

Logistics real estate markets: indicators of structural change, linking land use and freight transport

Paper for the ERSA 2002-Conference "From Industry to advanced Services",
Dortmund¹

First draft, 31st May 2002

Abstract

The system of physical distribution that comprises transport and logistics, warehousing and wholesale, is an ideal indicator of structural change. Physical distribution has developed dynamically, with respect to new technologies, corporate restructuring, and a changing market environment. Whereas traditional logistics were characterised primarily by the demand of manufacturing customers for the shipment of bulk-commodities, modern production and service systems require frequent deliveries over great distances, with high inventory turnovers instead of storage. As a consequence, the locational profiles of distribution firms have changed as well, both at a large-scale level and within metropolitan regions.

In this context, the paper points out how the European system of goods movement has changed in terms of regional distribution markets and warehousing location. It also considers the locational dynamics within metropolitan regions, with particular reference to places such as Hamburg, the Ruhr area and Berlin-Brandenburg. Secondly, the paper sheds light on the emergence of specified logistics real estate markets, making land and logistics subject to market capitalisation and bringing about new players in the field of development and policy. In doing so, it is demonstrated how critical the relationship between cities and goods distribution is becoming, with regard both to the regional economy and the urban environment. The dominance of the truck and the mushrooming of distribution centres raise serious concern about traffic reduction and locational policy. Hence the paper finishes with an outlook on a regional, spatially oriented management of supply chains.

The particular benefits of investigating logistics real estate markets are fourfold:

- They allow for a precise insight into regionally differentiated developments.
- They connect the system of "flows" with material "space".
- They demonstrate that structural change is by no means neutral for the environment, regarding specific transport and land use implications of distribution.
- They represent the emergence of new players in land use planning and policy (i.e. developers), thus shaping the system of political regulation.

¹ Some of the arguments presented in this paper are part of contributions to a forthcoming publication edited by the Urban Land Institute (ULI), Washington D.C., "From Storage to Speed: Logistics and Land Dynamics".

1. Logistics and distribution: mirror and driving force of structural change

By definition, physical distribution is “the collective term for the range of activities involved in the movement of goods from point of production to final point of sale.” (McKinnon 1988, 133). It comprises the movement and handling of goods, particularly transportation services (trucking, freight rail, air freight, inland waterways, marine shipping, and pipelines), logistics and warehousing service (e.g. consignment, storage, inventory management, packaging), wholesale and, in principle, retail also. These distributive services experienced strong growth over the last three decades. Among the different transport modes, truck and air transportation develop very dynamically, whereas railroad and waterways are losing a significant share of the market.

The rise of the distribution sector is influenced by forces located both inside and outside the logistics system. First, a major *external* force is the overall structural change. The growth of logistics is supported indirectly by sectoral changes and the emergence of corporate services, shifting the economy from material-intensive goods and commodities to more knowledge- and service-related values and activities. Since those are becoming increasingly interrelated, there is a certain need for intermediation and connectivity. This task is being fulfilled by logistics. Also, fundamental changes within manufacturing create a more service-oriented production pattern and fuel the need for timely delivery, e.g. in just-in-time production systems. They rely on efficient transportation services. The widely practised outsourcing of distribution functions helps to establish the rise of the transportation service economy, mainly consisting of so-called third-party logistics providers.

Secondly, the process of globalisation is shaping logistics in a multiple sense, i) through the spatial expansion of the economy, ii) due to the more complex global economic integration, iii) as a consequence of the upcoming network of global flows and hubs. Besides, the politics of deregulation and liberalisation also have to be considered, since this has made transportation cheaper and more competitive. Finally, the introduction of new information and communication technologies allowed for the integrated management and control of information, finance and goods flows. Thus a particular power shift in market relations could become reality, leading from a supplier dominated to a buyer oriented market.

In response to the shaping economic framework, radical changes have occurred over the last 15-20 years *within* the system of physical distribution. Corporate logistics used to be divided into three functions: supply, production and distribution (and, more recently, recycling as well). Most firms are now subject to comprehensive rationalisation that emerged as a major asset of flexibility and lean management in production (Gertler 1992). It is going to be implemented in retail, wholesale and logistics. The flow-oriented pattern of rationalisation is now affecting almost every single activity within the entire process of creation of value. The aggregate of this highly segmented picture is the *supply chain*, the time- and space-related arrangement of the whole goods flow between supply (of components and raw materials), core production (including manufacturing by suppliers and subcontractors), distribution and recycling. The chain also represents major actors of the interplay: producers, distributors (e.g. wholesalers, freight forwarders, carriers), retailers and end-consumers.

In a much broader sense, physical distribution is becoming the material foundation for the increasingly flow-oriented economy. It certainly needs to be clarified whether it is already justified to speak of a “network society” in general (Castells 1996). Yet it seems to be apparent that the demand for mobility, connectivity and distribution will continue to increase. Thus the significance of services and systems that are dedicated to the management and control of such flows is being emphasised: logistics. Paradoxically, according to the rise of goods flow, logistics is becoming more sensitive about proximity. Even the global system of flows specifically relies

on “local roots”, in terms of location, infrastructure and physical transport. Hence logistics should be subject to broader investigation, not exclusively by business management and transportation sciences, but from the geographical or “regional” perspective as well.

2. Macro-perspectives: Locational dynamics and spatial behaviour of distribution firms

The structural change in general and the response by distribution and logistics firms in particular have certain spatial dimensions, expressed in terms of mobilities (freight transport) and immobilities (land use). They can be roughly characterised by the spatial enlargement and temporal flexibilisation of freight flows, probably resulting in a higher volume of freight traffic, and by the concentration of logistics functions in certain facilities at strategic locations, the facilities being much larger than before and the locations being characterised by the connection of local and long-distance relations (Hesse 2002). Whereas some work has been done in the past on the structure and dynamics of freight flows and the related transport growth (cf. McKinnon 1998), the land use issue is widely underrepresented. Therefore, this paper focuses on the land and location related aspects of distribution.

