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**Global production networks in the passenger aviation industry**

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## **Abstract**

Although the number of directions which geographical research on transport is taking has recently increased, the extent to which transport geography capitalises on theoretical advancements made in other sub-disciplines of human geography is still fairly limited. This especially pertains to economic geography which, in contrast to the predominantly positivist and quantitative transport geography, has developed over the last few decades a more post-positivist and qualitative profile. By means of focusing on passenger air transport – one of the most neglected industries in economic geography – this paper aims to help bridge this gap. Three under-researched aspects of air transport are identified and a combination of two economic-geographical approaches – global production networks (GPN) and evolutionary economic geography (EEG) – is advocated as a useful conceptual basis for further, more qualitative and more critical research on this dynamic sector. The paper argues that GPN and EEG would help research on air transport to (1) employ network thinking beyond the infrastructural understanding of networks of air connections and thus better explain the multi-actor nature of the aviation sector, (2) complement the research on supra-national and national regulatory frameworks with more attention to the array of sub-national environments that shape the aviation industry ‘from below’, and (3) explore how the relations between aviation and economic development are moulded by different place-specific institutional factors. To lay foundations under further research the paper conceptualises the aviation industry as a global production network and uses the example of Polish passenger air transport to highlight the paper’s key empirical implications.

## **Key words**

The passenger aviation industry

Global production networks (GPN)

Evolutionary economic geography (EEG)

Economic development

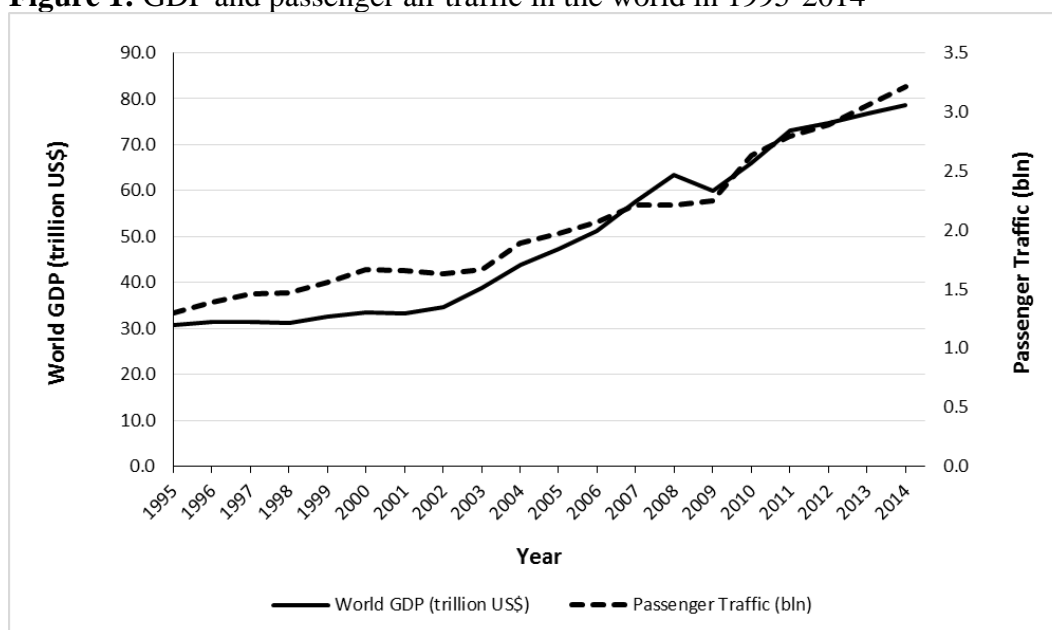
## **1. Introduction**

As Keeling (2007: 220) observed in his review of geographical research on transport, ‘whatever one thinks about the theory and process of globalization (...), transportation sits at the core of new kinds of global interaction’. In the same vein, it is difficult to challenge the conviction that transportation is a necessary (although not sufficient) component of growth and development (Keeling 2007). One of the transport industries to which these two observations apply particularly strongly is aviation – arguably the most global and dynamic transport industry. Indeed, by means of facilitating flows of people, capital, information and goods, air transport plays a critical role in fostering globalisation

(Cidell 2006, IATA 2015, Keeling 2007) and stimulating the economic development of the places which it interconnects (Button and Taylor 2000, Debbage 1999, Bowen and Cidell 2011).

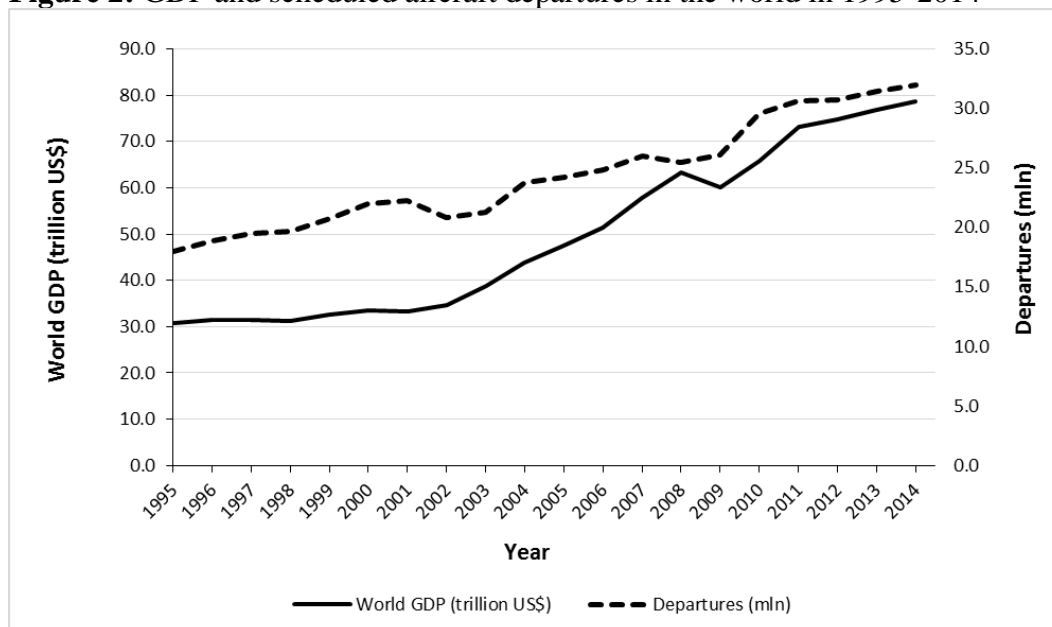
The aviation statistics published by the World Bank, the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA) further attest to the significance of passenger aviation. As Figures 1 and 2 show, with a few exceptions (including the short regression caused by the financial crisis of 2008/2009), the volume of traffic in the last two decades has been constantly growing – from 1.3 billion passengers and 18 million scheduled departures in 1995 to the record level of 3.2 billion passengers and 32 million departures in 2014. Accordingly, in the last 20 years the number of available routes (unique city-pairs) has almost doubled (IATA 2015). As ICAO (2015) and IATA (2015) indicate, this constant growth in demand for air services can be explained with the steady increase in global GDP (again, with the exception of 2009 – see Figures 1 and 2) and the interrelated growth in people’s mobility. As a result, the capacity of airlines is also growing. Only in the last decade the number of operational aircraft increased by 31% (from 20,356 to 26,653) (ICAO 2015). In 2013 their total capacity accounted for 3.4 million seats (IATA 2014). Finally, air transport is also an important employer. While the airline industry itself employs 2.5 million people, aviation as a whole supports 58 million jobs in total (IATA 2015).

**Figure 1:** GDP and passenger air traffic in the world in 1995-2014



**Source:** Own elaboration on the basis of data retrieved from <http://databank.worldbank.org> in September 2015.

**Figure 2:** GDP and scheduled aircraft departures in the world in 1995-2014



**Source:** Own elaboration on the basis of data retrieved from <http://databank.worldbank.org> in September 2015.

Meanwhile, despite the fact that the economic significance of aviation has been widely recognised and that geographical research on air transport is truly abundant in absolute terms, some important aspects of passenger air transport that determine its economic significance and that require intensive qualitative analysis remain largely under-researched. As many authors observed (Goetz 2006, Goetz et al 2009, Hall 2010, Keeling 2007, Shaw and Sidaway 2010), this underdevelopment should be (at least partly) attributed to the nature of transport geography which for many years borrowed mainly from civil engineering, business studies and neoclassical economics (rather than from more critically-orientated social sciences) and which was therefore mainly moulded by the positivist and quantitative tradition (rather than the post-positivist and interpretative epistemologies which in other social sciences came to prominence sooner). The divide between transport geography and other sub-fields of human geography comes here to the fore (Goetz 2006, Hall 2010, Hanson 2003, Keeling 2007, Schwanen 2008). Although the situation has recently started to change and transport geography is now catching up with the philosophical and theoretical diversification of human geography (e.g. see the review by Shaw and Sidaway 2010), some calls for close relations between transport and other sub-fields of human geography are yet to be addressed (Goetz 2006, Goetz et al 2009, Hall 2010).

