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RAISING EXTERNAL LOGISTICS INDUSTRY IN EUROPE: A SYSTEMIC VISION OF THE ECONOMIC APPROACH

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1. Introduction

In the last years the demand for logistics services by manufacturing and distribution firms has significantly increased. This has created the conditions for the development and the transformation of the logistics industry in Europe.

In the paper we try to focus these elements by using an integrated economic, territorial and environmental approach. To understand better the role of logistics services in keeping the competitiveness of economic systems we will therefore analyse elements of efficiency and inefficiency arising from the use of different types of resources: private resources – directly organised by logistics industries; public resources – coming from public funds for infrastructures and public additional services; common goods – land, air, time, life quality, etc.

We will first focus our attention on external logistics industry. We will therefore propose some definitions for logistics operator and logistics services process. A model shows our hypothesis about the logistics industries positioning in the sector, trying to get over differences and to stress homogeneity among different logistics sub-sectoral activities. We believe it is now essential to analyse both the technological vision and the economic vision. The main goal is to get over the traditional classification based on different technologies used by transport operators, warehousing operators or terminal and multimodal operators and to draw the attention also to a new classification, based on the integration degree of logistics activities along the supply chain and on handled products variety.

Even if the focus is on the dynamics of logistics as an economic sector, territorial and environmental matters are very important. Logistics services, connecting production and consumption systems, act in a territorial and environmental system and use public resources – infrastructures and environmental goods. As a consequence, real efficiency can be achieved as the sum of economic, territorial and environmental elements, in a systemic vision.

External logistics will be discussed as a point of logical integration between macroeconomics and territorial strategies, a field where we can combine economic system's competition elements and sustainable development goals.

Therefore, the contribution here presented primarily suggests a new methodological approach to the analysis of the logistics industry. The main attention has also been done to the internal European market, of which some data are considered representative of the logistics market dimension, technological innovations and infrastructures endowment. The others statistical data here considered regard the Italian situation as derive from specific researches on these same matters.

2. The characteristics and dynamics of external logistics industry

A strong reorganisation process is currently characterising the logistic activities both from the manufacturing industry and from the logistic services providers point of view.

From the demand side, in the last two decades, production models have deeply changed, due to the market globalisation and to the competition intensification. From a system characterised by the centralisation of all production phases in a unique production site or factory, the manufacturing industry has shifted to a new production model. This is made by a number of different firms, each working on a specific production phase in a very specialised way. The system as a whole creates what we call a supply chain, where each firm has its own particular task in the whole production process. It can therefore innovate or change some production elements quite easily in the short term, in order to increase production flexibility and to offer personalised goods in right time and of high quality.

Because of these innovations in the production process and aiming to maintain or increase their market shares in a long term perspective, the firms in the supply chain must co-ordinate the production processes. The success of the whole supply chain depends on capabilities in integrating production processes and in organising and managing activities and resources flows among the firms along the chain.

Moreover, due to the competition constraints, the reduction of costs, especially in consumer goods markets, has become a must. From the production phase point of view, firms must then be able to shift to just-in-time production model to reduce stock, store and unsold costs. From the distribution phase point of view, firms must be able to organise their activities to make right goods arrive in the right place in the right time.

The organisation and management of goods handling, warehousing and transportation activities for all the companies, what we call external logistics services, must therefore be considered essential to meet industry's production and distribution needs along the supply chain. And it is easy to understand how the efficiency of these activities can influence production and its capability to compete on the final markets.

At this stage of the production system's dynamics, the entrepreneur begins to perceive the high importance of logistics costs (together with their rising). Moreover the acquisition of adequate knowledge and capabilities in logistics organisation and management becomes crucial facing new markets needs. And, at the same time, costs of "non logistics" emerge and rise: costs resulting from the absence or weakness of a specific logistic function.

As a consequence of this dynamics the internal management and execution, but even organisation, of external logistics activities can turn out to be economically not interesting. In such a framework we observe a stronger and more steady trend towards outsourcing of external logistics activities (the whole process as well as parts of it).

On the supply side, according to these new perspectives, we can see the conditions for the rise and reinforcement of external logistics services supply as an industrial sector acting on a specific market. To be clear, we can refer to:

- a specific sector, because logistics can be envisaged as a whole kind of activity, adding up a huge variety of services of handling, flows organisation, management and transport of goods.
- an industry, because adequate external logistics management and distribution activities require now different support chains, variously integrated, based on well-defined and compatible procedures, techniques and technologies.

Moreover, high capabilities in innovation, organisation, and information technologies are now more and more necessary in order to meet a demand requiring day by day a higher quality level.

A last point regards the need to find out a way to evaluate logistics industry's current internal dynamics, as a "mirror effect" of the demand side strategies.

Manufacturing and distribution industries aim to outsource their logistics activities, provoking a rise in the demand of its activities to the specialised operators. Trends, on the other hand, show a growing tendency to ask for more integrated logistics services. Consequently, logistics industry is growing, developing capabilities and resources in order to offer a larger variety of services for a larger number of different goods that have to be managed and transported along the supply chain.

Trying to better identify this whole logistics industry sector and its evolutionary path, we think it is important to emphasise firms' common elements. This permits to get over the heterogeneity in technology, techniques and management which characterises the different subsectoral activities – warehousing, transport, terminal containers operators, multimodal operators, etc. –. Thus, we can focus our attention to some prevailing economic elements. We therefore propose our definitions for Logistics Operator and Logistics Process.