Traditionally, goods distribution has been located at major places of production, for instance in the manufacturing belt at the North American east coast and in the midwest, or in the old industrialised regions of England and continental Europe. Today, particularly the large-scale goods flows are directed through major gateways and hubs, mainly large ports and major airports, also highway intersections with access to a majority of customers. Regarding the interregional and international distribution business, favourite locations are either those gateways or transportation corridors with access both to traditional gateways of trade (interfaces) and to large consumer markets (destinations). Following the changes from a producer dominated to a buyer oriented market, logistics models are driving distribution facilities to strategic locations, often closer to customers. The generic logic of this process implies a shift from producer to consumer related distribution locations, at least in consumer goods distribution. “There is a new systematic logic to goods movement and storage. People and businesses (both public and private) are the consumers of goods and the targets of the distribution system. Today, the place of origination may have less influence on goods storage needs than on the destination. Finished goods are best kept near the consumer for quick response delivery.” (Mueller, Laposa 1994, 44).

At the large-scale (international) level, distribution firms respond to this by expanding the infrastructure and rationalising flows in order to meet the demand for quick and precise delivery. Owing to the increased competition between the main distribution locations, all major freight hubs (large ports, freight airports, inland hubs) are currently committed to expanding their infrastructure. This is primarily due to the growth of trade and transport in general, supported by economic growth and the enlargement of the market areas, both favouring scale economies. Secondly, it is an outcome of high pressure on supply chains, caused by accelerated information transfers, changing consumer habits and rising competition. Innovations such as containerisation and particularly IT developments have integrated all components of the chain. In response to that, major players in the distribution business (e.g. container lines, freight forwarders, warehousing firms, terminal operators) are trying to control as many parts of the logistics chain as possible. Not coincidentally, these firms are challenged by vertical and horizontal linkages, by mergers, takeovers and strategic alliances (cf. Slack et al. 2002). For them, staying competitive means increasing the throughput and providing the demanded services at low rates. As a result, the activity space of mainports is increasingly becoming “stretched”, reaching far beyond the traditional site of the mainport and connecting more distant places of their hinterland. Allaert (1999, 3) called this “sub-harbourisation”.

At the metropolitan (urban and regional) level, logistics changes are associated with an increasing demand for new transshipment points, particularly distribution centres (DCs) and warehouses (see chapter 3). The new facilities are operated in order to control the more complex, flexible and mass-customised freight flows for an increasing market area at limited logistics cost. This changing functional profile implies new locational requirements. Following the modern imperatives of mobility and accessibility, distribution firms necessarily locate at those places that offer excellent transport conditions. Secondly, they need cheap land for their increasingly large facilities. Most firms are taking into account these two particular considerations once they are looking for locations. This is due both to flow and stock-keeping aspects, regarding the high amount of freight traffic generated by DCs and their extraordinary demand for space. The concrete locational decisions are being made on the basis of the network composition (i.e. the number of DCs) and with respect to major customer markets that have to be served. Regarding this, the primary motives for firms to locate distribution facilities in certain areas comprise the following factors (cf. Dixon 1999):

- Proximity to customers,
- Land cost/land competition,
- Supply of qualified workforce,
- Strategic transportation access (long-distance/regional),
- Transportation infrastructure provision (e.g. intermodal access).

It is almost impossible to make a general statement on the degree to which one or two of these factors are predominant in site-selection decisions. Companies make these decisions in different ways, dependent upon the type of industry or the main product (retail or logistics business, consumer goods distribution or manufacturing), on major customer relationships or with regard to regional differences. There is no single rule of thumb how distribution companies decide to locate at certain places – apart from the fact that in most cases the five factors named above may play a significant overall role. Trade offs between inventory and transport costs are important for many location decisions, since mobilities (freight transport) and immobilities (land use) are closely intertwined. Since the deregulation of transportation markets, total costs can be lowered by rationalised location concepts at the expense of higher transportation costs. In order to find the optimal ratio between low land prices and short distances to the point of final distribution, firms move their DC location as far away from expensive land markets as necessary. At the same time, they need to stay as close to the customers as possible, in order to limit distribution costs. Not coincidentally, the common denominator of these considerations is the urban fringe.

As a consequence, and judging from recent observations in many metropolitan regions, it is evident that logistics spaces are moving out of the core city areas, toward sub- or even exurban places. The locational preference of firms for suburban sites has several reasons: they offer larger and cheaper land resources, compared with the urban core, and access to major transportation arterials is usually much better, due to the locational advantage of freeways and intersections, connecting local and long-distance flows. The suburban drift of distribution locations relates not only to regional location advantages (traffic access) or to specified facilities (e.g. terminals), both primarily being offered outside urban areas, but also to respective problems within cities. Existing sites or facilities often do not fit into the customers' profile, particularly if the facilities are ten years or older, if they are not quickly available or if the sites are contaminated. If the sites are surrounded by sensitive neighborhoods, the increasingly flexible and mobile pattern of contemporary distribution does not get along with other urban functions, e.g. housing. Compared with core urban areas, suburban sites also provide for a 'robust' environment for 24hr operations. The city's sensitivity in this respect could be a major barrier for re-use and re-cycling of inner city sites for distribution purposes (cf. ULI 2002).

Finally, locational assets are not provided for without the visible hand of public policy, even in an increasingly globalized, apparently unbound market economy. Zoning, economic development incentives, infrastructure provision and last but not least a qualified workforce remain important location factors. Their provision strongly depends upon active governance. Hence a majority of site-selection decisions in the distribution business can be explained by the interplay of *fixed cost* (land, facility) and *variable cost* (transport, labour), combined with the influence of *political regulation*. Thus, the firms' locational decisions follow a composite pattern of traditional (Weberian) "transport and labour orientation" and post-fordist criteria of customer orientation, market proximity, flexibility and reliability of services (cf. Storper, Walker 1989).