The relationship between transport geography and economic geography is one of the best examples here. Although the need to bridge the gap between these two sub-fields has long been highlighted, the epistemological development which economic geography has gone through to date is reflected in the existing research on transport very negligibly (Goetz 2006, Goetz et al 2009, Hall et al 2006).

Some responsibility for this situation should also be shared by economic geographers who usually take transport for granted and accept mobility as given (Hall et al 2006). The shortage of economic-geographical research on aviation further attests to this statement. Whereas the work on social and cultural geographies of air transport (such as that inspired by the mobilities paradigm – see Adey et al 2007, Adey and Lin 2014, Cwerner et al 2009) has undoubtedly enriched the aviation literature, economic geographers are oddly behind their social/cultural geography colleagues in enhancing the general understanding of air transport. Despite some notable attempts to tackle this deficiency (e.g. Bowen 2010, Bowen and Leinbach 2006, Hesse and Rodrigue 2004, Rodrigue 2006), the economic-geographical research on aviation suffers from underdeveloped theorisations, thus not giving justice to the conceptual advancements made in economic geography in general.

The key aim of this paper is to help bridge this gap. By means of focusing on passenger air transport (one of the most neglected sectors in economic geography) and making a case for global production networks (GPN) and evolutionary economic geography (EEG) as useful conceptual frameworks for addressing some of the under-researched aspects of air transport, the paper aims to set an economic-geographical research agenda for future work on this important sector. Three aspects of the aviation industry that require qualitative and critical analysis are identified. First, an economic geographical perspective could help aviation research more fully realise the explanatory potential of the concept of networks and employ network thinking beyond the infrastructural understanding of networks of connections. Instead, a primary focus should be the complex multi-actor architecture of the aviation industry that underpins networks of connections and brings them into existence. Second, to balance out the spatial-analytical nature of much of the existing research on aviation and to complement the work on the (supra-)national regulatory frameworks with more attention to lower scales, economic-geographical research could help explore the ‘on-the-ground’ geography of aviation. Key emphasis should be therefore placed on the institutional, economic and socio-cultural characteristics of the places which air transport interconnects and the patterns of politics and power that are at work at the subnational level and that mould aviation ‘from below’. Third, economic-geographical approaches could foster the recognition that the processes of deregulation and liberalisation in air transport are unlikely to homogenise the industry and that the (developmental) impacts of aviation vary across space. Thus, if these processes are to be understood, more attention should be paid to how the multi-actor structure of air transport differs between places and what place-specific factors shape it.

The remainder of this paper consists of five sections and conclusions. The following three sections discuss the three areas that need intensive, qualitative and critical research if passenger air transport is to be comprehensively accounted for. The subsequent section makes a case for a combination of

GPN and EEG as a useful conceptual platform for addressing these gaps. To offer a springboard for further research the section conceptualises the air transport industry as a global production network. Finally, in order to exemplify how GPN and EEG can better the general understanding of aviation, the penultimate section briefly discusses the example of the Polish aviation industry and its post-communist development after 1989.

The presented case study derives from the research project conducted in Central and Eastern Europe (CEE) in 2015. It relies on data generated by 16 semi-structured interviews, including:

- 5 interviews with executives from major international airlines active in Poland (mainly regional directors for CEE),
- 6 interviews with representatives of various Polish airports (mainly chief executives or sales and marketing directors), and
- 5 interviews with officials from local governments (mainly regional development departments) in various Polish cities with operational airports.

The interviews targeted those airports and destinations where access to respondents was the easiest. In order to address as wide a variety of regional examples as possible, the selection of interviewed governments did not entirely overlap in geographical terms with the selection of targeted airports. The interviews revolved around three main topics: 1) the operations of international airlines in CEE, 2) the interactions between airlines, airports and local administrations, and 3) the role of aviation in fostering regional development. The empirical section touches on all these topics, however, because of the theoretical nature of this paper, it utilises the example of Poland mainly to highlight the applicability of GPN and EEG to air transport, rather than exploring these topics in depth.

## **2. Networks of air connections and global production networks in aviation**

The first under-researched aspect of aviation which this paper aims to address derives from the way in which research on air transport utilises the notion of networks. Rather unquestionably, one of the key foci of analysis in aviation research is the networks of connections which airlines operate (see Vowles 2006 for a historical review of geographical research on aviation). Some key topics which aviation scholars focus on include:

- Different network structures and their development over time and across space,
- The influence of liberalisation and deregulation of aviation (i.e. the privatisation of airlines, the emergence of airline alliances, the evolution of low cost carriers and the removal of traffic limits and barriers of entry in various markets) on the development of networks of air connections,
- Profitability and competitiveness of various network strategies.

Although management and business scholars dominate (e.g. Burghouwt et al 2003, Button 2009, Dennis 2000, 2005, Flores-Fillol 2009, Hsu and Shih 2008, Lordan et al 2014, 2015, Pels 2008), the contribution of transport geographers lies in attention to the spatiality of networks of connections, i.e. how the uneven patterns of deregulation and liberalisation shape these networks in various areas and how the network position of different regions conditions their inclusion in the global economy (e.g. Bowen 2002, Daramola and Jaja 2011, Derudder and Witlox 2009, Dobruszkes and Graham 2015, Jimenez et al 2012, Lin 2012, O’Kelly 1998, O’Kelly and Lao 1991, Shaw and Ivy 1994, Wang et al 2011). However, although networks of connections are an important topic *per se*, such a positivist discourse of networks of connections does not give justice to the explanatory potential of the concept of networks, thus making transport geography largely absent from the wider debate on networks to which other sub-disciplines of human geography regularly contribute (Hall et al 2006, Keeling 2007). This mainly applies to economic geography where post-positivist network thinking has gained much popularity. Although some research on aviation (especially freight aviation – e.g. Bowen and Leinbach 2006, Rodrigue 2006) mirrors the work of economic geographers on relational global production networks in other industries (e.g. Coe et al 2004 for the automobile industry, Coe et al 2008a for temporary staffing, Hess and Coe 2006 for the mobile telecommunications industry and Niewiadomski 2014, 2015, 2016 for hotel groups), the various ways in which the concept of networks is utilised in economic geography permeate aviation research very negligibly (Hall et al 2006).

Indeed, the dominant way in which geographical research on aviation adopts the notion of networks relates almost exclusively to structural networks of connections that are treated as an equivalent of the fixed infrastructures observed in other transport industries and that can be described ‘according to their density, orientation and connectedness’ (Gregory et al 2009: 499). Meanwhile, there is a lot to be gained from employing the concept of networks to also account for network-based models of organisation and governance which are the key analytical focus in economic-geographical research on other sectors. Geographical research on aviation could thus largely benefit from acknowledging that networks of connections are observable outcomes of the complex multi-scalar and multi-actor relational production networks that bring networks of air connections into existence, underpin them and govern them and that the relationship between networks of air connections and the production networks in air transport is not limited to a mere convergence of terms. There is therefore a need for more research on the different categories of actors that constitute the aviation production networks, the power relations between these actors and the implications of these relations on how networks of air connections develop.

The research on the structural changes which the air transport industry has been undergoing since the beginning of deregulation and liberalisation can serve as a solid starting point. The work on the consolidation of the air transport industry and the emergence of international airline alliances (Alix et al 1999, Bilotkach and Hüschele 2012, Bruckener and Pels 2005, Debbage 1994, Dennis 2005, Denton and Dennis 2000, Evans 2001, Fan et al 2001, Gudmundsson and Lechner 2006, Iatrou and Alamdari 2005, Morrish and Hamilton 2002, Oum and Park 1997, Park et al 2001, Vowles 2000) and on the rise of low-cost carriers (LCCs) (Alderighi et al 2012, Dobruszkes 2006, 2009, 2013, Francis et al 2006, Graham and Shaw 2008, Hunter 2006, Kawamori and Lin 2013, Klophaus et al 2012, Morandi et al 2015, Morrell 2005) comes here to the fore. However, it must be recognised that, although all of these are important foci of analysis in geographical research on air transport (see Vowles 2006), the air transport sector is much more than airlines and alliances and that in the unevenly deregulated environment much more depends on other actors than before. It is to those categories of actors that bulk attention should be re-orientated.

Although by no means overlooked (see Vowles 2006 for a comprehensive review), airports are the most important category. Given that the processes of deregulation and liberalisation of air transport, which have provoked commercialisation and privatisation of airports, have effectively transformed airports from passive public infrastructure to dynamic commercial businesses which have no choice but to compete for air traffic (Bowen 2010, Gillen 2011, Graham 2011, Graham and Ison 2014), the understanding of airports as passive ‘nodes’ in networks of connections (e.g. Bowen 2002, Dennis 2000, 2005, Dobruszkes 2006) is no longer sufficient if the aviation sector is to be fully understood. Moreover, because of the continuous growth in demand for air transport and the associated airport development, the production networks in aviation are becoming more complex and widespread than ever before. For instance, the number of airports in the European Union alone increased from 379 in 2004 to 404 in 2014 (<http://ec.europa.eu/eurostat>). The example of China (Lin 2012 and Yang et al 2008) demonstrates that in other parts of the world this increase has been even greater. Importantly, it needs to be recognised that production networks in air transport do not only comprise more and more aviation-related firms but they also interlink more and more political, institutional and socio-cultural contexts. Although the scholarly interest in airports has recently grown (e.g. Bowen 2010, Bowen and Cidell 2011, Cidell 2006, Derudder and Witlox 2014, Gillen 2011, Graham 2009, 2010, 2011, 2013, Graham and Ison 2014, Morrell 2010, O’Connor and Fuellhart 2015), many ongoing changes remain largely under-researched.

