Global city regions and the location of logistics activity

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ABSTRACT

The aim of this paper is to extend and develop research surrounding the links between transport and urban regions. An understanding of transport activity has long involved the use of spatial frameworks, seen in the idea of a gateway city (with its surrounding hinterland) and in the identification of hubs or nodes. The particular framework used here is the global city region, a build-out from the much researched global city, and acknowledged as the most prominent feature of spatial development in the global economy. As these areas can accommodate important sea and airport infrastructure, the global city region can be expected to play a significant role in global logistics. Whether that significance extends just from the physical realm, as reflected in the infrastructure, or whether it is embedded in the scale and complexity of the advanced business services sector within the global city, is the issue that lies at the heart of the research. The research has set out to answer the question: “How important are these regions in logistics activity?”. The question has relevance in the context of transport geography as it provides an urban structure perspective on what is commonly seen as separate port or airport activity. Its relevance is enhanced as its answer relies upon a simultaneous analysis of both sea and air freight activity. Results show these regions counted for a substantial and growing share of sea and air freight between 1996 and 2006. In accounting for that outcome the research explores the particular effect of infrastructure (showing that global city regions with multiple seaport and airports play a special role) and also isolates the links with global city functions. The paper concludes with some insight on the special challenge these places create for strategic urban planning policy.

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1. Logistics activity and global city regions

The approach to understanding global logistics in this research is built upon the importance of global cities and the extended area surrounding them, which have come to be called global city regions. The concept of a global city has been debated and analysed over an extended period, spanning the time between some initial ideas expressed by Friedmann (1986), articulated and developed by Sassen (1991, 1994) and analysed in extensive detail by the project associated with the Global and World City project at Loughborough (for example see Beaverstock et al. (2000)). The essence of this perspective is that the global economy can be represented in flows or linkages, which are concentrated in some particular cities and reflected in employment in advanced business or producer services which are located in office buildings in and around their core. In turn too this concept recognizes a hierarchy, with a small number of dominant places, and a larger number of other locations whose influence will be felt just in some parts of the globe, or in some particular activities.

The interpretation and use of the concept of global city was expanded once the areas surrounding the global city were acknowledged as globally integrated along with the city core. Scott (1998, p. 7) argued that integration could be seen in the way the production systems of both manufacturing and services in these areas were tied together through globally organized interconnectivity of component and finished good production. That confirmed earlier observations of Muller (1997) concerning the global links of suburban areas and was illustrated in case studies of Philadelphia (Hodos, 2002) and Melbourne (O'Connor, 2002). Scott saw these spatial units as a part of a “global mosaic of development” and with colleagues later labeled them “global city regions” (Scott et al., 2001). Later he defined them as “enormous expanses of contiguous or semi contiguous built-up space … surrounded by hinterlands of variable extent (and) marked by ramifying local institutions and an increasingly distinctive political identity, and, concomitantly, by a growing self-assertiveness on the global stage” (Scott 2008, p. 131). These regions spill over 50–70 km from the central city, and make up the vast urban regions that can be seen from the air as clusters of light in parts of the US, Europe and Asia (Beaverstock et al., 2000) and elsewhere (Angel et al., 2008). They have also been labeled “100 Mile Cities” by Sudjic (1992), “mega city” Lo and

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There are good reasons to expect that these large spatial units will play a prominent role in global logistics. One source is the conceptual foundation laid by Scott who established they were integrated internally by the movement of goods (and people) and externally by world trade, both of which involve logistics activity. That foundation is enriched by the thinking on the location of outsourced producer services, a production arrangement central to the understanding of global city activity in the research of Sassen (1994) and extended by the research on services of Daniels and Bryson (2002) and Goe et al. (2000). Outsourcing has recently become a very significant part of logistics services as Skjoett-Larsen (2000) and Makukha and Gray (2004) have shown. Hence logistics services could be a significant part of the producer service mix of global city regions. Their significance might be due to the scale of the local market in these major city regions or it might reflect special skills in managing transhipment and intermodal functions, where logistics services are in effect underpinning the hub or gateway function of the global city region.

