

Is Industrial Districts Logistics suitable for Industrial Parks?

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Abstract: The paper discusses the role of logistics for industrial districts, highlighting the current status and defining a logistics model supporting the relationships between providers and users of logistic services within the local context of an industrial district. A comparison with industrial parks, with reference to Romanian ones, allows identifying the potential of adaptation for industrial district logistic models to industrial parks.

Keywords: industrial districts; logistics; industrial parks

JEL Classification: P25; R58; L16; O2

1. Introduction

Local industrial systems are in recent years exposed to strong stimuli arising from technological change and the growing competitive pressure both in the internal and the international markets. Under the influence of globalization and internationalization, industrial districts are forced to redesign their organization in order to open their boundaries to new markets and suppliers, being also forced to rethink their model of value generation, based on a local concentration of firms. In this scenario, logistics is particularly important for the role of local connector of networks focused on firms' ability to interact and coordinate themselves to respond to market changes on the basis of speediness and flexibility.

However, integrated logistics inside industrial districts, in spite of its potential, still faces infrastructural and cultural barriers. Industrial districts are characterized by the agglomeration of medium and small-sized industries, localized within a certain geographic area with precise social and cultural connotations. A crucial element of industrial districts is the existence of a wide immaterial flow of knowledge and information. In this sense, the industrial districts seem to have a network shape, rather than a hierarchical one. After an overview on the concept of industrial district, this paper analyses the role of logistics as a support framework in the

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relationships between providers and users of outputs. A model for industrial district logistics will be proposed.

Then a comparison with industrial parks will be made with reference to Romanian industrial parks, which are a relatively new phenomenon in Romania. The model of industrial parks seems to fit better Romanian market that has lack of industrial tradition. Unlike industrial districts, industrial parks are usually administered by a company which holds the title of industrial park while the land must meet certain conditions, provide certain facilities (access to road infrastructure and / or rail, exemption from taxes) and obligations (Dodescu & Chirilă, 2012).

Potential of adaptation of industrial district logistic models to industrial parks will be discussed.

2. Industrial Districts and the Role of Logistics

Industrial districts are characterized by a concentration of small and medium-sized enterprises, localized within an area with specific social and cultural characters (Carbonara, Giannoccaro & Pontrandolfo, 2002). Firms are generally specialized in one or more production phases and are connected each other through a complex relationships network based on complementarity and interdependence.

This decentralized organization varies among districts, depending on the characteristics of the production technology. Particularly, the recourse to the network depends on the possibility of clearly distinguishing phases along the productive process and on the existence of different minimum efficient scales at each stage.

According to Ketels (2004), a particular industrial district shares four critical characteristics: proximity, linkages, active interactions between firms, and critical mass.

Referring to the concept of cluster, Porter (1990) identified two types of clusters: *vertical clusters*, made up of industries that are linked through buyer-seller relationships, and *horizontal clusters*, that include industries which might share a common market for the products, use a common technology, labor force skills and similar resources.

With reference to the type of links and level of coordination, Markusen (1996) distinguished four types of industrial districts:

- a) Marshallian industrial districts, where the business structure is comprised of small, locally owned firms that make investment and production decisions locally, and characterized by the fact that they consciously relate with each other to solve problems;

- b) Hub-and-spoke industrial districts, present in regions where a number of key firms and/or facilities act as anchors or hubs to the regional economy, with suppliers and related activities spread out around them like spokes of a wheel;
- c) Satellite platform, a congregation of branch facilities of externally based multi-plant firms;
- d) State-anchored industrial district, where a public or non-profit entity (a military base, a university, or a concentration of government offices) is a key anchor tenant in the district.

Beccattini and Rullani (1993) identified the reason of the success of industrial districts. A key character, mainly in the cases of marshallian or hub-and-spoke industrial districts, is the presence of information flows that do not occur following only formal channels, but also informal and social based channels. These information flows ensure a rapid circulation of knowledge and foster the creation of widespread innovation processes. Information exchanges refer to specialised knowledge, uncodified and which cannot then be easily transferred to other systems (Gottardi, 1996; Maskell, 1999).

Therefore, the industrial district takes a network shape, rather than a hierarchical one, making the system more flexible. From a division of cognitive labor perspective, inside the network each company has its specific task.

