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## **Keskusteluaiheita - Discussion papers**

No. 578

Jussi Raumolin

**TRENDS IN LOGISTICS IN EUROPE**

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**ABSTRACT:** The formation of the single market within the European Community, the creation of the European Economic Area by the EC and the EFTA countries as well as the transformation of the former Communist countries in central and eastern Europe will provoke significant changes in the spatial organisation of Europe in the 1990s.

The regional development within the European Community seems to become very polarised and the promotion of cohesion by means of regional policy is a major political issue in the Community. The EC has the aim to link different parts of the Community area better with each other by means of building up of new infrastructures.

The formation of the large integrated economic space in western Europe, the opening up of former Communist countries to international exchanges as well as a rapid motorisation of population there will provoke a considerable increase in both air and land traffic in the 1990s. Problems related to the increase in traffic, such as congestion and environmental damage, have, however, led to a certain reevaluation of the transport policy, such as the promotion of railway transport.

The formation of the large integrated economic space is taking place simultaneously with the spread of new information and telecommunications technology. This has contributed to the spread of new logistical ideas and many people consider logistics a key issue in the integrating Europe in the 1990s. As a consequence, the transport and forwarding branch is experiencing a rapid transformation. Many regions are competing for becoming nodal points in new European distribution systems in formation.

The growing congestion problems as well as the rise of both environmental consciousness and regulation have become new constraints for the application of logistical ideas into practice. Some experts are developing new ideas of green logistics parallelly with the development of ideas of alternative transport policy. In addition, the modern logistical systems seem to be very vulnerable to any kind of disorder, such as large-scale strikes or other conflicts.

**KEY WORDS:** Transport, Logistics, European Integration, Regional Policy, Transport Policy, Environmental Challenge, Vulnerability

## Preface

This manuscript is stemming from May 15 1994 and it was destined to be printed in the book "Toward a New Europe - Restructuring of the European Space Economy" (John Wiley & Sons Ltd, London). The study was related to the European Science Foundation Programme "Urban and Regional Change in Europe" (RURE).

The publisher, however, cancelled the contract due to the problems of edition in November 1996. This was the only planned publication that was not published under the auspices of the RURE Programme.

There are few changes as regards the original manuscript in this publication. I have not changed the text itself while I added some new up-to-date information to the notes and the list of references.

# TRENDS IN LOGISTICS IN EUROPE IN THE 1990s

## 1. Introduction

The formation of the single market within the European Community, the creation of the European Economic Area by the EC and the EFTA countries as well as the transformation of the former Communist countries in central and eastern Europe will provoke significant changes in the spatial organisation of Europe in the 1990s.

The regional development within the European Community seems to become very polarised and the promotion of cohesion by means of regional policy is a major political issue in the Community. The EC has the aim to link different parts of the Community area better with each other by means of building up of new infrastructures.

The formation of the large integrated economic space in western Europe, the opening up of former Communist countries to international exchanges as well as a rapid motorisation of population there will provoke a considerable increase in both air and land traffic in the 1990s. Problems related to the increase in traffic, such as congestion and environmental damage, have, however, led to a certain reevaluation of the transport policy, such as the promotion of railway transport.

The formation of the large integrated economic space is taking place simultaneously with the spread of new information and telecommunications technology. This has contributed to the spread of new logistical ideas and many people consider logistics a key issue in the integrating Europe in the 1990s. As a consequence, the transport and forwarding branch is experiencing a rapid transformation. Many regions are competing for becoming nodal points in new European distribution systems in formation.

The growing congestion problems as well as the rise of both environmental consciousness and regulation have become new constraints for the application of logistical ideas into practice. Some experts are developing new ideas of green logistics parallelly with the development of ideas of alternative transport policy. In addition, the modern logistical systems seem to be very vulnerable to any kind of disorder, such as large-scale strikes or other conflicts.

## 2. Approach

The study of prospects of logistics in the integrating Europe in the 1990s is not easy because we are dealing with a very vast and complex issue. Furthermore, the conditions are changing constantly. We do not have any appropriate theoretical framework

for such a study while it is possible to look for inspiration from some approaches dealing with a couple of related issues.

We could firstly mention classical studies of the role of transport in the process of economic development, such as the articles of the German economist Fritz Voigt and the French econo-

mist Philippe Pottier. Those studies dealt eg. with the regional polarisation due to the construction of modern transport axes as well as various linkage effects related to the development of the modern transport systems ( Voigt 1953, Pottier 1963). 1)

Secondly, we should take into consideration new points of view of in the socio-economic study of technology, in particular, recent studies of large-scale technological systems. Those studies have mainly dealt with the development of modern infrastructures, such as electricity, transport and communication systems. An integral part in the development of modern large-scale technological system is vulnerability to risk (Cf. Hughes 1987, 1988, Jörges 1988, Weingart 1989, Gras 1993).

As far as studies of the development of logistics are concerned we could distinguish three different approaches. The traditional military point of view stresses the efficient organisation of supplies of a military unit in the conflict situation. The managerial and engineering approach which is dominating the actual discussion stresses an efficient organisation of the logistical chain from the point of view of a company while the geographical approach is dealing with the development of logistics in a regional context. In general, social sciences have paid few attention to the study of new logistics (Cf. van Crefeld 1977, Mathe & Tixier 1988, Andersson & Strömqvist 1988).

Turning to the problematics of European integration, several studies have been prepared about the formation of the large-scale economic space, in particular, from the point of view of economics. In contrast, much less attention has been paid on the impact of deregulation from the point of view of public corporations or actor-oriented studies, in general. In this study we are, however, focusing on the role of different actors, such as nation states, regions and companies (Cf. Cohen-Tanugi & Winkler 1991, Stoffaes 1991, Labasse 1991).

In the late 1980s, a kind of idealistic point of view was typical of many studies of the formation of the single market and the progress of deregulation and integration in the EC. It was thought that the integration would proceed straightly forward while we now know that the world is never so simple. A more realistic approach is to speak about dialectics of deregulation and reregulation in the case of European integration (Cf. Raumolin 1992b).

Turning back to logistics, a reference should be made to some former studies of the role of logistics in the European integration prepared in Germany and Great Britain as well as by the research programme "Euromobile" funded by the European Science Foundation. Those studies mainly stem from the point of view of business management and engineering or regional economics and regional science. They provide useful background information while we try to look upon things in a larger context my approach being closer to geography and social sciences (Cf. Jünemann (ed.) 1989, Cooper & Browne 1991, Nijkamp, Reichmann & Wegener (eds.) 1991).

I would like to stress that a comparative point of view would be very important for the study of the prospects for logistics in Europe. We should, in particular, compare the European case to those of Japan and the United States as important practices of modern logistics have been first developed in Japan and the large-scale economic space was established in the United States already for long ago. On the other hand, the increasing internationalisation and globalisation of the activities of large international companies, such as international sourcing, make them promote global strategies in logistics while Europe is only a part of those strategies. As we have only a limited space at disposal we cannot enter here into discussion of important

global and comparative problematics. 2)

This study is based on a couple of my former studies related to the European integration and, in particular, to the role of transport and logistics in this context. I have dealt with the internationalisation of companies, retail and wholesale trade, regional development, transport and logistics as well as environmental policy. Those studies offer a good starting point for the study of the complex issue of logistics in a large context of European integration (Cf. Raumolin 1990a, 1990b, 1991a, 1991b, 1992a, 1992b, 1993a, 1993b). 3)

As the supplier industries are an integral part of the change of the European transport system as well as the logistics system it would be important to deal with their prospects as well. Those industries are not normally taken into consideration in the contemporary studies of transport and logistics with the exception of the classical studies of the role of transport in the economic development as mentioned earlier. We shall pay some attention to the supplier industries in the references.

### 3. Notes on Regional Development and Policy

The regional point of view is becoming more and more pertinent in the process of the European integration. The major economic gravitation centres within the Community extend over national boundaries while the EC has adopted the aim to prevent widening of regional disparities. In addition, certain regional entities, in particular, dynamic provinces and cities would like to become significant players in the integration.

Some studies undertaken in the late 1980s, such as that of the French DATAR on the development of urban structures in western Europe or that of the German Ifo-institute on the competitiveness of regions there have presented the vision of the emergence of the Banana-Sunbelt zones as new power constellations of regional development in the Community (DATAR 1989, Nam, Nerb, Reuter & Russ 1990).

The Banana Zone is extending from southern England through the Benelux-countries and southern Germany to northern Italy. This zone has long historical roots as a kind of an interregional constellation of this character existed already in the Middle Ages: some authors have called it Lotharingia. Many traditional dominant urban centres such as London, Brussels, Rotterdam, Frankfurt, Munich, Zürich and Milan are located in the zone. A certain interregional shift has taken place within this zone in Germany during the last decades. The centre of German economic dynamism has shifted from the Ruhr area towards southern parts of the country, in particular, Baden-Württemberg and Bavaria.

The Sunbelt Zone mainly lies on the northwest coast of the Mediterranean. It extends from the Valencia region through Catalonia and southern France, where it includes the Lyon region as well, to northern Italy. This is a new rising zone of dynamic economic activities with special stress on new technologies and it overlaps the Banana zone just in northern Italy in the Milan region.

Some important urban centres, in particular, Paris, Hamburg and Berlin and Vienna are located outside those zones. They seem, however, to be strong enough to preserve their posi-

tions in the changing conditions. The German unification and the recent transformations in central and eastern Europe, strengthen the positions of Hamburg and Berlin, which will recover their traditional hinterlands. Vienna will also profit from those transformations.