There is a firm empirical base for this expected outcome too. Hesse and Rodrigue (2004) suggest that logistics activities are located in and around the big physical nodes of seaports and airports, but are also found at inland centres in the suburbs and in hinterland corridors beyond the edge of a metropolitan area. Illustrating these outcomes, Rodrigue and Notteboom (2008, p. 13) have identified an “extended gateway” in an area of 100–150 km around the port of Antwerp, and links extending over 100 km around Rotterdam (Notteboom and Rodrigue, 2008, p. 65), both consistent with Rodrigue and Hess’s (2007, p. 116) observation that “most of the movements” to New York “involve medium distance trucking of a few hundred kilometers at most”. The role of logistics in the global city region can also be seen in the link detected between US west coast port traffic and the demand for warehouse space in west coast metropolitan areas, especially the link between the ports of Los Angeles–Long Beach and the Inland Empire (Mortimer, 2008). That perspective is consistent with observations on the location of physical logistics activity in big urban regions in the US (King and Keating, 2006), Europe (Cushman et al., 2003; Graham and Sahling, 2004) and China (Cole et al. 2008). Hence the location of major sea and air freight terminals within global city regions means there may well be “a new species of global city……. a 24 hour conveyance urbanism of infrastructures, containers and specialized vehicles…the global city as Logistics city” (Easterling, 2004, p. 182).

The issue for the research is whether this set of outcomes is shaped by the location and access to large scale physical infrastructure, or whether the broader service sector in a complex urban region also shapes the flows of activity. The infrastructure effect, felt via large scale sea and airport facilities, is significant for global city regions as it has been shown that seaports within close proximity may collaborate in the handling of goods, and might in fact be served by one set of logistics service companies. Song (2002) suggested this outcome might have relevance in the rapidly expanding Asian context where ports within a region that were once in competition might begin to co-operate. Exploration of his idea in the case of Shanghai and Ningbo (Wang and Olivier (2007a), Hong Kong and Shenzhen (Wang and Oliver, 2007b), Singapore and Tanjung Pelapas (Tongzon, 2006) and Busan and Gwangyang (Yeo and Cho, 2007) confirms the relevance of a large-scale urban region as a framework for logistics activity. A similar perspective on airports was provided by de Neufville (1995), which spawned research on multiple airport regions. Fuehlhart (2003, 2007) has shown this effect on a small airport within the catchment of larger ones in the US, noting that passengers can travel 70–90 miles to use different airports at different times; Pels et al. (2001) explored the outcome in a more closely spaced set of airports in the San Francisco Bay Area, while Loo et al (2005) analysed these outcomes for Hong Kong and Shenzhen. There have been less attention to freight movements on this scale, although Schebera (2006) refers to linkages of this kind for Hong Kong-Shenzhen. Hence the sea and airport infrastructure in a global city region could be a critical factor in shaping its role in global logistics activity.

As noted earlier, global city regions also provide a foundation for service activity. This activity could be more mature where complex infrastructure provides the logistics service company with an array of alternative modal choices, which it can utilize to meet a client’s needs. Wang and Cheng (2009) have extended and developed this thinking, showing that the service functions of major port cities can evolve into “global supply chain management centres” as their service activities look beyond local loading and unloading to include skills in finance, product planning and management. That outcome could be based in part on a capacity to operate in both sea and air freight. Although there are substantive differences in bulk, speed and type of commodities handled by the two modes, it is possible that logistics service companies will have some clients who will need sea and air shipments of different goods at different times. For example, Henstra et al. (2007) provide details of a case-study of Sony who use both sea and air transport to supply warehouses in Europe, one delivering base load, predicted supply, the other being used to meet unexpected demand. Priemus (2001) indicated there was integration between the two elements of transport infrastructure in the Netherlands. Hence logistics activity, involving both physical movement and value added supply chain management activity, might be better developed in a global city region than if operating in a smaller city.

To establish the strength of the relationship between global city regions and logistics activity, the research has posed three questions. First, what is the actual share of logistics activity in global city regions that have both sea and airports? Second, do regions with multiple airports and seaports exert a disproportionate influence on this share? Third, to what extent do measures of physical logistics activity reflect measures of global city functions? The research reported here has developed a methodology to address those questions.

2. A methodology to link logistics and global city regions

The methodology to address the issues outlined above was developed in four stages.