To provide an output that fits to the customer's requirements a coordinator role is played by a firm that acts as an interface between the market and the district supply chain. Within this network, logistics plays a fundamental role, as essential support to interactions among companies taking part to networks/districts/supply systems.

For a better comprehension of the importance of logistics for industrial districts, a perspective focused on the firm and its relationship system is necessary, since logistic activities arise from the need to interact upstream and downstream according to criteria of efficiency and effectiveness. This is necessary to face competition in a market context.

The reduced size of the firm and, more important, the inclusion within industrial districts, are characters that emphasize the role of connector exercised by logistic activities in the presence of mechanisms of division of labor and specialization. These mechanisms are incomplete forms of transfer and re-transfer of knowledge (Di Bernardo & Rullani, 1990) and they need, especially in mature markets/industries, infrastructures that serve as support for innovative paths, with the objective to establish new competitive advantages (Albertini & Pilotti, 1996). Logistics plays an important role in this supporting task. Its potential can be exploited on a double front: the firm itself, supporting its value chain, and the system of relationships with suppliers and customers, inside and outside the industrial district.

With specific reference to logistics for firms, it is now widely recognized the role it takes in order to optimize the connection between purchasing, production and sales, through planning, organizing and controlling the activities of moving and storage of goods, starting from the points of acquisition of materials, along with the manufacturing process, up to the final customer.

Traditional activities that make up the logistic cycle (storage and inventory management, in-bound and out-bound transportation, final products storage, materials handling) tend to identify themselves as flow activities, that allow the overcoming of the single firm boundaries leading to a wider perspective, by which some activities can be placed outside the firm, along the sale or supply phases, mainly with the use of specialized operators.

In addition to these activities there are others who see their importance increased in relation to the need of improving the level of coordination with the partners of the supply chain / channel. This enhanced coordination can be pursued for the management of administrative flows (that represents a potential constraint on the fluidization of logistic activities, and that can be overcome thanks to the development of information and communication technologies - ICT), the provision of pre and post-sales services (customer service, returns management), optimization of reverse logistics for the organization of the recovery flows and reconditioning (or disposal) of products and packaging, and related administrative tasks.

This set of activities is supported by information flows, which are the basis on which the current concept of integrated logistics can be stated. Integrated logistics enables information processing and exchange at more affordable costs and in shorter time along the supply and distribution chain. Therefore, the traditional idea of logistics as an internal function for firms is superseded by a wider, but also more complex, concept which connotes logistics as a technical and organizational infrastructure that supports the management of all the physical and information connections with the subjects involved in the value chain.

In favor of the integration along the supply chain, on the upstream side, and the distribution/marketing channel, on the downstream side, are the benefits obtained with the approach related to the enterprise resource planning (ERP) systems, the use of which leads to an integration of the external relations of the firm with its internal activities. In this sense also the Supply Chain Management (SCM) concept can support an integrated view of the external activities of the value chain.

Thus, the objective of logistics becomes the coordination and alignment of its strategic components through the harmonization of all the physical and information flows that run along the firm's activities, both internal and in its relations with the outside environment (Cerruti & Musso, 2004).

Similar considerations can be made with reference to logistics for industrial districts, that becomes even more important. The small size of firms and the increased dependence of the single production units from the mechanisms of division of labor emphasize the importance of logistics as a connector on which the competitive advantage of the entire local system can be established.

However, some typical features of industrial districts are limiting the possibilities of full exploitation of logistics applications. The first of these is in the reversible character of the production networks (Corò & D'Agostino, 2001). In this sense networks are not stable, since they can be seen as "teams of firms" (Becattini, 1999) that are constituted time to time around specific product / market related projects. The composition of each team is made on the basis of the goals of the single project and also depends on the performance of partners, that can be easily replaced in the event of incapacity or inefficiency.

This character is not compatible with strong and stable links, as a necessary condition to justify high relation specific investments, as those related to the acquisition of software (SCM, ERP, extended ERP), to the recruitment of qualified human resources dedicated to the interface functions, to the re-engineering and sharing of practices, technical standards and databases.

In addition to this, the competitive/conflictual character of industrial districts relationships leads companies to distrust shared structures and procedures (Pepe, 2000). Small entrepreneurs fear loss competitive advantage, or undermining the uniqueness or differentiation of their products, or to weaken the relationship with their customers.

