

THE PROBLEMS OF LOGISTICS WITHIN THE FRAME OF EUROPEAN PLATFORM FOR TRANSPORT RESEARCH

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Abstract. Review of the main research activities in the field of transport and freight logistics within the frames of European Research Area and European Platform for Transport Research.

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1. Transport and logistics in the European research area

The relationship between the EU and the national research efforts is changing. Implementing the 6FP (2002–2006) will require a genuine partnership between the EU and its Member States and with other European scientific cooperation organisations.

The new 6FP will be based on the following main principles [1]:

- concentrating on a selected number of priority research areas in which EU action can add the greatest possible value;
- defining the various activities in such a way as to enable them to exert a more structuring effect on the research activities conducted in Europe thanks to a stronger link with national, regional and other European initiatives;
- simplifying and streamlining the implementation arrangements, on the basis of the intervention methods defined and the decentralised management procedures envisaged.

Two fundamental aspects of this new FP are the opportunity for the candidate countries to participate fully in all the activities as countries associated with its implementation, and the fact that to a large extent it opens up EU research activities to the rest of the world, more particularly on account of the possibility of third country researchers and organisations having access to a substantial proportion of the activities.

In the spirit of the Commission Communication “Towards a European Research Area”, the regional dimension of European research will be fully taken into account in the implementation of the 6FP by encouraging interregional cooperation, by taking into consideration specific regional economic and social situation and by supporting regional technological dynamics.

Seven thematic areas have been selected as have, within each of them, a number of subjects linked to economic and societal issues that are especially important to the EU and where its action adds specific value for reasons which may vary according to the themes in question. They are [2]:

- Information Society technologies, aiming to develop key information technologies to strengthen Europe's industry and help Europeans benefit from the knowledge-based economy;
- Sustainable development, aiming to strengthen the scientific and technological capacity needed for Europe to be able to implement sustainable development and make a significant contribution to the international efforts to understand and control global change;
- Genomics and biotechnology for health, aiming to build on the recent breakthrough on decoding the human genome, especially in regard to tackling disease and galvanising Europe's biotechnology industry;
- Nanotechnologies, intelligent materials and new production methods, aiming to help European industry to benefit from these leading edge technologies;
- Aeronautics and space, aiming to maintain Europe's leading position in the aerospace sector and focus on safety and environmental protection;
- Food safety and health risks, aiming to establish a scientific base needed to produce safe and healthy food and control the risks related to food production;
- Citizens and governance in European society, aiming to mobilise research capacity in economic, political, social and human sciences which will give a greater understanding to the importance of knowledge-based society across Europe.

The transport research should focus on the important challenges facing transport over the next decade, and therefore realise the vision of a sustainable transport system. The key issues are:

□ *Transport without boundaries:*

- Passengers and freight should be able to move across geographical boundaries without interruption. More importantly, all trips should be seamless and capable of being carried out in a multimodal environment, which maximises accessibility. All trips should be possible, within a reasonable journey time, and not depend solely on the use of a private car.

□ *Sustainability:*

- *Greenhouse gas emissions and pollution.* Transport has to contribute its full share to achieving the Kyoto targets, and beyond. Indeed, how can transport be moved to a non-carbon based system? All forms of transport generated pollution (including noise) must be significantly reduced.
- *Social inclusion.* The needs of all citizens

(including the vulnerable) have to cater for, so that access to goods and services is not impeded by any undue constraints caused by the transport system (cost or accessibility).

- *Health and safety.* Transport operations should not put the health or safety of citizens at risk, in both the short and long term.

□ *Understanding transport:*

- *Understanding transport demand.* The unsustainable growth in traffic (freight and passenger) suggests that the supply and demand for transport is out of balance. There is a need to fully understand the reason for travel/transport choice, and how these can be influenced. In addition we need to know how transport can and does interact with other policy objectives (e.g. social inclusion; quality of life; and enhancing cities and the built environment). Answering this question will greatly assist progress in addressing the following question.
- *Understanding decision processes.* The institutional aspects of transport and the decision making process are clearly important in complex societies, where there are always conflicting needs, e.g. national or European goals versus local constraints, environment protection versus mobility, and finite resources.
- *De-coupling the effects of traffic growth from economic growth.* The adverse effects of transport are made worse by the relentless growth in traffic. There is a need to limit, and indeed reverse, this growth while continuing to satisfy the needs of citizens and industry.