Logistic Operator

The company who organises, manages and implements parts of the whole logistics process as for its client.

Logistics Process

The whole of activities which – by a systemic way – plan, manage, move and control, the flows of goods (materials and products), services and related information throughout the supply chain.

These definitions stress three essential conditions:

- the services supplied by the logistics operator must be identifiable in one or more activities concerning with management, flows organisation and transport, that are outsourced by his client along the supply chain;
- logistics services, that can be envisage as the logistics industry's product, must be organised by the logistics provider itself;
- the logistics operator's added value derives not only from operational performance, but more and more from the capability to innovate both in technology and in organisational structure and processes

The whole of firms operating under such conditions identifies the logistics industry.

It is therefore possible to describe the configuration of the logistics industry on the basis of two operative issues that seem to be common to all the logistics operators:

- the number of individual logistic activities – functions - organised by the firm along the logistic process serving the whole supply chain: one function (mono-function) versus several functions (multi-function);
- the variety of handled goods: one product or product category (mono-product) versus several products or product categories (multi-product).

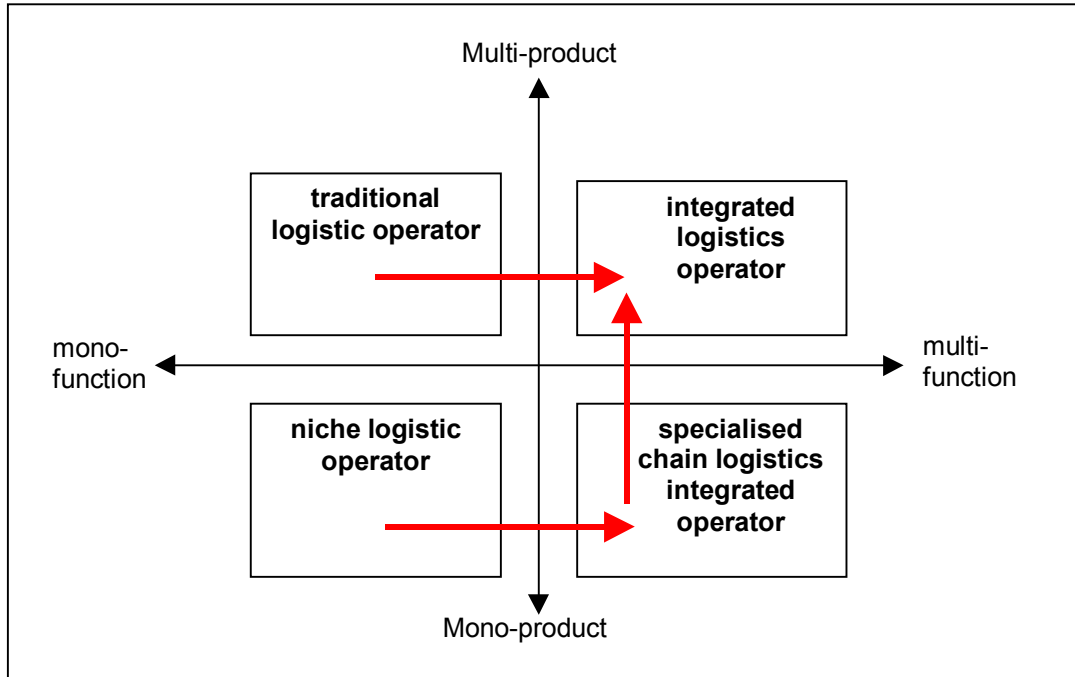
On the basis of multiple combinations of these two elements we can identify four categories of logistic operators,. The discrimination element is the integration degree in terms of number and variety of handled goods and logistic activities along the supply chain. The categories are the following (see also figure 1):

- mono-product and mono-function - niche logistic operator:
an operator who manage a single function along the logistics process for a single type of product;
- multi-product and mono-function - traditional logistic operator:
an operator specialised on a single main function and, in general, ancillary activities but operating for a large number of products;
- mono-product and multi-function - specialised chain logistics integrated operator:
an operator supplying a wide range of logistics services for a single category of products;
- multi-product and multi-function - integrated logistics operator:
an operator who's logistics supply concerns a wide range both of activities and products. It is able to manage a whole part of the logistics process or all the process for different chain.

In figure 1 we can see the operators' strategic positioning in the sector. We can also observe trends pushing logistic firms to the right and the upper part of the scheme. This means that firms moving in these directions are enlarging both the number of handled products and the number of supplied logistic functions. This tendency attests

organisational and management strategies oriented to the integration in terms of handled goods, operational logistic services along the client's supply chain and territorial localisation.

Figure 1 – Logistics industry sector positioning and dynamics



Source: Boscacci e Pesaro, 2001

We can observe two main dynamics:

- several traditional logistics operators are enlarging the range of supplied logistics functions, by a vertical integration, moving towards the integrated logistics operators' category;
- some specialised chain logistics operators are also moving toward the same area. They tend to cover new supply chains, which presents homogeneous characteristics with the previous in terms both of handling or manufacturing process or geographical localisation.