3. Micro views: site and facility

The emergence of a new real estate market that is specifically dedicated to warehousing and distribution land uses is associated with two developments: first, speaking in quantitative terms, the growth of logistics services in general simply propels the demand for more distribution space. When manufacturing and retail firms have abandoned storage and stock-keeping activities, this loss has to be compensated by logistics service providers. Therefore, an increasing number of facilities and locations will be needed to accommodate further economic growth. Secondly, with regard to more qualitative issues, logistics businesses experience a rising demand for a new type of facility, different from the traditional warehouse: the distribution centre (DC).

New patterns of demand and supply are turning the old warehouses into new DCs, or "High Throughput Centres." (Abbey, Twist, Koonmen 2001). The facility is no longer needed for storage (at least not primarily) but for the efficient consolidation of the materials flow. "The act of warehousing exists because companies are unable to predict demand and prefer to provide a buffer for themselves that accommodates spikes and lulls in the sales process. [...] Aggregate demand for traditional warehousing space should decline over time, as the enabling technology is widely adopted and implemented. Today's state-of-the-art warehouses feature high-cube space with clear heights of at least 30 feet. However, as the new technology enables continual movements of products in the supply chain, the need to stack inventory begins to diminish. Traditional storage space must start housing activities that involve more horizontal movement rather than vertical stacking (...)." (Kirschbraun, Bomba 2000, 16).

By definition, a distribution centre is a "physical facility used to complete the process of product line adjustment in the exchange channel. Primary emphasis is placed upon product flow in contrast to storage." (Bowersox et al. 1968, 246). Despite the predominant "flow orientation" of the modern economy, warehousing remains necessary in many events, particularly since it is becoming increasingly difficult to predict the demand for certain goods delivery. The more varied and differentiated the markets are becoming, the larger the market areas are supposed to be and the more competition is increasing, the more important is a finely tuned goods flow, the higher is the need to establish a buffer between the suppliers and receivers of commodities. In this context, DCs are becoming key components in the supply chain. They are responsible for organizing the receipt, consolidation and shipment of loads. Thus they represent major nodes in distribution networks that are increasingly designed and operated at a large-scale level. The functions of modern DCs comprise the following (cf. Strauss-Wieder 2001, 10): receiving, storage (as far as necessary), pick operations, value added activities, shippings, return processing, information management.

Three groups of core activities in a warehouse or DC can be distinguished: flow oriented, stock related and with regard to added value. Today, one of the major tasks to be carried out in a DC is the consolidation of incoming freight and its immediate shipping to final destination. This

“cross-docking” is e.g. relevant for large trucking and freight forwarding companies, in order to fulfill customers’ desires as fast as they expect it. Storage is practised in certain commodity groups that may not be delivered within the short term, e.g. in a DC of a hardware retailer, in a refrigerated warehouse or in the warehouse of a non-food wholesale chain. Added value is increasingly being realized in post-production/pre-distribution processes, including assembly and customisation (labeling, assembly, assortment), packaging and ticketing or product return and repair. Although value added activities have been a core manufacturing function ever, there has been a certain shift towards the distribution business.

Efficient goods flow requires certain equipment. A modern DC consists of the mere building, featuring high-cube space with clear heights of about 30 feet, an extremely flat warehouse floor and a certain load capacity (often about five metric tons). Dock doors and ramps provide space for unloading and loading trucks. Many DCs operate a racking system for storage, and also conveyor-belts for picking and internal movement of commodities. In-house ground transport is operated with forklifts and pallets. Sprinklers are installed for safety reasons and to protect customers’ commodities. Information and communication technologies are increasingly becoming necessary, e.g. to locate a certain item that can be identified via bar-code and radio frequency transmission. In order to reduce costs and to increase the speed of transaction, warehouse and DC operations are increasingly automated. Parcel and courier services were trendsetters in establishing highly automated DCs.

The size of DCs varies, certainly dependent on the role of the DC, the composition of the network, the size of the market area and the volume of transshipments. According to the tendency towards concentrated supply-chain functions and thus to a decreasing number of DCs, the average size of a facility is steadily increasing. This is simply following the law of economics of scale. Hence it is not surprising that large DCs can achieve a magnitude of 50,000, 75,000 or even more sqm. Whereas regional distribution centres can go beyond the threshold of 100,000 sqm, large-scale or nationally oriented facilities are likely to exceed even that (see *Table 1*). This property of modern DCs raises many conflicts in terms of planning, infrastructure provision or the environment (see below). Such large facilities can hardly be placed in traditional “gateway”-regions in densely populated countries, and certainly not within most of their core urban areas. Consequently, DCs are drivers of both space consumption and traffic generation.

Table 1: Examples of modern distribution and warehousing sites at selected locations in Germany

Company	Sector	Location	Size of site
German Parcel-Logistik	Parcel-Service	Bad Hersfeld	180,000 sqm
Kühne&Nagel	Freight Forwarder	Duisburg (Port)	87,500 sqm
Lidl	Retail Distribution	Straubing-Sand	90,000 sqm
Ikea	Retail Distribution	Salzgitter	65,000 sqm
Amazon.de	E-commerce Distrib.	Bad Hersfeld	60,700 sqm
Kurt Nagel GmbH&Co.	Food Distributor	GVZ-Wustermark	60,000 sqm
Lufthansa Cargo Center	Air Cargo Express	Frankfurt Airport	50,000 sqm

Source: Dresdner Real Estate (2001), 52/53

4. A new real estate market, new players in the field

In response to the structural change, technological innovations and a globalised competitive environment, particular corporate strategies were developed in logistics and distribution to cope with these challenges. As mentioned above, one of the characteristics of this structural change is that the demand for land has increased significantly, particularly in logistics. This is also indicated by the emergence of a specified logistics real-estate market. This once was a mere subsidiary of commercial or industrial real-estate markets, different from retail or office markets. In response to the new demand patterns both in terms of quantitative dimensions and qualitative user requirements, the real estate industry became aware of the significance of the logistics business. It is now going to diversify and specialise, in order to meet the demand of distribution businesses more precisely.

