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Some Thoughts on the Past and the Future of Economic Logistics[*]

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The scholarly analysis of logistics originally took the form of military logistics, and the analysis of problems of transportation, production and warehousing in large corporations. It was a key discipline of the new sciences of operations research and management science that arose in the years immediately following the second world war.

In the 1980s, working as a Centennial Research Fellow at the IC2 Institute, the University of Texas at Austin, I had an opportunity to publish fairly widely within this area. Overseeing the work of half a dozen Ph.D. students at the Department of Economics at the university, I was compiling a graduate textbook on the optimization of spatial and sectoral resource, production and distribution systems. There were some common themes: the optimization models all took the form of linear and nonlinear programming variables in quantity variables (such as quantities of some product produced and distributed via logistics network), and they all possessed a dual program in price variables. There was another common element: they could all be solved numerically, utilizing a new software package called GAMS, that David Kendrick of the Department of Economics had helped develop at the World Bank. Due to these contacts, I had already in the early 1980s access to GAMS, many years before it became commercially available.

As the decade drew towards its end, one major point needed to be settled: the title of the book. It should be catching, and smack of future opportunities. One day I asked W.W. Cooper, my colleague and friend, who also had co-authored a chapter on saddle point theory, what he thought of the title "Economic Logistics", pure and simple. Was it too daring? It implied that logistics was no longer just a discipline of operations research and management science, but actually a subdivision of economics. As far as I knew, no economists worked with logistics. No economics department in the land offered courses in logistics But I thought that they should! To my understanding, the conventional abstract micro-theory of economics should be replaced by a new theory of production, distribution and warehousing – the theory of economic logistics! And Bill Cooper agreed.
It would have been impossible to divine, at that time, the dramatical growth of economic logistics systems that has occurred since then in rail freight and air transportation, in hierarchical distribution and warehousing networks, and in international trade. If there is one characteristic of economic theory, it is this: economic agents, technologies, and markets are forever evolving and no economic theory is worth its name if it does not provide an explanation of such change.

As it happened, my own observation post in Texas turned out to be an ideal spot for seeing many of the seismic changes in the logistics industry first-hand. When I arrived in Texas in the late 1970s, it was home to a small upstart airline company called South-western Airlines that offered cheap travel between Houston, Dallas, San Antonio and Austin. During the next three decades, it were to grow to one of the most profitable airlines in the country, basing its operations on a new logistics model: low-cost direct non-stop connections between two cities, eschewing the standard model of passing all traffic via a central hub. It turned out to be the model of the future, copied in every part of the world. Today a new airline called Click Air offers direct low-cost flights from Naples to Barcelona. No need to travel via Rome or Madrid.

Texas was also very much an arena where breathtaking innovations in the information technology industry occurred - - from the very first personal computers built by Apple and by IBM (manufactured in Austin, Texas), to the mobile phones (manufactured by Motorola, also in Austin). The advent of new technologies went hand in hand with the introduction of just-in-time production - - instead of stockpiling parts and supplies at the plant, management would rely on air freight to deliver critical components as they were needed. Such management techniques in their turn opened the door to "outsourcing" - - spanning huge international logistics networks of production in faraway countries coupled with international trade.

All in all, international trade has grown by leaps and bounds, as transportation costs have come down. A major factor behind this has been the use of containers - - on trucks, on rail, in ports, and on ships. Just as the building of railways in the mid 1800 century opened up the Midwest in the US, and put in place the subsequent economic upswing, the construction of huge container ports and container facilities around the seaways of the world is now providing a platform for rapid further growth. Technical innovation in the ports of the Mediterranean are a component of this development.

In particular, I have had an opportunity to learn about the interports at Nola and Marcianise (serving Napoli and Salerno). The interport is a wonderful example of institutional innovation in logistics network. The lesson is this: the logistics network can never be taken as given and fixed. It evolves according to its own dynamics. Static economic theory just will not do. Logistics networks need to be embedded in a dynamic setting.

Which brings me back to economics again. The operations research people are good at tracing optimal paths through a network. But you need economics to understand economic evolution. Evolution occurs in many ways; one of them is through the introduction of new products and new technologies. In a paper published in 1998, I sketched how industry networks evolve. It is entitled "Innovation in an Industry Network: Budding, Cross- Fertilization, and Creative Destruction." Product development leads to hierarchical growth in the network: new layers of nodes and links are added. Budding occurs when the breeding of new links and nodes incrementally adds one or several new hierarchical layers downstream. Cross-fertilization, on the other hand, occurs when two or several nodes located in different parts of the network are joined together through the creation of new links (and new nodes). Whereas budding is the archetype of product development and gradualism, cross-fertilization represents the leap into the unknown, the dramatic technological discontinuity, the true innovation.

The introduction of commercial overnight mail services (by Federal Express, DHL and others) required the setting up of a combined system of customer mail pickup and delivery, the operation of aircraft, establishment of a national freight airport hub, and development of information systems to track packages. All these separate technologies existed before, but were now coordinated into a single packaged product, and sold via aggressive marketing.

In the same fashion, the interport is an assembly of well-known individual technologies brought together in a new setting. It is another example of cross-fertilization. Whether it will lead to a revolution in container handling remains to be seen. If successful, it might entail true Schumpeterian creative destruction: the withering of conventional port operations, and their replacement by vast warehousing and container handling operations in the hinterland. We truly live in exciting times.

Thank you.

References:

[1] Sten A. Thore, *Economic Logistics: The Optimization of Spatial and Sectoral Resource, Production and Distribution Systems*, with a Chapter on Saddle Point Theory co-authored with W.W. Cooper, Quorum Books, Westport, Connecticut 1991

[2] Sten A. Thore, "Innovation in an Industry Network: Budding, Cross, Fertilization, and Creative Destruction" in *Operations Research: Methods, Models, and Applications*, ed. By J.E. Aronson and S. Zikons, Quorum Books, Westport, Connecticut 1998.