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THE SYMBIOTIC DIVISION OF LABOUR BETWEEN HETEROGENEOUS DISTRICTS. THE DEVELOPMENT OF ORNAMENTAL HORTICULTURE IN THE NETHERLANDS AND ITALY.

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The symbiotic division of labour between heterogeneous districts. The development of ornamental horticulture in the Netherlands and Italy.

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Abstract

This article focuses upon the historical development of three ornamental horticulture districts located in the Netherlands and in Italy. The aim of our investigation is to underline the features of a global division of labour, which is driven by the specialisation of production and retailing. Despite the lack of natural resources and unfavourable climate, the high labour and energy costs, the Dutch district and the horticulture cluster based in Netherlands hold a leading position. The historical development of the three districts is very similar, but the application of science and the role of local institutions are the explanatory factor of the evolutionary path of the cluster located in the Netherlands. The Italian districts analysed, which enjoy better endowed resources are now strongly dependent by the entire Dutch cluster.

JEL – classification: Q1; O18; F0; R0.
Key words: Industrial district, global supply chain, ornamental horticulture industry

1. Introduction

The aim of this article is to describe the significant variety occurring among the horticultural districts in the Netherlands and in Italy. Our empirical analysis allows us to apply the two largely used concepts of industrial districts and clusters pinpointing the different meaning. A symbiotic division of labour has been discovered among the three districts considered: Boskoop, Pistoia, and Saonara, which dates back to the international fragmentation of the value chain. Our work shows that the application of science in horticultural districts has transformed them in knowledge-intensive districts. This process is more visible in the case of Dutch cluster than in the case of the Italian districts. Several theoretical concepts regarding agglomeration, and the main characteristics of the ornamental horticulture industry, will be discussed in the following article, with a special focus on three case studies regarding the Boskoop, Pistoia, and Saonara districts.

The principal idea discussed here is to understand the internal dynamics of the three districts, and their external relationships, along the value chain, which overcomes the boundaries of the single area or even of the single country. Section 2 provides the theoretical background of our research. Section 3 briefly outlines some important characteristics of the ornamental horticulture industry in the larger horticulture-agriculture context. Sections 4.1, 4.2, and 4.3, describe the evolutionary pattern of the three horticultural districts. Section 4.4 outlines a comparison. Some conclusions are set out in Section 5.

2. Theoretical background: districts' heterogeneity and global supply chains

The concepts of "industrial district" and "cluster" have entered our economic daily life language. However, there is a semantic ambiguity on the use of the two terms, because under the umbrella of the notion of "district" and "cluster", extensively used in economics, business, regional economics, industrial economics, economic geography, and sociology, different models of (local) development, and inter-firm arrangements, can be recognised. As a result, today, we count such a wide number of contributions that unfortunately denote with the same term a large variety of phenomena. This article

offers an empirical application of the use of these two terms which highlights how it is possible to set precisely a distinction among these "chaotic concepts"[1] (Martin and Sunley, 2003), on the basis of an empirical study, developed after a systematic analysis of the literature (Belussi, 2005). Let us start with the Marshall's concept of the industrial district (Marshall, 1890), based on the importance of external economies to understand the development of an agglomeration of small and medium-sized firms. The industrial district is an organisational model of interconnected firms, a hybrid model between market and hierarchy, and a territorial model (a specific localised system characterised by a high sectoral specialisation). Since the work of Marshall, economists have stressed that the characteristics of an industrial district is related to the benefits of external economies emerging from the close proximity of firms working together in the same industrial town, or in a decentralised "industrial district". Other important elements of the model are: a) the concentration of many small factories specialising in different phases of the same production processes; b) the gradual accumulation in the area of skilled labour force; and c) the creation of subsidiary industries and specialised suppliers. External economies, depending on "the aggregate volume of production of the kind of neighbourhood" (Marshall, 1920, p. 265), can be juxtaposed to the internal economies related to the coordination of activities under the vertically integrated factory. Marshall advocated that, at least for certain types of production, two (equally efficient) manufacturing systems could be employed: the large vertically integrated firm, and the industrial district.

We can, thus, arrive to the following definition:

1. the Marshallian industrial district regards a specific system of firms closely localised where there is a certain type of common productive specialisation, which allows inter-firm division of labour and positive external economies;
2. the district is characterised by a high density (prevalence, but not absolute dominance) of small-medium size firms;
3. firms cooperate along the supply chain, at least because there is an extended inter-firm division of labour;

4. typically, the district derives leadership in a special industry (Marshall, 1919, p. 287) from the "industrial atmosphere" if, as Marshall underlined, obstinacy or inertia of firm behaviours, in changing times, will not "ruin it;"
5. we have an industrial district if in the same area there is a high variety of similar producers, because this stimulates a highly creative faculty and, sometimes, intercommunication of ideas between machine makers and machine users (Marshall, 1919, p. 603).

