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HOW SUPPLY CHAINS AFFECT ECONOMIES OF AGGLOMERATION. EVIDENCE FROM PORT OF CONSTANTA

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ABSTRACT. In this paper I analyse how the economic agglomeration of a port is affected by the integration of companies composing it into international supply chains, studying the specific case of container terminals from Constanta Port. To notice the effects that supply chains have on the economies of agglomeration Iobserve internal and external economies from the perspectives of scale, scope and complexity. Afterwards, to emphasize the distinction between supply chains and agglomeration economies I engage in a comparative study between a global and a local terminal operator, both active on Constanta Port container handling market

JEL Classification: *R11, R12, L91, L14, L20*

Keywords: economies, supply chain, container terminal, Constanta Port

Introduction

For centuries, ports have formed locations for agglomeration of economic activity. The obvious reason for this is the existence of a set of conditions favourable for the outbreak and development of specialized activities related to the handling of goods and passengers. These conditions are composed of geographical location and the provision of specialized infrastructure. Therefore, shared inputs in infrastructure become foundations for shared inputs in economic activity, thus facilitating the development of industrial concentrations with their derived agglomeration economies.

In terms of the deterritorialization of production activities (Scholte, 2000) from the last 20 years, against the context of unprecedented growth in the flows of goods, services and knowledge and the mobility of persons (Zaharia, 2004), a paradigm shift occurred in the functions that ports, seen as clusters of specialized economic activities, fulfil. Thus, they began to be perceived as integrated elements in value-driven chain systems (Robinson, 2002). In the role of key elements of international supply networks, companies located in ports become virtually dependent on the activity of the networks they belong to. In the case of port economic agglomerations, there is a shift of analysis from the firms in the system to the system of firms.

Although there is a growing number of papers recognizing the important role that ports play on international supply chains (Slack and Frémont, 2005, Carbone and De Martino, 2003, Bichou and Gray, 2004, 2005, Robinson, 2006, Panayides and Song, 2009) there have been limited empirical investigations on how supply chains affect economies of agglomeration located in ports. In fact, the association between the theory of economies of agglomeration and that of supply chains is not a common one. This is mainly because of the

contrasting nature of the two theories, one stressing the importance of geographical proximity, and the other one the global network. This paper provides a mean to bring together the two divergent theories by reuniting them on the common ground represented by a seaport.

Understanding how agglomerations, in all their perspectives of scale, scope and complexity are affected by the integration in the supply chains, in the specific context of a particular port (Constanta Port) is the goal of this paper. For accomplishing this objective, the research will focus on revealing the effects that integration in international supply chains has had on the economies of agglomeration occurred in container terminal operations, one of the most dynamic segments of port activity, that greatly impacts the whole of port economic agglomeration. The analysis will not stop only to the container operations segment, but will also employ specific empirical evidence, in order to underline the discrepancies between a segment of the port market that is integrated in supply chains and the rest.

The article is organized as follows. In the next section I review the literature specific to agglomeration economies in order to define the main aspects of theoretical issues. In the second section I analyse the main features of a port economic agglomeration. The third part of the article will be devoted to the role that international supply chains have started to play in modern port activity. Fourth section will be devoted to study the effects that integration into international supply chains has had on agglomeration economies from Constanta Port. In the last section I present the conclusion of the article.

1. A view of scale, scope and complexity on agglomeration economies

Since the late nineteenth century, agglomeration economies began to be systematically studied by several authors. The result was formed by the development of an academic body dealing with this subject, named by Malmberg *et al*. (2000) as "agglomeration theory".

One of the first authors who showed the benefits derived by companies from locating in economic agglomerations was Marshall (1920), who categorized them in: skilled local labour pool, information spillovers and non-traded local inputs. An important starting point for the development of this subject was formed by the three categories of agglomeration economies described by Hoover (1948), based on the classification made before him by Ohlin (1933, p. 10), respectively: large-scale economies, localisation economies and urbanisation economies. At this stage of literature development, the important contribution brought by Hoover, Isard, Perroux and Mills, stands out among others.

A significant part of the literature focuses on the distinction between the urbanisation economies and localisation economies. Urbanisation economies represents the phenomenon of concentration of people and economic activities in cities and major industrial areas while localisation economies refers to similar or related industries that tend to agglomerate in certain areas. According to Malmberg *et al.* (2000), the positive effects of an agglomeration are showed by the improved performances of firms that compose it. These performances are reached by reducing the costs for shared tangibles and / or intangibles and through more efficient economic activities resulted from cost reductions and / or increased revenues.