These new positioning strategies are realised by the acquisition of specialised operators in the specific areas or co-operation and participation exchanges. They permit to respond efficiently to the demand developments, conforming to the quality, security and flexibility requirements, and to achieve:

- a world-wide market cover;
- a high knowledge;
- scale economies;
- high financial resources for infrastructure and ICT investments;
- an easier enlargement of the supply services rate;
- the facility to handle and move very different products.

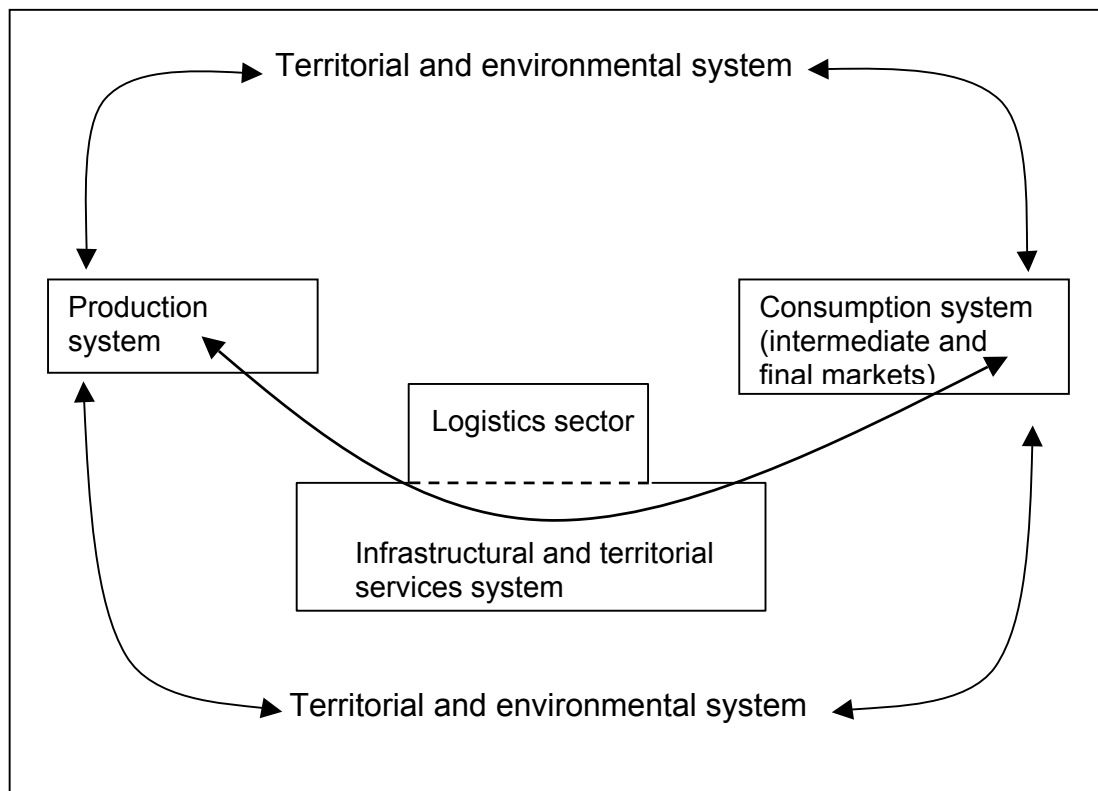
3. The role of logistics industry in maximising efficiency at the territorial level: a systemic vision to the economic approach

In our view, the economic system finds an important element for reaching systemic territorial efficiency in logistics. We will therefore refer to the various elements interacting on the territory as follows:

- logistics industry, as the whole of operative and organisational activities and physical and economic infrastructures for logistics services production;
- economic system, as the total demand for logistics and infrastructural services;
- environment, whose quality dynamics act as an indicator of functioning problems in the economic and social territorial system.

Figure 2 shows the interactions among the different systems on the territory.

Figure 2 – Interactions of the whole of logistics and infrastructural production system



We will therefore analyse the role, the functions and the influence of logistics in the economic and territorial systems and we will make reference to three levels of efficiency:

- the first one considers the efficiency of external logistics industry itself as a component of the economic system and a resource able to connect producers and consumers;

- the second one integrates the economic efficiency of the external logistics industry with the performance of territorial infrastructures as a resource that can seriously affect logistics sector's efficiency and, consequently, economic system's performance;
- the third deals with the trade-off between economic efficiency of the sector's activities and negative externalities produced on environmental and social common goods.

The discussion will then focus on efficiency in terms of use of private and public resources. Public resources will be divided into two main categories: infrastructures and other public services, whose use is directly involved in logistic services production, and environmental and social public resources, used in indirect way as affected by negative externalities.

3.1 Efficiency in the use of private resources: strategies to optimise costs and resource use in logistic industry

Since the outsourcing of logistics services is an optimisation process aiming to reduce industrial costs, it is clear that the efficiency of logistics industry becomes an essential element to achieve the general economic system's efficiency.