All transport policy relevant research, including urban transport, should be grouped within a single Programme.

There should be close links with other Programmes/Key Actions covering transport related research focused on improving European competitiveness (e.g. in the successors to the IST and GROWTH programmes).

The transport needs and challenges in various parts of Europe are different. Therefore, it should be recognised that research objectives will differ from region to region, within the overall objective of achieving European added value.

Research should focus only on topics where there is a real need for EU involvement, and should be linked to EU and Member State policy needs.

The realisation of 6FP priorities in transport area will be close connecting with New Transport Policy White Paper [3]. In adopting the White Paper "European

Transport Policy for 2010: Time to Decide”, the European Commission is for the first time placing users’ needs at the heart of its strategy and proposing 60 or so measures to meet this challenge. The first of these measures is designed to shift the balance between modes of transport by 2010 by revitalising the railways, promoting maritime and inland waterway transport and linking up the different modes of transport. The European Commission wants to ensure that the development of transport in Europe goes hand in hand with an efficient, high-quality and safe service for citizens.

With its new Transport Policy White Paper, the Commission is proposing an Action Plan aimed at bringing about substantial improvements in the quality and efficiency of transport in Europe. It is also proposing a strategy designed to gradually break the link between constant transport growth and economic growth in order to reduce the pressure on the environment and prevent congestion while maintaining the EU economic competitiveness.

The main activities within this Action Plan are:

- *Promoting passengers’ rights:* The Commission will shortly be proposing a reinforcement of air passenger rights, including compensation where travellers are delayed or denied boarding due to overbooking by airlines. The next step will be to extend the passenger protection measures to other modes of transport, notably rail, maritime and, as far as possible, urban transport services.
- *Improving road safety:* Over 41 000 Europeans lost their lives on the roads in the year 2000. The Commission wants every effort to be made to halve the number of road deaths by 2010. It will submit proposals concerning the development of appropriate signposting of black spots, combating excessively long driving times, harmonising road transport penalties at European level, and considerably increasing the use of new technologies: safe new vehicles, the protection of vehicle occupants in the event of impact, and the setting of safety standards for the design of car fronts in particular.
- *Making safety a priority:* More generally, the Commission’s objective is to ensure that safety takes priority in all circumstances. Citizens must be guaranteed the highest possible level of safety as a result of appropriate legislation and the strict application of controls and penalties for modes of transport such as aviation, shipping and the railways.
- *Preventing congestion:* If nothing is done, Europe will rapidly be threatened with “apoplexy at the centre and paralysis at the extremities”. The Commission is proposing to put an end to current trends and shift the balance between the different modes of transport through a proactive policy to encourage the linking-up of the different modes and promote rail, maritime and inland waterway transport. Therefore, the Commission will create a new programme to promote intermodality, called “Marco Polo”.
- *Towards sustainable mobility:* Transport in Europe must, as a matter of priority, be compatible with environmental protection. To this end, the Commission is proposing a wide range of measures to develop fair infrastructure charging which takes into account external costs and encourages the use of the least polluting modes of transport, to define sensitive areas, in particular in the Alps and Pyrenees, which should be eligible for additional funding for alternative transport, and to promote clean fuels.
- *Towards harmonised taxation of fuel for professional road transport:* harmonising taxes on diesel for professional use would reduce distortions of competition on the liberalised road transport market.
- *Ensuring a high quality of transport services in Europe:* The development of transport in Europe must go hand in hand with a high level of quality. The Commission is recommending in particular the harmonisation of working conditions, especially in road transport, and the maintenance of high-quality public services. In addition, in compliance with the subsidiarity principle, it intends to encourage good practices to ensure a high quality of urban transport services aimed at making better use of public transport and the existing infrastructure.
- *Carrying out major infrastructure work:* In the context of the trans-European networks, the Commission is proposing to concentrate on the missing links (in particular the trans-European high-speed passenger rail network, including airport connections) and infrastructure with genuine potential for transferring goods from the roads to the railways (in particular the large-capacity rail link across the Pyrenees).
- *Galileo, Europe’s radionavigation system:* Satellite radionavigation technology is at present in the hands of the United States and Russia. The time has come to offer Europe’s citizens a reliable European system offering everyone everywhere new universal services: location of vehicles, telemedicine, and geographical information systems for agriculture for example. The Commission is proposing that the Galileo system should be operational in 2008.