Another way to distinguish between the two types of agglomerations is by grouping them in a horizontal category, composed of companies that provide similar activities (rival and competitors) and a vertical category consisting of companies that supply related activities (business partners and collaborators) (Malmberg, 2001). In addition to these two groups, Isard, Schooler and Vietorisz have added a third category, namely, spatial-juxtaposition, linked with the social dimension of agglomeration (Polenske, 2001).

In trying to distinguish between internal and external economies I return to the work of Marshall (1920) and I take note that each of the three forms of agglomeration economies encountered by a firm has its roots in its geographical proximity to other firms:

"When an industry has thus chosen a locality for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from neighbourhood to one another. The mysteries of the trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously... Employers are apt to resort to any place where they are likely to find a good choice of workers with the special skill which they require... The advantages of variety of employment are combined with those of localized industries in some of our manufacturing towns, and this is a chief cause of their continued economic growth" (Marshall, 1920, p. 271).

So, there are skilled local labour pool, information spillovers and non-traded local inputs, which on the one hand have at their core geographical proximity, and on the other hand, are not internal to the firm but stems from its exterior.

Internal economies of scale can be obtained by a single firm on the base of production cost efficiencies achieved by serving a large market. This cost efficiencies do not necessarily relate with the localisation of the firm in the agglomeration, being more an internal characteristic of it. The existence of a large firm in a certain space implies, in turn, concentrating a large enough quantity of factors in that space. Through the size or number of companies providing these factors, external economies may develop, in the group of firms from the respective sector (localisation economies) or / and become available to all firms in agglomeration (urbanisation economies).

Further refining the categories proposed by Hoover, Parr (2001) considers that the agglomeration economies from whom a firm benefits can be divided into internal and external economies, each observable from the perspective of scale, scope and complexity. To achieve the objectives of this paper I use the classification proposed by Parr (2001), which main features are presented in *Table 1*.

Table 1. A perspective of scale, scope and complexity on internal and external economies

Type of economies	Perspective of observation	Explanations
Internal Economies (do not involve concentration of economic activity but when are spatially constrained the prerequisites are created for the emergence of agglomeration economies)	Scale	Economies specific to certain companies from the agglomeration that occurs beyond some minimum scale, in the form of decreasing production cost due to higher output.
	Scope	Occur when the joint production of two or more goods or services result in a lower total cost than if each product should be made by a different company.
	Complexity	The cost advantage arises from the company's involvement in the various stages of developing the product/service and not only resuming in producing an end product/service.
External Economies (require a spatial concentration of the relevant activities)	Scale (localisation)	Concentration of firms in the same industry. Is the source for the emergence of pools of skilled labour, low freight rates on inputs and outputs, access to specialized services and the possibility of information spillovers.
	Scope (urbanisation)	Concentration of unlike and unrelated firms. Facilitates the sharing of specific inputs among different firms and allows them to split the costs of public utilities, transportation and public infrastructure and specialized business services.
	Complexity (activity-	Unlike firms which are related to each other in terms of backward and /or forward linkages. The advantages of

	complex)	this type of agglomeration economies result from transport cost savings, efficient flows of materials among stages of production and lower industry costs, all in the context of firm proximity to one another.

Source: Author based on Parr (2001)

According to Parr (2001), the above classification outlines the fact that agglomeration economies derive from a variety of sources, not being easily generalised as a single economic phenomenon. The central feature highlighted by this classification, representing the motive for which it has been employed in this article is the parallelism of structure it grounds. Thereby, agglomeration economies based on internal economies have corresponding agglomeration economies based on external economies. In this way, the integrated structure represented by the economies of agglomeration specific to a port is confronted with the non-integrated structure of independent firms represented by supply chains.

2. The specific features of port economic agglomerations

Agglomeration economies derived from the use of public infrastructure can be observed both at the direct and indirect users of the infrastructure. According to McCann and Shefer (2004), even if the original beneficiaries of the infrastructure are its direct users, the way in which the infrastructure is used, can reduce the cost of providing a service or developing a good and also increase the demand for these outputs. The impact felt by direct users in the form of income is transmitted to the indirect users in the form of increased demand for inputs. Finally, the impact of public infrastructure on local production can be seen in the changes in income and employment, elements which in turn affect land values in the respective area.

So, the existence of public infrastructure is a cause for the emergence of economic agglomerations in a particular area. In the case of ports, the specialized infrastructure can be developed only in certain areas, that are endowed both with the physical attributes necessary in order to carry out the construction works and the geographic localisation capable of providing an advantage for the activities developed here. Therefore, geographic features and infrastructure compose the natural advantage that explains in a large extent the appearance of economic agglomeration consisting of companies that provide a particular type of service.