2.1. Identifying global cities

The starting point here was the hierarchy of global cities developed by Beaverstock et al. (2000). This is firmly rooted in a count of producer services in cities. There were two drawbacks to its use. One was that it was presented in categories, so it was difficult to separate out the global city status of individual cities. The second was that the ranking was published in 2001 and it drew upon data from an earlier time period. Though it might be assumed that the rank of global cities might not have changed much in this period, there were some cities where logistics activity is known to be significant, Shanghai and Dubai for example, which were likely to have become more important since 2001. The drawbacks of the Beaverstock approach were overcome with the production of a hierarchical ranking of individual cities by Mastercard Worldwide (2008) This was developed for a set of 50 cities in 2007, and was up-dated to 75 cities in 2008. This created a minor problem as the logistics analysis planned in the current research involved data up to 2006. However, closer study of the 2008 Mastercard research
showed some of its data referred to earlier years; in addition the 2008 publication added more cities and broadened the data base considerably, adding more variables, so it was potentially more useful than the 2007 publication. It was decided to use the 2008 data as it is based on more data and includes more cities. The city ranking is based upon 72 indicators which are merged into seven separate dimensions. These are the legal and political framework; economic stability; ease of doing business; financial flows; business centre; knowledge creation and information flow and livability. The business centre dimension contributes 12% to the ranking. It is made up of six variables, four of which in fact measure the logistics activity that is the focus of the current research. These variables are Port TEUs, Air Passenger and Airphone traffic, Air Cargo traffic and International Air Passenger traffic (Mastercard Worldwide, 2008, p. 13). Hence to use this as a measure in a study of logistics activity it was necessary to remove that dimension from the index. This was done and an Adjusted Mastercard Index for 2008 was used to re-rank the 75 global cities in the data base.

2.2. Identifying global city regions

The research then needed to identify the global city region of these cities. Here the approach drew on that used in case studies carried out by Simmons and Hack (2000) and the conceptual thinking of Webster and Muller (2002) applied to a study of Bangkok (Webster, 2004). These approaches suggested global city regions were areas up to 70 km from a central city, with both sea and airport and multi-lane road systems (and rail networks in some cases). Ideally the identification could be based upon measures of the capacity and efficiency of the region’s multi-modal transport systems; that information was not available in a consistent form in all urban regions across the globe. Hence the approach followed O’Connor’s (2003) identification of multiple airport cities; it used local maps to find the location of transport infrastructure within the 70 km radius from the central city of the places identified in the Mastercard list discussed above. For inclusion in the study a global city region had to have at least one sea port and an airport in data supplied from sources identified below.

2.3. Identifying logistics activity in global city regions

The third step involved the measurement of logistics activity. The initial approach aimed to identify both physical and service dimensions of logistics, but it quickly became apparent that the measurement of the service side of logistics (explored via directories and lists of the head offices of companies) was not going to be sufficient. Hence the focus fell back on the physical measures. The sources were Containerisation International, which provided the number of containers moved through 530 ports in 2006; the same data was available back to 1996 (though for a smaller number of ports) and Airport Council International, which showed tonnes of air freight loaded at 952 airports in 2006. These data bases were scanned to find all sea and airports that could be assigned to the 70 km radius of each global logistics region. The condition that the global city region had to have an airport and a sea port for which data was available reduced the data set to 44 places which were labeled Global City Logistics Regions.

The data set includes some expected locations, like the ports of Los Angeles–Long Beach along with airports in the Los Angeles basin, while the incorporation of San Francisco (airport), Oakland (port and airport) and San Jose (airport) into one region is another obvious case. The New York–New Jersey network of airports and a seaport was extended to include Hartford following Bowen and Slack’s (2007) observation on the latter’s role. The location of ports and airports in the Tokyo–Yokohama region, the combination of Rotterdam and Amsterdam, as well as a separate city region in Belgium (Brussels and Liege for air and Zeebrugge and Antwerp for sea) are further illustrations of the methodology. Likewise, an urban region labeled London and South East UK stretched the idea by including Flexistowe and Southampton with some smaller ports and a set of airports serving that region; the availability of road and rail links that allow freight movement across this area justified that decision. In the case of Shanghai and Ningbo, the combination followed the research presented by Cullinane et al. (2005) and Wang and Oliver (2007b) and incorporated knowledge of the new bridge reducing the distance between the two cities. A Dubai-Gulf region was shaped following the research of Zaid Ashai et al. (2007).

In some cases national borders separating near-neighbours (Hong Kong-Shenzhen and Singapore–Tanjung Pelapas for example) were ignored to provide a regional perspective on known (or potential) movement of goods and the spread of logistics management skills between these two places (Wang and Olivier, 2007a; Tongzon, 2006; Loo et al., 2005). These did not extend to large geographic scale regions (which could link Guangzhou in the Hong Kong Shenzen case, and Penang in the Malaysian case) as the distances were beyond the 70 km limit.

