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Economic Logistics for Competitiveness and Development

Forte E., University of Naples, Italy, forte@unina.it
Iannone F., University of Naples, Italy, fiannone@unina.it
Siviero L., University of Naples, Italy, siviero@unina.it

Abstract: *During the last few years a new interdisciplinary field of research has emerged: Economic Logistics. The new subject, pionereed by American scholars and currently being further developed by a group of Italian scholars, encompasses,* inter alia*, appraisal of specialized infrastructures, issues of regional planning, market regulation and economies/diseconomies of both transport and logistic outsourcing. Systems of economic logistics are investigated using tools of economic, computational and simulation analysis.*
After an introduction to the main topic, the paper discusses perspectives related to the completion of pan-European multimodal transportation corridors.

Recent advances in Economic Logistics.

Economic Logistics deals with the study of the regional distribution of both logistic nodes and flows as well as with their management, governance and possible equilibrium over the network space, at local and global level. The main issue is identifying and evaluating the constraints and factors for the logistic and productive development of the regional economic system viewed as a network.

Economic Logistics can split in two categories of interest: the study of logistic systems and the study of the logistic services' industry. The former prevalently deals with productive networks (clusters, districts, "chains", etc.) and infrastructure systems (ports, airports, interports, railways systems, platforms, distriparks, etc.) as well as with the related

problems of regulation, planning, programming, projecting, financing, monitoring and management. The latter, dealing with the provision of logistic services, can be considered as a new branch of Industrial Economics.

Several Italian scholars have recently focused their attention on Economic Logistics (Bologna, 1998; Forte, 2001a, 2001b, 2003a, 2003b, 2003c, 2004, 2005; Iannone, 2003, 2005; Marrelli, 2002; Siviero, 2005a, 2005b). Earlier developments occurred in the United States during the '50-'60 as well as in the second half of the '80s.

In particular, Sten Thore, a scholar of the University of Texas, suggested Economic Logistics as a new field of economic science that concerns the analysis of the optimal allocation of resources within production and distribution systems for goods (1991). The main interest of an economic logistician, then, would be not only the physical flow of goods along the production-distribution chain, but also the formation of markets and prices along this chain as well as in different regions. Thore considers three dimensions of a logistic system: the *spatial* or *regional dimension* (a transportation problem), the *vertical dimension* (flow of a commodities from the initial use of resources to the completion of final goods demanded by the consumer), and the *time dimension* (inventory and warehouse problems). The tools of analysis employed by Thore are linear and nonlinear mathematical programming.

According Thore it is meaningless to pose the question whether the "real world" is in equilibrium or not. The significant question is instead whether an equilibrium or a disequilibrium model performs better in explaining empirical observations. Further, referring to work developed during the last years in Italy (Forte, 2003a, 2003b, 2003c, 2004, 2005), we propose to view Thore's theories from the perspective of four new dimensions or principles of Economic Logistics: *invariance*, *transversality*, *compensation* and *self-regulation.* These dimensions will be studied employing tools of economic analysis, simulation and computational techniques, and geographic information systems (GIS).

These dimensions incorporate the earlier ones considered by Thore (1991), while putting mostly in evidence the importance of the transportation as a strategic factor for creating value at territorial and productive levels. This occurs both through a redefinition of the global economic space and the introduction of new operation models concerning demand and supply of logistic infrastructures and services.

- The dimension or principle of *invariance* rests on identifying and measuring the cost differentials of productive inputs at various locations. Such differentials can arise from a more or less intense market pressure of logistic activities defining the competitiveness of products. It is worth recalling that the value of the underlying mathematical program of the logistic system is exactly exhausted by the shadow value of all scarce factors (the dual theorem of mathematical programming). Hence, a uniform minimization of total shadow costs occurs throughout the system.

- *Transversality* concerns the multi-nodal or multi-pathway aspects of the logistics network. There are always multi-logistic itineraries alternative to the unimodal solution for freight distribution. Close attention should also be paid to the possibilities of unitization of cargoes (intermodalism) as well as to the differentials in terms of positive and negative externalities among the several considered solutions.