Another limit to the development of industrial district logistics is in the strong heterogeneity between the different districts due to localization (and de-localization) choices, characteristics of the final and intermediate demand (type of customers, time to market, seasonality), characteristics of the production processes, materials, technology, so that a general model of district logistics cannot be easily defined.

Also the poor orientation to the outsourcing of logistics services and a general distrust to outsource the downstream stages of the supply chain (order processing, packaging, etc.) are an obstacle for district logistics (Cerruti & Musso, 2004).

The comprehension of the potential of logistics within industrial districts must be analyzed considering the limitations and obstacles described above. In order to assess this potential, the main factors that determine the specificity of a single industrial district must be kept into account. The specificity factors are as follows:

- Technological cycle of the district supply chain and product characteristics: type of sector, materials, specialization / division of labor, contextual location and

infrastructural conditions, i.e. all the features related to products manufactured, which have influence on production processes and supply chain relationships;

- Degree of homogeneity / heterogeneity in size and organization of firms, and their degree of strategic rationality. This is a factor that affects the possibility to develop and share innovative solutions related to logistics and ICT;
- Type of government of district relationships, depending on the level of centralization / dispersion of decision nodes and the degree of power of leading firms.

3. A Model for Industrial District Logistics

To organize an integrated logistics for industrial districts a double level, single firm and district, can be assumed. The firm's level solutions should be consistent with those for the structural strengthening of the local environment and its links with outside markets.

A first step is a better coordination and synchronization of all parties involved, including those that offer logistics services. This means first of all to achieve a minimum level of ICT capacity among all subjects, including smaller ones, to allow the establishment of digital networks whose effectiveness depends on the quality of information exchanges and the degree of organizational integration among firms.

In this field local authorities and entrepreneurial unions can play a relevant role in organizing or supporting training initiatives and the adoption of ICT solutions, even coordinating the searching and negotiating activities with local or external providers of ICT services.

The organization of logistic activities can be analyzed looking at infrastructures and services in relation to two critical areas: the first is referred to physical flows and transports, that occur within the firms (between production phases or plants), outside firms but inside the district (for interfirm relationships), and outside the district linked to the supply logistics (inbound) and distribution (outbound). The second area is referred to the management of stocks, in this case with reference to stocks within the district supporting both the single firm production flows and the interfirm relationships (Fig. 1).

	Internal to firms	External to firms Internal to the district	External
Flows	Own managed by firms	Shared transport services (third party managed)	Open (to other firms within the area) hubs
Stock management	Own or third party managed warehouses and platforms	District platforms (third party managed)	

Figure 1. Organization of flows and stocks for industrial district logistics

As regard to the first of these two areas, internal flows refer to materials, components and semi-finished products movement from a production line to another, or from a plant to another. Internal flows need to be managed by the firm as part of the production process.

Interfirm transport flows within the district are usually managed by the single firms with their own vehicles. This is an area of possible optimization through the adoption of a third party transport service, that can better organize all transports thanks to an ICT based coordination system.

External transport, both from the supply side (inbound) and to the market side (outbound) can also be managed by specialized companies which can also provide infrastructure and services for materials and products handling. These services can be open to other firms of the area that are not part of the industrial district. The only limit, in this case, is in the degree of compatibility of other sectors with the technical facilities and vehicles that in some cases need to be sector-specific. The benefit from the open shape of the hub is in the possibility to rely on a scale size of facilities which in many cases goes over the volumes handled by a single district.

With regard to the second area, the stocks management, referred to inbound materials and components, intermediate products through the production processes and the final outbound products, solutions can be found at the single firm level and at the district level.

Inside the single firm, warehouses and storage areas can be managed directly (in-house) or through specialized service suppliers (in-sourcing), which can also use their own facilities inside the firm's boundaries.

Within the district, common solutions can be adopted for the management of specific platforms and warehouses. These structures can be managed by external specialized service suppliers or by associated / co-operative organization.

For the success of this model, not only the physical issues are critical, but also the ICT infrastructure, that requires a strong partnership with advanced suppliers. Since the integrated logistics problem is firstly an information-sharing problem, it is fundamental studying the information channels within the district; that is, information flow and existing relationships among different companies, to facilitate the rationalization of material flows (Dell'Orco & Giordano, 2002).