The requirement of co-incident sea and airport in the methodology meant that several global cities were left out of the analysis: These included Paris, Frankfurt, Madrid and Zurich in Europe and Chicago, Dallas, Atlanta and Toronto in North America. Some significant seaports and airports have also been excluded as they were not in locations classified as global cities: Kaohshung, Qingdao–Yantai and Busan–Gwangyang are examples of seaports, while Memphis, Louisville and Anchorage are examples of air freight locations. Given these exclusions it might be expected that the concentration on global cities with sea and airports might provide a limited view of the logistics scene. The results show otherwise. The full data base of cities, with their constituent seaports and airports is displayed in Appendix 1.

Table 1 provides an overview of the data base developed from this methodology, and a preliminary insight into the significance of the 44 global city regions that are the focus of the research. As shown in the table, this group accounted for 48.8% of global air freight and 58.4% of global sea freight in 2006. Global cities in the Mastercard ranking that did not have sea ports account for a further 15% of air freight. A group of the twenty busiest airports (led by Memphis, Louisville, Anchorage, and Luxembourg) and seaports (such as Busan–Gwangyang, Kaohsiung, Quingdao and Guangzhou) account for an additional one fifth of air and sea freight. The significant level of concentration of logistics activity in these 44 global city logistics regions justifies further analysis.

2.4. Measuring both sea and air freight

The fourth step in the methodology involved a calculation to express the scale of physical sea and air logistics activity. The aim was to find a way to compress the data to simplify the presentation

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of places</th>
<th>Share of air freight</th>
<th>Share of sea freight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global city logistics region</td>
<td>44</td>
<td>48.8</td>
<td>58.4</td>
</tr>
<tr>
<td>Global city with airport only</td>
<td>29</td>
<td>15.5</td>
<td>14.2</td>
</tr>
<tr>
<td>Non global cities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 20 in sea or air traffic</td>
<td>20</td>
<td>18.2</td>
<td>19.4</td>
</tr>
<tr>
<td>Rest of cities in data bases</td>
<td></td>
<td>17.5</td>
<td>22.2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Total includes 952 airports, 530 seaports</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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and interpretation of levels of, and changes in, activity. It is obviously not possible to add sea freight (measured in containers) to air freight (measured in tonnes). However it was considered feasible to add the shares of total sea or air freight at each global city region as these are measures in a comparable metric. It is a crude measure as in effect it assumes an equal significance of sea and air freight; the need to refine and enhance measures like this are discussed in the conclusion. The output from this step was termed a Global Logistics Index, a dimensionless variable discussed in terms of points. Its value for a given global city logistics region is the sum of that city's port(s) and airport(s) share of all total container movements and all air freight loaded in the data bases used. The index has a total value of 200 points (which corresponds to the sum of all shares i.e. 100% of sea freight and 100% of air freight). This will be used to measure the physical logistics activity at global city logistics regions.

3. The results

3.1. The significance of global city logistics regions

The data displayed in Table 1 earlier confirms one key in issue for the research: global city logistics regions are a critical part of logistics activity. Attention now turns to the effect that the significance or rank of the global city itself has upon logistics activity. The analysis of global cities often involves place in a hierarchy and much attention in research is focussed upon the highest ranked cities, with special attention to cities like London, New York, Tokyo and Paris for example. In that vein, the first step in the analysis was to examine the Global Logistics Index values recorded for hierarchical categories of city regions. This will provide an overview of the link between the level of global city functions (seen in the rank of the global city region) and its share of combined sea and air physical logistics activity. The results are displayed in Fig. 1.

The figure shows that the top ranked category of cities does dominate logistics activity, having double the index value of those in the next ranked category. The cities ranked in the top ten can be seen in Appendix 1. These cities have the widest array of business and urban development as used in the Mastercard index research. It is possible that the more complex producer service environment, along with the large market and higher income of these higher ranked places may be a significant attractor of freight activity. However not all cities in the top ten category are significant logistics centres. It is apparent that there are really three types of city region in this top 10 group. One is made up the commonly cited cores of the global economy namely London–SE UK, New York and Tokyo; the latter two are recognized generally as important logistics centres. A second group is made up of what could be labeled specialist ports or airports, and include Hong Kong–Shenzhen, Singapore and Amsterdam–Rotterdam. A third sub group in this list of ten (Stockholm, Copenhagen and Sydney) are highly ranked probably because of livability measures along with their commercial functions but are not associated with modern logistics activity. Seoul has not been included in this three way grouping: its logistics role in air freight is significant, but its seaport functions are less significant. The analysis just of the top ten cities helps sharpen the analysis. It shows that many of the top ranked cities have acknowledged logistics functions and as a group they dominate the location of this activity. But it also raises the question whether global city rank alone is an important determinant of the location of this activity.