On the other hand, since the port infrastructure can not be developed unless there are appropriate geographical conditions, over a certain area port development becomes very expensive, because of the works involved. This fact actually affects the size of the market for the services provided by companies located in the port area. Thus, a small market size relative to minimum efficient scale may affect competition between firms located within the perimeter of the port, the market structure for port services being frequently monopolistic (Verhoeff, 1981, Notteboom, 2002, Goss, 1999, Goss and Stevens, 2001). In such a market, scale economies are achieved only with a limited number of suppliers. On the other hand, intra-port competition is important because it is a method to achieve economies of lateral integration (or internal economies of scope) and flexible multiservice organization structures (Notteboom and Winkelmans, 2001).

To distinguish the activities specific to a port I used the classification model proposed by Langen (2004) separating them in: cargo handling, transport, logistics, manufacturing and trading. Of these, cargo handling activities are most important because they connect the various modes of transport served by the port in question, becoming in this way the key activity of any port. Next are transport activities that connect the production with the consumption markets, providing the supply chain operation.

The third specific activity is composed by logistics which integrates operations like storage, repackaging and assembly that are provided to goods in transit through the port area. In the case of manufacturing and trading activities, the physical presence in the port area is not required although these activities are dependent on the existence and operation of the port.

3. Ports as nodes on international supply chains

Ports are complex systems consisting of several parts in which various institutions and functions intersect at different levels. What makes them work and perform is their ability to attract commodity on its movement between production and consumption markets. Thus, the main objective of a port is attracting and retaining traffic. In a market guided by competition laws, in order to fulfil its objective, this complex system must be able to offer those seeking its services benefits in the form of lower costs than those of its direct competitors, opportunities for differentiation in the range of services, while obtaining a higher price (higher than the additional cost of differentiation) or opportunities for the emergence and development of niche markets. In other words, to be able to obtain and maintain the competitive advantage (Porter, 1998).

Hence, given the fixed nature of port infrastructure, the competitive advantage of a port is derived from the advantage created for those who transit their goods through the port and also for those who provide various services for goods in transit. In other words, as long as both shippers and those who provide them with the services they need will add value to their activities using a particular port, that port will have a competitive advantage.

Thus, the competitive position of a port is not determined solely by reference to its internal capabilities (efficient transfer of goods, hinterland connections, a wide range of services), but also by the relationships that its component actors have on a specific supply chain. One of the first authors who emphasized this phenomenon – Slack (1993), defines ports in a very suggestive manner as "pawns in the game" of "global transportation system". In other words, even if they are important elements for the supply chains they are embedded on, firms that are specialized in providing services in ports rarely can play the role of the leader on the international supply chains. For this reason, these companies focus only on the value that can be added in a single stage of the goods process of advancing to their final destination, hence economies of vertical integration (internal economies of complexity) being beyond their reach.

In the context of the economic system formed by a port it is useful to consider the concept of logistics pathway (Robinson, 2002), which defines a sequential set of logistics operations consisting of stevedoring, warehousing, depot operations, stripping, trucking, freight forwarding. All of these operations are performed by separate firms, each covering costs and adding a profit margin. In this way, a cost-plus environment is created (Robinson, 2002). Each element of this system is trying to provide more value to the end user and so to capture the competitive advantage of this network.

Thus, firms no longer compete with each other as separate entities, but within the supply chain (Carbone and De Martino, 2003, Heaver, 2002, Bichou and Gray, 2004, 2005, Wang and Cullinane, 2006), attention being basically moved from the firms in the system to the system of firms. The logic of this context makes freight volumes to be captured increasingly by systems with the best integrated actors (because the performance of each actor makes the system to be more competitive). As captured cargo volumes increase, internal and external economies also increase.

In this spatially context are two important forces: agglomeration economies and dispersion economies (Polenske, 2006). On the one hand there is the port economic agglomeration, created by companies that commonly benefits from the public capital existing in the form of port infrastructure and thus generating internal and external economies

stemming from the mechanisms of the agglomeration, and on the other hand, there are companies organized as networks, concentrated around private capital, which seeks to add more value to the end customer, in order to benefit by the membership statute of the network.

The next section of the article is devoted to studying the impact that the integration in the supply chains of the actors who provide services specific to a port has on the economies of agglomeration of that port. I will place at the centre of the analysis the development of the container handling sector of Constanta Port in the 2003-2011 period.

4. Supply chains and economies of agglomeration. The case of Constanta Port container terminal industry

Constanta Port is the largest seaport of the Black Sea and thus of the European Union at the Black Sea. Its development was enhanced both by natural factors – the proximity to the Bosphorus Strait and the connection with the Danube, and by the massive investments made in infrastructure projects by the Romanian State during the period of 1960-1990.