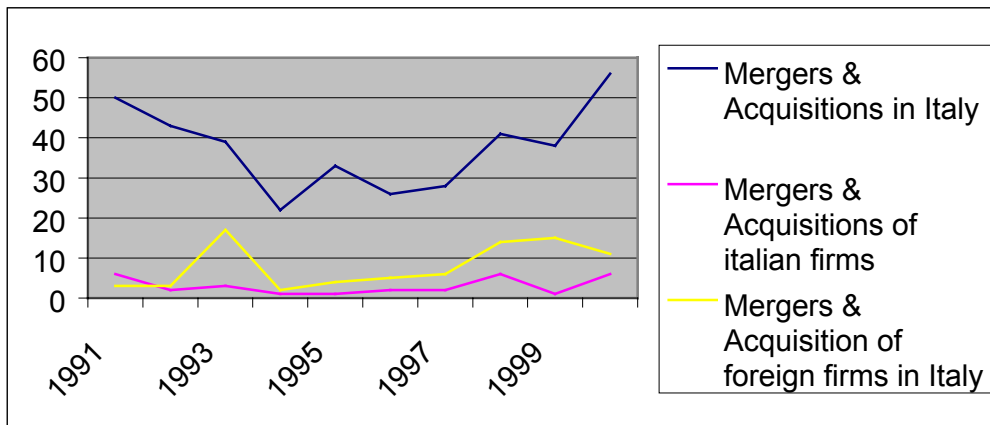
As seen in the previous paragraph, the driving forces of the economy globalisation are now pushing the logistics traditional sectors to change their strategic market position, in response of a new logistics demand. This is creating an innovative and complete logistics industry, which offers a crucial support to the success of the other economics activities. Moreover, this is leading to a concentration of the supply market in some large companies, able to realise very expensive investments, innovating their organisation and "product".

The European logistics market is no more fragmented in very different operators; few logistics companies offer integrated services, often externalising the simple physical execution of some non strategic functions to other small firms, which become the suppliers of the new growing industry.

As a "mirror effect" of the increased outsourcing demand, the process of supply concentration aims to achieve high scale, scope and localisation economies. Even if it is still not easy to perfectly identify logistics industry operators in official statistics as we are adopting a different definition, it is interesting to observe the available data on Italy's dynamics, as represented in figure 3¹. They are related to mergers & acquisitions process: in the last years several Italian logistics companies have been bought by Dutch, England and German firms.

¹ Federtrasporto-Nomisma (2001), *Scenari dei trasporti. L'internazionalizzazione del trasporto: la posizione dell'impresa italiana*, Quaderno n. 4.

Figure 3 - Mergers & Acquisitions dynamics in Italian logistics providers sector



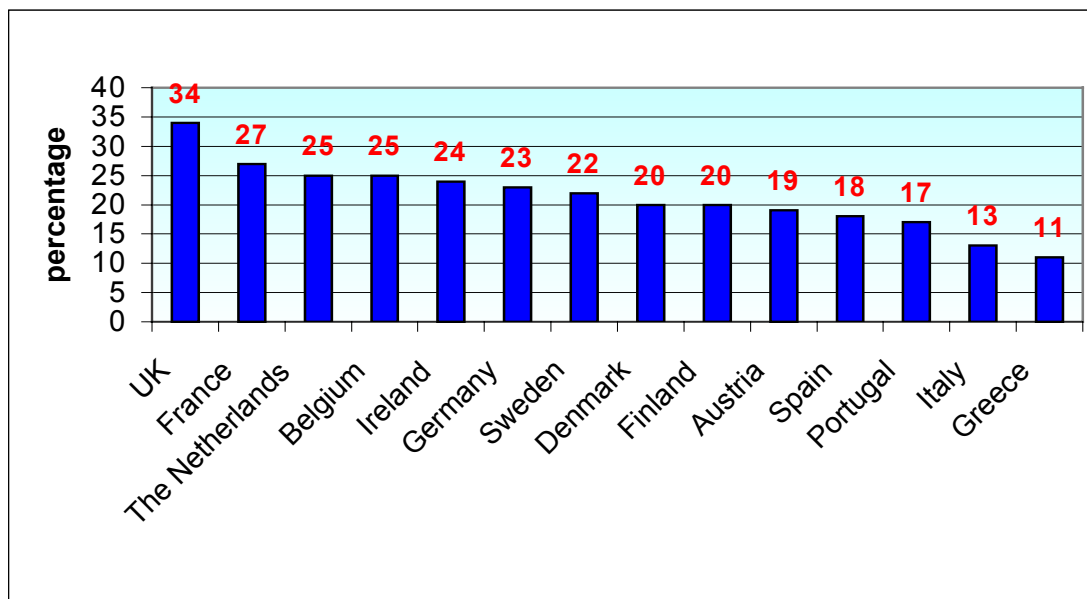
Source: elaboration of Federtrasporto, 2001 (Nomisma's database)

Evidence of these dynamics can be found in market evolutionary trends, remembering that the logistics industry appears as a demand pull sector.

Therefore, the first element to be considered is the dimension of outsourcing trend as a measure of demand increase.

A recent European Commission document (2001) presents, as shown in figure 4, the Marketline's estimates on logistics outsourcing. In the European market the percentage of logistics activities outsourced is strongly different from country to country. In the UK the rate of outsourcing is higher than in the other European States; while in the countries of South-Europe the process of logistics outsourcing is developing more slowly. In Italy it is still at 13%.

