooperation. Representatives of each airports will be involved in the Management Committee of the others airports. All representatives of the airports approve a shared commercial policy: **an overspecialization of airports to overcome the competition.**

Villanova d'Albenga airport, with Nice and Cannes airports, is an operative example of an international cooperation. In that case, Nice Airport is the international big hub. Cannes Airport will be specialized in business aviation. Villanova d'Albenga will be the developed by hangar for the aircrafts' maintenance of all airports.



Map 24. Airport Network_Villanova d'Albenga Airport

4 Issues for further analytical work and research, data gaps to overcome

There are a few issues for further work. On the analytical side, this project focussed on accessibility in general and airports in particular. A further study field should be the **cooperation between different transport modes in the various regions**. The research question might ask for the optimal mix of transport infrastructure and services in a given region, including rail, road, and air.

Further research could develop the ***Recycle strategy*** applied on other types of infrastructure: abandoned railways but also underused harbours or roads. The renewal of this infrastructure could be analyses as process to reactivate urban transformation, growth of mobility, development transport and

communication networks, and increase the availability of landscape and places in which to live.

In order to gain better insight on developing regional policies our work can be expanded and replicated in order to include **a methodological model** that will take into consideration different and unique transformational aspects of each European region. This model must not only examine air transport but also take into consideration both commercial, business and cargo transfers needs in order and provide guidance to developing regional policies related to transportation. This model can be supported by both archival data but also by more in depth cases that will take into account considerations and expectations of the local population. The model can also support national policies if applicable to all relevant regions in the decision making process.

Other research can also be done related to the updating of empirical methods. The methodology can still be developed and applied to **different time periods and regions.**

In a dynamic view, future research should **include also prices** for both transport services and for the use of the traffic infrastructure and account for the impact of high capacity utilization not only on prices but also on the supply on the respective markets.

Another extension is on the geographical scale. The present study was executed only for regions in Western Europe (in the borders of 1989). Due to path-dependency, regions in Eastern Europe and Western Europe start from different levels and structures at the beginning of our data set period and then follow different performance patterns during the period of analysis. Technically speaking, regions in Western Europe and in Eastern Europe do not belong to the same population and should, therefore, not be analysed at the same time. However, it should be interesting to make a similar analysis for peripheral regions in Eastern Europe (including data, empirical analysis and case studies).

Further research could provide **a set of guidelines** for small regional airports in Europe. The research of a new research could be a catalogue of renewal strategies for secondary airport in Europe. It could be an operative tool that each politicians or local actors could consult to afford the problems of obsolete airport infrastructure. This investigation will improve the added value of the project and raise awareness about the role of regional airports as drivers of economic growth and development opportunities.

In further research it would be appropriate to **follow-up the development of the case study regions**, particularly in terms of medium and long-term perspectives, but also on the success of the actions and recommendation given to regional authorities to improve accessibility and economic growth. For instance a potential need is related to the possibility that ADES results will be up-dated in near future (for instance after 5 or 10 years) and compare the situation and development to the present one.

It will be also extremely important the **cooperation with other territorial projects** dealing with similar issues: it could be very usefulness to compare theses results and findings with other European or National research programme focused on similar issues in order to understand better the role of airports and accessibility in general and to the a long-term strategy for the development of this region.

4.1 Concluding remarks

The results of this targeted analysis show that accessibility is an important factor for economic performance in Europe. Large regions with big cities and their airports usually profit from large demand for transportation services. These demand side effects dominate the development of infrastructures and traffic services and thus induces supply side effects. In addition, the resulting good accessibility will contribute to further economic performance. The result of this process is a positive self-accelerating process between economic performance and accessibility.

Smaller regions usually do not profit from such effects. On the contrary, there is even the risk of a downward accelerating process (some kind of a vicious circle), where poor economic performance only requires poor accessibility, which in turn has a negative impact on economic development. Therefore, it is necessary to break up this vicious circle a set a positive impulse. Depending on the concrete situation of a region, this can be a subsidy for additional scheduled flights to the next relevant hub.

However, airports often offer the opportunity for improvement not only in the field of air traffic, but rather in many other dimensions. In this study, we showed various renewal strategies for existing airports, be they used or rather unused and waiting for new tasks.

a. Transferability of ADES research results

ADES findings and results should constitute a source of inspiration to other local and regional authorities in charge of planning, managing and/or monitoring plans and strategies that acknowledge the positive effects of transport infrastructures in revitalising local economies.