Another insight in the data is the index value for the category of cities ranked 31–40. The global logistics index value for this category breaks what seems to be a steady downward trend in the activity associated with the rank of city. That suggests global city roles may be important in logistics even irrespective of rank. To explore that issue further, the focus now shifts to the rank of individual cities and their global logistics index score.

The data for each individual global city's amended Mastercard Index and Global Logistics Index value has been plotted in Fig. 2. That provides a general impression of the link between the two variables. Statistically the regression line drawn on the graph has an R-square value of 0.46, which means that on average just 46% of the variance in global logistics activity is related to global city rank. It seems there are two broad groups of cities represented here. One where transport functions are matched to their global commercial influence, which are arrayed on or close to the regression line and a group where that link is weak. Among the former, global city regions marked in italics on Fig. 2 and as diverse as London, SE UK, New York–New Jersey, Amsterdam–Rotterdam, Seoul and Hamburg–Bremerhaven (along with unmarked San Francisco–San Jose, Rome and Sao Paulo–Santos) have logistics activity consistent with the rank of their global city functions.

However there are many global cities where logistics functions are either more important or less important than their global city rank would predict, indicating that other factors have an important role to play in this relationship. The places with strong logistics functions are Hong Kong–Shenzhen in particular, along with Singapore, Los Angeles–Long Beach, Tokyo–Yokohama, Shanghai–Ningbo and Dubai–Gulf, locations that figure prominently in...
most research on logistics activity. It is possible that these places have greater significance because their global city regions incorporate multiple sea and airport infrastructure, an aspect to be explored below. In addition it could be that their hub role in global logistics movements exaggerates their physical logistics activity beyond that associated with their own regional or national market need.

At the same time it is apparent that a series of cities plotted within the circle drawn on the city rank axis have significant global city functions but are not important as logistics centres. These include Copenhagen, Sydney, Stockholm, Philadelphia and Boston, which are highly ranked on the Mastercard analysis due to their scores on financial and business functions and possibly livability. The presence of these attributes is not enough to ensure logistics functions, confirming that the link between logistics activity and global city rank is not straightforward.

3.2. The role of port and airport infrastructure

It is likely that several of the global city logistics regions that are prominent in Fig. 2 might have more than one sea and airport. In some cases these might be close together and reflect early history in development (eg. Los Angeles and Long Beach seaports); others could reflect new additions as the region has grown (Gatwick and Stansted airports in London, Narita Airport in Tokyo and Kansai airport in Osaka–Kobe). In other cases regional development can lead to the merging of cities to form larger city regions, and so add to the transport infrastructure, a case represented by the example of Shanghai and Ningbo. The effect of this infrastructure outcome was explored by assigning the 44 global city logistics regions to one of four classes based on the number of their sea and airports. Four classes were created: (1) Multiple sea and airports; (2) Multiple seaports with a single airport; (3) Multiple airports with a single sea port and (4) Single sea and airport. The data assembled for these categories included the number of cities, as well as the total value of the global logistics index for all cities in that category. The results are displayed in Fig. 3.

This figure makes very clear that the small number of global city logistics regions that have multiple sea and airports account for the majority of sea and air freight. Just eight cities in this category recorded a total of over 50 points on the Global Logistics Index, (which in effect means around 25% of all global sea and air traffic in 2006). This significance suggests that the concentration of global logistics activity can in fact be largely associated with the provision and accessibility of infrastructure in and around a region. It is also possible that this strong role reflects a hub function at many of these city regions, so that traffic is larger than might be the case for their own market. Of course it is possible that the hub function relates to the scale and skills of commercial and financial management (i.e. their global city role) than simply to the number and lift capacity of craners at their seaports and/or runway and storage space at their airports. That idea is supported by the fact that the 27 places that had single sea and airports together recorded a global logistics index over 40, (corresponding to a share of all traffic around 20%). For this group it might be the scale and complexity of the global economic functions that account for their role in this data.

These results suggest that the scale and complexity of infrastructure is but one part of the story. To elaborate the association between it and logistics activity it is useful to explore the global city rank of places within the two main categories discussed above. These are shown in Table 2.