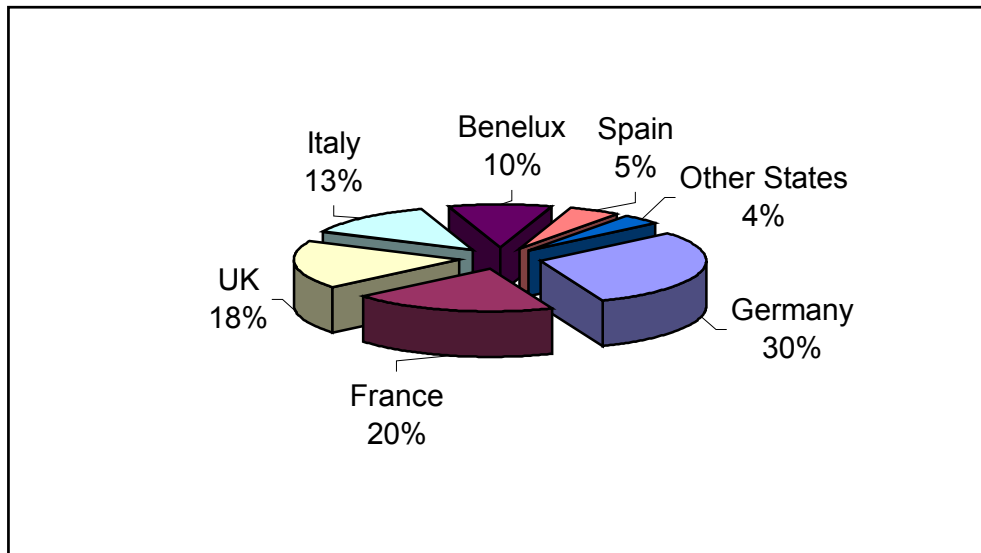
Figure 4 - Logistics Outsourcing In Europe



Source: European Commission, 2001 (data 1998 of UPS Worldwide Logistics, Marketline)

Referring to the more recent market evaluation of “Italian Transportation Account” (Conto Nazionale dei Trasporti - CNT), only the 13% of the European logistics market is in the Italian hands (see figure 5).

Figure 5 - Logistics market shares of the European States²



Source: Conto Nazionale Trasporti, 2000

The market of new logistics appears characterised by the demand coming from large manufacturing firms and by large scale retail trade companies. Small and medium firms, on the contrary, still express a modest demand .

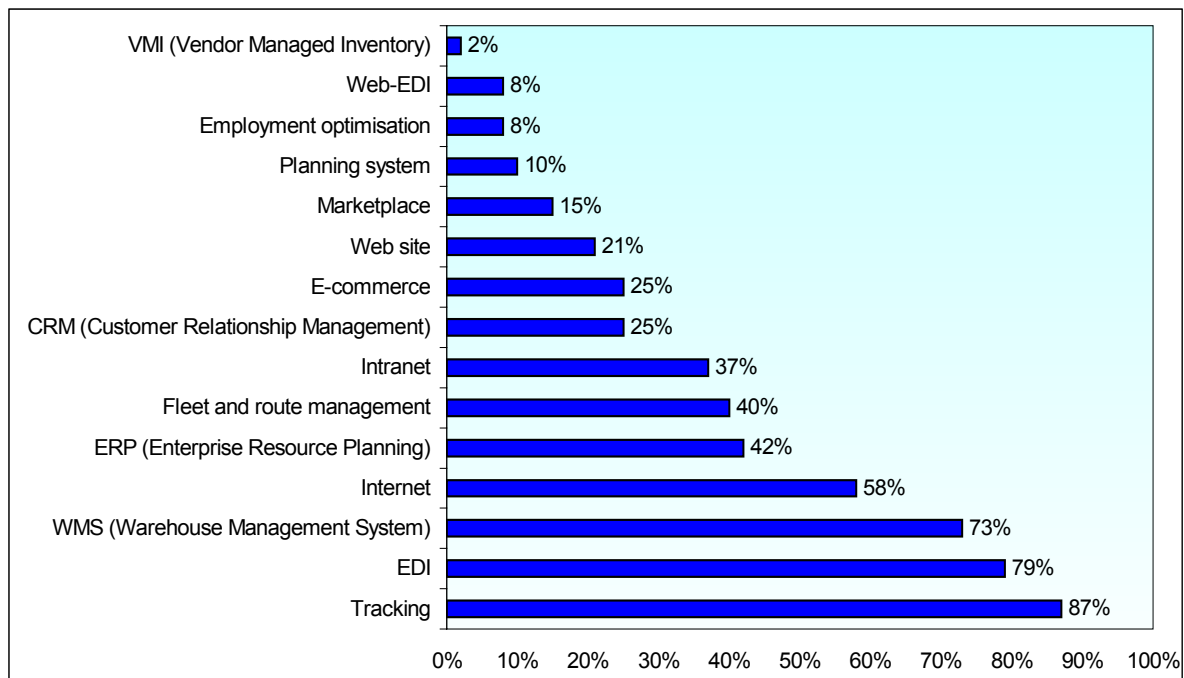
From the supply side, Italian logistics operators seem to have a more difficult task than Northern European and North American operators. Physical and economical structures are not large enough to easily allow concentration strategies and investment policies comparable to the international level. A demonstration for this is the entrance of foreign companies on the Italian market directly in leadership positions.

Information and communication technologies play an important role in firm evolution within the logistics sector. This because these technologies can empower more efficient and effective links with clients' information systems. In logistics industry ICT can be regarded as a central element to move from demand-pull to demand-push character. For instance ICT solution coming from logistics operators can push client firms to change their organisation (i.e. just-in-time).

As shown in figure 6, investments in ICT technologies increasingly permeate logistics functions.