In 2011, over 850 companies were active in a geographical area of approximately 1561 hectares over which 46 million tones of cargo have transited. However, this agglomeration of companies in the port area is of relatively recent time. It started 20 years ago, with the liberalization of port services market, amid steps taken by the Romanian economy to capitalism. That explains why, along with the progress of Constanta Port from a public port type to a landlord port type[1], the seven largest companies that provide many of the services to the merchandise in transit have been replaced by a host of companies of varying sizes, many of them former departments of state-owned enterprises that existed before 1990.

In *Figure 1* I have presented an analysis of the level of aggregation of economic activities in Constanta Port. For this purpose I used a statistic of work licenses issued by the Port Authority in 2011. The work license is a mandatory document issued by the Port Authority for all the companies who operate in the seaport area.

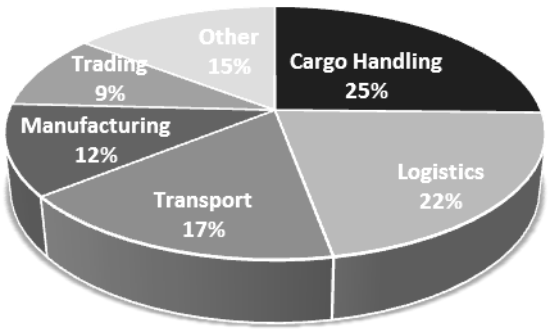

Figure 1. The level of aggregation of economic activity in the Constanta Port in 2011
Source: Author based on work licenses issued by the Port Authority in 2011

The analysis results confirm in part the findings presented by Langen (2004). Hence, from a total of 1.078 work licenses issued by the Port Authority in 2011, the majority were

[1] In the public port management model, the whole range of port related services are performed by the port authority, who is the owner of the infrastructure. In the landlord management model, the Port Authority remains the owner of infrastructure, but leases or rent it to private investors, who are responsible for the port related services (The World Bank, 2003).

related to cargo handling activities (25%). This comes as no surprise given the fact that the first operational function of any port is that of moving the cargo from one mode of transport to another. Logistics activities cover 22% of issued work licenses, being the second most encountered. Having in view that these activities are composed mainly by operations that give value to a merchandise that is in transit (assembly, mixing, packaging and repackaging, labelling etc.), this percentage is a good indicator of the added value activities that occur in the port area. Thirdly, there are transport activities, responsible with the flow of merchandise in the port, with 17% of issued work licenses.

The reason why manufacturing and trading work licenses are not as prevalent as the other three is that the physical presence of the performing companies is not required. In addition, there is a substantial percentage (15%) of services not included in any of the five main groups of services provided in the port area. This category is comprised of consulting services, financial services, telecommunication and IT, constituting a possible indicator of external economies of scope.

Beginning with the first decade of the 2000s, more and more companies with foreign capital are emerging in the economic landscape of Constanta Port. This is caused mainly by the globalization of production activities and the increased flows of goods and services. The phenomenon has continued until present times so that 14 of the 35 terminal operating companies (providers of services associated with the receipt, intermediate storage and delivery of cargo) have the majority of capital owned by foreign companies. Of these, 10 are subsidiaries of multinational companies, which is a clear form of integration in supply chains.

To distinguish the effect that supply chains have on sea port agglomeration economies, I further study the impact that the activity of the subsidiary of one of the top global container operators, has on port of Constanta agglomeration economies.

5. Supply chains and internal economies

As was specified in *Table 1*, internal economies do not imply a concentration of activity in agglomerations. Nevertheless there are situations in which, for the attainment of the internal economies is necessary the concentration of economic activity or the existence of a relevant volume of activity. In these cases, the premises for the emergence of economies of agglomeration are created.

Ports are areas where competitive advantage is often conditioned by the existence of economies of scale. This conditioning stems from the nature of the activities, especially those related to the movement of large volumes of cargo. Thus, many terminal managing companies still have at the heart of their strategy the Fordist concept of economies of scale. Neither container operating terminals make an exception from this inclination. With the rapid growth in container ship size, in the race for reducing transport costs per container, more and more pressure began to be put on the container terminal operators.

Thus, not only that the time for operating a vessel has declined dramatically in order to reduce the costs associated with port charges, higher for large vessels, but also massive flows of containers must be managed in such a manner that congestion be eliminated and containers directed most efficiently to end users.