This table shows that the multiple sea and airport regions span a wide array of global city ranks, from London at 1 to Dubai-Gulf, ranked at 55 in the Mastercard data base of 75 cities. In fact it would seem infrastructure provision seems to be independent of the scale of global city functions as only three of the nine global city regions in this category are ranked among the ten major global cities in the data base. In the second category, there are no highly ranked city regions, and the majority make up the middle to bottom end of the set of 75 cities studied here. In many of these places their global city role, as well as their logistics function, is probably associated with their national commercial and industrial significance. Fifteen cities in the group (Jakarta, Manila, Cairo, Buenos Aires, Santiago, Lisbon, Tel Aviv–Haifa, Stockholm, Mumbai, Beijing–Tianjin, Dublin, Amsterdam–Rotterdam, Sydney, Mumbai, Sao-Paulo) are capitals or main commercial centre of their nations which is reflected in significant commercial and business service development. Among the rest are places with strong regional commercial roles (Vancouver, Houston, Boston and St. Petersburg). The commercial and financial service development of the global cities in these regions would seem to underpin their logistics functions. In fact 15 of the 34 cities named in this table are ranked above the half way point on the adjusted Mastercard ranking, confirming again that global city commercial activity seems to have a strong influence upon logistics functions.

In summary, global logistics activity has a complex interdependence with global city functions that extends beyond infrastructure. In aggregate global city logistics regions are very significant as a focus for world sea and air freight. A good part of that significance is associated with a small number of places with substantial air and sea port development and a role as hubs in the movement of goods. In addition however, a wide array of global cities is also significant in sea and air freight. The final stage in the analysis explores the way those relationships have changed in the period 1996–2006.

3.3. Change in the location of logistics activity 1996–2006

The aim here was to establish whether the outcome identified in the previous analysis had a longer term foundation or is a recent phenomenon. In particular it was important to establish if the regions with multiple sea and airports have played a more important role over the decade under review.

Fig. 4 provides data to explore the first issue. It shows the global logistics index for the global city logistics regions from 1996–2006, with details on the index values for sea and air transport.

This data suggests that the role of the global city logistics regions has changed little over the decade. A small but steady rise...
in the index value suggests these places have been attracting an increase in the share of global sea and air traffic, and the bars on the graph confirm that the gains might be stronger in sea traffic than in air freight. That outcome is consistent with the fact that there are a number of global city regions with important air freight functions that lie outside the group of cities that are represented in Fig. 4. At the same time, the data confirm that global city regions have been, and continue to be, important as sea ports, and that importance is sufficient to edge up their share of global traffic slightly over the decade.

Exploring this situation further, the data displayed in Fig. 5 was re-configured for the four categories of logistics regions used earlier. This provides the opportunity to establish any change in the role played by those places with major sea and airport infrastructure.

The data in Fig. 5 confirm that the multiple sea and airport city regions have become steadily more important over the decade displayed here. This suggests infrastructure capacity, and its likely accompanying hub role, is a critical factor in shaping the location of physical logistics activity. As only a few of the places in this category are high ranked global cities it would appear the influence of global city functions may be weakening and the sheer capacity to manage logistics activity may be emerging as a key factor in the underlying geography of logistics at a global scale.

As noted earlier however, some of that capacity may be related to the skill and breadth of producer service functions in those locations.

### 4. Conclusions

This research set out first to identify the actual share of logistics activity in global city regions that have both sea and airports. The results show that just 44 places, defined as global city logistics regions, accounted for almost a half of air freight and two thirds of sea freight in 2006, a share that has been steady over the past decade. That importance is underscored by the fact that this research did not include some 29 global cities that only had airports: they together handled an additional 15% of global air freight in 2006. That shows the spatial unit surrounding the global city is critical to logistics flows. This has one very important consequence; logistics operations will be competing for land use and mobility in what are some of the most crowded and congested urban regions on the globe, which in some cases are already, or could become “choke-points” in the “...conduits of commerce” (Leinbach and Capineri, 2007, p. 270).

Second, the research explored the role of regions with multiple airports and seaports. It found they did exert a disproportionate influence in terms of share of activity, and that share had been rising over time. In effect multiple transport infrastructure now plays a powerful role in shaping urban and regional transport outcomes and will need to be at the heart of the regional planning initiatives. Addressing the issues surrounding that result will require new spatial thinking in port and airport development. This is reinforced by the fact that multiple sea and airport infrastructure in a region is usually dispersed across a wide area.
Third, the research was designed to assess whether measures of physical logistics activity reflect the level of development of global city functions. In the absence of data on the actual location of firms and details of their functions in each city, the analysis relied upon the statistical relationship between the rank (and hence the commercial, financial and administrative importance of a global city) and logistics role of each global city region. The research found that less than 50% of the variance in logistics activity in a global city logistics region was associated with an index measuring the rank of the rank of its global city. Exploring those results for categories of city exposed the infrastructure issue outlined above, while at the same time showed that many middle and lower ranked global cities with basic infrastructure were important in logistics activity. Hence, infrastructure may be a necessary but not sufficient explanatory factor of the performance and concentration of freight activity in the main global logistics regions. Rodrigue and Hesse (2007, p. 106) have observed “It is not only simple infrastructure provision that makes firms go to a certain area but the ability of regions and cities to cope with the extraordinary demand for flexible, timely and cost efficient physical distribution”. It may be that the newly-minted and special role that out-sourced logistics companies now play in the handling of freight might be a critical part of the link between global city functions and logistics.