² Ministero dei Trasporti e della Navigazione - Servizio Sistemi Informativi e Statistica (2000), *Conto Nazionale dei Trasporti e della Logistica*, anno 2000.

Figure 6 – ICT investments in European Logistics Companies³



Source: European Commission, 2001

The whole of technological, organisational and dimensional innovations is pushing logistics industry towards a more efficient use of private resources. In particular, in each country, the share of outsourced freight transport is growing. This produces a better systemic organisation of freight transport, a higher service quality and, last but not least, a reduction of private and collective costs.

3.2. Efficiency in the use of public resources: territorial infrastructures

Logistic services providers are now regarded as an industry. Operators therefore act on the markets according to specific strategies, management and organisation models and rules different than the past. From the demand side, production models have changed, keeping just-in-time production models and personalisation of final products. Also locations are now less important than in the past, as proximity to intermediate and final markets are not a priority any more compared, for instance, to labour costs.

This new situation tends to produce a different relationship with territorial services and a great importance is now given not only to the mere logistics services but also to

³ Commission Européenne - DG Entreprise (2001), *Impact des NTIC sur la logistique des entreprises commerciales*, Rapport final.

their location sites. This makes the need for a different placement of logistics sites or “interconnection knots”⁴ rise.

As an effect of these transformations, an evolution in territorial approach to these activities occurs. Logistics services use land, linear infrastructures, intermodal structures and common goods. Moreover their supply produces interactions with territorial elements and cross effects on territorial system which must carefully be analysed.

In such a framework, there could be several possible reading keys of relationships between logistics and territory:

- degree of availability and quality of each economic infrastructure typology;
- degree of accessibility of each economic infrastructure typology;
- quality of additional services;
- territorial system’s capability to supply an infrastructural system adequate to increasing intermodality needs.

At present, in Italy the equipment of “territorial sites or knots” for logistics appears jeopardised. This because of a long history of strictly sectoral activities and poor planning co-ordination. As a consequence, highways, rail, airports and harbours cannot connect easily, compromising the crucial conditions for modal interchange.

Milan is a perfect example. At present the largest metropolitan industrial area in Italy has no intermodal hubs. Consequently, shunting of enormous goods quantities is affected by serious inefficiencies (additional costs) whether it produces large amounts of negative externalities: urban congestion, air pollution, damages to people and reduction of quality of life.

We should therefore conceive a different conceptual approach when referring to infrastructures and goods territorial mobility. Linear infrastructures cannot be any more the only accurately considered element. The “net model” must instead be implemented, where a coherent construction of arches (linear infrastructures) and knots (punctual infrastructures) permits to obtain the necessary

- efficiency in duty vehicles circulation;
- effectiveness in goods provisions;
- equity in the distribution of collective costs arising from the use of large quantities of common goods in logistics services production, i.e. environment, space, energy, citizens’ time.

Important distinctions must be made about the degree of accessibility of knot infrastructures:

- a) infrastructures whose owner is the individual operator, characterised by high exclusivity in use. These are normally regarded as instrumental production factors for storage, loading and unloading activities and additional services (warehouses, distribution points, transit points);

⁴ Senn L., Boscacci F.(1998), *I luoghi della trasformazione e dell’innovazione: Economia, tecniche di analisi e politiche per la sostenibilità urbana*, Seat, Torino

- b) public accessibility economic infrastructures, like rail stations, harbours, airports, intermodal and container terminals, warehouses for public use, distribution platforms, distriparks and logistic city centres.

As an hypothesis, we could imagine large and concentrate industrial firms and large scale retail trade organisations producing goods flows economically sustained by large private logistics structures characterised by exclusivity in use.

The case of fragmented and dispersed production and distribution structures is different. Here the capability to reach scale and scope economies along the supply chain mainly depends on public access logistics structures. These kind of structures can actually concentrate a large number of small goods flows in a certain site on the territory. Goods are then re-distributed later on from this points to reach other little storage points closer to the intermediate and final destinations.

The Italian manufacturing system is characterised by a large number of medium and little size firms. This element, combined with the complexity of territorial and urban Italian reality, would then require a strong presence of public logistics structures. The systemic efficiency would be strengthened because of the public supply for central warehousing and organisation points to optimise freight trips, intermodality and vehicles loads.

At the moment, by the way, the supply for these kind of public logistics structures is not adequate. National Transportation Plans, at central and regional level, include financial tools to fund intermodality hubs and to move goods traffic from road to rail or sea transportation, but the system still seems not really working. Consequently, planning in this field should be re-oriented and integrated according to the systemic approach herewith proposed. Or, at least, according to an integrate approach to the control of the whole of positive and negative impacts on economic, territorial and environmental systems.

In figure 7 a comparison between Italian and other EU member states is shown, with reference to the four main typologies of infrastructure: road, rail, harbour, airport.

Figure 7 – territorial transport infrastructure equipment index in some European countries (EU average index=100)⁵

EU member states	Rail	Road	Airport	Harbour
GERMANY	159,3	101,5	110,1	83,4
SPAIN	35,8	51,4	67,9	74,0
FRANCE	109,3	94,6	92,2	68,9
ITALY	91,6	94,5	127,5	115,5
UK	136,0	218,2	135,8	229,8

Source: Ecoter and Confindustria, 2000

⁵ Ecoter e Confindustria (2000), *Analisi della dotazione di infrastrutture nei principali Paesi Europei*, Confindustria, Roma.