Using the Marshallian approach we can derive several analytical consequences. Firstly, the industrial district is not a universalistic model of firm clustering. Secondly, the industrial district is a specific organisational model, ceteris paribus, equally efficient - in the condition of technical or economic divisibility of activities - to that one of the large firm (from this we have not to imply always that a bunch of similar small firms, specialised in a particular activity, and clustered in one area, are per se efficient: for instance, they could adopt inferior technologies to those in use by large organisations). This is equivalent to say that local agglomeration of small firms may (but not must) resort to an entrepreneurial positive model, without setting a deterministic causal low, as it was implied ad nauseam by the international literature of 1980s, shaped on the track of Krugman contributions (agglomeration of firms is always connected to dynamic firms growth or positive externalities, as he called them, if the cost of urbanisation and congestion are not too high). Fourthly, a single firm network cannot form a district: the same definition of industrial district recalls the concept of a large population of firms, and introduces the concept of a sizeable "threshold" of local firms. Fifthly, in the industrial district we can clearly find a mechanism of increasing return embedded in the territory, but there is also the possibility of contemporary increasing returns bound to the individual organisation, and even some large firms and plants located in industrial districts. In districts there is still room for increasing organisational efficiency depending on individual firms' strategies. Thus, from the Marshallian theory we assume that external efficiency in industrial districts is related to the volume of activities (scale efficiency), but there are also other forms of efficiency related to increasing returns and

to innovation dynamics (dynamic efficiency): they are conditioned by the stage of evolution of each industrial district.

To summarise, most of the social features of this ideal type organisation are related to:

1. extended inter-firm division of labour with no asymmetries of power among the clustered enterprises (Sforzi, 2003):
2. equilibrium between cooperation and competition among rival firms (You and Wilkinson, 1994; Asheim, 1996),
3. social integration (Brusco, 1982, 1990), and
4. existence of trust, which enforces cooperation, economizes on transaction costs and fosters flexibility and innovation (Dei Ottati, 1996)
5. moderate or strong forms of learning (Belussi and Pilotti, 2002).

A cluster is defined in the Concise Oxford Dictionary as – *'a group of similar things growing together'*. This definition implies either a spatial proximity or a functional relatedness of the same, or of closely related things, that may be involved in a dynamic process. This ambiguity, or double sense, is intrinsically related to the use of the term cluster in the work of Porter. For Porter:

> *'A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities' (1998, p. 199).*

Porter never defines the spatial boundaries of his territorial system under analysis. For him a cluster is not just a small portion of a territory, a piece of identifiable "localised industry". Porter (1998, cap. 7) extensively mentions the existence of "regional clusters", mapping them in US (for instance the Californian cluster of wine), Portugal, Sweden, and Italy, but in his book he also presents "national clusters" like the Italian (our italics) cluster of fashion and shoes industry. In his work Porter also specifies that tracing the boundaries of a cluster is often a matter of degrees, and that this is a creative process, related to the understanding of links and complementarities

existing among industries and institutions. In fact, he argues, the "external effects", significantly related with competitiveness and productivity, determine the very boundaries of a cluster.

But if we study the "economic interrelatedness" of a cluster, we can shift easily from spatial interconnections, which are defined by the geographical proximity, to virtual connections (Gallaut and Torre, 2005), which are related to the many external linkages that each local organisation activates with the external world: in other terms, by doing so, we put at risk the same possibility of defining a "given system", and we loose the limiting boundary conditions between what is inside and outside our model.

Clearly there is nothing wrong in using the term cluster. But we must acknowledge that we refer to a class of economic systems that: a) are not spatially defined, b) do not have a minimum threshold of agglomeration (three firms are not a district in a Marshallian sense, but they can belong to a cluster); c) do not have an history-based identity (its definition depends strongly from the research assumptions), d) do not have a close relationship with the local community, and strictly speaking f) do not have a local evolutionary pattern of growth.