These new roles reflect the way many other services have evolved and developed over recent years, moving from a position as a final step in a production process to a central and innovative function, one that can shape production outcomes (Bryson et al., 2004). This change emerged from the outsourcing of functions from firms, which, in turn, created specialist service providers. One effect of this shift has been a geographic concentration of service firms. That has been illustrated within the broad category of producer services, and, in particular, in the finance sector. It may well apply to logistics services. If so, understanding the location of out-sourced logistics service companies might provide some new insight into reasons for the uneven nature of freight activity among cities. Just as the idea of a “buzz” has been used to account for the concentration of innovative activity in the cores of global cities (Storper and Venables, 2004), so the local expressions of the “global buzz” that has become logistics” Wang et al. (2007, p. 1) might provide insight on the role played by global logistics regions in world freight movement. Olivier and Slack (2006) have created one path into this new perspective by clarifying the role and significance of multi-national terminal operators as a new dimension in the services of sea freight.

This perspective recognizes the steady evolution of logistics services through the standard out-sourced model (labeled “third party provider” in logistics analysis) to “fourth party provider” where the logistics service company becomes fully integrated into the production process of the client firm, running warehouses, in some cases dictating production outputs (from a knowledge of stock levels) and in other circumstances handling returns and servicing problems. The global city logistics regions used in this research may be very attractive places for these complex service companies. That is because access to competing gateways could provide lower freight and loading cost due to competition, provide greater flexibility in operations and possibly ensure a wider set of destinations served. Access to both sea and airports would be an additional advantage for those logistics firms with clients needing both sea and air transport at different times and for different products. Finally, the complex logistics tasks might begin to draw upon other services just as the finance sector has done as it has become more specialized. Again global logistics regions could be attractive as their core business city will have the array of producer services that might be needed to underpin the operation of logistics. It is these places that might evolve into what Wang and Cheng (2009) has labeled “global supply chain management centres”. A key question here is whether these new logistics service providers shape the direction of physical flows, favouring some ports and airports because of the depth of supporting services, even if their clients may not necessarily be in that region. This is a potentially interesting area of research.

The research has provided some additional insight into the function and vitality of global city regions, showing not only that logistics is an important activity, but that levels of that activity might be a useful means of differentiating the development of these regions. In effect, the acknowledgement of the role of both sea and air freight in a region has confirmed that it makes sense to think of global cities as logistics cities, as Easterling (2004) suggested. A further aspect step in this research could involve the analysis of the internal spatial development of these regions. Logistical activities could be creating or re-vitalising some of the nodes that Hall (2001) has found contributes to the poly-centric character of these regions. Alternatively the transport activities might be dispersed among fringe green-field sites, so accelerating the spread of the region. Local case studies of this aspect are planned as a follow up to this paper.

Finally, this paper set out to utilize sea and air freight data simultaneously in an innovative effort to capture the breadth of logistics activity. Apart from the need to bridge two separate sets of thinking and analysis this approach faced serious technical questions in measurement. The approach used was the Global Logistics Index which made it possible to merge sea and air freight data into a readily interpretable form, and provide a foundation for more refined thinking on the patterns that were detected. It is however a crude summation of two separate data sets and will need refinement if it is to be applied in other issues. That refinement could involve some way to weight sea and air freight prior to any merge of their numbers. Drew and Jansen’s (1996) efforts to differentiate between tonnage and value-added in ranking transport activity could be a useful starting point here.

Acknowledgements

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### Appendix 1. Global city logistics regions with component seaports and airports