At the Italian level, efficiency should therefore be a central element in the future planning activities. And taking into account efficiency, in our approach, the development of territorial activities and infrastructures should be much more consistent with the evolution dynamics of production and distribution system. Moreover, planning should conceive adequate “logistics spaces” capable to integrate territorial networks functions. This also to let the production and distribution system taking real advantages from the best possible offer coming from the “new” logistics industry.

3.3. Efficiency in the use of public resources: environmental and social negative externalities

The production of logistics services, in particular freight transport, generate externalities on environment and society. Such externalities can be regarded as costs for logistic industries, because pollution means not completely efficient use of raw materials and energy (that is additional production costs). But, more important from a systemic point of view, they represent a loss in terms of common goods – environment and time in particular - available for collective use. This means that logistics industry uses public goods as a production mean, but costs are paid by the collectivity.

Reduction of externalities must therefore be seen as a central point to reach systemic efficiency.

The main externalities coming from logistics can be identified in environmental and social effects of freight transport.

To obtain a complete perspective of freight transport externalities on environment and society, according to TERM 2000, the EU Report on Transport and Environmental reporting Mechanism⁶, the following elements should be considered:

- energy consumption
- CO₂ emissions
- air emissions - NMVOCs and NO_x
- soil consumption by transport infrastructures and proximity to natural areas
- accident fatalities
- noise

At the moment it is difficult to find figures regarding only freight transport impacts to the environmental and social resources. To obtain an overlook on EU situation we have extracted some information from TERM 2000 report.

⁶ EEA (2000), *Are we moving in the right direction? – Indicators on transport and environment in the EU TERM 2000*, EEA, Environmental issues series n. 12, June

The growth in energy use for transport register a large increase. This led to increased emissions of CO₂ and other greenhouse gases, due to a transport system still based on fossil fuel engines. Transport is the fastest-growing consumer in the EU: its consumption grew by more than 42% (3% annually) during 1985-1997, while consumption by the remaining economic sectors rose only 11%. In particular, according to 1997's data, road transport is responsible for 73% of the energy use of the EU transport sector.

CO₂ emission levels are directly interrelated to energy consumption. CO₂ from transport in the EU increased 30%. This makes the transport sector the fastest growing source of emissions. Parallel to energy consumption, road transport accounts for 85% of all transport CO₂ emissions and we can expect CO₂ from freight transport being around the same level as for energy.

The trend in CO₂ emissions from transport is due to the little change in average energy use per vehicle-kilometre compared with the growing traffic volumes. There is evidence for an important increase in freight transport during the '90s, that has resulted in a doubling of tonne-km between 1970 and 1997, with the largest annual growth in road (4% annual rate on average) and short-sea shipping (3%).

Regarding air polluting emissions, trends show a decrease as a result of technological improvements in engines and fossil fuels quality itself.

The only exception is PM₁₀/ton trend for light duty vehicles (>3,5 ton.). A possible reason for this difference could be the increased frequency of this kind of trips, very often supplied by little transport firms or vehicles owners, which use old transport means and less quality fossil fuels.

About soil consumption, road and rail infrastructures take land mainly from agricultural use, but also from built-up areas, forests, semi-natural areas and wetlands. Linear infrastructure can constitute an important barrier, dividing communities. Transport infrastructure also imposes a significant threat to nature conservation by fragmenting and disturbing habitats, putting areas designated for nature protection under pressure and producing pressures on landscapes, natural ecosystems dynamics and biodiversity.

Transport infrastructures cover 1.2% of the total available land area in the EU. Again, road transport infrastructures are the main land consumer, 93% of the total area of land used for transport in the EU15, while rail is responsible for only 4% of total land-take and requires the lowest land-take per transport unit (i.e. passenger-km and tonne-km).

At the EU level, transport accident fatalities have decreased markedly during the 1990s, in spite of rising traffic volumes, but road accidents still claimed some 44 000 lives in the EU in 1996. Unfortunately this is not true in Italy⁷, where accidents are still increasing (Amici della Terra and Ferrovie dello Stato, 2002).

Noise annoyance from transport is increasing with traffic growth, especially near roads, railways and airports. In general terms, the harmful effects on man can be classified under three different categories: generic annoyance – between 30 and 45

⁷ Amici della Terra Italia and Ferrovie dello Stato (2002), *The environmental and social costs of mobility in Italy*, Ferrovie dello Stato, Rome, February

decibels, disturbance of activities - between 45 and 75 decibels, physical damage – more than 75 decibels. Externalities can be calculated in terms of population exposed to noise. In Italy, for instance, noise between 55 and 60 decibel from road transport affects 18.5 millions people and 600.000 people are exposed to more that 75 decibel⁸. In this case, again, a distinction between passengers and freight vehicles is difficult⁹.

As a final point, to obtain a general framework of environmental and social externalities, we should also observe congestion¹⁰. Congestion occurs when the traffic cannot be adequately absorbed by the capacity of the infrastructure and the time needed to make a given trip is larger then “normal”. In this case externalities directly affect people because of the time lost and the greater consumption of energy. Indirect effects are wasted time, noise increase and costs of delays, both for people travelling and third parties waiting for goods and services. Moreover this can result in greater environmental effects because of an increase in energy consumption and CO₂ and other air pollutant emissions.