A second issue that raised an increasing interest in logistics real estate was associated with the emergence of the internet and the much debated – at least temporary – explosion of electronic commerce (e-commerce) services in the second half of the 1990s. With the advent of the internet as a universal standard for web-based communication, online merchandise appeared to be a source of almost unlimited growth in trade and transactions. Since most electronically traded goods – except software, music files etc. – have to be delivered physically, logistics gained much interest as an organisation tool for online-retail and wholesale. In this respect, logistics was regarded as a “backbone” of the new economy, without which any of the new businesses could not successfully materialise. (More recently, this prediction came really true, when retail start-ups went bankrupt, due to their neglect of basic logistics expertise, cost and requirements).²

Since then, an increasing number of studies on the emerging logistics real-estate market has been published, underpinning the significance of a new market segment (Bankgesellschaft Berlin 2001, JonesLangLaSalle 2001a, 2001b; CB Richard Ellis 2001; HVB 2001). The underlying assumptions are i) that logistics represents a dynamically growing market segment, due to the generic structural change, ii) that the consolidation of logistics is associated with new geographical patterns and respective locational strategies, and iii) that the demand for qualitative space might not be met by existing sites and facilities but creates the need for further development. All this promises attractive business options for the real estate industry. Respective activities are likely to increase in future.

The upcoming specified logistics real estate-market reflects changing behaviour patterns on both the *demand* and *supply* side. The demand side consists of distribution firms in wholesale, retail and core transport business. Their attitude to real estate can be roughly characterised by changing purposes (task or contract related instead of firm related), by a changing timeline for use (short-term cycles instead of long-term) and by a changing market behaviour (lease or rent instead of ownership). Due to the rise of contract related logistics, primarily as an outcome of outsourcing and periodical tendering by manufacturers or retailers, firms are increasingly inclined to make location decisions dependent on specified operations. This is particularly the case if a logistics firm organises the distribution for one large customer exclusively. The company is no longer committed to life-long location but may be able to follow the ever changing pattern of flows. Contracts as well as locations might be accommodated. This means that the planning horizons appear much shorter than before, comprising no more than three to five years instead of up to ten years before. This also implies, certainly, a different purchasing behaviour of such firms, since they are less inclined to buy the land as the large majority of enterprises did before

² At the end of the 1990s, there was also a rising demand for space by so-called Telehouses or Colocation-Centres, operated by web-providers who host servers and other hardware installations. These telehouses competed with distribution firms on the market for cheap warehousing space with particular facility features.

(contrary to the usual practice in North America). As a consequence, renting and leasing is now becoming increasingly popular among distribution firms in Europe.

As the demand side is changing, so does the situation on the supply side. The most significant shift is associated with the emergence of developers and real estate-brokers as key players in the land-for-distribution business. Since sites and facilities are no longer user-owned (this is true for a majority of enterprises, at least in the U.S.), there is a rising demand for intermediaries such as development and brokering firms. Either they trade sites in order to find customers, or they are being asked by customers to seek for appropriate locations. Both the brokers' and developers' activities emerged out of their general commercial and industrial experience, which is now going to be directed toward the particular demand of distribution firms. It is no coincidence that many of these firms are international, owned by major U.S. corporations. Among the largest brokering firms in Europe with particular attention given to distribution are CB Richard Ellis and Jones Lang LaSalle, in Germany also Aengevelt or Colliers Müller. Among well-known development firms are AMB or IDI in the U.S., also Prologis which is headquartered in Colorado/U.S. Prologis gives a good example since it started to operate on major European markets after having bought the "Garonor" operator of french distribution centres, particularly the widely known sites around Paris. With two acquisitions in Krefeld and Cologne, Prologis recently also entered the German market. The particular differences between traditional and more modern development patterns are included in *Table 2*.

Table 2: Changes in the development of warehousing space

Traditional development pattern	Modern development pattern
Ownership rate averages 50-70%	Increasing share of rent and lease
Primarily German/local firms (KG, GbR, GmbH)	International developers and investment trusts
Few speculative developments	Speculative development of logistics parks on significantly larger lots
Lease or rent contracts of 10 years	User demand of 3-5 years
Weak investment market (i.e. in the case of short-term leases)	Strong investment market for new developments
	Primarily old facilities

Source: Koepke 2002, 16

Another new player on the German market is Viterra, a real estate and service enterprise that emanated from the merger of the housing subdivisions of two German industrial corporations, the Raab Karcher AG and VEBA Immobilien AG. Viterra is now a wholly owned subsidiary of the E.ON Group and, based on self-assessment, Germany's largest property owner. At the end of the year 2000, Viterra purchased eight logistics centres of the Deutsche Post World Net (DPWN), Germany's largest freight forwarding and logistics company. DPWN operates a total of 33 freight centres in Germany for parcel distribution. The eight freight centres bought by Viterra were leased back to DPWN or its subsidiary Danzas AG on the basis of long-term contracts. Viterra functions not only as the owner of the facilities but also as maintenance and service provider. Now that outsourcing is being practised not only in the core distribution business but in the process of site selection, development and use as well, the respective framework may also change.

Somewhat different in nature from the distribution business, capital markets are also developing a rising interest in logistics real estate. This is particularly true for investment trusts who are increasingly active in this sector. One reason behind this may be the recent development of distribution and warehousing as a growth industry. In addition, logistics is also characterised by a very high market capitalisation: investment trusts offer prime yields of eight percent per annum, which compares very well with retail investments that are usually made at much higher cost (for land, facilities), in a much more competitive environment. Consequently, further development in distribution is likely to occur, as long as strong returns on the invested money are expected. Both makes logistics and warehousing increasingly attractive for investments.