- *Compensation* refers to the actual or implicit payment of productive factors according to their shadow price. Economic value may be created from physical refusals (e.g. through the reverse logistics and effective urban hygiene management) or from redundant production capacity (e.g. empty load journeys).

- Finally, the dimension or principle of *self-regulation* refers to the ability of regulation-deregulation to correct failures of the market mechanism. In this manner, it will often be possible move the markets closer to equilibrium (e.g. through the introduction of "Pigouvian" taxes, point-based driving licences in the road transport sector, etc.).

The dimensions of economic logistics now outlined can be investigated either simultaneously or alternatively in various sector and space-territorial applications. Thus employed, they may provide useful decision support for private operators and public authorities alike. In addition, Economic Logistics is poised to draw on contributions from allied sciences (Transport Economics, Public Economics, Regional Economics, Economic Geography, etc.). Innovative solutions and wide-ranging interpretations of logistic matters are thus becoming available.

Investigating the Economic Logistics dimensions: the case of the Pan-European multimodal corridors.

The simultaneous investigation of the new dimensions of Economic Logistics (*invariance*, *transversality*, *compensation* and *self-regulation*) can be considered as a dynamic process aiming at optimizing the flows and activities in the region according its opportunities and specific features. Efficient models of mobility and development can be pursued ensuring competitiveness of the products and services involved. The analysis will also reveal the potential of relieving negative impacts related to the start-up or expansion of infrastructures, production and services.

"Corridor policies" constitute a good example of the simultaneous application of the principles of Economic Logistics. Such policies rest on the local optimality conditions for alternative opportunities of transversal itineraries, bearing in mind the possible compensation of productive activities or functions previously managed in a sub-optimal manner.

In Europe, the "corridor" concept arose in the context of the pan-European transportation infrastructure. The so-called "Pan-European Transport Network" was developed at three Pan-European Transport conferences: at Prague in 1991 where the concept for transport infrastructure was adopted (later to become the "corridor"); at Crete in 1994 where the countries of Western, Central and Eastern Europe identified nine long-distance transport corridors as priorities for their infrastructure development; at Helsinki in 1997 when a tenth corridor and the Pan-European Transport Areas for maritime basins were added.

The corridors mainly lie within the European Union and thus form parts of the "Trans-European Transport Network"; the remaining sections are in the territory of Balkans, Russia and the Western New Independent States (WNIS)[1] and Turkey.

The Economic Logistics approach to the study of corridors focuses on the major intermodal routes and on the interdependent economic and social activities at local, interurban, national and international scale. A similar approach can be found in Reynaud (2003).

The introduction of the intermodal dimension considers not only the links but also the interchange nodes of the logistics network. In this manner, the number of potential solutions increases dramatically, offering new combinations of transport modes and new commercial routes. It is useful

[1] Belarus, Moldova, Ukraine.

studying the conditions and opportunities for activating processes of both endogenous and exogenous development through a reorganization of the local productive systems. It may even promote mechanisms of complementarity between faraway areas and nodes.

In this way, it should be possible to exploit the most appropriate conditions for maximising the benefits to be obtained from the integration between the manufacturing and tertiary sector, while reducing the negative effects of heavy road traffic (pollution, congestion, accidents, noise, etc.).

Investments projects in multimodal transport systems need to be supported by integration of infrastructures and of the supply of logistic services, as well as the demand and supply of these services. Global economic competition more and more becomes a competition between regions rather than between single production units. This poses a challenge for the design of the transportation and information systems as well as for the more or less informal networks of relationships among big and small-medium firms. To this aim, innovation and public-private collaboration is needed for the realization of productive, infrastructural and service advanced projects.

Application of the principles of Economic Logistics, with their associated technological and informatic functions, will permit private enterprise to realize their competitive advantages, Similarly, it will permit the entire economic system to engage on a path of optimal development.

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