Recently, a discussion has started about the formation of a new dynamic zone starting from Hamburg and extending through Berlin Leipzig, Dresden and Prague to Budapest. The development of this zone is promoted, among other things, by the delocalisation of German industries towards the East (Cf. Brunet 1991).

The national regional policies of the member states have, since the 1960s, tried to promote economic development in the peripheral poorly industrialised areas and to alleviate restructuring problems in the old industrialized regions. In the 1980s and, in particular, during the last few years new attention has been paid to the promotion of activities which would profit from the dynamic developments related to the deepening of the integration, such as that is taking place in the Banana-Sunbelt zones.

The new regional policy is also reacting to the increasing globalisation of economic activities. It tries to make the regional basis more attractive by promoting the construction of new infrastructures, such as highspeed railways, regional airports and telecommunication networks. It is also promoting the building up of technology villages close to universities as well as regional research centres.

The EC became a player in regional development in the middle of the 1970s when it started to become seriously concerned of regional disparities within the Community. It established special funds for the promotion of economic development in backward areas and for the reconversion of traditional industrial centres in decline. After the entry of new southern member states, which were economically lagging far behind northern industrialised member states, at the beginning of the 1980s, the promotion of cohesion by means of regional policy became a major activity in the EC.

As the creation of the single market seemed to lead to a significant regional polarisation of economic activities within the Community the southern member states were able to gain a doubling of the Community funds for regional policy for the period from 1987 to 1993. The EC also adopted some new initiatives, such as the funding of development projects for border areas facing with common problems. As an example could be mentioned the creation of a special "Pole Européen de Développement" in the border area of France, Belgium and Luxembourg suffering from the decline of traditional industries (Cf. Doutriaux 1991).

The new initiatives include aims for coordination, such as a better coordination of the activities of the EC funds for regional policy and an effort to coordinate the regional policies of the member states. In order to have a document to support those aims, the Commission prepared a special prospective view of the regional development and policy within the Community, called Europe 2000 (Commission of the European Communities 1992a).

In this report, considerable attention is paid on such notions as networks and links. The activities within the Community should be better connected by means of the construction of new infrastructures, such as transeuropean energy and telecommunication networks, new roads, tunnels and bridges as well as highspeed railways. Special stress is laid on the construction of new infrastructures in peripheral and backward regions. The Community should also become



better linked with the Nordic countries and central and eastern countries which are aspiring to become new member states (Cf. Stoffaes 1991, Landaburu 1991).

The EC adopted its first programme for the promotion of new infrastructures in December 1990. The Maastricht Treaty which aimed at creating conditions for the deepening of the integration and which was adopted in principle in 1992 and entered into practice in 1994 includes the promotion of pan-European infrastructures in the new action sphere of the Community. After the member countries have suffered from economic depression during the last few years the Commission has tried to promote a special EC programme for the construction of new infrastructures as a countercyclical measure and as a means for putting a new long-term development model in practice. It has been, however, difficult to raise funding for such a purpose (Commission of the European Communities 1993). 4)

The opening up the Channel tunnel which connects France and Great Britain on a permanent basis for the first time in history in the spring 1994 raise many speculations about future links in Europe. It will, among other things, oblige the French and the British for a closer cooperation in many issues, create a rapid rail link between Paris and London, and increase competition in one of the most important transport connections in western Europe. The regions close to the entries of the both sides of the tunnel, such as Nord-Pas-de-Calais and Kent, would like to profit from development opportunities offered by it (Cf. *Le Tunnel sous la Manche* 1994).

#### **4. Notes on Transport and Transport Policy**

One of major aims and means of the formation of the single market within the European Union has been liberalisation and harmonisation of transport. Many reports prepared in the late 1980s and in the early 1990s made a prognosis of a considerable increase in traffic and transport, in particular, road transport and air traffic in the 1990s. The volume of road transport was seen to grow up to threefold while the annual growth of air traffic was considered to be seven to eight percent. This growth perspective has been now changed, in particular, as regards air traffic since the European air business is suffering from low profitability and facing a severe crisis. 5)

The transition of the former Communist countries in central and eastern Europe towards market economy will result both in an international opening up of traffic and transport and in a rapid increase in traffic flows. Some reports speak about a fivefold increase in private car traffic in central and eastern Europe in the 1990s.

As road, rail and water transport and air traffic have been traditionally under strict public control on the national level deregulation process has not been easy. Typical of the member states is a kind of monopoly position traditionally enjoyed by the state railways and airlines. Deregulation started from road transport and the main focus is shifting to rail transport, air traffic and sea transport.

The simultaneous liberalisation and expansion of traffic and transport has, however, met with new constraints already before the deregulation process has been achieved. The busiest roads and airports are experiencing serious congestion problems and those problems seem to become more serious in the 1990s.

Concerning road traffic, such areas as southern England, the Benelux countries, the Rhone River valley as well as the Alpine passages are considered to be hit by the most serious traffic jams in the 1990s while the major airports such as Milan, London, Amsterdam, Brussels and Frankfurt will reach capacity limits.

As a reaction to this crisis view of future many plans have been presented so as to construct new infrastructure capacity in order to meet with new challenges. Many factors, however, prevent the realisation of these aims (Cf. ECMT 1986, 1992).

Firstly, it has been stressed that the share of transport investment in the GDP has declined during the last few decades in the West while it is not possible to expand it rapidly, in particular, in the depressed state of the economy in the early 1990s. Secondly, there is, in fact, no physical space available in the most densely settled areas eg. for the construction of new airports. Thirdly, new popular movements are opposing the construction of new major highways and airports. Fourthly, environmental issues related to traffic and transport have become political issues, by and by, which will set constraints as to the growth of investment in road transport and air traffic infrastructures.

It seems hence to be unavoidable that there will be more and more traffic jams in the major roads as well as congestion in major airports in the future. This gloomy perspective has led to a certain re-evaluation of the former transport policy, which has paid special attention to the promotion of road transport, among the member countries of the EU, in particular in France, Germany and the Netherlands, during the last few years. New stress is laid to the upgrading and development of the railway network, in particular, to the construction of new high-speed connections between the major urban centres. The aim of those high-speed connections is to shift passengers from using airplanes to the advantage of railways.

The issue of the combined transport of goods gained great attention at the beginning of the 1990s when the EC and the Alpine countries Switzerland and Austria entered in conflict concerning the transit rights through Alpine passages which are of utmost importance for the North-South direction of land transport flows within the Community.

It was stressed from the Swiss side that she would not like to become an open transit country for the growing heavy truck transport, in particular, between Italy and Germany because this provoked considerable noise and air pollution. The Swiss Government set a ban on large trucks as well as started to give subsidies in order to promote combined road-rail transport. It also presented plans for the construction of two new rail tunnels which would make rail transit more rapid in the future. 6)

The Swiss restrictions diverted a growing amount of road transport of goods to Austria and to the Rhone River valley in France. Austria soon started to follow the Swiss example by setting restrictions on the transit of heavy trucks. After difficult negotiations between the Alpine countries and the EC a compromise was achieved and it was approved by popular vote in Switzerland in the autumn 1992. The Swiss Government was able to defend its original position i.e. restrictions on heavy trucks and a strong preference on rail transport. New Swiss popular initiative, however, changed the state of affairs as soon as 1994. The voters approved a new referendum which prohibited the construction of new major highways and set a ban of the transit of heavy trucks beginning from 2004. This will pose a serious challenge to the EU transport policy in the future.

New attention is also paid to the combined transport of goods in the EU member countries, in particular in Germany and the Netherlands. This presupposes considerable investment in new facilities. Because state railways are running on deficit they are asking new public subsidies which is against the deregulatory spirit of the time. It is also pointed out in many reports that transport of goods by rail will not become competitive with road transport unless there is a change of the prevailing price structures, in particular, of the price of petrol.

The EC has not traditionally carried on a proper transport policy as transport issues have been considered to be under competence of member states. The recent effort to liberalisation and harmonisation of transport within the Community has been considered rather to be a question of the competition policy than of the transport policy (Cf. Erdmenger 1984).

The EC has, however, undertaken a more active attitude vis-à-vis transport issues at the beginning of the 1990s. The official aim is now to promote pan-European networks and links with heavy emphasis on transport infrastructures. Under the Maastricht Treaty which is under the process of ratification, the construction of pan-European infrastructure networks belongs to the competence of the Community. The aims of the regional policy and the transport policy are converging in this respect.

The Community is now supporting the creation of a transeuropean high-speed railway network. It has, however, met with difficulties in raising funding for the construction of such a network and it is also difficult to establish a coordination between the plans of the state railways of the member countries. A pioneer cooperative agreement was set up in Brussels for the construction of the new high-speed railway line Paris-Brussels-Cologne-Amsterdam by the French, Belgian, German and Dutch state railways in January 1993. 7)

The EC has adopted the aim of raising up of the share of combined transport of goods up to eight per cent by 1998. The Commission has estimated that the setting up a Community-wide road-rail network for handling of domestic cargo would cost Ecu2 billion. It is stressing that the utilisers of road transport should pay a larger share of the costs of infrastructure and negative externalities (Commission of the European Communities 1991, 1992b).