The answer of the port terminals came in the form of horizontal expansion and massive technologization of the activity. Horizontal expansion allowed port terminals to achieve economies of scale and scope that were previously limited due to the types of operations performed (Notteboom and Winkelmans, 2001), while substantial technologization enabled effective management of increasingly massive information flows. Thus, the scale enlargement encountered in transport industry, forced an extension of the range of logistics services provided to clients, bringing to the forefront of this sector the economies of scope.

In *Figure 2* I have presented a comparison of container throughput and the rest of throughput of Constanta Port in the last 11 years. Besides container terminals, Constanta Port has more than 35 stevedoring companies and terminal operators specialized in handling and storage of merchandises which come in different shapes and forms, such as: dry bulk (grains, chemical products, ores, scrap), liquid bulk (oil, liquefied gases, fertilizers), general cargo (timber, metallic products) and cars.

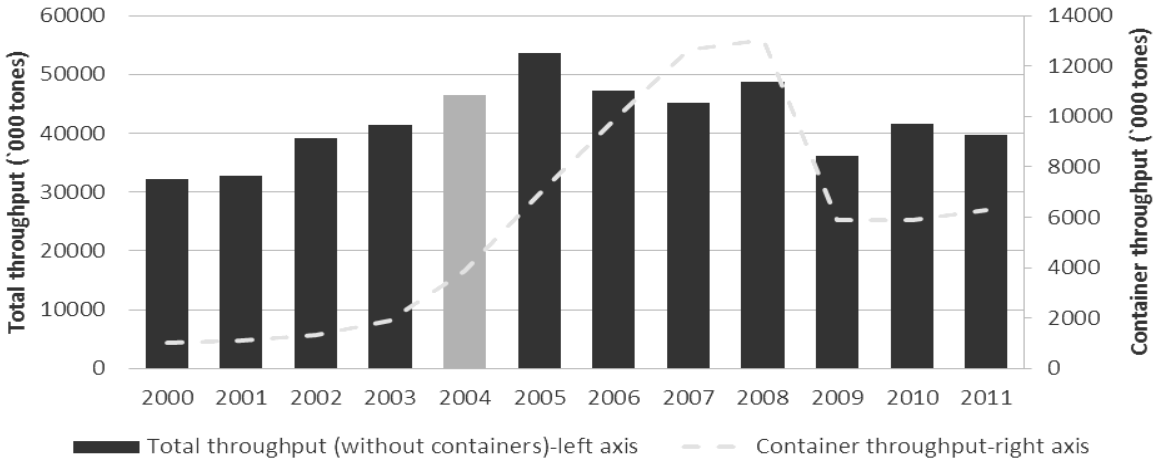

Figure 2. Comparison between the evolution of the total throughput and the container throughput of the Constanta Port in the last 11 years
Source: Author based on data from National Company Maritime Ports Administration S.A.

Beginning with the early 2004 a decisive change occurred in the container throughput segment. Between 2004 and 2008 on this port market segment, year-over-year increases on growth rates had reached in some moments over 100%. This phenomenon has been influenced by two major factors. The first is the major developments in the world economy and merchandise trade reflected in the dynamics of the international seaborne trade, an indicator which has recorded in this period an annual average growth of 4.5% in contrast with 4.1% registered in the 2000 – 2010 period (UNCTAD, 2011). The second influencing factor is the entry on the container handling market of a large global operator. This company managed, both by taking advantage from the favourable international context brought by the growing world economy and by introducing at the local level of Constanta Port of new technologies and adopting a new terminal management system, to grow 13 times the entire port's throughput on this segment.

It is worth noticing in the *Figure 2* that between 2004 and 2008 the growth registered in the container segment is unparalleled by the evolution of the total traffic, the single exception being the year 2005 where the port's throughput was influenced by an increase registered on the grain throughput segment (from 3.88 mil. tones in 2004 to over 6 mil. tones in 2005) due to a good agricultural season. Although the activity of the global operator is responsible for a serious proportion of this growth, there is also another important factor that has to be taken into consideration. This is represented by the infrastructure endowments of the container terminal rented by the global operator. Thereby, this operator benefited from major water depths and large depositing areas, specially configured for the requirements of a modern container terminal.

A comparison between the global operator and the local operator who was the former leader of this market segment (*Figure 3*) is relevant to emphasize the important role that specially designed infrastructure, modern technologies and effective management of information play in this sector of economic activity.