Thus, there is a need to recognise that the processes of liberalisation have given airports the ability to reconfigure networks of connections ‘from below’ and therefore the role of airports in mediating



the effects of various processes of globalisation (such as foreign trade and investment) on different places has also substantially changed (Cidell 2006). While the impact of external processes on host territories depends on how capable of responding to the global pressures and the demands of global actors airports are (Cidell 2006), the fate of airports and the respective regions will also depend on the demand for air services which they are able to generate. More attention is thus required to the social agency of airports and the complex relationships which they develop with airlines on the one hand and the regions they represent on the other.

Connected to this, more research is needed on the array of additional services that airports provide, including indispensable services such as handling, security, air navigation and ground transport, and various complementary services such as food outlets, retail, accommodation, meeting facilities and car hire, all of which are now also an important source of revenue for airports (Graham and Ison 2014). The fact that some of these services may be owned by the airport (e.g. meeting facilities), some may be associated with an airline present at the airport (e.g. handling), some may be owned by the state (e.g. air navigation), while others may be operated by the local authorities (e.g. ground transport), gives a clear picture of the complex mosaic of actors which global production networks in aviation encompass. Gillen's (2011) observation that airports are 'two-sided platforms' designed to provide airside services to airlines and landside services to passengers and to enable both groups of customers to network together, is a useful prelude to research on how global production networks of airlines integrate with (global) production networks of airports.

In line with the mushrooming literature on the consequences of airport privatisation (see Graham 2011 for a comprehensive review) and on the different modes of airport governance (see e.g. Gillen 2011), more attention should also be paid to local/regional governments, regardless of whether they co-own their regional airports or not. Given that airports have the potential to foster regional growth (Baker et al 2015, Button et al 2010, Bowen 2002, 2010, Derudder and Witlox 2014, Graham and Ison 2014, Hakfoort et al 2001), the extent to which this potential is realised will always depend on the administrative, logistical, political and financial support offered by the respective authorities and how high on their political agendas this support is placed. This mainly applies to regional airports which are rarely profitable by themselves (Baker et al 2015, Fernandes et al 2014) and which may be therefore perceived by the local authorities either as an unnecessary cost or a worthy investment in bettering the region's accessibility and enhancing its prestige (Graham and Ison 2014, Graham and Guyer 2000). Thus, it is important to understand why some airports are fully privatised while some others remain in the hands of local or national authorities, what interests airport owners have in maintaining their airports (economic or political?) and to what extent the ways in which airports

are operated reflect the institutional traits of the respective places (Cidell 2006, 2013, Bowen and Cidell 2011, Derudder and Witlox 2014). The processes of liberalisation and deregulation, which lead to ‘open skies’, should not be therefore expected to be fully reflected ‘on the ground’ where authorities often choose to retain control over such strategic assets as airports (Graham and Ison 2014). Indeed, a lot may depend on how local administrations market the destination in tourist and business terms, what conditions they offer to airlines and air transport-related firms, what supporting infrastructure they provide and to what extent they participate in attracting air traffic. To date, apart from the work on airport planning (e.g. Bowen and Cidell 2011, Cidell 2013, Szyliowicz and Goetz 1995), the role of local authorities in structuring air transport at the sub-national level has not been fully explored.

Moreover, although many calls have been made for more research on how tourism, as an important category of human mobility, fosters the development of transport and how transport defines tourism (Hall 2010, Keeling 2007, Shaw and Sidaway 2010), little work has been done on the supply-side links between transport and tourism. Despite the growing number of international tourist trips (from 24 million in 1950 to 1.133 billion in 2014; UNWTO 2015) and the associated growth in demand for air services (as highlighted before), this argument applies particularly strongly to air transport. With a few exceptions (e.g. Wheatcroft 1998), the literature on air transport overlooks the fact that the air transport industry is also a sub-sector of the international tourism production system and the links it has to other sub-sectors of tourism largely determine its shape. More work is thus required on the relations between aviation and travel agents, tour operators, internet booking engines, online travel companies (e.g. Expedia) and global distribution systems (GDSs) and the role which all those actors play in influencing ‘the geography of origin-destination tourist flows’ (Ioannides 1998: 139) which networks of air connections depend on. Although the era of vertical integration in the tourism industry when airlines owned hotel chains is now over (Ioannides and Debbage 1998, Lafferty and van Fossen 2001, Littlejohn 2003), the engagement of airlines in trip planning services (manifested through their collaboration with e.g. hotel groups and car rental firms) also require more attention if the geography of air transport is to be understood.

Finally, to paint as comprehensive a picture of passenger aviation as possible it is also essential not to overlook labour and aircraft manufacturers. The role which airline industry trade unions played at the beginning of deregulation and liberalisation clearly exemplifies labour’s potential to shape the aviation industry (Blyton et al 2001, Hendricks et al 1980). While in the regulated environment air transport jobs were secure and the terms of employment were good, the processes of liberalisation and deregulation (including the privatisation of airlines) re-shaped the environment from stable and

safe to competitive and dynamic, thus pressurising airlines to seek efficiency through intensifying labour use and cutting labour costs and, simultaneously, triggering trade unions to resist the changes (Blyton et al 1999, 2001, Goldstein 2001, Hendricks et al 1980, Wever 1989). As Gittel et al (2004: 163) observed, ‘the battles between labour and management in the first decade of deregulation are legendary and continue to leave a residual bitterness and mistrust throughout the industry’. Thus, the various ways in which labour-management relations in air transport shape the global production networks of airlines from within remain an important issue to be explored. Accordingly, given that the pressure on aircraft manufacturers to produce more efficient airplanes has significantly increased since the beginning of deregulation (Chew 1987), it is essential to investigate how the production networks of airlines integrate with those of aircraft manufacturers. The literature on the competition in the aircraft manufacturing industry (e.g. Campos 2001, Irwin and Pavcnik 2004, King 2007) and the work on how airlines select their fleets and what pressures they exert on aircraft manufacturers (e.g. Dozic and Kalic 2014, Harasani 2006) can serve as a useful basis for exploring the relations between these two sets of production networks in detail.

### **3. Place matters**

The second research gap which this paper aims to help overcome refers to the insufficient ways in which aviation research addresses the territories which networks of connections interlink. Although all means of transport are grounded in local and regional supply and demand relationships (Keeling 2008, 2009), the geography of aviation is usually analysed at a high level of spatial aggregation, i.e. at the supra-national or national scale with little reference to the sub-national level. The work on the spatiality of networks is the best example (e.g. Daramola and Jaja 2011, Derudder and Witlox 2009, Lin 2012, Shaw and Ivy 1994). Even when aviation research goes below the national level, it tends to focus on the position of an airport in its network and the implications of this position on the city’s connectivity (e.g. Bowen 2002, Dennis 2005, Halpern and Brathen 2011, O’Connor and Fuellhart 2012, Redondi et al 2013, Wang et al 2011). Although some important exceptions exist and the role of history, politics, power and governance (e.g. how airport projects are negotiated and financed) is being gradually recognised (Cidell 2006, 2013, Bowen and Cidell 2011, Derudder and Witlox 2014, Szyliowicz and Goetz 1995), more research is required on how the institutional, political and socio-cultural features of the places which airports represent shape air transport ‘from below’. Economic geographers’ low interest in air transport to date is another factor explaining this imbalance.