The main results and findings of ADES project constitute a source of inspiration to formulate clear, coherent messages about the role of secondary airports with low or moderate levels of both passenger and freight traffic. The project gives a comprehensive and at the same time detailed views of the problems that European peripheral regions encounter when trying to keep up or develop their competitiveness in the era of declining resources and generally poor economic development.

Apart from specific results for stakeholders involved, the approach shows how the connection between accessibility and regional development is more complex than everyday thinking would imply. The research aims to change the monolithic view on regional development and argue a new perspective of

reuse, renewal and renovation of existing infrastructure. In fact, ADES research outlines several **alternatives visions** which may contribute to initiation of a positive and self-accelerating process between accessibility and economic performance of a region.

The multidimensional methodological approach on the same issue aimed a critical discussion and give relevant results to afford the many-sidedness and complexity of the research questions. The **methodology mix** is highly recommended on national and European level to afford research activity in order to increase their respective knowledge, to provide a more complete overview of the research topics and to obtain results more coherent and appropriate for each issues and nation.

ADES Target Analysis gave also a significant improvement in the European debate of transport policy in particular for airport renewal. ADES research findings support an innovate point of view: the construction of a new a infrastructure is not always efficient by its own and should be supported by innovative actions outlined by the **REnewal strategies.** These strategies show different scenarios that increase airport efficiency and provide financial growth for local communities. The three basic alternatives (REload, REuse, REcycle) suggest to develop the vitality and the functions of the peripheral airports in the future. Regional institutions or local policy makers could adopt these strategies to afford the widespread problems of obsolete or underused airports (as the research shown).

Besides, the possibility of developing cooperation agreements with other neighbouring airports is seen as a window of opportunities, especially in terms of commercial activities and market segmentation. The model of **airport network** could be studied and adopted as an operative strategy in similar European regions. A cooperation of small and medium airports instead of a competition could drive a territorial synergy between nearby airports. Representatives of each airports will be involved in the Management Committee of the others airports and they have to approve a shared commercial policy: an specialization of airports to overcome the competition. This is something that many European second and third tier airports could consider and make use of.

Finally, ADES research proposes an innovative **graphical representation of maps**. Maps became powerful tools to visualise spatial data but they can be also useful instruments for policy makers to choose and define the best strategies for local development. They could be used by others local or regional authorities or institutions as essential implements of communication of the local context and to give instructions. The data can be described also in the form of maps: *descriptive maps* could visualise statistical information. This will help identifying structural patterns in space. *Vision Maps* instead can visualise potential futures and possible further development. These explore potential new assets: they use design as analysis and methodological support for strategic processes.

b. ADES research influence in regional plans and documents

In relation to the national, regional and local authorities the results of ADES research can provide a valuable help. ADES results will mainly used as a background material in regional plans and documents. The research findings have already been very useful in each stakeholder regions to discuss with the transport ministry as well as to attract attention on problems that we encounter in view of the future of the air traffic.

Even though in some cases ADES research is not precisely cited or its recommendations will not be directly involved in regional documents or plans, it will certainly have influence on representatives of regional authorities by raising awareness on problems encountered in regional airports with low or moderate levels of both passenger and freight traffic. It is not excluded the possibility to incorporate some aspects of the report in national and regional development policy documents after the different bureaucratic process of regional approval.

In **Central Finland**, the main results will be cited in the document of the growth agreement between the city of Jyväskylä and the Ministry of Employment and the Economy, and it will also be utilized in Jyväskylä's application to a Finnish development program "*Innovative cities*" (INKA).
On the 31st January 2013 took place a discussion with the representatives of the Ministry of Traffic and Communications in Jyväskylä. The results of the ADES research project have been presented, which is likely to grow in the future, as the issue is continuously on the local and regional political agenda.

In **region of Western Greece**, the findings of the project have already been very useful to us in discussions with the transport ministry as well as in attracting attention to the problems that have to do with utilization of infrastructure. To this end aspects of the report can be incorporated to national and regional development policy guidance.

In **Province of Savona**, the results will surely influence the political agenda on strategies to revitalise small airports in decline and therefore boost growth and jobs. In particular, the research provided cognitive elements and new viewpoints to the management company for the expression of plans and programmes of development of the airport and it also contributed, through communication and dissemination activities to reinforce, among local actors, the belief that the Villanova d'Albenga airport may have a future. In fact, ADES research analysis was also took in consideration by the representative of Villanova d'Albenga airport. The research findings aimed the agreements that the Italian airport signed with the nearest airports of Nice and Cannes on the 30th November in order to became part of a cross-border network system.