Thus, the term cluster can accommodate a very general class of phenomena, while the term district is a more specific sub-set. To shift from the cluster concept to the industrial district notion we need three necessary conditions:

1. agglomeration (density of similar, or sectoral interrelated, firms in a restrict area),
2. interaction with the local institutions and among the individual firms, and
3. social embeddedness (a certain level of identity, trust, and cooperation which is historical formed during the process of "distrectualisation" or "clustering", as discussed for instance by Hu, Lin, and Chang, 2005).

The third necessary condition is linked with the Marshallian approach: a communitarian view of the economic and social system under examination, which is represented as a unique and historically dependent territorial system (Belussi, Gottardi and Rullani, 2003; Sforzi and Lorenzoni, 2002; Paniccia, 1998 and 2002).

Conditions 1 and 2 suffice for the identification of a local cluster with possible different geographical borders. Condition 3 introduces the idea of a socio-economic embeddedness, locally bounded because of face-to-face social interactions. This is a necessary condition for the definition of an industrial district.

In the international literature, unfortunately, this distinction does not always hold. Various means and methodologies have been used to identify and measure the type and characteristics of industrial districts and clusters, in a type of interchangeable meaning[2]. For instance, in the Nordic European countries there is a common usage of the term cluster as a close substitute of the term industrial district (Cooke and Huggins, 2003; Maskell, 2001; Maskell and Lorenzen, 2004), but the local systems under analysis satisfy the 3 conditions above presented. In our view a mix of quantitative and qualitative analyses is required for the identification of an industrial district (Belussi and Gottardi, 2000; Belussi, Gottardi and Rullani, 2003).

Largely used quantitative and systematic approaches, based on regional input-output analysis, location quotient analysis, and systematic benchmarking exercises, diffusely used for the cluster analysis and for identification of clusters (for example, European Commission, 2001; OECD, 1999a and b and 2001a and b; DTI, 2001, and Harvard Business School, 2002) can be considered only as a first step in the identification of an industrial district.

A possible four-stage system for measuring linkages within industrial districts/clusters is here proposed (see also Belussi, 2006).

1. Identification of industrial districts geographical boundaries using either quantitative measures – for example, concentration indexes, input-output and innovation interaction matrices, or historical sources.
2. Mapping of firm networks using social network analysis to identify and measure types of relationships occurring in industrial districts, in relation to the type of analysis conducted.
3. In depth analysis to measure the stage of evolution of industrial districts.

4. Qualitative case studies to explore the rich details of the firm characteristics and linkages in the industrial district.

The heterogeneity that characterises industrial districts has been well emphasised by the international literature and recently also by Sammarra (2003), where for instance a synthetic taxonomy of the Italian industrial districts is proposed. The essential parameters used to discriminate between different typologies are the following: a) the socio-economic structure (including the relational structure and the type of governance); b) the prevalent strategy of district firms (including the degree of openness); c) the learning mechanism (and the attitude towards innovation); and, finally, f) the institutional environment.

The classification suggested does not take into account the product specificity, and the variety of processes of production, which can be viewed as additional distinctive elements of a possible taxonomy.

Still, the official classification of products in high tech, medium-high tech, medium-low tech, and low tech, put forward by the OECD (2001) is not truly representative of the peculiar knowledge intensity of each sector, as it has been discussed in Sedita (2005). Accordingly, investments in a plurality of learning activities affect also industries not properly considered at the edge of the economic growth, such in the case of the ornamental horticulture industry further down analysed.

These learning activities are internally (to the district) supported by firms strategies, and by their proactive efforts (R&D, engineering departments, focused working groups), but also they are the result of firm interactions, both locally and globally developed.

We are referring to firm networks, which include local suppliers, customers, and global supply chains (Gereffi et al., 2005; Gereffi and Bair 2001). Networks access can potentially upgrade firms belonging to the district. Sometimes the global connections do not carry on any transferable knowledge or organisational routines, but they work as powerful governance structures whose leaders are the commercial actors. It is the case

of the Netherlands and in particular of the Boskoop district, and of its intense and distributed business networks spread throughout the world.

Already Richardson (1972), in his seminal article, highlighted the motivations for firms to enter business networks: in order to reach complementary, but dissimilar competencies, they lack, and that need to fit the specific organisational productive demand, and cannot be bought on the market ready-made. In the industrial districts, this has implied the continuous search for specialised producers, and for critical competences, but it has also called for cheaper producers, either geographically co-located or more and more dispersed in low-wages countries. This is why, in a period of fragmented, but integrated global production processes, the construction of global supply chains (Gereffi et al., 2005), has gained ground, both as buyer-driven chains (ruled by retailers and large commercial buyers) or producer-driven chains (MNCs)[3].