In order to interpret the consequences of structural change: What does the emergence of brokers, developers and investment funds in the distribution business mean for its regional performance? First, land devoted to logistics functions is becoming a commodity. This is by no means new. Yet it may mark a difference whether logistics firms, e.g. SMEs, are going to build facilities for their own use and at their own risk, or whether investment companies are going to supply an anonymous market, following more or less speculative purposes. The performance of the U.S. warehousing market, in this respect different from the European one, is characterised by a higher degree of rent or lease (instead of ownership), by intermediate activities and speculative development of land. More speculation is likely to increase the consumption of open space.

Secondly, the rise of intermediaries is highly important for the way land is being developed and capitalised, thus determining political regulation. Regarding the recent trend towards privatisation of infrastructure provision, this type of land development raises serious conflicts between private and public goods and interests. Market capitalisation and returns on investments are now becoming preferred in land use decisions, whereas public institutions – who are obliged to environmental, transport or community aspects – are losing influence. Thus a power shift in land use conflicts occurs, likely to exert an increasing pressure on public policy to develop land.

5. Spatial consequences: Regional developments in Europe and Germany

5.1 Overview

The European framework of goods distribution has changed dramatically since the 1990s.³ This is not also due to the generic structural change mentioned above, but is particularly associated with the introduction of the Single European Market in 1992 and subsequent developments. Salient features of the common market were the economic and monetary union of the 15 member states and the deregulation of their transport industries. The latter was of major importance for the formerly highly regulated market of truck transportation. As a consequence, the European landscape of distribution is reconfiguring. Logistics operators reorganise and consolidate in response to an expanded market area and to accelerated competition. Their strategic behaviour is accompanied by new locational patterns. Logistics and warehousing real estate markets emerged in response to new demand, focusing on strategic locations with good access both to gateways and consumer markets.

The European Warehousing Index established by Jones Lang La Salle, a brokering firm specialised in industrial and commercial real estate, reflects regionally differentiated developments of major warehousing markets. The index is based on the continuing observation of prime rent markets in office, retail and warehousing (both in manufacturing and transport business) in selected European metropolitan regions. Indicators are prime rents, prime yields and

³ This section extensively refers to a report by Jones Lang LaSalle (ed.): *The Changing Landscape of European Distribution Warehousing*, January 2001.

vacancy rates. They both reflect the general performance of the economy as well as regional differences in the development of warehousing related activities. The development of partially competing markets such as office or retail also have to be considered. Market demand for warehousing space has been very high during the second half of the 1980s and the second half of the 1990s, reaching a peak in 2000. Among the strongest regional markets in Western Europe are London, Dublin, Stockholm or Barcelona; more recently, they also experienced highest growth rates. German metropolitan regions rank in the middle of the field. An overview on different European real estate market performances is given in *Table 3*.

Table 3: Prime rents in European Metropolitan Regions (Euro/sqm/a)

	Office Rents	Retail Rents	Warehousing
London	1408	4515	213
Moscow	641	3598	152
Helsinki	317	908	129
Dublin	508	1823	113
Oslo	414	1254	107
Barcelona	303	1298	101
Warsaw	378	1012	94
Glasgow	409	-	92
Manchester	422	2482	93
Stockholm	461	1073	91
Madrid	469	1442	79
Amsterdam	374	1520	79
Munich	387	2761	77
Frankfurt/Main	583	2331	74
Budapest	215	1104	74
Brussels	248	1289	68
Berlin	337	2516	67
Hamburg	307	2393	67
Milan	465	1704	67
Prague	252	1104	67
Rotterdam	182	1066	66
Düsseldorf	307	2331	61
Copenhagen	236	1751	61
Paris	732	5946	55
Lyon	191	1829	46

Source: Jones Lang LaSalle (2001b)

The regional differences in European warehousing performance are derived from strategic locational behaviour against the background of distribution consolidation. European Distribution Centres (EDC) are becoming larger, as the pressure to consolidate distribution centres into pan-European centres continues. EDCs will become increasingly externally “wired”, technologically advanced. With access to a significant part of the European marketplace required, core Europe is the preferred location – most notably Benelux and Northern and Eastern France. National and regional centres are under pressure particularly in core Europe, as distributors attempt to offload this layer of warehousing. However, this does not mean the demise of national or regional distribution centres, with some goods still requiring a three-tier distribution system, with regional, national and international DCs. Moreover in peripheral European regions, which cannot be serviced effectively by EDCs, national centres are becoming more important, e.g. in the UK. Very large units are being developed in central England (Midlands, Southeast) to serve the whole country.

The Netherlands is emerging as the most favoured location for European logistics, due to excellent accessibility, advanced terminal and transport infrastructure, critical mass of logistics functions and attractive operating conditions (vis-a-vis its neighbours). Schiphol Airport and the Port of Rotterdam are among the most important hubs for international freight flows in Europe. Major population concentrations are well represented – Paris, London, the Ruhr area and Frankfurt (Europe’s largest air cargo hub). Flanders in northern Belgium and the Nord-Pas de Calais region in northern France also score high. UK distributors increasingly prefer north-west Europe, due to improved access to the continent via the Channel Tunnel. Current distribution developments in Germany favour outer areas of competitive metropolitan regions, such as the eastern Ruhr area, the East of Munich or the common border-region between Germany and the Netherlands. The Autobahn A 73 between Venlo and Nijmegen already functions as a logistics motorway (“*De logistieke snelweg*”); dedicated freight railways are also considered, in order to offer improved hinterland connections out of the Ports of Rotterdam (The Betuweline) and Antwerp (The Iron Rhine). Major port activities are reported from Hamburg and Duisburg, with much regard to intermodal transactions. In the new geographical centre of Germany in the *Land Hessen*, several distribution firms have settled near the town of Bad Hersfeld, close to the intersection of two major motorways, the Autobahn 5 and 7. The average distance of about 300 km from this locale to mostly any other place in the country has made it attractive for freight forwarders and distributors, in order to place their national “hubs”.