In the study by Friends of the Earth Italy environmental and social costs of freight mobility have been calculated, trying to assign a monetary value to externalities produced by freight transport. Each element has been evaluated in a different way, trying to take into account all possible costs for the whole of negative effects coming from the externality itself.

Figure 8 - External costs traceable to mobility as a whole in 1999 (10⁶ euro)

	Greenhouse gases	Air pollution	Noise	Accidents	Congestion	Total
FREIGHT TRANSPORT						
Road	2,566	17,924	5,159	1,898	3,332	30,879
Light duty vehicles	0,743	6,423	1,744	0,959	1,513	11,382
Heavy duty vehicles	1,823	11,501	3,415	0,939	1,819	19,498
Rail	0,810	0,158	1,016	0,130	...	1,268
Air	0,640	0,570	0,900	0,211
TOTAL	6,582	36,576	12,234	3,926	6,664	63,238
PASSENGER TRANSPORT						
Road	5,846	18,704	5,907	25,829	7,815	64,101
Rail	0,154	0,432	1,078	0,810	0,360	1,781
Air	0,644	0,573	0,908	0,790	0,600	2,210
TOTAL	6,644	19,709	7,893	27,429	8,775	68,092

Source: elaboration on Amici della Terra Italy, 2002

In figure 8 an elaboration of the synthesis results is proposed. As one could expect, road transport represents the main externalities source. In particular, freight is mainly

⁸ Amici della Terra e Ferrovie dello Stato, 2002, op.cit.

⁹ Noise is not only related to the number of circulating vehicles, but also on overall annual distance travelled by each category of vehicle and on the degree to which each type of vehicle produces noise under average driving conditions.

¹⁰ Amici della Terra e Ferrovie dello Stato, 2002, op.cit.

responsible for air pollution and noise, while passenger transport external costs are concentrated on accidents.

To obtain a more complete framework for external costs from freight transport we also propose another indicator: the amount of external costs per vehicle for road transport. The indicator tries to establish a connection between total external costs per type of transport and total number of vehicles per type of transport (fleet). This could be seen as a possible proxy to understand the real contribution of passengers and freight transport in terms of external costs.

Figure 9 shows the results of our elaboration for the indicator.

Figure 9 – Amount of external costs per vehicle for road transport

	Greenhouse gases (10 ⁶ euro)	Air pollution (10 ⁶ euro)	Noise (10 ⁶ euro)	Accidents (10 ⁶ euro)	Congestion (10 ⁶ euro)	Total (10 ⁶ euro)	Fleet (millions)
Freight Transport External costs (FTE)	2,566	17,924	5,159	1,898	3,332	30,879	40,395
Passenger Transport External costs (PTE) (10⁶ euro)	5,846	18,704	5,907	25,829	7,815	64,101	3,321
FTE/ FT fleet	0,773	5,397	1,553	0,572	1,003	9,298	
PTE/ PT fleet	0,145	0,463	0,146	0,639	0,193	1,587	

Source: elaboration on Amici della Terra and Ferrovie dello Stato, 2002

Applying the indicator, externalities from freight transport result even more important than in the previous case. Again, the only element in which freight shows lower costs is accidents, but the difference is now really little. On the contrary the difference augments if we examine the whole of the elements. The impact per vehicle from freight transport is 9,298 as compared to 1,587 from passengers transport per vehicle.

Looking for system's efficiency the main results coming from these figures is the need for rationalisation and optimisation of freight transport activities. This therefore means the need for a better organisation and management of logistics activities, to reduce both the number of trips and not full loaded trips.

Adequate investments in and for the logistics sector should therefore produce not only improvements on the economic and territorial system but also on externalities mitigation actions. With reference to pollution and greenhouse gases emissions, for instance, policies should concentrate on intermodality, as rail and sea transportation show really better environmental performances as compared to road transportation.

4. Conclusions

In this essay we focus our attention on present evolution of logistics firms and industry in the European territory. We also analyse the whole of the complex relationships among the logistics industry, the production system and the system of intermediate and final consumers. Finally we introduce the environmental and territorial system, where economic activities take place and produce a whole of positive and negative externalities.

The possible recovery of margins of economic efficiency in logistics industry is one of the main findings. Moreover, an improvement in efficiency of logistics industry can produce an improvement in competitiveness of the whole territorial production structure.

By means of the systemic approach, we can also weight the different elements which contribute to the efficiency of the logistics/infrastructure system. As a matter of fact, a lot of expectations come from the capability to reach efficiency in this field. In a private perspective a reduction of prices and an improvement in services quality can be expected. From a collective point of view, effects like energy and soil conservation or reduction of pollution and traffic congestion can emerge.

As a consequence, we cannot project anymore an improvement only looking at the economic efficiency. We also have to carefully estimate social costs and benefits in order to attain sustainable development.

We think that the approach proposed in this essay is the right one to adequately reflect on this complex system. Moreover we think that from such an analytical framework the action path for both economic subjects and public administration could arise more clearly. This with two main objectives: firms competitiveness and development sustainability.

Researchers, anyway, should need more data and information than what is now available. The term “logistics” itself, even if broadly used in technical and common languages, doesn’t appear in official classifications of economic activities. In other words, officially, “logistics doesn’t exist”!

Much remains to be done, both to emphasise “the raising of logistics industry” in Europe and to give public administration the best possible advice to face these complex problems in a more effective way.

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