On the other hand, the Commission is supporting the development of sophisticated electronic monitoring systems and new hauling systems based on satellite technology in order to increase the flexibility and efficiency of road traffic and transport. It has also constated that the amelioration of security is a high priority as 50 000 people die every year on the roads within the Community. 8)

The recent reports of the Commission also stress the new importance of water transport which is using much less energy per transported unit than road transport and offers an alternative to the congested roads. Inland waterway routes should be upgraded along with the example of the new Rhine-Main-Danube canal opened in Germany in 1992 and more cargo ships should be used in coastal traffic and in short sea crossings. The introduction of stricter security norms is also necessary in water transport. 9)

Turning to prospects of traffic and transport in post-communist central and eastern Europe, this opening up means that Europe becomes more continental from an economic-geographic point of view. East-West direction of traffic and transport flows will grow in significance. On the one hand, Poland and Germany and, on the other hand, Hungary and Austria will become

important gateways between the East and the West, in particular, as far as land transport is concerned. Ethnic conflicts, along with the example of the war in Croatia and Bosnia may, however, hamper the development of transport connections in the new East. 10)

The traditional railway systems are poorly competitive and a considerable expansion of truck transport is in view. As the funding needs for the development of new infrastructures is enormous, the experts have proposed a selective construction of new highways, railways as well as river transport systems. International funding organisations, such as the World Bank and the new European Bank for Reconstruction and Development are providing funds for the construction of new infrastructures in central and eastern Europe.

## 5. The Rise of European-Wide Logistics

The coincidence of certain tendencies of capital importance has created favourable opportunities of the spread of modern logistical ideas in Europe since the 1980s. 11)

Firstly, the impact of the microelectronics upheaval which started in the late 1970s is constantly extending. The principle of flexible production and automation have been adopted in production, new systems based on just-in-principle, storage automation and scanners have been introduced in distribution while computer networks, EDI systems and telecommunication satellites facilitate and accelerate information transfer.

Secondly, the formation of the single market in the EC signifies a liberalisation of traffic and transport, a lowering or an elimination of barriers to the movement of capital, goods and people as well as a harmonisation of technical norms and standards. The aims of the integration include a liberalisation of public services, such as post and telecommunication services. by and by.

Thirdly, the member countries are promoting the upgrading of infrastructures and the EC has recently adopted the aim of creating trans-European networks in infrastructures, in particular, in the areas of transport and telecommunications.

Fourthly, the EFTA countries, except Switzerland and Iceland, will join to the joint European Economic Area, sooner or later, and those countries have applied membership of the Community as well. Hence the geographical scope of the Community will extend towards the North and the East in the 1990s. 12)

Originally a military concept, logistics became a business notion during the Great Depression in the United States in the 1930s; it signified efficient organisation of materials handling. The rise of new information technology during the economic downturn in the late 1970s extended the scope of business logistics. It was considered that purchasing, production and distribution formed an integral logistical system. Hence the role of logistics became of crucial importance for business management. Those new ideas were adopted first in the United States and Japan and started to diffuse to Europe in the 1980s.

After the formation of the single market in the EC and the extension of the Community were in view in the late 1980s many experts had the view that considerable savings in costs

were possible by the application of new logistical ideas. In general, it was thought that logistics is a key concept in the European integration in the 1990s. In the situation of the economic downturn at the beginning of the 1990s, considerable attention is paid to logistics as a means to create opportunities for cost savings.

A comprehensive view of logistics from the point of view of business management which has been formed recently include several elements:

- the integration of purchasing, production and distribution
- the creation of a European-wide distribution network
- the combination of different forms of transport (land, water, air)
- the upgrading of services (punctuality, speed, door-to-door-services)
- the integration of the whole system by information technology (CIL or computer integrated logistics)

The integration of the whole system by information technology is becoming a key element. Taking into consideration the complexity of the problem its mastering presupposes an excellent knowhow in information technology as well as a good capability to develop new efficient systems. Only some leading international software consulting companies seem to be able to answer to the challenge. 13)

The large companies have better chances to adopt the new logistical ideas than the medium-size or small companies. Large industrial companies, trade houses, retail and wholesale companies as well as transport and forwarding companies are interested in the application of new logistical ideas.

For instance, the leading European car manufacturers and the American and Japanese ones operating in Europe have built up logistical systems of their own. They have created extensive sub-contractor networks and after international sourcing has become an important means of industrial internationalisation and globalisation the organisation of efficient logistics has gained new importance. The French Peugeot corporation, e.g. has an affiliate logistics company Gefco.

The leading European international trade houses have gained considerable experience in international transport already for a long time and they have been keen to adopt new information technology and pay considerable attention to new logistical ideas (Cf. Chalmin 1985).

The large European retail and wholesale companies which are internationalising their operations are naturally very interested in new applications of logistics, in particular, in rationalisation of purchasing, storage and distribution activities. The large mail order companies have made a strong effort to create logistical systems of their own. For instance, the German Quelle recently established the largest distribution centre in this branch in the world close to Leipzig; its size is 115 000 square meters (Cf. Raumolin 1990b).

Large private European transport and forwarding companies which have traditionally been

specialised in transport and storage of goods are, of course, keen in becoming significant actors in European logistics. In addition, large international transport and forwarding companies, shipping companies and express-parcel companies, such as the Australians TNT and Mayne Nickless, the Japanese NYK and Nippon Express as well as the Americans Sealand, DHL, Federal Express, UPS and Emery have established their operations in western Europe as well.

The international companies have gained a dominant position, in particular, in express-parcel business where DHL has overtaken by far the leading position. This company has recently been acquired by German and Japanese interests. The leading private European companies in the branch are the British Securicor, the German DPD, the French Jetserve and the Spanish Secur.

In addition, the traditional state-owned companies, such as state railways, post offices and telecommunications companies try to upgrade and develop their services. State railways which have established road transport companies of their own are aiming at becoming significant actors in logistics. Facing with shrinking market shares the West European post offices and telecommunications companies have entered in close collaboration as regards the development of international express parcel and telecommunications services. Recently, TNT and a couple of European post offices established a joint venture in express-parcel business called GD Net. 14)

The deregulation and liberalisation effort is putting, however, the traditional monopoly position enjoyed by them in jeopardy.

Privatisation has, in particular, proceeded in Great Britain while the continental EC member countries have slower to privatise the traditional public services. After the privatised British Telecom entered in alliance with the American company MCI, Deutsche Telekom and France Telecom established an alliance to be competitive with the Anglo-Saxon telecommunication giants. Those kinds of alliances between large public service companies enjoying privileged positions will pose problems to the competition authorities within the EU. 15)

The new situation and the related opportunities provoke an intense competition and create conflicts between main actors. The manufacturing companies are, for instance, building up European distribution centres for the distribution of final products while the retail and wholesale companies are establishing European purchasing centres to gain better negotiation chances as far as purchases from industry are concerned.

The traditional division of labour between industry and trade becomes more obscure and the logistics interests of the industrial or trade companies may enter in conflict with those of the transport and forwarding business. Such basic question as who is the system integrator, who takes care of storage, who is responsible for transport and how much one should pay for logistics services, in particular, for quality services, are still open in many occasions. The large industrial companies, for instance, consider carefully the advantages and disadvantages of internalising and externalising of logistics services. 16)

The perspective of the formation of large integrated economic space in Europe and the idea of new comprehensive logistics has started a concentration process in the European transport and forwarding business. Traditionally, there has been a couple of large enterprise in the branch while many middle-sized and small family businesses have been dominant and even several large companies have been family-based. Some recent consulting reports tell us that there will

be only 20-25 large companies in West Europe in the late 1990s.

Independently of their origin which may be in land transport or sea transport, the large transport and forwarding companies are diversifying their operations to other forms of transport. They try to gain a stronger position in the markets of their country of origin while they are making an effort to create a pan-European service network by means of acquisitions and alliances.

The on-going concentration process does not, however, mean that there would not be any opportunities left for important smaller companies in the business. Specialized companies operating in the areas which presuppose special knowhow, such as express-parcel business, transport of small-scale cargo or transport of chemicals and hazardous items, and following a consistent niche strategy still have their chances.

The concentration process neither means that the large companies would integrate all the operations in their structure. They will, of course, control the strategic tasks, such as the integration of the system, the coordination of the operations as well as the planning and financial functions, while they will use local sub-contractors as far as the transport of goods is concerned. They presuppose, however, that local sub-contractors are able to master modern information technology and render quality service.

Local independent truck drivers have tried to preserve their positions and to upgrade their services and capabilities by creating local and regional associations. Examples of large regional associations are Rhenania in Germany, Stock-Europe in France and Blueflight in Ireland.

As most of the large European transport and forwarding companies still have a strong national basis, as the concentration process has been uneven on the national level and as there is a clear spatial concentration of the business within the Community it is pertinent to have a look on national profiles. 17)

We shall start from the core area, in particular, from the Netherlands which has both an excellent geographical position and long traditions in trade and transport. The concentration has been strong there. There are two large international transport and forwarding companies left, Nedlloyd and Franz Maas which are expanding their European networks. In addition, there are both smaller niche specialists and large trade houses, such as Internatio Muller, which has important shipping activities and which is involved in the distribution activities on the Continent as well. 18)

The concentration process has been strong in two other smaller European countries, Switzerland and Sweden as well. Switzerland has also traditionally enjoyed from an advantageous geographical position and there are also two large international transport and forward companies left, Danzas and Panalpina, which are extending their networks in Europe. 19)

As far as Sweden is concerned the country has a prominent position both in Scandinavia and the Baltic Sea area and concentration in the land transport and forwarding business has been rapid during the last few decades. There are also two major companies left, Bilspedition and ASG which is a subsidiary of the Swedish state railways. Both Swedish companies have internationalised their operations and Bilspedition has risen into one of the largest transport and forwarding companies in West Europe. They have, however, had difficulties in getting a

stronghold on the Continent. ASG finally made an alliance with Danzas which retracted its operations to the Nordic and Baltic countries. This is an example of recent Swedish-Swiss business alliances.