- *Managing globalisation*: All too often Europe's appearances on the world stage are uncoordinated or inadequate, to the detriment of efficiency. The White Paper is proposing to raise the European Union's profile within international organisations such as the International Maritime Organisation (IMO) and the International Civil Aviation Organisation (ICAO) to make Europe more assertive and place the EU at the forefront of the efforts to improve safety and protect the environment.

The new White Paper advocates a qualitative change of direction in transport policy in order to ensure that measures to promote an environmentally friendly mix of transport services go hand in hand with the measures to open up the markets. The competitiveness of Europe economy and the establishment of a high-quality European model for citizens will depend upon the common desire to bring about the proposed changes.

2. Transport and logistics in the European platform for transport research

Also one institution is active actor in transport research area.

In 2001 the European Platform for Transport Research (EPTR) was established to improve co-operation and co-ordination between national transport research programmes. Of course several organisations and networks of co-operation already existed before. The aim of EPTR is not to compete with these, but to identify what measures are needed in order to further improve the research co-operation and hopefully create the options for these actions in the future.

The origin for EPTR was laid by the committee of national representatives to Key Action 2 "Sustainable Mobility and Intermodality" (part of the 5th Framework Programme). The group however found that although EU research co-operation is important it should be extended by increased multilateral co-operation of national research. The motivation for this is that:

- 85% of transport research in Europe is still funded by national bodies,
- As transport problems are more or less the same all over Europe there is overlapping and/or complementary research going on.

The aim is to improve research by creating enhanced co-operation for different levels and modes of research. It is however regarded important to maintain national control over the national funds [4, 5].

The work of EPTR is carrying out in four clusters:

- Traffic safety,
- Freight transport logistics,
- Monitoring Transport policy in Europe,
- Intelligent transport systems.

EPTR wishes to start the process by initiating concrete activities to facilitate and stimulate co-operation. As regards instruments of co-operation the following could be relevant: exchange of information, synthesis of project results, joint analysis of results, joint project definition, joint projects, joint programme implementations and joint programming.

This list indicates that different instruments could be used at different stages of co-operation. The EPTR group is open to discuss the options in all these kinds of instruments.

In order to get an overview of the research activities in the European countries and to provide the participants with ideas on how to generate co-operations actions, in 2002 the organisers elaborated a questionnaire covering five topics:

1. How has the logistics developed in the last decade?
2. What have been the most important national research findings in the last decade?
3. Have these research results been implemented?
4. What are the most important ongoing and future research areas?
5. What will be the most relevant areas and types of research co-operation in Europe?

Logistics research has developed as an area for science during the last decade. Questions about supply chain issues have been brought up to corporate management levels and the researchers have gained resources for their work with superior development.

Answers to question 1: How has logistics developed in the last decade?

A snap shot of some significant developments in logistics in the last decade are:

- *Environmental friendly logistics*. How are you going to transport your incoming and outgoing goods? Within an intermodal transport solution with minimized carbon oxide emissions and less traffic jam affection or by a standardized trucking end-to-end solution? The transport buyer and logisticians of the last decade have become more aware of environmental issues than ever before. One could easily say that the green wave has captured the logistics and freight market. Logistics and transport companies have adopted the ongoing trend and focused on new solutions. Intermodal transports are a growing concept where many of

the market actors are trying to increase their freight volumes.

- *The “new” logistics companies.* A decade ago most of the actors in the logistics area talked about themselves as transport or freight companies. Today we are almost exclusively dealing with logistics companies offering more than just pure door-to-door transports. Logistics providers as third or fourth party are taking care of issues along the supply chain. They offer traditional logistics services as transportation and warehousing but they have also increased their portfolios with more value added services, e.g. assembling and risk management.
- *Measurements in Logistics.* Nowadays logistics is seen as one of the main enablers in the value chain. In order to build an efficient supply chain one must be able to follow up the operations along the chain. Cooperation along the supply chain put up a high demand for coordination and joint planning. Customers are interested in total supply efficiency built on e.g. rate of on-time deliveries, cycle times, picking rates etc. The complexity of the supply chains is handled by a greater amount of integration.