Such a call for more work on the mosaic of contexts which aviation interconnects is not particularly new. As early as the 1970s, when transport research was predominantly positivistic, Hurst (1973, in: Goetz et al 2009: 326) bemoaned the shortage of attention to ‘the entire socioeconomic and political

realm within which transport systems operate'. Regretfully, not much progress has been made since. Indeed, the main way in which aviation research addresses the differences that places make refers to the spatial unevenness of deregulation and liberalisation, the mosaic of (supra-)national regulatory frameworks which this unevenness produces and the impacts of liberalisation and deregulation on the spatial structures of networks of air connections (e.g. Bowen 2009, 2010, Button 2009, Debbage 1994, 2014, Duvail and Koo 2012, Goetz and Graham 2004, Goetz and Vowles 2009, Graham 1998, Graham and Shaw 2008). Given that aviation is critical to the globalisation imperative (Cidell 2006, Keeling 2007) and that the deregulation and liberalisation of aviation derives from the same neoliberal agenda as many other globalisation processes, this emphasis on higher scales is to a large extent understandable. What is still underappreciated, however, is that just like globalisation is not 'an inexorable global force that will inevitably eradicate local differences' (Coe and Yeung 2001: 368), but rather a set of conflicting processes whose outcomes vary in space (Coe and Yeung 2001, Dicken 2004, Tickell and Peck 2003), the deregulation and liberalisation of air transport is unlikely to homogenise the aviation sector and render various sub-national processes meaningless. Thus, it is essential to recognise that aviation will always be shaped not only by national authorities and their decisions to deregulate (or not) their air transport industries, but also by the patterns of politics and power at the sub-national level (Keeling 2009). As Shaw and Sidaway (2010: 515) put it, 'transport (...) is not just about modes and movement but also about politics, money, people and power'. The research by Bowen (2012), who demonstrated how various local factors influence the decisions of US air cargo operators where to locate their hubs, clearly shows that place matters and can therefore serve as an inspiration for similar work on passenger air transport. Thus, more attention should be paid to how airlines' decisions to include a given region in their networks depend on the political, institutional and socio-cultural features of that region, what factors influence this inclusion and how these processes vary within and between different regulatory frameworks.

#### **4. Aviation and economic development**

The third under-researched aspect of aviation which this paper aims to address relates to the impacts of air transport on economic development. Although the relations between aviation and economic development have been explored relatively well, the existing research largely underappreciates two significant (perhaps in some cases crucial) groups of factors that mould these relations – how the air transport industry is organised at the sub-national level and how the places which networks of air connections interlink differ (i.e. exactly what is called for in the previous two sections).

Quite understandably, one of the key entry points to research on the relations between air transport and economic development is analysis of a given region's position in networks of air connections.

Defined in terms of the number and frequency of available connections, such a position translates into the overall accessibility of the region – one of the pivotal conditions for development to occur. The literature on how air transport opens regions to various external influences (foreign investment, tourism, trade, knowledge transfer) is indeed abundant (Johansson 2007, O’Connor 1995, O’Connor and Fuellhart 2012, Taylor et al 2007). Bowen’s (2002) research on how the uneven development of networks of connections perpetuates uneven economic development is a very useful example here.

The literature that explores the relations between aviation and economic development more deeply tends to focus on the different categories of influence which aviation has on host regions. Thus, air transport (and airports in particular) can impact on regions in a direct way (e.g. through generating new jobs at the airport), an indirect way (e.g. through enhancing demand for products and services which the airport requires) or an induced way, which is associated with the spending of the people employed in the direct and indirect activities (Baker et al 2015, Graham and Ison 2014, Halpern and Brathen 2011, Perocco 2010). Crucially, in relation to the position which regions hold in networks of connections, there is also an extensive body of work on the catalytic impacts of aviation, i.e. its ability to enhance the competitiveness of the surrounding economy, generate spatial spillovers and function as an economic multiplier by means of improving the region’s accessibility (Button and Taylor 2000, Graham and Guyer 2000, Graham and Ison 2014, Hakfoort et al 2001, Ivy et al 1995, Redondi et al 2013). While in business terms airports help regions exploit their economic potential and attract investment (e.g. they are essential infrastructure for industries that rely on interpersonal communication such as financial services), in terms of tourism they play a crucial role in facilitating visitation to the region. Importantly, air transport also fosters social development. For instance, by means of enhancing residents’ mobility, it provides access to better services such as education and health and it helps remote and rural regions to mitigate their peripherality (Baker et al 2015, Button and Taylor 2000, Graham and Guyer 2000, Graham and Ison 2014, Halpern and Brathen 2011, Perocco 2010). Negative effects such as the ability of airports to outcompete traditional industries and change the structure of the local economy by diverting jobs from other places have also been identified (Graham and Guyer 2000, Graham and Ison 2014).

However, as Keeling (2007) pointed out, the relations between transportation and socio-economic change are often taken for granted without explaining how and why they occur. Indeed, while it has been recognised that economic development requires stability and continuity of air services and that it frequently pays off for national and local governments to invest in appropriate infrastructure, it is often forgotten that the provision of air services is a prerogative of airlines and if flying to a given region cannot bring airlines economic gains, the region will not secure a position in their networks

solely by building an airport (Graham 1998, Graham and Guyer 2000). A number of over-designed airports developed by local/regional authorities without much consideration to what regional assets these airports could promote and rely on further attest to this statement (Graham and Ison 2014). Thus, to fully explain the relations between air transport and economic development it is necessary to consider how and why air transport fits the developmental paths of the regions which it interlinks and how and why some regions fit the strategic interests of airlines whilst others are either excluded from their networks or fall victim to the volatility of their strategies (Graham and Guyer 2000). By the same token, attention to place-specific factors is also in a position to foster the understanding of one of the most critical problems in air transport research – the circular and cumulative nature of the relations between aviation and economic development (Derudder and Witlox 2014). While it is evident that, as much as aviation fosters development of host territories, high levels of economic prosperity attract even more air connections (Baker et al 2015, Sellner and Nagl 2010, Zhang and Zhang 2001), little research exists on how the relations between the two vary across space and what factors beyond the laws of supply and demand mould these relations.

## **5. Towards an economic-geographical approach to air transport**

As the previous three sections imply, more post-positivist, qualitative and critical research is needed if the global air transport system is to be fully accounted for. Given that issues like the three under-researched aspects of air transport identified above are typically of interest to economic geographers and that advanced conceptual frameworks for analysing such matters have long been developed in economic geography, contemporary economic-geographical approaches could shed new light on air transport, thus bridging the gap between transport and economic geography. This section advocates a combination of global production networks (GPN) and evolutionary economic geography (EEG) as a useful basis for more critical and qualitative research on air transport.

Global production networks (GPN) is an interpretative framework for understanding the complexity of the global economy and its unevenly developing geographies (Coe and Hess 2011). Elaborated in the early 2000s by Henderson et al (2002, see also Coe 2009, 2011, Coe et al 2004, 2008b, Coe and Hess 2011, Hess and Yeung 2006) and recently developed by Coe and Yeung (2015) in the form of GPN 2.0, it attempts to grasp ‘the global, regional and local economic and social dimensions of the processes involved in many (...) forms of economic globalization’ (Henderson et al 2002: 445). The GPN framework’s key focus of analysis are ‘the complex intra-, inter- and extra-firm networks that constitute all production systems’ (Coe and Hess 2011: 130), with each production network defined as ‘the globally organized nexus of interconnected functions and operations of firms and nonfirm institutions through which goods and services are produced, distributed, and consumed’ (Henderson

et al 2002: 445). Thus, recognising that global production networks integrate not only firms but also national (and regional) economies, the GPN framework pays attention to how production networks are structured both organisationally and geographically and what developmental implications these structures have (Henderson et al 2002). Moreover, in its most recently refined form (i.e. GPN 2.0), the framework also tackles the role of structural capitalist dynamics that underpin the formation and operation of GPNs and influence the strategies of actors in GPNs. Thus, as a broad-based approach, the GPN framework brings different foci of analysis in an integrated form (Hess and Yeung 2006).

The promise which the GPN approach holds for addressing the three identified gaps derives from its three key attributes: 1) the specific discourse of networks on which it relies, 2) its multi-actor and multi-scalar sensitivity, and 3) the selection of concepts which it encompasses. First, rather than in structural terms, the GPN framework defines networks in relational terms, i.e. as complex network-based models of organisation and governance that comprise multiple different categories of actors (see Coe 2009, 2011 and Henderson et al 2002 for more details). Second and third, ‘GPN analysis seeks to reveal the multiactor and multiscale characteristics of transnational production systems – and their developmental implications – through exploring the intersecting notions of power, value and embeddedness’ (Coe 2009: 556). While the notion of power addresses how power is exercised by different actors within GPNs, the concept of embeddedness assumes that firms locate in, become embedded in and are constrained by the economic and social dynamics that are already in place in the locations from which they originate and into which they expand. The concept of value, in turn, tackles the developmental impacts of GPNs, i.e. who creates and captures the value and how power relations between different actors influence these processes (Henderson et al 2002). Importantly, the three concepts conveniently map onto the three research gaps identified above.