Turning to the three big core countries Great Britain, Germany and France Great Britain has evidently long traditions in trade and transport similar to the Netherlands. There has traditionally been large shipping companies and trade houses in Great Britain and large modern international multibranch companies, such as Unilever, have important trading activities. In contrast, the companies specialized in land transport and forwarding have mainly operated in the British Isles. Now the largest of them, such as LEP International and NFC with its affiliate Exel Logistics, are extending their operations on the Continent. The opening of the Channel Tunnel in 1994 pose a new challenge to the British transport business and the large ferry operator and container shipper P & O is looking for new business in short sea crossings to Spain, for instance.

An outsider, the British international multibranch company Lonrho with important trading activities aimed at becoming an important player in the European transport and logistics in the late 1980s. It became soon a strong player, in particular, in Germany. It first acquired a controlling interest in the large family-owned transport and forwarding company Kühne & Nagel and then entered into collaboration with the large German multibranch company Krupp by establishing a common trading and transport unit Krupp Lonrho in 1988. Krupp Lonrho acquired the transport branch of the other large German multibranch company Mannesmann in 1988.

Typical of the German industrial traditions has been that the large multibranch companies with origins in the steel business like Krupp, Mannesmann, Klöckner and Thyssen have created considerable trading and transport units. Side by side by them, some large family-based large trading, transport and forwarding companies have been formed such as Kühne-Nagel and Dachser. A considerable restructuring of those activities has taken place in Germany during the last few years. The entry of Lonrho into business was a part of this process.

Two large multibranch holding companies, Veba and Viag, have become strong actors in transport and logistics in Germany. The large trade house Stinnes belongs to Veba and it has acquired the large transport and forwarding company Schenker which was formerly an affiliate of the German State Railways. Veba integrated Schenker with its transport unit Rhenus; the new company Rhenus-Schenker is aiming to become the largest transport and forwarding one in Europe and is expanding its activities eastwards.

Viag which is smaller than Veba tries to follow the example of the latter. It first acquired the Klöckner trading affiliate and it acquired recently a third of shares in Kühne & Nagel. After Lonrho run into difficulties it sold this company to the traditional owners which, however, were not willing to continue as an independent company due to the new future challenges in the branch.

The third large unit in Germany was formed when the transport units of Thyssen Handelsunion and the large wholesale company and trade house Franz Haniel merged to a new company Thyssen Haniel Logistics.



**Table 1.** The Largest European General Transport and Forwarding Companies in 1992

Company	Turnover 1992 (Billions DMk)
1. Danzas	11,8
2. Schenker-Rhenus	11,0
3. Nedlloyd	6,0
4. Panalpina	5,6
5. Kühne-Nagel	5,4
6. NFC Excell	5,2
7. SCAC/Delmas Vieljeux	4,0
8. Thyssen-Haniel Logistics	3,4
9. LEP International	3,1
10. Calberson	2,3
11. Bilspedition	1,8
12. Dachser	1,6

Source: Manager Magazin 5/1994 p. 47.

In addition, the Hamburg-based Hapag-Lloyd which is specialised in the international container business has other ambitions as well. It belongs to the leading groups of tourism business in Germany and has involved in air transport in this context. The containerisation of the sea transport has raised interest among the leading shipping companies in integrating their operations more closely to the land transport business. In general, the globalisation of transport and logistics will make them more and more important players in the European transport and logistics in the future.

Lufthansa, for its part, is aiming to have a strong position in air transport of goods. It has recently acquired in collaboration with Japan Air Lines and the large Japanese trade house Nisho Iwai the international specialist in express-parcel transport DHL. 20)

In general, the liberalisation of air traffic with the growing need for investment in the new fleet in the context of economic downturn at the early 1990s is provoking a considerable restructuring of airlines in West Europe. Air France has acquired the Belgian Sabena and British Airways is acquiring regional air companies in the Continent. The airlines from smaller countries KLM, Swissair, SAS and Austrian Air have presented plans of a closer cooperation but negotiations have not been successful.

As far as France is concerned, there is a tradition of large Africa-centered trade houses, strong state-owned companies as well as a multitude of family-owned companies. The French State Railways which is pioneer in Europe in adapting the modern high-speed technology has also considerable land transport affiliate Sceta. This company has acquired many French family-owned transport and forwarding companies, in particular, Calberson and internationalised its operations.

Instead, the large state-owned shipping company CGM which has extended its activities to land transport is in financial trouble and facing a restructuring. The large family-owned ship-

ping company Delmas Vieljeux also extended its activities to land transport but was not able to preserve independence.

The most dynamic French company in the field has been an outsider, the Bolloré Group. It entered in the transport business in 1986 by acquiring SCAC which had transformed from a large trade house to a large transport and forwarding company, among other things, and continued acquisitions in France. The Bolloré Group which had interests in wholesale trade as well announced its aim to become a strong actor in logistics (Cf. Bonin 1989).

The Bolloré Group which formed alliances with other dynamic companies in France and had support among leading French commercial banks was able to acquire Delmas Vieljeux in 1991. Thus it became the leading private transport and forwarding company in France.

Another outsider, the dynamic French company Novalliance followed the example of the Bolloré Group and started acquiring the French transport and forwarding companies in 1990. It was able to acquire the large transport and forwarding company Mory TNT and became a considerable actor in French transport and logistics. Novalliance made an alliance with Thyssen Haniel Logistics in 1992.

The French case points clearly out the role of external actors in the restructuring of the traditional family-owned transport and forwarding business with an individualist orientation. If a traditional transport and forwarding business based on family ownership is not able to undertake a restructuring and concentration, external forces will take care of the process. In France, the external forces were domestic, in particular, the state-owned company Sceta and new dynamic multibranch companies the Bolloré Group and Novalliance. In smaller and peripheral countries, the external actors are often foreign companies. 21)

It is very probable that the restructuring process in southern Europe will take place in this manner and the role of foreign companies will be important. There are traditionally large state-owned air and railway companies while the transport and forwarding business is consisting of a multitude of small- and medium-sized family-based companies with the exception of large shipping companies in Greece. The large northern companies have already started acquiring southern companies in the aim of creating pan-European networks.

In spite of the spread of the ideas related to the new comprehensive logistics, the practice of distribution in West Europe has not been transformed as rapidly and radically as was supposed. Many large industrial corporation eg. have focused more on the upgrading of purchasing activities than on the remaking of distribution of goods. A key question seems to be in this context that the companies do not trust that the uniform level of service can be guaranteed everywhere.

Although a harmonisation of norms will take place in the transport and forwarding business differences in habits and traditions will persist in different parts of the Community in the future. The practices of sub-contracting are, in particular, different. On the other hand, labour relations have been conflict-ridden in many Mediterranean ports, such as Genova and Marseille which has hampered the upgrading of services. The important role of institutions and the conflicts in labour relations stress the need to take into consideration the social science approach in the study of modern logistics. 22)

Consequently, the creation of a pan-European networks has been proven more difficult as it was thought originally. The large transport and forwarding companies have still many challenges as regards the development of pan-European service networks.

Turning back to the role of outsiders in the European logistics it is evident that multinational corporations which have entered in the European market since the late 1980s have certain advantages vis-à-vis the traditional European companies and the international companies which have arrived in western Europe already earlier. Those companies can build up a new logistical system from a scratch taking consideration of the extension of the markets, the state of technological development, new service networks as well as new logistical ideas. Instead the manufacturers and the service companies which have operated in Europe many decades are a kind of prisoners of the past structures and they have to make a great effort to build up new logistical systems.

Japanese multinational corporations are typical examples of those outsiders. They have started to build up production capacity and distribution centres within the Community, Sony eg. has turned its European distribution to the European subsidiary of the world largest transport and forwarding company, the Australian TNT. Large Japanese trade houses, shipping companies and transport and forwarding companies, such as Nissho Iwai, Nippon Express and NYK are also expanding their networks to West Europe eg. by acquisitions of smaller European transport and forwarding companies.

The economic downturn at the beginning of the 1990s has led to a loss of profitability of the large transport and forwarding companies and the large multibranch companies involved transport and logistics have experienced difficulties as well. Some of them which strongly expanded their activities in the late 1980s have had to sell out some of their recent acquisitions.

Hence Lonrho decided to sell out of its interests in Kühne & Nagel and to restrict its ambitions in the European logistics, the Bolloré Group sold out its affiliate involved in distribution in France, GT Entreposage to the Australian multinational in the transport and forwarding Mayne Nickless and Bilspedition which had expanded to shipping activities has tried to get rid of its shipping subsidiaries. In addition, Federal Express restricted its operations in Europe and TNT resorted to the cooperation with national post offices in express-parcel business.

Because of the rapid transformation of conditions and the constant restructuring of the companies it is not very easy to give a clue as concerns the top 20-25 transport and forwarding companies in West Europe in the late 1990s. We shall only present some candidates. Those include the Dutch Nedlloyd, the Swiss Danzas and Panalpina, the German Hapag-Lloyd, the Veba Group, the Viag Group and Thyssel Haniel Logistics, the French Sceta-Calberson and the Bolloré Group as well as the British NFC and LEP.

Among the international companies operating in Europe, we should mention the Australian Mayne Nickless as well as the Japanese Nippon Express. The large international shipping companies such as the Japanese NYK and the American Sealand will extend their operations to the European mainland.

## 6. A Regional Perspective

Logistics has become an important factor of location of companies in West Europe and large industrial corporation are building up special European distribution centres. The large retail and wholesale companies, for their part, are building of both European purchasing and distribution centres either alone or jointly. 23)

As far as those European distribution and purchasing centres are concerned several factors play an important role in their location. An appropriate location should, of course, have good land, sea and air transport connections. It should be provided by efficient telecommunication services. In addition, a large hinterland in the neighbourhood is an important factor as well.