For both levels of intervention discussed above (flows and stocks), innovation of logistics processes is necessary and it is favored by the development of digital platforms within the district. The support from these platforms is in terms of efficiency and optimization for all commercial, administrative and logistics related relationships among the district firms and with the external partners. This can at least partially compensate for the lack of internal information management and organizational capabilities of individual small businesses.

Also this area can be a field on which local authorities, institutions, administrators and entrepreneurial unions can support and stimulate the search for coordination and the selection of external specialized providers of logistics and ICT services and infrastructures.

4. Industrial Parks and Industrial Districts: A Comparison

Industrial parks are agglomerations of firms within a dedicated area with facilities and centralized services that support the functioning of the resident firms. They are usually located near a city, possibly nearby road / rail infrastructures and accompanied by tax exemptions and discounted utilities. As tools to encourage agglomeration economies, they can be considered as instruments of industrial policy in order to influence the development of a locally rooted industrial structure.

Industrial parks can also be named as science parks, technology parks, innovation parks, technological development zones, hi-tech industrial zones (Dodescu & Chirilă, 2012) or, in particular circumstances with tax and duty concessions, free trade zones, border economic zones or special economic zones (Musso, Bartolucci & Pagano, 2005).

In case of the prevailing industrial character, the relevant facilities are those related to spatial conditions, dedicated infrastructure and services, and support from public

authorities. When the prevailing character is on innovation and technology, additional conditions come from partnerships with universities, research institutes, training centers and other subjects.

Industrial parks are usually administered by a company owned (or participated) by a local administration (Municipality or Province).

Compared to industrial districts (Table 1), industrial parks are more clearly focused on the objective of industrial development, with weaker links with the surrounding social and economic environment but with a more efficient and rational organization of the infrastructure and services required for the functioning of the businesses that are located inside them.

Table 1 Differences and similarities between industrial districts and industrial parks

Characters	Industrial Districts (ID)	Industrial Parks
Localization area	Close proximity (Gordon, McCann, 2000) or more widespread in a territory. Wider extension and blurred boundaries compared to IP	Close proximity, smaller extension than ID and delimited boundaries
Origin	Spontaneous on the basis of: a) Manufacturing tradition (e.g. Italian IDs); b) Regionalized or localized outsourcing system by a single "channel master," such as "Toyota City" (Isbasoiu, 2007; Sheffi, 2010); c) Closeness to Universities, research centers (e.g. Silicon Valley)	Deliberate structures, planned by local administrative authorities
Industry / sector specialization	Yes	Possible, but not common
Specialization of individual firms and division of labor among firms within a district value chain	Yes: technical fragmentation of the manufacturing cycle and original method of social coordination of the supply chain (Piore, Sabel, 1984)	Possible, but not common
Interdependence	Yes	Possible, but not common
Competition and co-operation among firms	Strong	Weak or non-existent
Common services and public utilities	No	Lighting, energy, electricity, heating, running water, gas, security, cleaning, catering, public transport to the park site (Dodescu, Chirilă, 2012)
Common customers	Yes	Possible, but not usual
Social links	Yes, in the form of a social community (Morosini, 2004)	No
Information networks	Wide flow of knowledge and information (codified and tacit) both upstream and downstream the value chain (Dell'Orco, Giordano, 2002)	Only for centralized services
Land ownership	Widespread among entrepreneurs	Municipalities or other administrative authorities. Administration managed by a public owned real estate company

One of the key characters of industrial districts, the common language and culture among all firms participating to the same sectorial value chain, is not present in industrial parks, which are planned by local authorities with the objective to stimulate entrepreneurship and innovation, but not with reference to a specific sector / industry.

The more heterogeneous specialization of firms within industrial parks brings them to connect separately with the market, preventing them to exploit those that have been defined as "channel district economies" (Pepe & Musso, 2003). As a matter of fact, the industrial district plays an important role in market relationships, first of all, because of the greater visibility, compared to the single firms, among channel subjects. Once located the production area, it is easier for intermediaries, especially those at the international level, to find a supplier inside a sector specialized district. Therefore, being placed inside a district becomes a natural promotional tool towards trade operators, for which the presence of many firms in competition each other offers an easy way of comparison and the possibility of selecting the best supplying conditions.