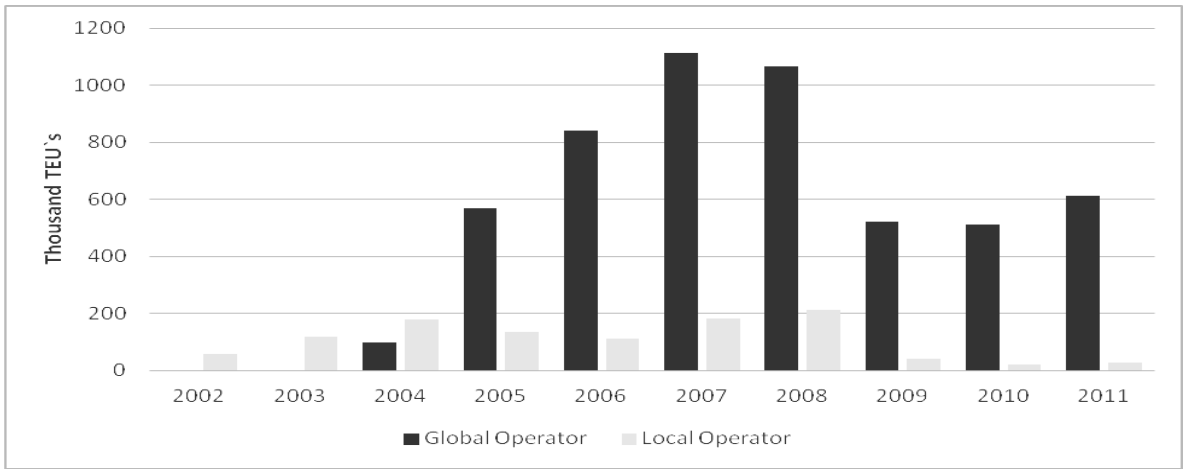

Figure 3. Comparative evolution between local and global container terminal operators of port of Constanta
Source: Author based on data from National Company Maritime Ports Administration S.A.

Even if differences in throughput (measured in TEU`s or twenty-foot equivalent units, the size of a standard container) are sometimes more than six times higher in favour of the global operator, the terminal managed by this operator is only 2 times larger than that of the local competitor (31 hectares versus 15 hectares). This fact indicates the achievement by the global operator not only of economies of scale but also of economies of scope, since a greater flexibility is needed in order to reach the logistic performances imposed by the standards of the served supply chains.

In fact, another indicator of the presence of economies of scope is represented by the expansion of the range of activities performed in the terminal. Thus, if in the case of the local operator most of the terminal activities are related to cargo handling and transport, in the case of the global operator, in addition to the two traditional types, an increasingly high emphasis is put on logistics activities. An important effect of the insertion of Constanta Port on the supply chains served by one of the top global operators consists of its increased level of importance from a feeder port (served mainly by smaller, short sea vessels) to a hub port (served by large container vessels operating on the major trade routes). This fact is illustrated by *Figure 4* below.

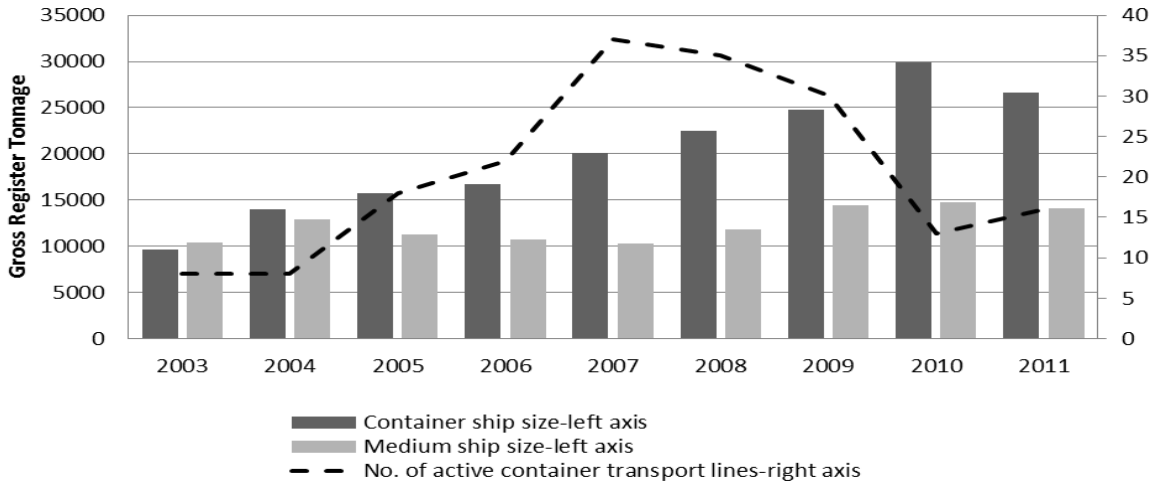

Figure 4. Comparative evolution of container ship size vs. the average of all other ships that have called at Constanta Port
Source: Author based on data from National Company Maritime Ports Administration S.A.