Answers to question 2: What have been the most important national research findings in the last decade?

Some of the most important national research findings in logistics in the last decade are:

- *The shift to Multimodal Transports.* Long time sustainable logistics will be reached by increased use of alternative transport systems. The traditional door-to-door trucking will be replaced by intermodal transport chains including railway or sea shipping whenever it is possible. Research findings have shown that technical and organizational support can be used to reach new logistics solutions based on more transport modes than just road transport. One of the key factors for success in this area is infrastructural investments in equipment for shifting the loads along the supply chain.
- *Telematics as a useful tool.* A decade ago most of the actors in the logistics have barcodes as the only way of collecting data about the freight shipment. Today we have alternative methods in RFID-tags, GPS-transponders, GSM-phones, etc. The networking capabilities including the Internet have also been a main reason for the ease of sharing information between different supply chain actors.
- *Enhanced City Logistics.* The freight deliveries to our city centres are one of the most difficult tasks

to solve for logistics researchers of today. Most of the countries in Europe are facing a growing urbanisation and the infrastructure of the large cities is not capable of handling a large increase of the number of vehicles in the cities. New concepts with city distribution centres for transferring goods from large shipments to smaller city distribution are arising. The solutions are also heavily dependent on environmental issues like less pollutions and traffic jams. The building of new concept has been made in close co-operation with the local authorities and others.

Answers to question 4: What are the most important ongoing and future research areas?

Some of the most important ongoing and future research areas in logistics are:

- *Make the policies decisions “easier”.* The wind of change is blowing in the field of logistics. You can only make the right decisions if you know or at least have a good idea of what comes tomorrow. The exploration of logistics trends and causality analysis of supply chain effects have to be accomplished. When policy decision makers take their stand point they relay a lot on the researchers and their findings. Simulation, scenario planning and processes analysis are some of the tools for conducting these studies.
- *Cooperation in logistics.* The logistics area includes a large number of actors. There are private market actors as shipper, hauliers, etc. There are public stakeholders such as governments, regional authorities, etc. And there are a lot more. If we want to maximize the outcomes of logistics research and solutions development there has to be close cooperation between actors involved. E.g. in cross border transport systems, IT-solutions and joint risk management.
- *Learning and logistics change.* The findings from research projects have to reach the market. If we want to be able to implement our ideas we have to know how the logistics systems change. We have to match the industry needs and the know how of logistics staffs.

Answers to question 5: Some of the most relevant areas and types of research co-operation in Europe in the future:

- *Infrastructure.* The logistics systems are heavily dependent on the infrastructure. The road and rail networks have to be harmonized. The information systems with their interfaces have to be standardized. The roles of authorities must be similar in different countries. Research and development programs are main enablers in the

process for better infrastructural prerequisites.

- *Tools and methods.* Information and Communication Technologies (ICT) and Telematics have led the logistics market in a new era. Computer programs such as planning and simulation tools have done the job a lot easier for logistics developers. Data management and warehousing have enabled cross supply chain measurements. The progress must go on and research projects are well suited as a forum for growth in this area.
- *Logistics Innovation Systems.* As we have mentioned earlier in this minutes best practice cases are a well known tool for logistics researcher. The concept can however be transferred from traditional information sharing of state of the art solutions to a more holistic view on the development process itself. If we are able to identify new ways of dissemination of know how in the research area we are better prepared to implement our findings. Knowledge of the innovation systems can indeed support the progress in logistics research.

The basis for transport logistics research is analyses of the quick changes on the market and correspondingly within the logistics field, where new applications and concepts for better logistics efficiency occur all the time. In such a dynamic surrounding there is a need for research that explains the factors behind and contributes to a long-term competence build-up in academy and industry. The long-term view is implied by good and stringent analyses of well-defined competence areas, developing our knowledge and explaining what's behind trends and concepts, but also how industry can put our practice in its operative reality. In other words, we have to know the logic of business so that we can estimate potential effects from changes in logistics via our research.