5.2 Three case studies

The way the reconfiguration of supply chains is shaping urban and regional development will be exemplified in further detail by presenting three German cases: a traditional port region (Hamburg), a restructuring former manufacturing region (the Ruhr area), and a transforming consumer agglomeration (Berlin-Brandenburg). Together with Frankfurt and Munich, they represent the majority of the German warehousing market. In each of these regions logistics and distribution play a major role as an outcome of sectoral changes; they are linked with the emergence of a specified transportation industry, and require material flows and land, thus impacting the urban environment.

The city of *Hamburg* hosts the second largest European container port and is still Germany’s most important location in terms of goods movement and handling. As a consequence of the long history of the port, city and region are traditionally specialised in the transshipment of bulk, containers and commodities, in warehousing and distribution, freight transport and related services. Due to the rising competition between all major (container) ports at the North Range, port administration and city government are working on the expansion of terminal areas and

facilities. This is also true for Hamburg, where City Government, the Port Authority and industry representatives have built a strong policy network in order to improve the competitiveness of the port location. The related land policy is conducted by powerful, semi-public agencies. The further deepening of the Elbe river, the development of the Altenwerder site in the southern port area, the new Elbe tunnel and the search for a new deep-sea container terminal at the German North Range demonstrate the broad range of respective activities. Altenwerder, controversially discussed for decades, covers an area of more than 200 hectares and is dedicated to host a large container terminal. In order to improve the hinterland connection out of the Port and to retain control over the value chains, a new sea-land-sea bridge towards the Baltic is also on the agenda.

Despite the tradition of Hamburg as a port city and prime distributive location, the overall employment in related sectors has not increased over the last two decades.⁴ Whereas about 122,000 people were employed in transport and warehousing services in the entire Hamburg Metropolitan Region in 1980, this number dropped down to about 100,000 employees in 1997 (-19%). Since the core city of Hamburg lost 27,000 related jobs (-29.5%), the suburban regions gained 7,200 additional workplaces (+25%). The fact that growth effects are confined to the surrounding municipalities is very much in line with the hypothesis of sub-harbourisation and sub-urbanisation of distribution, against the background of logistics rationalisation and due to technological innovations. The authors of the study point out that the rising importance of the suburbs mirrors a sustained trend in metropolitan economics, since in specific fields of activity (e.g. warehousing), the suburban increase - in absolute terms - was higher than the loss in the core city (ibid., 64). This allows for two conclusions: First, an increasing demand for space is being realised outside the central city and thus reinforces the tendency of commercial sub-urbanisation. Secondly, although the port related policy network is committed to strengthening the port's position, its regional effects can be questioned to a certain extent.

The *Ruhr area* represents an old industrialised region that faces the structural change from industry to advanced services almost prototypically. Once regarded as one of the most significant locale for manufacturing in continental Europe, the Ruhr has a long tradition as a place for materials flow and goods transportation. In accordance with the predominance of heavy industries such as coal, steel and iron sectors, the related logistics and distribution pattern was characterised by local and regional supply structures (due to particular resources and import/export interfaces) and by a high share of a diversified regional railfreight network. Nowadays, the “industrial heart no longer beats in the Ruhr area” (Nordhause-Janzen 2002). The economic structure of the region is underproportionally characterised by manufacturing (compared to the rest of the *Land Nordrhein-Westfalen*), but increasingly consists of activities such as infrastructure and transport services, construction, corporate and consumer services (ibid., 5). This is of major importance for the logistics and distribution sector, since it primarily operates for sectors such as light industry, wholesale and retail, and the core transport industry. Ruhr freight traffic mainly comprises regional and interregional trips by vans and light trucks, whereas the railfreight system has lost a significant market share.

In terms of location, the Ruhr area bears three major areas of distribution concentration: First, the western area primarily with the *Duisburg Mainport*, Europe's largest inland waterway port and surrounding developments. Second, the eastern edge of the agglomeration in the *Kreis Unna* with intersections of three important motorways (the Autobahn 1, 2, and 44); this area faced dynamic growth of warehousing and DC-construction, due to its favourable location offering

⁴ This section refers to the report “Die Hamburger Arbeitslandschaft”, published by the Technical University of Hamburg-Harburg, Urban and Regional Economics Research Group (Authors: Birgit Kaempf, Dieter Laepple). Hamburg, February 2001.

access to inter-regional and local transport. Third, the city and region of *Cologne* in the south, close to the Benelux neighbours, where an integrated freight centre has been built during the 1990s. Particularly the western (Duisburg) and eastern (Unna) edges of the core Ruhr area experienced tremendous growth of logistics related developments over the last two decades, and, consequently, an increase of freight transport as well. Contrary to the growth at the edges, the centre such as the city of Dortmund has lost employment or remained stable (see *Table 4*). In Duisburg, a former steel plant in Rheinhausen of about 265 hectares is going to be redeveloped to function as a port-subordinate logistics node, the so-called “Logport”. Tri-modal access, value-added services and close relations to the Duisburg Mainport are announced. The reuse of this former manufacturing site stands in remarkable contrast to the rise of warehouses and DCs at the eastern edge of the Ruhr area, which were primarily built on former greenfields. As a consequence of both location and corporate organisation, it is primarily road transport oriented.