Many countries would like to become hosts of those centres while it seems that the Benelux countries have a privileged position in this respect. The Netherlands, in particular, has adopted a national strategy of seeking to attract important logistical activities in West Europe. The country is at the traditional crossroad of sea, river, land and air traffic and transport on the Continent; Rotterdam Europoort is the biggest harbour in Europe. Large international Japanese companies, such as Canon, have set their European distribution centres close to Schipol Airport ( cf. de Smidt 1990). 24)

The government has upgraded traditional infrastructures and developed new ones, in particular, telecommunications networks. The Netherlands is located in the midst of the Banana Zone and close to the German industrial core areas i.e. close to a vast hinterland. The Benelux countries will, however, suffer from increasing congestion problems and the Dutch government has recently started to pay great attention to the promotion of combined transport and to a rehabilitation of river and canal transport.

The regions in Germany and France close to the Benelux countries, such as Nordrhein-Westfalen would like to become great players in the European transport and logistics as well.

The largest inland harbour in Europe is located in Duisburg in Nordrhein-Westfalen and the headquarters of many leading German transport and forwarding companies, such as Thyssen Haniel Logistics are located there. This region is also suffering from serious congestion problems and the provincial government is making a shift in the transport policy parallel with the Dutch case.

Such harbour centres as Bremen-Hamburg in Germany and Rouen-Le Havre in France which are located more faraway from the Benelux countries have also great ambitions in the European logistics while their chances are not so good from a locational point of view. The closer integration of Scandinavia and the Baltic Sea area to the Community as well as the transformation of former Communist countries in central Europe will, however, increase the chances of Hamburg, in particular. 25)

Northern Germany, Denmark and southern Sweden are struggling for the control of transport and logistics between the European Continent and Scandinavia as well as the Baltic Sea area. The collapse of Communism, the split of the Soviet Union, the formation of new independent states in Baltia as well as the unification of Germany have radically changed conditions in the Baltic Sea area.

The unification of Germany has strengthened Germany's position in the Baltic Sea area and major cities in northern Germany have ideas about the formation of a new Hanseatic League. Large German trade houses and Schenker are expanding their activities eastwards and rail ferry connections operate between Germany and Lithuania.

The Danish government, for its part, would like to see Denmark as a gateway from Scandinavia and the Baltic Sea area to the European Continent and Copenhagen is trying to attract new logistical functions. Copenhagen airport which is the stronghold of SAS is busiest in the Nordic countries. Danish interests are also active in developing telecommunication links between the West and Russia.

The Danish government which was supported by the Swedish and German business interests as well as by the ideology of infrastructure links of the EC Commission has started the construction of a bridge over the Great Belt and a tunnel under it. Plans are ready for the construction of a bridge over the Oresund from Copenhagen to Malmö, Sweden. In addition, the construction of a bridge or tunnel from Rödby across the Fehmarn Belt to Puttgarden, Germany is expected to start in 1996. According to those plans there would be a direct land transport link from Germany via Denmark to Sweden at the end of the 1990s.

Those bridge-building plans have aroused considerable criticism from the side of conservationist interests and environmental groups. The construction of bridges will damage bird sanctuaries and local fishing and mussel beds and there are doubts about their negative impact of the precarious ecological balance of the Baltic Sea. The critics would have preferred tunnels and the promotion of public transport instead of private car use. The plan of the construction of a bridge over Oresund provoked a crisis in the Centre-Right coalition government in Sweden in 1994 when the Centre Party ministers expressed their opposition to the plan.

The Swedish business interests have paid a great attention to the development of Pollink i.e. transport connections to Poland and via Poland. There are ferry connections between southern Sweden and Poland and Bilspedition and ASG have established a base there. The use of a route via Poland gives an access to the German market, an opportunity to turn the congested roads in Germany as well as a direct connection to southeastern Europe and the Black Sea region. Bilspedition overtook the largest Finnish road transport and forwarding company and ASG has a subsidiary in Finland which are looking for new opportunities in the Russian market as well. Large Swedish trade houses have also extending their activities eastwards.

The large international Swedish and German trade houses and transport and forwarding companies will struggle hard for the control of transport and logistical networks the Baltic Sea area in the future. There are big shipping companies both in Denmark and Norway, such as Maersk, but those are more interested in operations in oceans than in the Baltic Sea type of regional seas. They have showed interest, for example, in the opening of a new shipping route to Far East via the Northwest Passage in the Arctic Ocean.

Business interests in Finland which is located both in a geographical and transport periphery in the Baltic Sea area are also interested in creating new links. The Finnish State Railways has developed a long-term cooperation with the Russian State Railways and a considerable transit of Russian exports is taking place of the harbours of southeastern Finland. The Finnish State Railways has plans to extend links by the creation a new transit traffic route via Russia to Far East up to the Sea of Japan. Finnair, for its part, has made an effort to develop the Helsinki-

Vantaa airport to a transit point for the flights between North America and Japan.

The Finnish business community has strong interest in upgrading and developing transport links towards the West and the South. Hence there are ferry connections from Finland to Sweden and Germany. A major programme is the opening of a new Baltlink because many companies are afraid of that the Swedish companies will gain considerable transport advantages by the opening of the direct link via Denmark to the Continent. Baltlink means the development of ferry connections from southern Finland to Tallinn and the upgrading of the principal highway from Tallin to Poland. The new governments in the Baltic countries have adopted a positive attitude vis-à-vis this project but the considerable transit problems in the border between Lithuania and Poland have posed a serious obstacle for the development of transit traffic.

In general, the Polish government has not been enthusiastic about the idea that Poland would become a transit country of the Nordic countries to the North-South direction while it has been more interested in developing East-West transport links between Germany and Russia. There is a evident conflict between the Polish and the Nordic points of view of transit issues.

Turning from northern to southern Europe, the harbour of Marseille and the axe of the Rhone River valley has traditionally enjoyed a strong position in transport and distribution. The new "Euroregion" consisting of the provinces of Midi-Pyrénées and Languedoc-Roussillon in France and Catalonia in Spain is trying to develop an alternative to the Marseille-Rhone River valley axe. The major cities are struggling for becoming transit places of new transport lines, such as TGV lines, which will have a polarising effect on regional development. On the other hand, local environmental groups are opposing the construction of the new TGV lines to the South (Cf. Marconis 1991, Perrier 1993).

New infrastructure links are planned across the Pyrenees, such as traffic tunnels at Puymorens and at Somport. Those plans, in particular the Somport tunnel, have met with strong resistance from the side of conservationists which are afraid of negative consequences on local ecosystems and endangered species.

The eastern part of the Mediterranean is a transport periphery as compared with the western one. There are, of course, international shipping routes passing through the Suez Canal while few international harbours exist in Greece, for instance.

The Italian government is trying to promote Trieste on the Adriatic Coast as a major harbour while the lack of large hinterland and modern infrastructures is an obstacle to the development of harbours in this part of Europe. The traditional land transport route from western Europe through Yugoslavia to Middle East is blocked by the ethnic conflicts and war in the former Yugoslavia territory. An alternative route is running through Hungary, Romania and Bulgaria (Cf. Reynaud 1991).

The split of the Soviet Union has created new transport problems in eastern Europe. After the independence of Ukraine and the Baltic states, the Russian direct access to sea transport has become restricted, in particular, as the harbours at the bottom of Gulf of Finland in the Baltic Sea are small and inefficient.

There are plans to construct new large harbours there.

The major land transport route to Germany is passing through White Russia and Poland and efforts are made to upgrade both railway and road connections. The insecurity prevailing in the cargo transport in Russia, however, hampers development efforts.

After having gained independence Ukraine is trying to develop new transport connections to the West. The main traditional road connection runs through Hungary, Austria and southern Germany to the Netherlands. The upgrading of the Donau-Main-Rhine canal system will make river transport from the Black Sea to North Sea more efficient. There are plans to construct a new highway from Ukraine through Hungary and Slovenia to the coast of the Adriatic Sea. The Italian government which would like to extend the Trieste harbour is supporting the plan.

As the new situation emphasizes the role of Hungary as a major transit country, critical voices have raised against this role-taking. After the breakdown of the state-owned monopoly transport companies in the East, Hungarocamion has, however, been able to keep a strong position in the market. It has aimed at creating an integrated transport system which would cover road, rail and river transport.

During the last few years, the truck drivers in EC and EFTA countries have started to complain about dumping after low-cost eastern truck drivers have entered in the western market. As the prevailing economic depression has provoked overcapacity problems and low profitability in the transport branch protectionist measures have been asked for.

## 7. The Rise of New Constraints and Strategies

The increase of congestion and environmental regulation are setting new limits to the growth of traffic and transport as well the application of the logistical ideas developed in the 1980s. In fact, the application of logistical ideas, in particular, the just-in-time principle which has shifted goods from storages to road has contributed both to the increase in congestion and air pollution due to traffic. 26)

The increase in congestion in major European highways is jeopardising, in fact, the just-in-time principle as stops in traffic flows may last several hours. Congestion problems are also becoming more and more serious in major cities. After major airports have become more and more congested, the chances of rapid delivery of goods have deteriorated as well.

Because of increasing congestion problems many companies have already started to adopt alternative transport strategies. The first alternative can be called a security strategy. The company starts sending a part of the delivery by air and another part by road to be sure that something will arrive at the destination in due time. Or the company may shift to use sub-contractor network closer to the main production facilities. It may be also necessary to build up security stocks again.