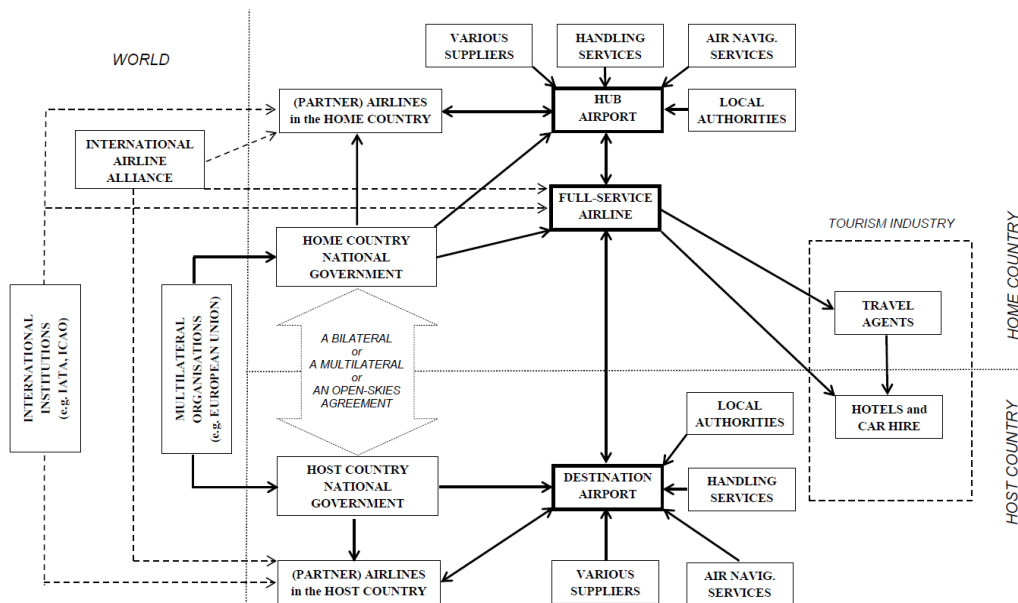
First, the concept of power is a solid starting point for closer attention to the structural complexity of the air transport industry beyond airlines and airline alliances, including issues such as:

- The power relations between different actors (e.g. airlines and airports) and their implications;
- How GPNs of airlines integrate with GPNs of airports and aircraft manufacturers;
- The role of national and local authorities in linking their territories to air transport GPNs;
- The relations between air transport and the international tourism production system.

A full service carrier’s (FSC’s) GPN and a low cost carrier’s (LCC’s) GPN shown in Figures 3 and 4, respectively, are stylised examples of how the global air transport sector can be conceptualised as a global production network. Arrows in the figures denote flows of services and goods and different kinds of impact. The figures also show how different networks of connections are underpinned by

different global production networks. Thus, LCCs, which almost always confine their operations to point-to-point connections in open skies environments, tend not to have hubs, rarely join alliances or cooperate with other airlines, often rely on secondary airports and more frequently than FSCs tie their locational choices to different non-market-related local factors (e.g. they will be more likely to establish a presence in the host territory if the support from the local authorities is substantial). By contrast, FSCs, which favour hub-and-spoke networks across different regulatory frameworks, are more willing to develop cross-border partnerships, have a strong preference for major international airports and are often less dependent on the involvement of local governments. The latter naturally does not pertain to their hubs where good relations with the local authorities are usually of utmost importance. The figures also imply that the relations between airlines, whose operations are shaped by the processes of deregulation and liberalisation, and airports, which are naturally embedded in the places they serve, are the key variable moulding global production networks in air transport. As such relations have so far received little attention in the literature, Figures 3-4 can serve as a useful starting point for further research on the topic.

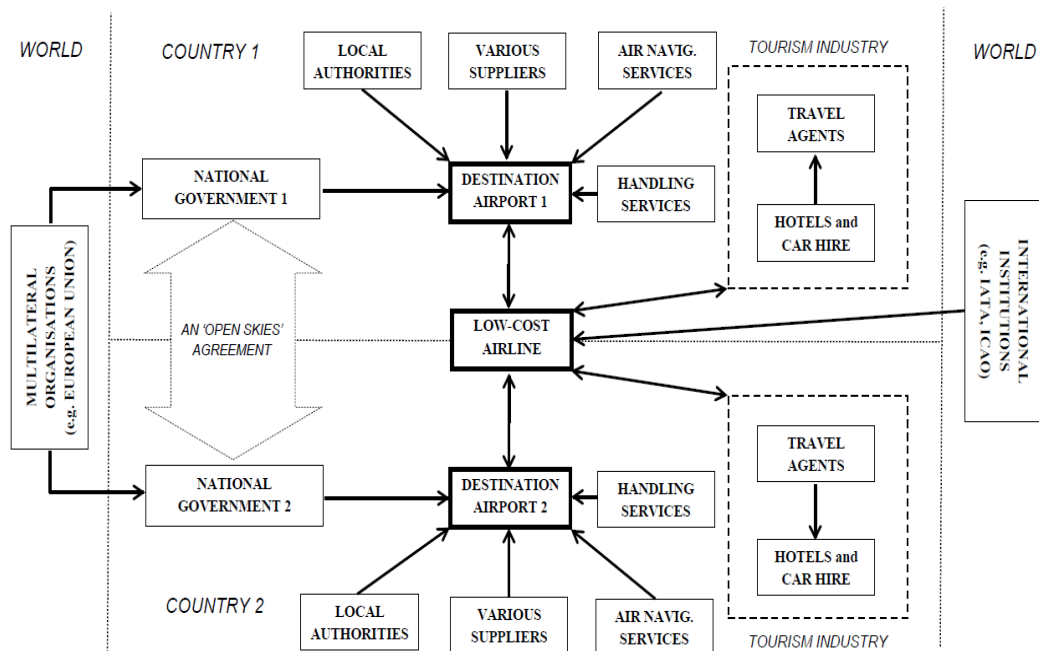
**Figure 3:** A stylised example of a full service carrier’s global production network



**Source:** Own elaboration



**Figure 4:** A stylised example of a low cost carrier's global production network



**Source:** Own elaboration

Second and third, the notions of embeddedness and value, combined with the recognition that GPNs interlink not only firms but also territorially-defined multi-scalar systems of economic organisation (Henderson et al 2002), are a springboard for analysing the relations between air transport GPNs and the various places which they interconnect. While the assumption that the strategic decisions of actors depend on the political, socio-cultural and institutional traits of the places which they occupy can help explore how air transport is shaped ‘from below’, the idea of value will draw attention to how the value created by and within air transport GPNs is distributed between places and firms and what power relationships within those GPNs condition this distribution. Thus, rather than taking the relations between aviation and economic growth for granted, the idea of value can help explore how the processes of value capture are determined by the position of an airport, an air transport-related firm or a region within aviation GPNs (see Henderson et al 2002). Important issues which GPN-informed work could explore include:

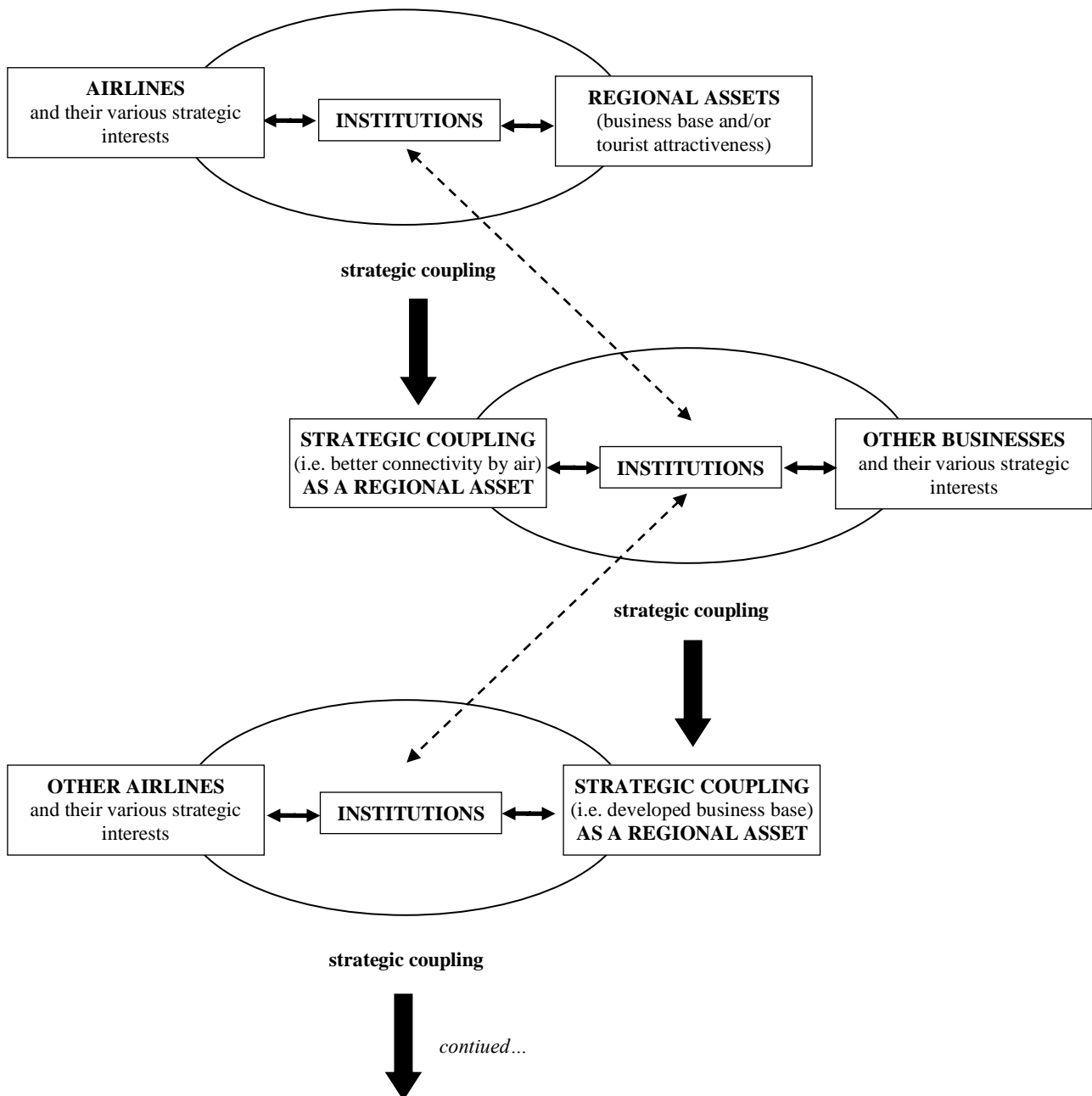
- What relations with local authorities, local suppliers and local tourism industries air transport GPNs develop and what local place-specific factors shape them;
- How relations between airlines and airports depend on the structure of the airport industry at the sub-national scale and the level of control which political authorities retain over airports;
- How local governments utilise air transport to mediate the effects of globalisation on different places at the sub-national level;
- What local factors shape the catalytic impacts of aviation on economic development and how air transport fits regional paths of growth?