Based on this dynamic business environment, EPTR have defined following areas for future research:

- *The interplay between logistics and marketing strategies.* A successful business design is characterised by strategies that create prerequisites of large volumes and operative platforms, which make opportunities of high profitability. The more dynamic surroundings with rapid changes in demands and keen competition, the more important is the interplay in the development of strategy and operative efficiency. In this context marketing and product development have the role of creating growth, while profitability is created in the operational processes and in the field of logistics. One common denominator is that logistics not only shall make a contribution to low costs and high service level, but also by means of well designed logistics platforms supporting new market positions.

Therefore EPTR suggest research in order to understand logistics structures and systems in different industries and branches:

1. Define best practice in terms of costs, delivery time and lead times, by industry/branch, including key figures for operational performance.
 2. Describe the marketing context and from that demands on operational and strategic flexibility in the logistics strategies, structures and systems.
 3. From 1-2 above, predict future changes in supply chain design and design of logistics platforms by industry/branch. (In this context, further research on the impact from E-commerce and IT/IS-development on logistics development is motivated.)
 4. How can the operational efficiency and effectiveness as well as the responsiveness on market changes are improved from further development of IT/IS and the use of E-commerce in logistics?
 5. What are the effects from different logistics structures and strategies on environment issues and recycling logistics? This is based on the hypothesis that if the logistics strategies and structures are wrongly designed, there is no operational options left to for the good environmental solutions in logistics and no opportunities to integrate logistics systems with recycling logistics systems.
- *Third party logistics.* For the past ten years we have developed wide knowledge of third party logistics, concerning underlying driving forces, obstacles and how the service companies can be conducive to different positive effects. Furthermore, research has been done on the service companies' strategic positioning.

The definition from the EU-research programme states that: "*Third-party logistics (TPL) are activities carried out by an external company on behalf of a shipper and consisting of at least the provision of and management of multiple logistics services*". Today these activities are offered in an integrated way, not on a stand-alone basis. The term has become to be somewhat of a fashionable word and is wrongly used also for simple services. For that reason, concepts like Integrated Third Party Logistics, Fourth Party Logistics, are now emerging. Even if these concepts imply the same as Third Party Logistics, its indicates a development to more high value services, in order to increase the service-content and from that increase the profit margins in the business. The result is new IT-based middlemen, between shipper and the traditional warehouse and transport providers.

Based on this development in the field of Third Party Logistics EPTR suggest following research areas:

1. Define opportunities of IT/IS/e-commerce applications for new intermediates to enter a supply chain or to eliminate existing parties in a supply chain. Do new applications improve the transparency and matching of real-time demand and supply of logistics services and transport?
 2. Explain and better understand the new forms of middlemen in the field of third party logistics, based on concepts of 4PL, Control Towers.
 3. In theory SME's with small volumes should gain most from TPL, but most TPL-concepts are for large corporations, with large volumes. Therefore it is important to define how TPL can be more available for SME's in the future.
- *Innovations in transportation and freight integrators.* In logistics development it is important to have instruments that enable us to prioritise innovations in terms of their contributions to policy objectives such as sustainable transport, transport efficiency and the reduction of road congestion and the environmental impact from transports etc.
 1. Innovations and diffusion of innovations: how to improve innovative behaviour of companies related to sustainable transport and how to improve the diffusion of "preferred" innovations.
 2. Bottlenecks and ingredients for success for intermodal transports, as well as opportunities for alternative intermodal transport concepts and prevention of transport from integrated product design, innovations in packaging etc.
 3. Opportunities from real-time transparency in the market matching supply and demand of logistics and transport services across all modes of transport, in order to identify optimal logistics and transport solutions based on the (transparent) availability of all combinations of unimodal/multimodal transport services and chains.
 4. Based on above, how IT/IS/e-commerce tools in this field can be available for small players on the market to find niches on the European logistics provider market.

In addition, the recent White Paper on European transport policy for 2010, recognised that further integration of transport and logistics is needed to maintain the efficiency of the transport system and that of one-stop-shop freight integration. In consequence, the freight integrators – ideally need to balance the relative strengths of each mode of transport. This gives the research question:

Which role will the freight integrators have in the

supply chain, and how could the process be efficiently and effectively carried out in terms of price and other attributes that customers value (e.g. reliability, transit time, absence of losses through damage or theft and added value logistics services)?