Secondly, the company may start shifting deliveries to rail or to use combined transport. Thirdly, some companies try to turn the most congested roads and areas by shifting a part of deliveries to sea and river transport. Or they may use alternative road transport routes. Fourthly, if the congestion problems become very serious some companies may start reflecting to shift the production facilities closer to main markets. Summa summarum, congestion prob-

lems may become a new significant location factor for companies in the future.

As far as environmental regulation of traffic in West Europe is concerned, the control of air pollution and noise due to traffic has become stricter, by and by. Significant road, railway, airport, bridge and harbour construction projects necessitate the utilisation of environmental impact assessment. The new legislation on recycling of waste will also concern used cars, sooner or later.

Many expert reports as well as reports of international organisations, such as ECMT and OECD, stress that the Polluter Pays Principle and economic instruments in environmental protection, in general, should be applied to traffic. The considerable external costs of traffic, in particular, of road traffic are poorly internalised by users. Consequently, the taxation of road traffic should be greatly increased. This would mean a considerable raising of petrol prices as well as a generalisation of the use of road pricing instruments, such as tolls on highways, bridges and tunnels (ECMT 1989b, 1990, 1991b, 1993, OECD 1988, 1990, 1993).

The European Parliament and the Commission of the European Communities have adopted parallel views during the last few years. They, however, warn about drastic actions which would imperil economic progress and freedom of mobility. For instance, internalising all the known environmental costs of road traffic at once would jeopardise the entire structure of economy and society in West Europe. The Commission proposed a new relatively small CO<sub>2</sub> tax to cut down the greenhouse emissions in 1992. This proposal aroused, however, a strong opposition, in particular, from the part of the industries, and it was not accepted ( Cf. Topmann 1992, van Miert 1992).

The interests associated to road transport emphasize technological and market solutions to environmental problems. The R & D effort will produce more energy efficient, cleaner and less noisy engines in the future. The introduction of new road-vehicle communication systems, such as satellite-based guidance systems, will increase the efficiency of road transport and reduce the necessary amount of vehicles. Liberalisation of transport which diminishes the circulation of empty trucks will have a similar effect. A permission to use heavier trucks would also reduce the necessary amount of vehicles (Cf. OECD 1992a, 1992b).

There are a few examples of alternative transport policy on the national level which would look for solutions to both congestion problems and environmental damage caused by the increase in traffic. The Swiss model of combined transport is the best example in Europe concerning those issues. As governmental action seems to be more and less paralysed, the search of solutions has shifted on the local level, in particular, the city level.

Logistical reasoning has started to react to new challenges, by an by. The so-called new city logitics implies the construction of a large urban distribution centre outside the city centre close to railway connections. So the need to use heavy trucks and, in particular, their circulation in the city is diminished and the efficiency of distribution is increasing as well. The cooperation of large department stores in the city centre is necessary for this kind of alternative system. Some German, Swiss and Dutch cities are involved in this kind of experiments. 27).

Some companies are developing ideas of a new green business logitics. For instance, the large Swiss retail trade company Migros which is stressing the importance of environmental considerations in its general business strategy, is shifting as much transport as possible on rail. It is



making an effort to integrate the aims of the company environmental policy and logistics with each other. The aims to integrate environmental concerns into transport and logistics belongs also to the integral environmental company strategy promoted by Georg Winter and the BAUM organisation ( Hauser 1991, Gege 1991, Winter 1993).

The adoption of the new strict legislation on recycling of waste in Germany has led to a considerable transport of waste which is contributing to the increase in traffic and related negative external effects. As a response, new ideas of "Entsorgungslogistik" or recycling logistics have been recently introduced. According to those ideas, the production and, in particular, the need of transport of waste should be diminished or totally eliminated in the future ( Stölzle 1991).

## 8. Final Reflections

New comprehensive logistics is a newcomer in the group of modern large-scale technical systems which has been created since industrialisation started. It is closely related to new telecommunication and transport systems. A paradox in the actual state of affairs that railways which were considered to be sunset technology related to the first phase of industrialisation are coming back with the support of hightech. Another paradox is the idea of the Keynesian multiplier which was considered to belong to the past during the long period of growth which started in the 1960s, is coming back as Western governments try to mobilise funding for the construction of new infrastructures in order to alleviate serious unemployment problems.

The new ideas of business logistics adopted in western Europe during the optimistic booming period of the late 1980s were based on new opportunities offered by technological development and the formation of large economic space. Logistics became a key word as it made possible the cutting of costs as well as an increase in efficiency and in rapidity and flexibility of operations. System planners were fascinated about the challenge of developing new tools which would make it possible to master complex and complicated networks.

Those ideas and aims were supported and subsidized by public authorities which promoted liberalisation and deregulation of economic activities as well as the construction of new infrastructures favourable for applications of new logistical ideas. Logistics became an important factor for location of production and distribution activities. National states and regional authorities which were competing for location of companies had to pay considerable attention to logistics.

The ideas of business logistics which were developed in the 1980s, however, formed a kind of an abstract closed system. They paid few attention to geopolitics or the existence of strong ethnic and cultural traditions as well as different socio-economic conditions in Europe. They did neither take into consideration important externalities such as, in particular, rapid increase in traffic, congestion and environmental pollution. In this respect, they ran parallel with the economic theorizing of integration or modern utopies based on the breakthrough of information technology. 28)

The modern business logistical systems are vulnerable to disturbance like any modern large-scale technological system. One can refer to the example of the French truck driver strike in July 1992 which was related to the question of deregulation and reregulation of road traffic

due to the formation of the single market within the EC. When the striking truck drivers blocked the main French highways the transport of goods in western Europe was soon greatly disturbed. The car manufacturers, in particular, which had adopted the just-in-time principle and relied on extensive sub-contractor networks were strongly affected by the strike. They experienced soon great difficulties in keeping their production units in operation both in France and Spain. 29)

The road and air traffic in Europe is becoming more and more dependent on the Middle East oil due to growing problems of production and conflicts in the former Soviet Union territory.

The political situation in the Middle East is continuously unstable and susceptible to crisis. A crisis there and a consequent rise in oil prices would rapidly affect traffic and, in particular, air traffic as was seen recently.

A short-term effect of the recent Gulf War seems, however, to be a strengthening of ideas of business logistics in Europe. Cheap oil prices were not finally affected and the efficient logistical organisation of the American Army aroused much attention in business circles.

The important question of internalising of external costs of traffic and transport has not, however, been solved. The recent advances of logistics are based on neglect of external costs and public subsidies. There is an evident conflict between the aims of business logistics and the aims of environmental policy. If the petrol price would be much higher and traffic and transport costs, in general, considerable higher the whole system of transport and logistics should re-evaluated. 30)

The new idea which is present, in particular, in the United States stresses the importance of the building up of a national system of electronic highways. The new system would contribute to the solution of many actual problems related to traffic and transport, such as congestion and pollution. This sounds a little bit like the announcement of the forthcoming information society at the beginning of the 1980s. 31)

Studies of environmental impact of traffic and transport as well as their external costs will get a new impetus in Europe in the 1990s. Those impacts and costs will become better and better known while demand for regulation, restriction and taxation will become more and more loud. We shall also see new struggles between experts about evaluation and measurement of those impacts and costs as strong interest groups would like relativise the new information on the state of affairs.

It is even probably that the issue concerning political regulation of traffic and transport will become a major political issue in Europe in the future.

We shall also see a pluralisation of the discussion of ideas of logistics. The actually dominant business and engineering view of logistics which pays few attention to externalities will be more and more challenged by different variants of ideas of alternative and green logistics. This could be considered a positive development as we certainly need alternative ideas and practices of transport and logistics in the next century.

## Notes

- 1) Compare the recent work of the French economist Pierre Bauchet dealing, in particular, with the maritime transport and with the role of transport in the development process and world economy cf. Bauchet 1991, 1992 and as far as the development aspects are concerned cf. Leinbach & Lin Sien 1989.
- 2) About recent globalisation of business see eg. Dunning 1993. The Australian political scientists Joseph A. Camilleri and Jim Falk stress that globalisation is eroding the basis of the traditional state sovereignty in many fields cf. Camilleri & Falk 1992.
- 3) I would like to stress the importance of following up of important European magazines in order to keep up with constant change, such as company acquisitions. From the point of view of transport and logistics, special mention should be given to the German business magazine *Manager* as well as the French ones *L'Expansion* and *Moci*.
- 4) The new American president Bill Clinton and his government have stressed the importance of the upgrading of American infrastructures and, in particular, of the building up of a new national electronic highway network.
- 5) This section is principally based on my former studies, see in particular Raumolin 1991b.
- 6) I have dealt with this conflict in my former studies, see in particular Raumolin 1991b, 1993b. A side-effect of the conflict has been a growing interest in studies of fundamental questions of European mobility cf. P.C. Mayer-Tasch, W. Molt & H. Tiefenthaler (eds.) 1991.
- 7) About the rise of high-speed railways, in general, see "L'avenir à grand vitesse ferroviaire" 1990. It is interesting to note that railroads were considered to be a sunset technology for a long time, see eg. articles in R. Mayntz & T. P. Hughes (eds.) 1988.  
There is an internationally strong railway equipment industry in the EC which has experienced a restructuring and concentration under the initiative of the leading electrical engineering companies during the last few years. The leading manufacturer is the French Alcatel-Alsthom company. In Germany, there is only one major manufacturer left, Siemens. The Swiss-Swedish multinational ABB is the third major manufacturer left in Europe. The Italian Fiat Group has developed a more simple high-speed technology, called Pendolino.  
The only serious competitor of the leading European manufacturers on the international scene is the Japanese Mitsubishi Group. The leading European companies are selling their technology to North America, South-East Asia as well as Russia and they are looking for alliances with American and East European manufacturers cf. Raumolin 1991b, Delage 1990.
- 8) There is an internationally strong truck industry in the EC as well. This industry has experienced a strong restructuring and concentration since the middle of the 1980s. The leading manufacturers are the Daimler Group, Iveco associated to Fiat, Renault and Volvo. The smaller manufacturers, such as Man and DAF, are facing great difficulties and will be acquired by larger manufacturers in due time cf. Raumolin 1991b, Aribert 1990, Dietz 1990. The American manufacturer Paccar acquired DAF in 1996.
- 9) Many authors have complained of a lack of maritime policy in the EC. The EC shipbuilding industry has experienced a drastic rationalisation while it is still poorly competitive cf. Bauchet

1992, Ronai 1992, Roussel 1992.