The dotted line represents the number of container transport lines that were active in a given year. Thus, the comparison between the dynamics of average size of container ship that called at the Constanta Port against the dynamics of average size of all other ships represents an indicator of the economies of scale achieved in Constanta Port on container segment of throughput. However, this indicator has to be watched in a global context of the swift growing of the average size of container ships. Thus, according to the Institute of Shipping Economics and Logistics (2012), between 2005 and 2010 the average size of container ships has increased by 18%, from 30000 deadweight tons (approx. 26650 gross registered tons) to 35500 deadweight tons (approx. 31524 gross registered tons). In the same period, the average size of container ship in Constanta Port has increased by 90%, from 15752 gross registered tons to 29880 gross registered tons.

Furthermore, as represented in *Figure 4*, the growing size of average container ship has a correspondence in the gradual increase of the active number of container shipping lines (until mid-2007). This points to the increased connectivity Constanta Port to other parts of the world. This statement is enforced also by the evolution of the Liner Shipping Connectivity Index, calculated by UNCTAD (UNCTAD, 2010) p. 192 for Romania, from 12.02 corresponding to a total throughput of the port of 0.38 million TEU's in 2004, up to a maximum of 26.35 corresponding to a total throughput of 1.38 million TEU's, reached in 2008. The liner shipping connectivity index indicates a country's integration level into global liner shipping networks.

All three indicators: the growing size of the average container ship, the increase registered on the active number of container shipping lines in Constanta Port and the dynamics of Liner Shipping Connectivity Index, give important information about the impact of the new container terminal on its surrounding, but have to be considered in relation with the context of the global economy. Between 2005 and 2010 this context is characterised by a strong growth of the international seaborne trade on containers (a measure of demand for shipping, port and logistics services for containerised cargo), evaluated by UNCTAD (2011) at 32%.

The global container operators were the first to benefit from this context, further expanding their market segments through scale increases and development of global networks (Notteboom and Rodrigue, 2012). Using this strategy, the global operator who activates in Constanta port has managed to grow its global throughput from 13.3 mil. TEU`s in 2005 to 49.6 mil. TEU`s in 2010. Analysing from the specific case of the Constanta Port, the economies of scale and scope achieved by the global container terminal operator have served to increase the volumes of merchandise attracted by Constanta Port on this segment.

Even if at the first glance, the beneficiary of the increased throughput of containers on Constanta Port is the global operator, due to the fact that each container that transits the terminal is subject to a sequential set of logistic operations provided by separate firms operating in a cost-plus environment, scale and scope economies reached by the terminal operator are transferred to the logistic service providers, much of the economic agglomeration thus having to gain.

Nonetheless, companies that for various reasons could not integrate into supply chains, as is the case with the local operator, can not confront the reduced costs promoted by competitors who benefit from economies of scale and scope, being forced either to switch to other types of services that can be provided in the port area or to leave this market. I will further examine the way where international supply chains affect external economies of scale, scope and complexity.

6. Supply chains and external economies

The question that arises after observing the economies of scale and scope achieved by the global operator is whether they are transferred to the economic agglomeration in which the operator activates. According to Crăciun and Zaharia (2012), this type of firm is able to seize opportunities offered by globalization and, in the same time, benefit from locating near other firms but without entering into a symbiosis with the space they occupy.

One of the striking differences between economic agglomerations and international supply chains is shown by the contrast between tangible physical networks (based on public capital) and the intangible economic networks composed of agreements and routinized arrangements (Williamson, 1975). Thus, one of the main sources for the development of port economic agglomerations, is represented, as I emphasized above, by the existence of public capital (port infrastructure), shared between firms from the agglomeration, while for international supply chains, the place of public capital is taken by private capital, used only by firms from the chain.

Therefore, there are on one side, public institutions in the case of economic agglomerations, which can not exclude the existing economic actors from receiving benefits (related to the use of public infrastructure and economies of localisation, urbanisation and complexity), nor can they price these benefits efficiently, and on the other, private institutions in the case of supply chains that operate as clubs, in which exclusion and discrimination is possible (Johansson and Quigley, 2004). This difference can determine a company integrated in a supply chain to focus on rules, criteria and technology standards promoted by the respective chain, even if they are inconsistent with the context of economic agglomeration in which the firm operates. When the company concerned achieves internal economies of scale and scope, rules and criteria that guide its activity will be imposed also to its inputs providers located in the agglomeration.