<table>
<thead>
<tr>
<th>Global city logistics region</th>
<th>Seaport(s)</th>
<th>Airport(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 London, SE UK</td>
<td>Felixstowe, Thamesport, Tilbury, South Hampton, Dover</td>
<td>Heathrow, Gatwick, Stansted, Luton</td>
</tr>
<tr>
<td>2 New York–New Jersey</td>
<td>New York/New Jersey</td>
<td>JFK, Newark, La Guardia, Hartford</td>
</tr>
<tr>
<td>3 Tokyo–Yokohama</td>
<td>Tokyo, Yokohama</td>
<td>Narita, Haneda</td>
</tr>
<tr>
<td>4 Singapore</td>
<td>Singapore, Tanjung Pagar, Pasir Panjang, Jurong Incheon</td>
<td>Incheon, Gimpo</td>
</tr>
<tr>
<td>5 Seoul</td>
<td>Incheon</td>
<td>Incheon, Gimpo</td>
</tr>
<tr>
<td>6 Copenhagen</td>
<td>Copenhagen, Malmö, Hong Kong, Shenzhen</td>
<td>Copenhagen, Shenzhen</td>
</tr>
<tr>
<td>7 Hong Kong–Shenzhen</td>
<td>Hong Kong, Shenzhen</td>
<td>Hong Kong, Shenzhen</td>
</tr>
<tr>
<td>8 Sydney</td>
<td>Sydney</td>
<td>Sydney</td>
</tr>
<tr>
<td>9 Stockholm</td>
<td>Stockholm</td>
<td>Stockholm</td>
</tr>
<tr>
<td>10 Amsterdam–Rotterdam</td>
<td>Rotterdam</td>
<td>Amsterdam</td>
</tr>
<tr>
<td>11 Philadelphia</td>
<td>Philadelphia</td>
<td>Philadelphia</td>
</tr>
<tr>
<td>12 Boston</td>
<td>Boston</td>
<td>Boston</td>
</tr>
<tr>
<td>13 Osaka–Kobe</td>
<td>Kobe, Osaka</td>
<td>Itami, Kansai</td>
</tr>
<tr>
<td>14 Los Angeles–Long Beach</td>
<td>Los Angeles, Long Beach</td>
<td>LAX, Ontario, Burbank, Long Beach, Santa Ana, San Francisco, Oakland, San Jose</td>
</tr>
<tr>
<td>15 San Francisco–San Jose</td>
<td>Oakland</td>
<td>Oakland, San Jose</td>
</tr>
<tr>
<td>16 Montreal</td>
<td>Montreal</td>
<td>Mirabel, Trudeau</td>
</tr>
<tr>
<td>17 Antwerp–Brussels</td>
<td>Antwerp, Zeebrugge</td>
<td>Brussels, Liege</td>
</tr>
<tr>
<td>18 Dublin</td>
<td>Dublin</td>
<td>Dublin</td>
</tr>
<tr>
<td>19 Hamburg–Bremerhaven</td>
<td>Hamburg, Bremerhaven</td>
<td>Hamburg</td>
</tr>
<tr>
<td>20 Washington DC–Baltimore–Virginia</td>
<td>Keelung, Taichung</td>
<td>Taipei</td>
</tr>
<tr>
<td>21 Vancouver</td>
<td>Vancouver</td>
<td>Vancouver</td>
</tr>
<tr>
<td>22 Houston</td>
<td>Houston</td>
<td>Houston</td>
</tr>
<tr>
<td>23 Barcelona</td>
<td>Barcelona</td>
<td>Barcelona</td>
</tr>
<tr>
<td>24 Miami–Port Everglades</td>
<td>Miami, Port Everglades</td>
<td>Miami</td>
</tr>
<tr>
<td>25 Melbourne</td>
<td>Melbourne</td>
<td>Melbourne</td>
</tr>
<tr>
<td>26 Shanghai–Ningbo</td>
<td>Shanghai, Ningbo</td>
<td>Shanghai, Pudong</td>
</tr>
<tr>
<td>27 Tel Aviv</td>
<td>Haifa</td>
<td>Tel Aviv</td>
</tr>
<tr>
<td>28 Lisbon</td>
<td>Lisbon</td>
<td>Lisbon</td>
</tr>
<tr>
<td>29 Santiago</td>
<td>Valparaiso</td>
<td>Santiago</td>
</tr>
<tr>
<td>30 Rome</td>
<td>Civitavecchia</td>
<td>Rome</td>
</tr>
<tr>
<td>31 Bangkok</td>
<td>Laem Chabang, Bangkok</td>
<td>Bangkok</td>
</tr>
<tr>
<td>32 Munich</td>
<td>Jawaharlal Nehru</td>
<td>Munich</td>
</tr>
<tr>
<td>33 Kuala Lumpur–Port Klang</td>
<td>Port Klang</td>
<td>Kuala Lumpur, Subang</td>
</tr>
<tr>
<td>34 Athens–Pireaus</td>
<td>Piraeus</td>
<td>Athens</td>
</tr>
</tbody>
</table>

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* Listed in order of rank on Adjusted Mastercard Worldwide Centers of Commerce Index.

### References


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