The idea of ‘strategic coupling of global production networks and regional assets’ (Coe et al 2004: 469) – an integral part of the GPN framework – could help tackle the relations between aviation and regional development even more strongly. The concept defines regional development in relational terms as ‘driven by complementarities between local assets (...) and the strategic needs of translocal actors situated within global production networks’ (Coe 2011: 391). Regional development is thus a dynamic outcome of the complex interactions between the region and firms, i.e. if a firm expects to benefit from gaining access to the region’s assets a coupling process will occur (Coe 2009). Thus, the idea of strategic coupling could help explore why some regions attract multiple air connections whilst some others are persistently bypassed by air traffic and why developing an airport facility is not a sufficient condition for regional growth to occur. Importantly, the concept also recognises that interactions between firms and regional assets will produce desired developmental outcomes only if appropriate institutions to promote regional assets and ‘hold down’ GPNs of translocal firms are in place (Coe 2009, Coe and Hess 2011, Coe et al 2004, Yeung 2009). This, in turn, is a good basis for investigating what local authorities which own their airports do to attract air traffic in order to help the region secure a place in networks of air connections and to maximise the positive impacts of air transport. Given the recent intensification of inter-regional competition and the growing tendency of local administrations to harness the potential of their airports to enhance the region’s competitive advantage, attract more investment and catalyse new forms of development (see Bowen 2010), such an emphasis on the role of local/regional institutions in mediating the relations between airlines and regions would be very timely.

Moreover, the concept of strategic coupling and its sensitivity to the interplay between the strategic interests of firms and regional assets can also help disentangle the circular and cumulative nature of relations between aviation and regional development. While many airlines choose to serve a given destination only if it has adequate regional assets to support a given connection (i.e. an airport and a sufficient business/tourist base), some firms will only consider expanding into that destination if, alongside other factors, its accessibility by air is sufficient for their strategic needs. Thus, air connections available from a given airport should not be only theorised as strategic couplings between the respective carriers and the region’s assets, but also as crucial regional assets that may be of value to future investors and that may serve as a catalyst for further development. While the literature on catalytic impacts of air transport has long tackled many of these processes, the contribution which the idea of strategic coupling can make lies in its attention to the contingent, spatio-temporal and inherently relational nature of these processes beyond the laws of demand and supply. In this respect, the circular and cumulative relations between aviation and regional growth could be conceptualised as a ‘ladder’ of interdependent strategic couplings (Figure 5) where every

strategic coupling between an airline and an airport becomes an extra regional asset that is capable of attracting new firms for which air connections are a significant locational factor and which, as an additional source of demand for air services, are capable of attracting more carriers into the region.

**Figure 5:** Air transport, regional development and a ladder of interdependent strategic couplings



**Source:** Own elaboration inspired by Coe et al (2004: 470, Fig. 1)

However, where the GPN approach falls short of exploring the place-specific nature of the relations between air transport and regional growth is in accounting for the role of history in how institutional arrangements which GPNs interlink and the regional assets which they promote develop over time. According to MacKinnon (2012), this limitation can be overcome by combining the GPN approach

with selected assumptions of evolutionary economic geography (EEG) – a relatively new paradigm which emerged in economic geography to address the under-researched issue of how the economic landscape evolves and is transformed over time (Boschma and Frenken 2006; Boschma and Martin 2007, 2010, Martin and Sunley 2006). As such, EEG aims to explore how the spatial structures of the economy emerge and how geographies of economic development and transformation are shaped by the processes of path-dependence and path-creation (Boschma and Martin 2007, 2010).

While the concept of path-dependence implies that future results of economic processes will always depend on past events and that the state of the economy at a given time will always be moulded by the trajectory of development that the economy has been following to date, the idea of path-creation assumes that economic actors will always have the power to reproduce, deviate from and transform existing economic structures, practices and trajectories of development (Martin and Sunley 2006). With regard to air transport research, the explanatory potential of these two notions can be realised in accounting for the role of place-dependent historical factors in producing regional assets, shaping aviation ‘from below’, generating demand for air transport and utilising air transport to initiate new directions of growth. Moreover, they can also shed new light on the evolution of strategic couplings between airlines and regions. Due to the fact that local institutions’ capacity to bargain with extra-local firms is always determined by the heritage of previous decisions and strategies (i.e. is always path-dependent), the processes of strategic couplings between aviation GPNs and regional assets are by themselves always evolutionary in nature (MacKinnon 2012). Accordingly, they can always be key mechanisms of path creation (MacKinnon 2012) – something that has already been recognised (although not necessarily explored) by the literature on catalytic impacts of air transport.

The following section utilises the example of the Polish air transport sector to identify some of the issues which remain under-researched and which the concepts associated with GPN and EEG could help explore. Due to the shortage of space, rather than examining Polish air transport in depth, the key aim is to highlight the empirical implications of the theoretical arguments presented above.

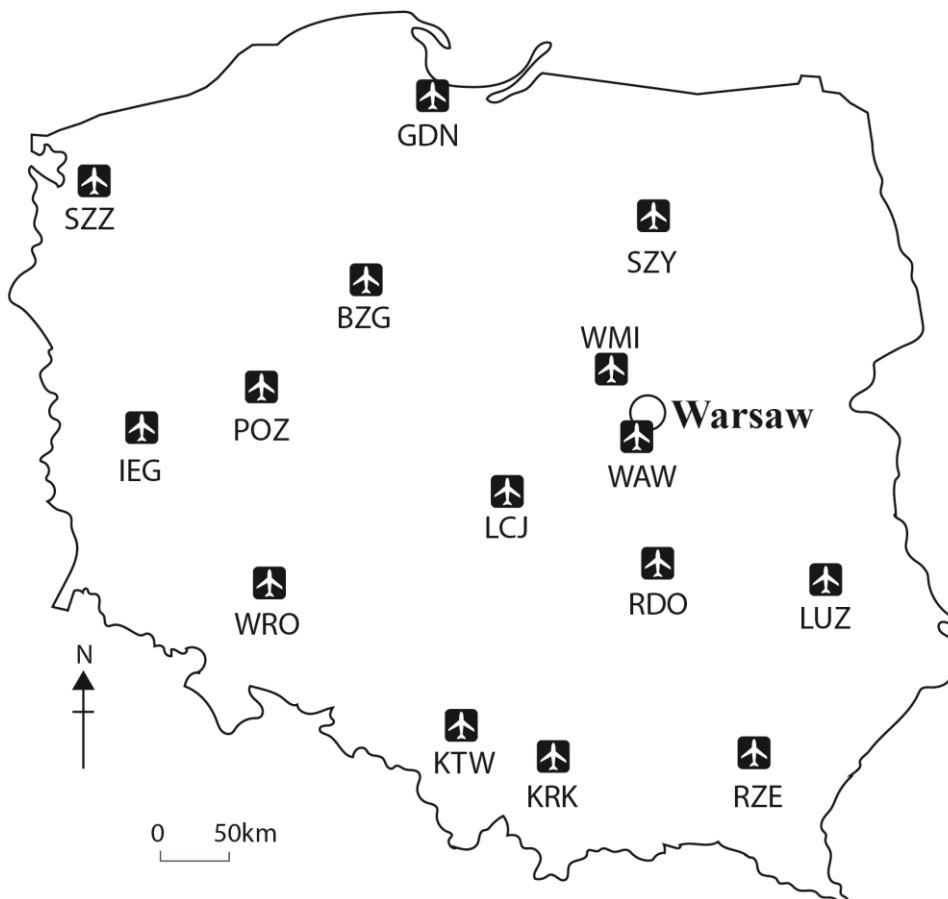
## **6. An example: GPNs of international airlines and the post-communist reality in Poland**

The pro-capitalist reorganisation of the economy which the Polish government embarked on further to the collapse of communism in 1989 (Bradshaw and Stenning 2004, Smith 1997, Sokol 2001) also naturally embraced air transport. While commercialisation and privatisation, which the transition to capitalism was based upon, were hoped to give Polish air transport unprecedented opportunities for development and modernisation, Polish air transport simultaneously found itself constrained by the

central government's protectionist tendencies and its will to retain control over air transport-related assets (Hall 1993, Shibata 1994, Taylor 1998).