Table 4: The Ruhr area – logistics and warehousing related employment (Spedition, Lagerei) in selected municipalities 1989-1998 (no. of employees)

	Duisburg	Dortmund	Unna
1989	2,498	2,579	3,043
1994	3,632	2,329	3,764
1998	4,282	2,329	5,933

Source: Mathejczyk (2001), 13

The *Berlin-Brandenburg Metropolitan Region* is characterised by a fundamental political and economic transformation since 1990, associated with a certain spatial re-configuration. The fall of the Iron Curtain was followed by a massive de-industrialisation, one cause of which was the immediate suspension of government subsidies for industries in both parts of the city. Today, after a decade of intense recovery and redevelopment (associated with a high level of construction and related logistics), the City of Berlin has three different economic functions: as the capital of the Federal Republic, as a desired centre of excellence in media, science, and services, and as a large consumer agglomeration. Due to the lack of their own industrial basis, city and region represent freight destinations rather than places of origin. The exchange of goods between the Berlin-Brandenburg area and other regions is still uneven, since the import/export ratio is 1.7:1 (or 57,98 million tons inbound to 34,70 million tons outbound).

Among the most significant spatial developments is the prototypical movement of distribution firms out of the core city into newly emerging suburban areas. Commercial development at the Berlin urban fringe primarily consists of distributive services (whereas core manufacturing is mostly absent). Freight transport, trucking and warehousing firms have been attracted to locate in dedicated freight centres, in order to optimise their logistics and to open up inner-city sites for qualitative redevelopment. This was due to locational advantages, land prices (and subsidies) and policy (see *Table 5*). The freight centres were established at three strategic places in the west, south and east of Berlin. At the same time, following the up-speed transformation in the early 1990s, development has happened along the southern backbone highway and the Berlin beltway autobahn in general. (Since proximity to customers in the core city is often essential, urban locations are also preferred by other companies, compared to the regional drift). The peripheral, easily accessible locations e.g. alongside the southern motorway, in a western and a northeastern corridor and at Schoenefeld Airport are mostly attractive for freight forwarders and carriers.

Table 5: Berlin-Brandenburg – Prime rents for office, service and warehousing space (DM per square meter/month), sales prices for commercial sites (DM/sqm)

	Office Space	Service Space	Warehousing Space	Sales prices for commercial sites
City of Berlin	10-16	12-15	5-12	250-600
Urban fringe	10-16	12-15	5-12	100-300
Business Parks	16-23	14-16	10-12	300-400

Source: Jones Lang LaSalle (2001c), 5

Two conflicts arise from the current state of the Berlin distribution system. First, as a consequence of the growth of transshipment *outside* the city (that is primarily devoted to serving customers *within*), the related freight traffic growth has increased significantly. Even massive road construction at the periphery could not solve this problem yet, since inner-city space for road enlargements is definitely limited and infrastructure works at capacity. Regarding long-distance transport, the inter-modal access offered in all three freight centres has not yet been used to a large extent. This comes primarily from the uneven flow-structure of the region and the cost-related competition among carriers that favours the truck rather than railfreight. Cooperative delivery schemes that were introduced in order to increase the truck load-efficiency failed, due to marginal market shares and the competitive nature of the business.

Secondly, the integrated freight centres were not accepted by all distribution firms that were ready to invest in the early 1990s. Since the opening up of sites and infrastructure provision took more time than actually desired, several companies decided to locate somewhere else at the urban fringe. Public policy is still trying to avoid this, e.g. by spending subsidies exclusively for locations within freight centres, but did not succeed. Meanwhile, after five years of operations, two thirds of the lots in the three freight centres have been sold, mostly to logistics companies. At the same time, further greenfield developments can be observed as well. The most significant example is the so-called “Magna Park” site close to the small town of Werder, at the Berlin Autobahn beltway. An area of about 50 hectares is now being developed for distribution purposes. The responsible developer is Gazeley Properties, a UK firm specialised in logistics and, by the way, owned by the U.S. retail chain Wal-Mart. The developer did not agree to settle within one of the freight centres as actually desired by regional planning, but decided to locate farther away close to the beltway. The ‘external’ implications of this preference are clear: the site is likely to consume dozens of hectares of open space, whereas the public freight centre promoter is under pressure to sell vacant land, eventually to non-logistics firms also, in order to receive any return on the invested money. Secondly, logistics operations at the Magna Park site are expected to use only truck and vans, thus deteriorating the region’s transport problem.

6. Outlook

Logistics real estate markets indicate current spatial dynamics and reflect a changing socio-economic framework. Whereas much attention has been paid in the past to flow-related aspects, considering real estate markets highlights fundamental land use-implications of the distribution system. To summarise the spatial impacts of this particular structural change: transforming supply-chains into transport and land use dimensions means “sub-harbourisation” with respect to long-distance transport flows (and the related expansion of terminal facilities), and “sub-urbanisation” regarding the locational dynamics at the urban and regional level. As the three

different cases may have demonstrated, cities and regions are particularly affected by these structural changes, and they are embedded in the classic contradiction of public and private interests. The new geographies of distribution are an outcome of corporate reorganisation and rationalisation, in order to make logistics more efficient. Yet the establishment of modern distribution and freight transport pattern happens for the benefit *and* at the expense of the municipalities. As a consequence, the outstanding growth of warehousing and DCs at favoured locations raises serious concern for local communities.

On the one hand, the current development of DC and warehousing locations appears critical, since the construction of new facilities requires much space and because a vast majority of the DCs is being served either by trucks and parcel vans or by air carriers (using airplanes and often feeder vans or trucks). Thus the current freight system's lack of sustainability – e.g. in terms of energy consumption, land use and noise emissions – seems to be perpetuated. On the other hand, the functional concentration of supply chains in DCs may bear the potential for improvement, particularly by bundling logistics competence and by achieving the critical mass of freight loads for intermodal carriers.