10) The European Conference of Ministries of Transport (ECMT) has paid special attention to the reorganisation of transports in the former East Europe cf. ECMT 1991a, see also Raumolin 1993a.

11) The section relies heavily on my former studies, see in particular Raumolin 1991b.

12) Austria, Sweden and Finland are now new member countries of the European Union.

13) The software consulting service units associated to giant international corporations, such as the American General Electric Group, are involved in the development of new computer integrated logistics.

14) The privatised Dutch post and telecommunication company KPN acquired recently TNT. It would like to become a global player in the post business in the future. It contributed also to the establishment of a network of European public telecommunication operators, Unisource in 1992. The other members of this network are Swiss Telecom, Telia and Telefonica from Spain. The headquarters are located in the Netherlands. Unisource has made an alliance with the American multinational ATT.

15) The telecommunications sector has experienced a rapid change within the European Union in the last few years due to the prospects for liberalization, the introduction of mobile telephone and expanding markets. Many new actors enter the field, for instance, large power companies and state railway companies which have built up telecommunication networks of their own.

New actors in Germany include multibranch companies Veba, Viag and Mannesmann while the big construction and water management companies are main new actors in France. All principal actors in the Continent are looking for alliances with big privatised British and American companies.

16) The companies are, of course, still internalising functions which they consider strategic from their point of view. The control and coordination tasks are, of course, strategic cf. Lorino 1989.

17) As far as the main European transport and forwarding companies are concerned, see eg. Cooper, Browne & Peters 1991, Kähäri 1992. In the studies written from the point of view of business logistics, they are called megacarriers.

18) Nedlloyd and the British P&O fused their container operations into a common company 1996. It is one of the leading companies in the world in this field together with Maersk and the Taiwanese Evergreen.

19) Concerning Denmark, the large international multibranch company Maersk should, of course, be mentioned in this context. It belongs to the leading shipping companies in the world and is, in particular, involved in the container business. Maersk is also active in air transport business.

- 20) This is linked to the actual globalisation of business as well as an example of recent German-Japanese alliances.
- 21) In Finland, the Finnish business development corporation Spontel tried to build up a large Finnish transport and forwarding unit Speditor in the late 1980s but it was not successful and Bilspedition took over this unit in 1990. In addition to Bilspedition/ Speditor there were two larger groups in the field in 1994, the affiliate of the Finnish State Railways Transpoint which is working in alliance with ASG and Danzas as well as the Huolintakeskus Group which was representing independent interests and had several partners in the Continent, such as Schenker, Nedlloyd and Dubois.  
In 1996, Huolintakeskus Group was sold to Bilspedition while the largest Finnish shipping company Finnlines acquired strategic minority shares of the Swedish company. Regional truck companies which were opposing to the sale of Huolintakeskus, for their part, allied with Nedlloyd and the Danish company Dan Transport.
- 22) Compare here, in particular, the studies by Hughes, Joerges, Weingart and Gras mentioned in the introduction.
- 23) This section is mainly based on my former studies, see in particular Raumolin 1991b, 1993a. As far as recent studies of transport and environment in Europe, in general, are concerned, see eg. Koenings & Schaeffer (eds.) 1991, "Transports & environnement" 1991, Kågeson 1993, Petersen & von Weizsäcker 1993.
- 24) The recent reorientation of the major Dutch logistical players, such KPN and Nedlloyd, are part of this process. KLM, for its part, has turned toward the USA in its search for alliances.
- 25) As far as port functions are concerned see the work of the German geographer Helmuth Nuhn cf. Nuhn 1994.
- 26) This section is mainly based on my former studies, see in particular Raumolin 1992a, 1993b.
- 27) The recent trends in the German city logistics are presented in the book edited by Hans Böes and Markus Hesse cf. Böes & Hesse 1996.
- 28) The French sociologist Philippe Breton who is specialised in the study of the impact of the new information technology has dealt with the rise of new utopianism related to recent technological breakthroughs cf. Breton 1992.
- 29) The new strike provoked again similar problems in the autumn 1996. In addition, the French transport and logistic system experienced again difficulties in the winter 1996/1997 due to heavy snowfall and coldness which made, for instance, the TGV system and the canal system partly inoperational for a couple of weeks. Adverse meteorological conditions are becoming a constraint to the operation of modern high-tech logistical systems.
- 30) The special stress on traffic and transport is evident in the plans of ecological tax reform presented both in western Europe and in the United States cf. von Weizsäcker & Jesinghaus 1992, Repetto et al. 1992. I have dealt with externalities and new ideas of transport planning

in a recent article cf. Raumolin 1996.

31) Compare the discussion of the ecological impact of the information society in Jahrbuch Ökologie 1997: Grieshammer, Opaschowski and Tenzer 1996.

## Bibliography

- Andersson, Å. & U. Strömqvist 1988. *K-samhällets framtid (Future of K-society)*. Stockholm.
- Aribert, M. 1990. Véhicules industriels: le dynamisme des constructeurs européens in: G. Crespy (dir.) *Marché unique, marché multiple. Stratégies européennes des acteurs industriels*. Paris, 153-64.
- Bauchet, P. 1991. *Le transport international dans l'économie mondiale*. Paris.
- Bauchet, P. 1992. *Le transport maritime*. Paris.
- "L'avenir à très grande vitesse ferroviaire". 1990. Special Issue. *Annales de Mines*. October 1990.
- Boës, H. & M. Hesse (eds.) 1996. *Güterverkehr in der Region. Technik, Organisation, Innovation*. Marburg.
- Bonin, B. 1989. Le Groupe Suez et le commerce international (1967-1987) in: F. Crouzet (dir.) *Le négoce international, XIII-XX siècle*. Paris, 223-40.
- Breton, P. 1992. *L'utopie de la communication*. Paris.
- Brunet, R. 1991. Ménager le territoire français dans l'espace européen in: "Le nouvel aménagement du territoire". Special Issue. *Annales de Mines*. December 1991, 10-16, 91-96.
- Camilleri J. A. & J. Falk 1992. *The End of Sovereignty? The Politics of a Shrinking and Fragmenting World*. Aldershot.
- Chalmin, P. 1985. *Négociants et chargeurs. Le saga du négoce international des matières premières*. Paris.
- Cohen-Tanugi, L. & A. Winckler 1991. L'Europe des réseaux sera-t-elle celle du droit anglo-saxon? in: "L'Europe des grands réseaux". Special Issue. *Annales des Mines*. April 1991, 125-27.
- Commission of the European Communities 1991. *Transport in Fast Changing Europe by Group Transport 2000*. Brussels.
- Commission of the European Communities 1992a. *Europe 2000. Outlook for the Development of the Community's Territory*. Brussels.
- Commission of the European Communities 1992b. *White Paper on the Future Development of Transport Policy*. Brussels.
- Commission of the European Communities 1993. *White Paper on Growth, Competitiveness and Employment*. Brussels.
- Cooper, J., M. Browne & M. Peters 1991. *European Logistics. Markets, Management and Strategy*. Oxford.
- van Grefeld, J.L. 1977. *Supplying War*. Cambridge.
- DATAR 1989. *Villes européennes*. Paris.

- Delage, B. 1990. Electrotechnique et téléphonie: synergies et restructurations industrielles in: G. Crespy (dir.) *Marché unique, marché multiple. Stratégies européennes des acteurs industriels*. Paris, 167-219.
- Dietz, W. 1990. Die europäische Nutzfahrzeugungsindustrie im Umbruch. Ifo-Schnelldienst no 26-27. 1990, 22-27.
- Doutriaux, Y. 1991. *La politique régionale de la CEE*. Paris.
- Dunning, J.H. 1993. *The Globalization of Business*. London.
- ECMT 1986. *Trends in the Development in International Traffic and Infrastructural Needs*. CM (86)2. Paris
- ECMT 1989b. *Environment and Transport Infrastructures*. ECMT Round Table 79. Paris.
- ECMT 1990. *Transport Policy and Environment*. Paris.
- ECMT 1991a. *Prospects for East-West European Transport*. Paris.
- ECMT 1991b. *Freight Transport and the Environment*. Paris.
- ECMT 1992. *Investment in Transport Infrastructure in the 1980s*. Paris.
- ECMT 1993. *Transport Growth in Question*. Paris.
- Erdmenger, J. 1984. *Vers une politique des transports pour l'Europe*. Bruxelles.
- Gege, M. 1991. *Ökologisches Wirtschaften als Zukunftsstrategie moderner Unternehmen* in: R. Kreibich, H. Rogall & H. Boës (eds) *Ökologisch produzieren*. Weinheim & Basel, 63-103.
- Gras, A. 1993. *Grandeur et dépendence. Sociologie des macro-systèmes techniques*. Paris.
- Grieshammer, R. (1996). *Kein Ökotopia auf der Datenautobahn* in: *Jahrbuch Ökologie 1997*. Munich, 209-16.
- Hauser, C. 1991. *Environnement. emballages et déchets: La contribution d'une entreprise de distribution suisse Migros* in: *Commerce, consumérisme, protection de l'environnement*. Institut du Commerce et de la Consommation. Paris, 82-88.
- Hughes, T. P. 1987. *The Evolution of Large Technological Systems* in: W. Bijker, T.P. Hughes & T. Pinch (eds.) *The Social Construction of Technological Systems*. Cambridge Mass., 51-82.
- Hughes, T. P. 1988. *The Seamless Web* in: B. Elliot (ed.) *Technology and Social Process*. Edinburgh, 9-19.
- Joerges, B. 1988. *Large Technical Systems: Concepts and Issues* in: R. Mayntz & T.P. Hughes (eds.) *The Development of Large Technical Systems*. Frankfurt a.M, 9-36.
- Jünemann, R. (ed.) 1989. *Logistik in Europe. Innovationsstrategien für Wirtschaft und Dienstleistungen*. Köln.
- Kågeson, P. 1993. *Getting the Prices Righth; A European Scheme for Making Transport Pay its True Costs*. The European Federation for Transport and Environment. Stockholm.
- Kähäri, P. 1992. *Euroopan logistiikkatoimiala ja sen kehitys muuttuvassa toimintaym-*