Despite transforming LOT Polish Airlines (Poland's national airline) into a public limited company in 1992, the central government's decision to keep 51% of its stake made it difficult to find partners and successfully privatise the remaining 49% (Akbar et al 2014, Shibata 1994, Taylor 1998). As a result, LOT is still fully owned by the state and, apart from SprintAir (formerly Air Polonia) – a small airline that only offers a few connections – is now the only Polish airline operating scheduled services. Similarly, although in 1993 all passenger airports in Poland (apart from Warsaw Chopin – LOT's hub and Poland's central airport) were commercialised and some of their shares were passed to the respective local administrations, Polish Airports Enterprise (PPL) – a state-owned enterprise which until 1993 was the sole operator of all passenger airports – strategically kept shares in all the airports which it previously controlled. As a result, 11 out of 15 Polish airports are now (co-)owned by the state. All 15 airports are shown in Figure 6.

**Figure 6:** Polish passenger airports in 2015



**Source:** Own elaboration

The accession of Poland to the EU in 2004 and the subsequent deregulation and liberalisation of the Polish air space significantly transformed the landscape of Polish air transport. While EU carriers were granted unrestricted access to the Polish market (something that the biggest LCCs like Ryanair immediately capitalised on), Polish airports gained the right to attract air traffic independently, thus getting an opportunity to take their fate in their own hands. By means of presenting the volume of passenger air traffic in 1994 (i.e. after the commercialisation of airports), in 2003 (shortly before the accession to the EU) and nowadays (2015), Table 1 illustrates the growth in passenger air traffic in Poland and the increasing role of Polish regional airports in the last two decades. Table 2, in turn, lists the biggest carriers operating in Poland, thus showing the important role of LCCs in the Polish market. However, despite commercialising Polish airports and creating a competitive environment for airlines, the structure of ownership in the Polish air transport sector and the multi-scalar, place-specific patterns of politics that are associated with it, all of which are a partial legacy of the former political and economic system, remain a particular feature of Polish aviation. The specific processes which the following section identifies and which the GPN/EEG ideas can help interpret include:

- The selective development of airlines' GPNs in the Polish market (→ production networks),
- The place-specific nature of power relations between airlines and Polish airports (→ power),
- The varying forms of embeddedness which airlines' GPNs reveal in Poland (→ embeddedness),
- The varying abilities of regional airports and the respective local/regional authorities to attract air connections and capture the value which strategic couplings with airlines can produce (→ value, strategic couplings),
- The path-dependent nature of Polish air transport's development and the attempts of airports and regions to escape from this path-dependence through strategic couplings with airlines (→ path-dependence versus path-creation).

The recognition that FSCs and LCCs develop different GPNs (see Figures 3 and 4) is pertinent here. Given that FSCs, which rely on business clientele more than LCCs and which strongly favour hub-and-spoke operations, usually target those destinations where a business base to support their routes already exists, the bargaining power of airports towards FSCs is determined more by the demand which the destination generates than by local issues. By contrast, the operations of LCCs are often more closely tied to local politics. Given that LCCs target diverse groups of customers and strongly prefer direct connections between secondary airports, all of which gives them power to create new markets, they are fully aware of how critical for the economic well-being of individual destinations their services may be and therefore they often expect local/regional authorities to help them build a presence in a given market. The bargaining power of airports (and regions) who seek to be included

in LCCs' GPNs is thus relatively limited. The GPNs of airlines and the networks of air connections which these GPNs operate in Poland exemplify these tendencies perfectly.

**Table 1:** Passenger air traffic at Polish airports in 1994, 2003 and 2015

AIRPORT	IATA CODE	PASSENGER AIR TRAFFIC					
		1994		2003		2015	
		<i>quantity</i>	<i>% of total</i>	<i>quantity</i>	<i>% of total</i>	<i>quantity</i>	<i>% of total</i>
Bydgoszcz	BZG	-	-	20 065	0.28	318 817	1.05
Gdansk	GDN	149 096	5.21	365 036	5.13	3 676 771	12.1
Katowice	KTW	29 631	1.04	257 991	3.63	3 044 017	10.02
Krakow	KRK	122 249	4.27	593 214	8.34	4 208 661	13.84
Lodz	LCJ	-	-	7 320	0.10	287 620	0.95
Lublin	LUZ	-	-	-	-	264 070	0.87
Olsztyn	SZY	-	-	489	0.01	0	0.00
Poznan	POZ	55 129	1.93	263 551	3.71	1 477 318	4.86
Radom	RDO	-	-	-	-	670	0.01
Rzeszow	RZE	9 007	0.31	67 165	0.94	641 146	2.11
Szczecin	SZZ	25 168	0.88	87 433	1.23	412 162	1.36
Warsaw Chopin	WAW	2 377 527	83.13	5 166 991	72.67	11 186 688	36.79
Warsaw Modlin	WMI	-	-	-	-	2 589 286	8.52
Wroclaw	WRO	92 316	3.23	273 712	3.85	2 269 216	7.47
Zielona Gora	IEG	-	-	7 813	0.11	15 550	0.05
<b>POLAND TOTAL</b>	<b>-</b>	<b>2 860 123</b>	<b>100.00</b>	<b>7 110 780</b>	<b>100.00</b>	<b>30 391 992</b>	<b>100.00</b>

**Source:** Own elaboration on the basis of data retrieved from the official website of the Polish Civil Aviation Authority (Urząd Lotnictwa Cywilnego) [www.ulc.gov.pl](http://www.ulc.gov.pl) in October 2016

**Table 2:** The dominant air carriers in Poland in 2015 by the number of passengers and the market share

NO.	CARRIER	COUNTRY OF ORIGIN	PASSENGERS	
			<i>quantity</i>	<i>% of total</i>
1	Ryanair	Rep. of Ireland	8 211 803	30.76
2	Wizz Air	Hungary	5 818 709	21.79
3	LOT Polish Airlines	Poland	5 488 472	20.56
4	Lufthansa	Germany	1 958 067	7.33
5	Norwegian Air Shuttle	Norway	791 135	2.96
6	Easyjet	UK	543 198	2.03
7	SAS	Denmark/Norway/Sweden	358 521	1.34
8	Air France	France	350 734	1.31
9	Air Berlin	Germany	313 036	1.17
10	KLM Royal Dutch Airlines	The Netherlands	277 987	1.04
-	<i>Other carriers</i>	-	6 280 330	9.71
	<b>POLAND TOTAL</b>		<b>30 391 992</b>	<b>100.00</b>

**Source:** Own elaboration on the basis of data retrieved from the official website of the Polish Civil Aviation Authority (Urząd Lotnictwa Cywilnego) [www.ulc.gov.pl](http://www.ulc.gov.pl) in October 2016

Given that many Polish regions are, due to the communist past, still not as economically developed as their counterparts in e.g. Western Europe, the presence of FSCs in Poland is, despite its size, still rather limited. Indeed, the only airport with a strong bargaining position towards FSCs is Warsaw Chopin (WAW) which serves the country's capital and its most important business destination and which is therefore an obvious first choice for FSCs interested in the Polish market. In April 2015, when the research started, WAW was served by as many as 28 FSCs. By contrast, the presence of FSCs beyond Warsaw is limited to Krakow (the country's second biggest city and its most popular

tourist destination), where some FSCs such as KLM and Swiss have also recently started operating, and a few regional airports where SAS and Lufthansa operate single connections. The selective and predominantly demand-driven presence of FSCs in Poland is the main reason why the average level of embeddedness which FSCs in Poland reveal is rather superficial (i.e. it hardly ever goes beyond the exchange of basic market information with respective authorities). Despite this, the multi-scalar politics associated with how Polish aviation is structured and what patterns of demand the market creates has a crucial impact on how FSCs' GPNs in Poland evolve.