In this context, future planning and policy considerations may focus on two aspects. First, the apparently most competitive road-based distribution should be considered an important subject in local and regional planning, particularly with respect to three questions: i) How can logistics requirements become integrated in longer-term planning objectives (land use, regional development considerations)? ii) How can the decision where to locate DCs and warehousing be better balanced in future? iii) How can the distribution operations be organised more acceptably for the community (by establishing truck routes, minimising neighbourhood conflicts etc.).

A second aspect in this context considers the market potential of the intermodal warehouse or DC. It was traditionally located in port cities, in old industrialised areas with a high share of manufacturing or in the core commercial area of urban regions. The intermodal DC may play an important role in the future of distribution, since it offers certain opportunities to overcome capacity- and acceptability-constraints at other locations. If transport and logistics access were to become a scarcity, these traditional locations could gain a higher share of the distribution market. There are also potentials for the conversion of military sites, e.g. railyards or regional airports, in order to establish new inter- or multi-modal facilities, as the Ruhr area may demonstrate. Implementing such policy goals is the joint responsibility of private and public actors. Regarding the emergent role of brokers and developers in the process of “grounding” distribution, it is becoming increasingly important to make them aware of the external effects and critical impacts of their product.

References

- Abbey, D.D., D.C. Twist, L.J.Koomen (2001): *The Need for Speed: Impact on Supply Chain Real Estate*. AMB Investment Management, Inc., January 2001.
- Allaert, G. (1999): *The iron Rhine, key issue for cross bordered development*. Paper presented at the 1st Scientific Euregional Conferences (SEC), Maastricht November 17-18, 1999.
- Bankgesellschaft Berlin (2001): *Logistikimmobilien*. Immobilienmarkt-Research. Marktbericht 8. Berlin, Juli 2001 (Bearb.: Gewos-Institut für Stadt- Regional- und Wohnungsforschung GmbH).
- Bowersox, D.J., E.W. Smykay, B.J. LaLonde (1968): *Physical Distribution Management. Logistics Problems of the Firm*. New York/London: MacMillan.
- Castells, M. (1996): *The Rise of the Network Society. The Information Age: Economy, Society, and Culture*, Vol. 1. Malden/MA, Oxford/UK: Blackwell.

- CB Richard Ellis (2001): Logistik- und Distributionszentren in der Bundesrepublik Deutschland. Frankfurt am Main, Mai 2001.
- Dixon, R. (1999): How to Select an Optimal Distribution Site. In: Site Selection magazine, September 1999.
- Dresdner Real Estate (2001): Neue Perspektiven. Marktreport 2001 – Deutschland in Zahlen. Frankfurt/Main.
- Gertler, M. (1992): Flexibility revisited: districts, nation states, and the forces of production. In: Transactions of the Institute of British Geographers N.S. 17: 259-278.
- Hesse, M. (2002): Missing links: Geographies of Distribution. Paper presented at the 2002 AAG-Conference, Los Angeles/California, March 2002.
- HVB/Hypovereinsbank (2001): Immobilienmarktanalyse: Lager und Logistik Berlin. München, Oktober 2001.
- Jones Lang LaSalle (2001a): The Changing Landscape of European Distribution Warehousing. January 2001.
- Jones Lang LaSalle (2001b): European Real Estate, Key Market Indicators. Q4 2001.
- Jones Lang LaSalle (2001c): Gewerbegebiet Report Berlin. Der Markt für Büro-, Industrie- und Gewerbeflächen in der Region Berlin. Berlin, April 2001.
- Kirschbraun, T., Bomba, T. (2000): The New Economy. Effects on corporate real estate strategies. In: Jones Lang LaSalle (ed.): Property Futures. Occupier Strategies in the New Economy: 10-19.
- Koepke, R. (2002): Die Logistikimmobilie im Spiegel der Nutzungen. IIR-Konferenz "Logistikimmobilien der Zukunft", 22.4.2002. Jones Lang LaSalle.
- Laeppe, D., Kaempf, B. (2001): Die Hamburger Arbeitslandschaft. Struktur und Entwicklung von Tätigkeitsfeldern im regionalen Vergleich. Report published by the Technical University of Hamburg-Harburg, Urban and Regional Economics Research Group. Hamburg.
- Mathejczyk, W. (2001): Die Entwicklung der Logistik in Deutschland. In: Kock, K. (ed.): Wohin treibt die Logistik? Regionale Beschäftigungswirkungen und Anforderungen an die Weiterbildung, 8-23. Beiträge aus der Forschung, Band 120. Dortmund.
- McKinnon, A. (1988): Physical Distribution. In: Marshall, J.N. (ed.): Services and uneven development. Oxford/UK: Oxford University Press.
- McKinnon, A. (1998): Logistical Restructuring, Freight Traffic Growth and the Environment. In: D. Banister (ed.): Transport Policy and the Environment, 97-109. London: FN Spon.
- Mueller, G., Laposa, S. (1994): The Path of Goods Movement. In: Real Estate Finance 11, No. 2 (Summer 1994): 42-50.
- Nordhause-Janzen, J. (2002): Das industrielle Herz schlägt nicht mehr im Ruhrgebiet. IAT-Report 2002-3. Retrieved from the Internet: www.iatge.de in May 2002.
- Slack, B., McCalla, R., Comtois, C. (2002): Logistics and Maritime Transport: a fundamental transformation. Paper presented at the 2002 AAG-Conference, Los Angeles/California, March 2002.
- Storper, M., Walker, R. (1989): The Capitalist imperative. Territory, technology and industrial growth. New York/Oxford: Basil Blackwell.
- Strauss-Wieder, A. (2001): Warehousing and Distribution Center Context. NJPTA Brownfield Economic Redevelopment Project. Prepared for the New Jersey Institute of Technology and the North Jersey Transportation Planning Authority. February 2001.
- ULI/Urban Land Institute (forthcoming): From Storage to Speed: Logistics and Land Dynamics. Washington D.C.