- päristössä (European logistics branch and its recent transformation). Graduation thesis in International Marketing. Helsinki School of Business Administration. December 1992 166 pp.
- Koenings, T. & R. Schaeffer (eds.) 1991. Fortschritt vom Auto. Umwelt und Verkehr in den 90er Jahren. Munich.
- Labasse, J. 1991. L'Europe des régions. Paris.
- Landaburu, E. 1991. L'aménagement du territoire européen in: "Le nouvel aménagement du territoire". Special Issue. Annales de Mines, November 1991, 28-31.
- Leinbach, T. & C. Lin Sien 1989. The Role of Transport in Development in: T.R. Leinbach & C. Lin Sien (eds.) South-East Asian Transport. Issues in Development. Singapore, 1-7.
- Le Tunnel sous la Manche. Cahiers spécial. Le Monde 7.5.1994.
- Lorino, P. 1989. Quelles stratégies pour l'entreprise ? in: B. Cassen & P. de Saussay (dir.) Europrospective: Le monde vu d'Europe. Paris, 201-18.
- Marconis, R. 1991. La reorganització de les grans infraestructures del transport a les rodalies de Toulouse. Revista Catalana de Geografia 6. No 15, 121-28.
- Mathe, H. & D. Tixier 1987. La logistique. Paris.
- Mayer-Tasch, P.C., W. Molt & H. Tiefenthaler (eds.) 1991. Transit. Das Drama der Mobilität. Zürich.
- Nam, C.W., G. Nerb & H. Russ. 1990. An Empirical Assessment of Factors Shaping Regional Competitiveness in Problem Regions. Main Report. IFO-Institut für Wirtschaftsforschung/Commission of the European Communities. Brussels.
- Nijkamp, P., S. Reichmann & M. Wegener (eds.) 1990. Transport, Communications and Mobility in Europe. Aldershot.
- Nuhn, H. (1994). Strukturwandlungen im Seeverkehr und ihre Auswirkungen auf die europäischen Häfen. Geographische Rundschau 46:5, 282-89.
- Opachowski, H.W. 1996. Mit neuen Medien zu neuen Umweltbelastungen in: Jahrbuch Ökologie 1997. Munich, 200-08.
- OECD 1988. Transport and Environment. Paris.
- OECD 1990. Environmental Policies for Cities in the 1990s. Paris.
- OECD 1992a. Cargo Routes: Truck Roads and Networks. Paris.
- OECD 1992b. Advanced Logistics and Freight Transport. Paris.      OECD 1993. Cars and Climate Change. Paris.
- Perrier, G. 1993. TGV-Méditerranée: Premières leçons d'un conflit. Ecologie Politique No 6. 1993, 29-51.
- Petersen, R. & E.U. von Weizäcker 1993. Mobility in the greenhouse. Special issue "Transport and the Environment". UNEP Industry and Environment 16: 1-2, 7-10.
- Pottier, P. 1963. Axes de communication et développement économique. Revue Economique 14, 58-132.

Raumolin, J. 1990a. Restructuring and Internationalization of Finnish Forest, Mining and Related Engineering Industries in: M. Hebbert & J.-C. Hansen (eds.) *Unfamiliar Territory - The Reshaping of European Geography*. Aldershot, 8-22.

Raumolin, J. 1990b. Suomalaisen kaupan toimintamahdollisuudet Euroopan yhdentyessä (Challenges facing the Finnish wholesale and retail trade vis-à-vis the integrated European market). The Research Institute of the Finnish Economy (ETLA) B 65. Helsinki. Raumolin, J. 1991a. Euroopan yhteisön ympäristöpolitiikka ( Environmental policy within the European Community) in: I. Massa & R. Sairinen (eds.) *Ympäristökysymys ( Environment: a challenge for social sciences)*. Helsinki, 349-89.

Raumolin, J. 1991b. Prospects for Logistics in Europe in the 1990s. The Research Institute of the Finnish Economy (ETLA) Discussion Papers 381. October 21, 1991 25 pp.

Raumolin, J. 1992a. Recent Trends of Logistics in Europe. Working paper presented at the European Science Foundation RURE Programme WG 1 & 2 Meeting in Copenhagen. September 36, 1992 Mimeo 7 pp.

Raumolin, J. 1992b. Dialectics of Deregulation and Reregulation. The Example of Environmental Policy within the European Community. Paper presented at the EAEPE 92 Conference "Structural Change and Regulation of Economic System: Integration, Disintegration and Globalisation" held in Paris, November 4-6, 1992.

Raumolin, J. 1993a. Transport, Logistics and Environment in the Baltic Sea. Reflections on the Finnish Strategy vis-à-vis the European Integration in: L. Lundqvist & L. Persson (eds.) *Visions and Strategies in European Integration - A North European Perspective*. Berlin, 175-92.

Raumolin, J. 1993b. Transport, Logistics and Environment in Europe in: B. Forsström, M. Nyholm, J.-Å. Törnroos (eds.) *Finländska samhällsgeografiska forskningsperspektiv (Socio-geographic studies from Finland)*. Essays in Honour of Nils H. Winter on his 60th Birthday. *Meddelanden från Ekonomisk-statsvetenskapliga fakulteten vid Åbo Akademi. Serie A: 400, Åbo 94-111.*

Raumolin, J. 1996. Traffic, Transport, Sustainability and Spatial Cohesion in: U. Graute (ed.) *Visions and Strategies Aroud the Baltic Sea 2010 and their Relevance to Central and Eastern Europe*. Institute für ökologische Raumentwicklung. Dresden, 55-61.

Repetto, R. et al. 1992. *Green Fees: How a Tax Shift Can Work for the Environment and the Economy*. World Resources Institute. Washington D.C.

Reynaud, C. 1991. Synthèse: Les communications et l'intégration de l'espace méditerranéen in: C. Reynaud & A. Sid Ahmed (dir.) *L'avenir de l'espace méditerranéen*. Paris, 725-32.

Ronai, M. 1992. Nouveaux champs d'action pour Bruxelles in: *Les mers, avenir de l'Europe. Savoirs 1. Le Monde Diplomatique*. Paris, 66.

Roussel, M. 1992. Construction navale: le rêve brisé in: *Les mers, avenir de l'Europe. Savoirs 1. Le Monde Diplomatique*. Paris, 67-69.

deSmidt, M. 1990. The New Business Logistics ant the Netherlands Randstad in: J.-C. Hansen & M. Hebbert (eds.) *Unfamiliar Territory - the Reshaping of European Geography*. Aldershot, 73-84.

- Stoffaes, C. 1991. L'Europe des grands réseaux in: "L'Europe des grands réseaux". Special Issue. Annales des Mines. April 1991, 7-15.
- Stölzle, W. 1991. Entsorgungslogistik ist neues Feld in: Jahrbuch der Logistik 1991. Düsseldorf, 202-03.
- Tenzer, G. 1996. Mit neuen Medien zur Umweltentlastung in: Jahrbuch Ökologie 1997. Munich, 188-99.
- Topmann, G. 1992. Rationelle Transportketten statt massenhafter Individualverkehr in: M. Vohrer (ed.) Ökologische Marktwirtschaft in Europe. Baden-Baden, 143-53.
- "Transports & Environnement" 1991. Special Issue. RTS Recherche-Transport-Sécurité No 32, 1991.
- Van Miert, K. 1992. Verkehr in Jahr 2000 in: M. Vohrer (ed.) Ökologische Marktwirtschaft für Europe. Baden-Baden, 154-63.
- Voigt, F. 1953. Verkehr und Industrialisierung. Zeitschrift für gesamte Staatswissenschaft 109:2, 193-239.
- Weingart, P. 1989. "Grosstechnische Systeme" - ein Paradigme der Verknüpfung von Technikentwicklung und sozialem Wandel? in: P. Weingart (ed.) Technik als sozialer Prozess. Frankfurt a.M., 174-96.
- Weizsäcker, E.U. von & J. Jesinghaus 1992. Ecological Tax Reform. A Policy Proposal for Sustainable Development. London.
- Winter, G. 1993. Das umweltbewusste Unternehmen. Ein Handbuch der Betriebsökologie mit 28 Check-Listen für die Praxis. Fifth entirely rewritten edition. Munich.

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