At the general level, some FSCs for whom LOT is the main competitor in the market resent the fact that despite its permanent financial troubles since the fall of communism (Akbar et al 2014), LOT is perceived by the central government as 'the jewel in the crown' (Interview with a senior executive from a Polish regional airport, May 2015) and is therefore persistently saved by the state. However, the state's ambition to support LOT and its hub WAW also paradoxically creates opportunities for foreign FSCs. LOT's decision to abandon international connections from regional airports (partially imposed on the airline by the European Commission in return for allowing the central government to offer LOT financial aid in 2014) and its current strategy to develop a hub-and-spoke network and redirect as much traffic as possible through WAW gave up a lot of market space to other European FSCs (Money.pl 2015, Polskie Radio 2014). The space has been quickly filled by Lufthansa which now offers connections to its hubs in Frankfurt and/or Munich from nine Polish airports, including WAW. Also, the central government's tendency to protect the interests of WAW and LOT (even at the expense of other Polish airports and regional interests, as many interviewees claimed, May-June 2015) is often deemed to be the reason why another Polish airline, EuroLOT, was put into liquidation in 2015 (Various interviews with senior executives from Polish airports, May-June 2015). EuroLOT, which operated international connections from a few regional airports, was allegedly considered by LOT as a serious competitor. Although LOT was hoping to take over this traffic and direct it via WAW, according to a few interviewees (May-June 2015) most of that traffic is now served by other FSCs, which replaced EuroLOT's connections with their own operations. However, given that FSCs are more strongly profit-oriented than EuroLOT was, unfortunately for many Polish regions not all connections have been replaced.

By contrast, the various ways in which GPNs of LCCs evolve in Poland are much more susceptible to local issues than GPNs of FSCs. The relations between LCCs and Polish airports have been (and continue to be) shaped by four place-specific factors: 1) the interregional competition that emerged in Poland after the fall of communism, 2) the devolution of developmental responsibilities from the central level to regions and communities brought by the reform of the system of administration in



1999, 3) the aforementioned partial transfer of airport ownership to local/regional administrations, and 4) the recognition that in the liberalised and deregulated environment airports have the power to catalyse new forms of development. All these factors significantly fostered airport development in Poland in the last 20-25 years and tied air transport to regional interests and the political ambitions of local/regional authorities more closely than before.

However, the over-supply of airport facilities in Poland (with numerous competing airports located less than a 2-hour drive from each other), which reflects the local authorities' ambitions to maintain their airports for political prestige purposes even though many of those airports are not financially self-sufficient, deprives multiple Polish airports of much of the bargaining power which they would have towards LCCs otherwise. As a few interviewees commented (May-June 2015), this situation is resented especially by those airports which because of the regional economic potential would have a chance to be financially self-sufficient but which often lose out because of the unnecessarily intense competition in the Polish market. The lack of a national strategy that could restrain the development of financially inefficient airports in order not to create too much competition for those that are able to attract enough traffic was mentioned a few times as one of the reasons why the power relations between LCCs and Polish regional airports are so unbalanced. Indeed, multiple regional airports in Poland, including those that represent economically stronger regions, have no choice but to compete for air connections according to the 'beggars can't be choosers' rule (Various interviews with senior executives from Polish airports, May 2015). Moreover, how successful airports are often depends on the support which they obtain from their owners and which their owners are in a position to offer directly to LCCs. This naturally entangles LCCs in local issues, creating a platform on which LCCs become embedded in host regions far beyond the exchange of information.

The help which local/regional administrations in Poland offer to LCCs to attract their business and encourage them to become embedded in the region as strongly as possible varies widely. It ranges from advising LCCs on what business and leisure demand the destination generates and offering favourable conditions for doing business to joint marketing of routes which a given LCC intends to operate (in order to lower their start-up costs and compensate for what may be initially insufficient demand). Given that subsidising specific connections counts in the EU as illegal state aid, this form of support cannot be practiced. As the cases of airports in Wroclaw (WRO) and Lodz (LCJ) demonstrate, a lot can depend on the local/regional institutions' ability to develop appropriate relations with LCCs if strategic couplings between LCCs and regional assets are to emerge and the value which aviation can generate is to be effectively captured by the region. The high number of connections which Ryanair operates from Wroclaw (i.e. 20 connections to nine different states in

April 2015, with only Warsaw Modlin and Krakow offering more Ryanair connections from Poland), as well as Ryanair's recent decision to open its repair base at Wroclaw Airport ([www.airport.wroclaw.pl](http://www.airport.wroclaw.pl), 2016), are both attributed to the propitious political and business climate which Wroclaw (as a city) and Lower Silesia (as a region) are offering to investors (Various interviews with representatives of regional airports and local authorities in Poland, May-June 2015). Ryanair's repair base, which will cost 6 mln Euro and which will create 150 high-skilled jobs, will be Ryanair's first investment of this kind in Poland ([www.airport.wroclaw.pl](http://www.airport.wroclaw.pl), 2016). As such, it is also a good example of how GPNs of LCCs can develop and get embedded in the local economy beyond the services offered at airports. By contrast, the very low number of air connections offered from Lodz, relative to the size of the city (i.e. in April 2015 it was only six routes to five different countries, with four routes operated by Ryanair), is, amongst other factors such as the geographical proximity of Warsaw, frequently explained with the lack of support from the local authorities who officially admit that they have no faith in the local airport despite the fact that the city owns 94% of its shares (Krystek 2015, Various interviews with representatives of Polish regional airports, May-June 2015). Thus, as the examples of Wroclaw and Lodz illustrate, regardless of regional assets and locational strategies of LCCs, which are the most important factors moulding strategic couplings between airlines and regions (Bowen 2010), it is difficult for regions to capture any air transport-generated value if the local/regional institutions remain disengaged.

Another important factor determining the ability of Polish airports (and the respective local/regional authorities) to attract LCCs derives from the joint co-ownership of many airports by local, regional and national authorities (the latter in the form of PPL), whose objectives towards individual airports may vary widely, depending on their political visions, strategies of growth and economic interests. For instance, PPL, which fully controls WAW and which co-owns ten other Polish airports, is often accused by regional airports of prioritising the interests of WAW (i.e. LOT's hub) in line with the central government's will to protect the Polish national carrier (Various interviews with representatives of Polish regional airports, May-June 2015). One of the reasons for this is the fact that LCCs, which normally operate point-to-point connections from regional airports, naturally take over some of the air traffic which LOT would like to direct via WAW.

The case of Poland shows that various local issues, including the varied ways in which air transport is organised at the sub-national level, have a significant influence on how airlines' GPNs (and thus the networks of connections which they operate) evolve. The fact that many of the discussed factors are rooted in Poland's communist past and the chaotic post-communist restructuring which Polish aviation has undergone, also demonstrates that the impact of sub-national political, institutional and

socio-cultural environments on foreign airlines' GPNs is inherently path-dependent. The example of Poland also shows that the processes of liberalisation and deregulation of air transport are unlikely to homogenise the industry. Although Poland belongs to the EU's liberalised air space and its air transport industry is now governed in full accordance with European requirements (not to mention that EU subsidies have helped the country to develop its airport infrastructure to the EU standards), the Polish passenger aviation industry continues to be shaped by local, place-dependent factors and for this reason its structure and its impact on economic development vary widely across space.

## **7. Conclusions**

The paper has demonstrated that the predominantly positivistic and quantitative orientation of much of the geographical research on air transport carried out to date has left many qualitative aspects of aviation largely under-explored. Although the situation has recently started to change and transport geography is now much more open to other philosophical and theoretical approaches, many of the calls for bridging the divide between transport geography and other sub-fields of human geography are yet to be addressed (Goetz 2006, Goetz et al 2009, Hall 2010, Keeling 2007, Shaw and Sidaway 2010). Amongst them is the gap between transport geography and economic geography.

By means of identifying three under-researched aspects of the passenger air transport sector which contemporary, post-positivist economic geographical theories are well-placed to address, the paper has aimed to help bridge this divide. First, it has been argued that, in order to better account for the complex multi-actor structure of the air transport industry, it is essential to employ network thinking beyond (structural) networks of connections and focus on the relational global production networks that underpin and govern networks of connections. Second, the paper has contended that the geography of air transport is much more complex than the mosaic of national and supra-national regulatory frameworks that are one of the key foci of analysis in the air transport literature. Therefore, if the territoriality of air transport is to be fully accounted for it is necessary to address the economic, political and institutional features of the places which aviation interconnects and the varied patterns of politics and power that are at work at the sub-national level and that shape the industry 'from below'. Third, it has been contended that in order to disentangle the circular and cumulative relations between air transport and regional development there is a need to more deeply consider what is called for in the previous two points, i.e. how air transport is structured at the sub-national level and how various place-specific factors shape its developmental outcomes.

In order to help address these research gaps, the paper has made a case for a combination of global production networks (GPN) and evolutionary economic geography (EEG) as a useful platform for

more qualitative and critical research on the passenger air transport industry. It has been argued that the discourse of relational networks which the GPN framework invokes and the concepts of power, embeddedness and value on which it relies, can prove helpful in exploring the multi-actor nature of air transport and the varied ways in which local factors shape it 'from below'. Simultaneously, the GPN-related concept of strategic coupling, especially if put together with the ideas of path-creation and path-dependence (i.e. integral concepts of EEG), can shed new light on how place-specific the cumulative and circular relations between air transport and regional development are. The example of Poland, where communist legacies and the different multi-scalar patterns of politics and power at the sub-national level play an important role in shaping air transport and where in the context of the post-communist re-integration with the global economy great hopes are pinned on air transport and its developmental potential, has justified and exemplified the applicability of these two frameworks to research on air transport.

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