- *Implementation of logistics changes.* Many companies need to develop their organisational capacity for systems changes, i.e. how to manage a dynamic world around by high internal change capability, which is not the same as affective driving of change processes (which is the dominating view among established change management theories). The traditional linear thinking built on decisions and directives, for example implementation thinking, need to be supplemented by process and circular change thinking with continuous changes based on systemic learning.

To get the most out of logistics changes requires organisational change and methods for support or further development of change processes. EPTR suggest research in following areas:

1. What does the implementation process look like, before during and after the implementation?
2. How could the implementation process in logistics be improved, in terms of shorter and more accurate implementation times as well as improved involvement from strategic and operational personnel?
3. What is needed from measures and key figures in logistics to better support fast and accurate implementation of logistics changes?
4. How can the implementation process for TPL be improved?
5. How can simulation and visualisation tools be used to speed up the implementation processes?

Globalisation and other economic dynamics have put the logistics system under several recent structural changes. The main trends having place in the recent times have been the restructuring of logistics; the realignment of supply chains, the rescheduling of product flows, and changes in transport management and product design. The restructuring of logistics is a consequence of the spatial concentration both in production and inventory, while the suppliers and consumers are widespread all over the world. At the same time, the transport sector has seen a move towards the concentration of transport in distribution hubs and therefore the development of hub and spoke systems, linked through transshipment, has been achieved. Regarding the supply chain management, the most relevant changes are the increasing customisation of the product closer to the end consumer

(postponement) and the concentration of international trade in major hubs, connected with other areas by spokes and transshipment systems.

All these change processes have been accompanied of equivalent reformulation of the Supply Chain, leading thus to a new system configuration that requires in-depth analysis of real world practice in order to answer the following questions, which are determinant for any policy formulation:

- What is the current state of logistics and supply chain management trends across the EU?
- How is it likely to evolve over the next 5-10 years on a 'business-as-usual' basis?
- To what extent might supply chain and transport performance be improved over this period given our knowledge of best practice and optimisation potential?
- What policy initiatives will be required to achieve this potential and foster the sound development of effective and efficient logistic chains?

Supply Chain Management requires different companies to take some form of co-ordinated action in a consistent and coherent manner. However, the practice of each individual company or unit from a company in optimising its own logistics decisions does not provide the optimum solution for the whole supply chain. To cope with this problem we need to improve the information flow through the whole decision-chain. Optimal solution can only be found by having complete information on every relevant aspect at each key node of the decision chain. This situation can only be reached when all the participants in the chain share information flows and agree in joint decision making.

Regarding supply chain configuration, it was found that the process of vertical disintegration, which reverses the prevailing trend during the 1960s and 1970s, is adding extra links to the supply chain and might be increasing the transport intensity of the production process. These trends create also a new environment in freight transportation and distribution systems in Europe, largely characterised by:

- Deregulation of the freight transport services across all modes.
- A strong trend towards privatisation of transport operations and public/private partnership for the financing of transport infrastructure.
- Stricter environmental regulations.
- Strong policy inclination towards the use of intermodal transport.
- Increase of the transportation services market size in terms of geographical spread, goods transported and services provided.

- Technological advancement and increase in the use of information systems and telematics applications.

Moreover, the analysis of the relationship between SCM trends and freight transport system utilisation suggest that there is a visible trend towards:

- More rational development of the fleets.
- More efficient utilisation of the transportation resources.
- More rational utilisation of the transport modes.
- This new environment characterised by the interaction between Supply Chain.

3. Conclusions

Implementation of management and freight transport systems is favourable for:

- Better and more efficient utilisation of resources (vehicle and infrastructure).
- Policy pushes for the use of environmental friendly modes and use of intermodal transport.
- More intense competition for the provision of freight transport services.

The configuration of the supply/distribution networks will provide private sector decision makers with the necessary input information for developing suitable policy measures for steering of the transportation and logistics sector. Hence it is important that EPTR outline which are the EU policies underpinning the evolution of logistics and supply chain management trends.

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