In this context, the fact that supply chains entail systems of highly organized flows becomes important. This is a process where multiple sources of information are incorporated and then disseminated over increasingly broader networks. In other words, in the case of port economic agglomerations, the presence of highly integrated operators in international supply chains, could be a source of technology transfer and harmonization of systems and practices that increase the efficiency of the entire agglomeration through the mechanisms of urbanisation and localisation economies, namely: pools of skilled labour and the possibility of information spillovers (for the external economies of scale) and sharing of specific inputs among various firms (for the external economies of scope). Thus, internal economies of scale and scope obtained by a firm integrated in a supply chain and operating in an economic agglomeration could be the mechanism of transfer for new technologies, knowledge and international practices, in a hitherto closed medium.

Returning to the sector of container terminals from Constanta Port, I have shown in *Figure 5* below an analysis of the average performances, for the core activity of the two terminals – charging and discharging containers from ships (stevedoring), in the range of 2004 to 2011. The performance achieved by the terminal operators influences the level of port charges (which are a significant part of total transport costs) incurred by the shipping lines. Thus, the higher operating rates are, the less time a ship spends in port, this leading to drastic spending reductions for the operator's customer, the shipping line.

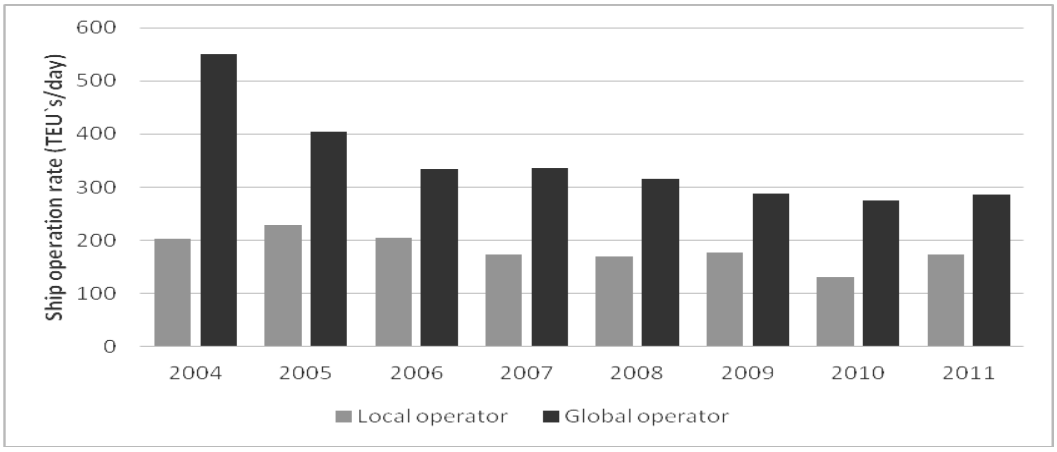

Figure 5. A comparison between the performances reached by the two operators at the ships they handled
Source: Author based on data from National Company Maritime Ports Administration S.A.

It is obvious, once again, the advance that the global operator also records at this chapter against the local operator.

According to Van der Lugt and Langen (2007), activities taking place in port area show real-time mutual dependency. In other words, distinct firms which are related to each other in terms of backward and/or forward linkages have developed coordination mechanisms as inter-firm planning, mutual control systems, incentives and penalties. These coordination mechanisms are the main source for the external economies of complexity that entail transport cost savings, efficient flows of materials among stages of production and lower industry costs.

Conclusions

In this article I analysed the way in which the economic agglomeration from a port is affected by the supply chains, taking note to the specific case of container terminals from Constanta Port. Thereby, I used the classification developed by Parr (2001) to observe the way in which internal and external agglomerations are affected by the development of supply chains in the container handling sector from Constanta Port. As such, after I identified a global operator embedded in international supply chains, I followed its activity in the Constanta Port and I compared it with that of a local operator.

Firstly, I found that with the advent of the global operator on the container handling market from Constanta Port, the total throughput of the port on this segment has registered impressive growth rates. This phenomenon has been influenced both by an external factor and an internal one. The external factor was the strong growth of the international seaborne trade on containers that took place in the analysed period. The internal one is represented by the successful combination between specially designed infrastructure, modern technologies and effective management of information brought by the global operator.

Secondly, the internal economies of scale and scope reached by the global operator, far exceeded those reached by the local operator, who use to be the market-leader. These performances were attained in a favourable global context in which global container operators were expanding their market segments through scale increases and development of global networks.

Thirdly, I examined the way where internal economies of scale and scope obtained by the global operator are transferred to the economic agglomeration in the form of external economies, finding that through systems of highly organized flows entailed by supply chains,

rules and criteria that guides the activity of a supply chain company will be imposed also to his inputs providers located in the agglomeration.

This effect can constitute a source of technology transfer and harmonization of systems and practices that increase the efficiency of the entire agglomeration through the mechanisms of urbanisation and localisation economies.

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