Although industrial parks do not offer the same advantages of industrial districts in terms of Marshallian industrial atmosphere and channel economies, the presence of favorable conditions is a stimulus particularly for smaller firms and star-ups, as a pre-condition for the fertilization of an industrial culture at the local level.

5. Industrial Parks in Romania

Like all the Eastern European countries, in the last two decades Romania experienced the transition from a centrally planned economy to a market economy. Romania was a highly industrialized country in the communist period, with mono-industrial or predominantly agricultural economic structures (Dodescu & Chirilă, 2012).

However, the transition turned into a process of de-industrialization, as a consequence of the crisis of the post-communist system, the closure of relevant factories and unsuccessfully privatization processes (Boștină, 2010). The strongest stimulus to industrialization came from foreign direct investment (FDI) inflows, in correspondence of a weak national industrial policy, that was characterized by chronic low public research and development and insufficient indirect instruments, such as tax incentives (European Commission, 2010).

A relevant part of FDI came from Italy, whose firms found unique opportunities to develop international supply chains, mainly based on intensive-labor manufacturing processes. The geographical closeness favored North-East Italian companies, that re-located their factories partially reproducing the industrial district model (Majocchi, 2000). However, this did not stimulate an autonomous

entrepreneurial development of local firms. Lack of manufacturing traditions and a weak entrepreneurial culture (strongly influenced by the communist experience) prevented the activation of autonomous mechanisms of proliferation of firms, as typically occurs for industrial districts.

More recently, the phenomenon of industrial parks arose. The development of industrial parks began in Romania in 2001 when the Government introduced new legislation for the creation and functioning of industrial parks (Law 490/2002), providing fiscal advantages and facilities for the investment in infrastructure for industrial activity in specific local areas.

In 2010, in the records of the Ministry of Interior and Administrative Reform were registered 63 industrial parks in various industries (e.g. textile, software and electronics) for a total an area of over 2000 ha, of which 1200 ha were "greenfield" investments (Dodescu & Chirilă, 2012).

The model of industrial parks seems to fit Romanian market and registers a growing trend. Industrial parks are until now considered the only "success stories" in the field of Romanian EU convergent industrial or enterprise policy, like in the case of Industrial Park Eurobusiness Oradea (Dodescu & Chirilă, 2012).

6. Conclusion: Industrial District Logistics for Romanian Industrial Parks

Romania industrial policy must face the risk of deindustrialization and needs to improve the mono-industrial or predominantly agricultural economic structure, in conditions of poor infrastructure and strong migration processes of active population.

In this context, agglomeration economies can be encouraged, with the objective of an industrial structure that could exploit the benefits of the locally rooted economic systems. In the previous sections a lack of manufacturing tradition and local entrepreneurial culture in Romania was discussed, and the role of industrial parks emerged as a policy tool to stimulate a widespread industrialization following the model of the industrial district. For this purpose a key role is played by logistics, that fosters more efficient processes, both physical and informative, within inter-firm relationships inside the district and in market relations.

The logistics optimization model seen in section 3 must be considered with regard to its applicability to industrial parks, especially those in Romania. About this, it must be considered that within industrial parks, intra and inter-firm efficiency in relationship processes is a more relevant key factor, that needs to be stressed. Indeed, whereas manufacturing factors related to agglomeration economies and local know-how are weaker, a more efficiency level must correspond. On the other

hand, in industrial parks sectoral specialization is less relevant as a cohesion factor, and many of the benefits of industrial atmosphere, that are typical of industrial districts, are missing. Hence, these weaknesses can be offset by a higher level of efficiency thanks to the possibility of a greater coordination level that centralized choices can guarantee as regard to common services and infrastructures to be activated. Common services can be related to transports, ICTs and warehouse management, as well as training, administration, banking, insurance, and others. Infrastructures can be those seen for stock management and complementary facilities. In both cases the outsourcing to specialists could ensure more efficient and effective results.

For industrial parks logistics optimization derived by industrial district logistics can produce more effective results than those obtained in industrial districts, therefore representing an important intervention area for economic policy, as well as a valuable reference for the management choices of industrial parks.

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