The different ability to interpret and catch the opportunities given by the network characterises differently the three districts illustrated in this article. They are ranked in a sort of hierarchical order, where the first place is taken by the Boskoop district (where there are the global most powerful international retailers), the second one is occupied by the Pistoia district (which plays in part the role of international producers of several final goods which are sold by Dutch wholesalers on international market), and the last district considered in this ranking is the Saonara district (where local firms cover the Italian market and are specialised in the service of landscaping, being low exporters). The relations among firms in these three districts are often regulated not by long term subcontracting but by spot-transactions. Our analysis has shown that the three districts are not autonomous. Instead they are linked by a symbiotic relation, where the entire value chain is characterised by a string inter-firm division of labour (being upfront activities and commercial distribution carried out in the Boskoop district and in the Netherlands cluster).

3. The ornamental horticulture industry

The ornamental horticulture industry exhibits clearly how the globalisation of the markets can affect a product – the flower or a plant – that is easily transportable so that

the production can be moved to lower energy costs countries, or countries with better climates, or finally, countries with lower labour costs.

One way to avoid the negative effect of increasing local costs in nursery garden districts, as argued by Cresti (1991), firms (and public institutions) must invest in research and product/process innovation, as well as increase collaborations with universities and research centres, with the purpose of keeping "in house" the most profitable activities, and to outsource the lowest value added ones.

The Netherlands is presently at the forefront of this industry, and contains a whole cluster of related activities and a specialised district (Boskoop), because, even with the highest labour costs and the most unfavourable climate, it has been able, over time, to develop a strong expertise in the horticulture production, and in related R&D activities. This attitude towards product and process innovation places the Netherlands in a leading position, allowing it to exert its power as a strong supplier of cut flowers and young potted plants to be sold throughout all of Europe.

The Italian producers mainly organised in industrial districts, regardless of their ancient tradition, their territorial embeddedness, and the excellent climate, became strongly dependent on the Netherlands, which is now the "head" of a global value chain.

The ornamental horticulture industry is composed of the floriculture and nursery sectors. The floriculture sector covers firms specialised in production of cut flowers and cut foliage, whereas the nursery sector comprises the cultivation of a wide variety of plants and gardening products, as shown in Fig. 1. Both are involved in production and sales.

The ornamental horticulture industry in Europe is dominated by the Netherlands, but Italy holds the second position, producing 23% of the entire European market. According to the 2000 census of the agricultural industry[4], the Italian sector is composed of almost 19,000 firms, which cultivate an area larger than 12,600 ha (7,200 ha plein air), producing more than 25,500 types of flowers and plants. If we include all the firms in the filière (business services and induced activities) the number of firms rises to 30,000 units, with 130,000 employees (Ferretti, 2004).

Even though the ornamental horticulture industry is far from being high-tech, it firmly and extensively adopted ICT technologies for the commercialisation, conception and production of new products.

Concerning the commercialisation stage, we refer mainly to the applications of B2B (Business-To-Business) technologies, and to the construction of e-marketplaces, which use the "reverse" (to lowest price) auction mechanism [5].

The emergence of B2B and e-marketplaces, spanning both vertical and horizontal markets, has re-structured the competitive field of this industry, by aggregating scale in the final selling phase, increasing market and value chain transparency. The use of automating transactions has rendered the de-verticalisation of the value chain possible, and, as a consequence, it has created a high level of dis-intermediation.

The Dutch cooperative enterprise Bloemenveiling Aalsmeer (VBA), the most prominent floricultural products auction in the world, involves about 7,000 cultivators from all over the world and where daily about 55,000 transactions take place. The VBA works as a virtual marketplace, where buyers can purchase flowers and plants from the clocks[6] (that run from the highest to the lowest price) using the Remote Purchasing service (KOA), simply by the Internet. This is a window-shopping mechanism. Wholesalers and consumers, by viewing the un-priced supply of product, can ascertain in advance what they need to buy, mark the batches that interest them, and they will be informed in good time if the product is about to be auctioned, so that they can switch to the correct clock for the one-shot buying. There is also freedom to purchase outside the auction room, which has significant advantages for repetitive-shots. For example, it allows an organisation to buy items from the same producer, and it creates more cooperative interactions, and thereby integrates data from the auction with internal firms data systems.

Concerning the conception of new products, we refer basically to new varieties of flowers and plants. The creation of new varieties takes place within advanced laboratories (located in universities or large MNC). The Praktijkonderzoek Plant & Omgeving (PPO – Applied Plant Research) in Boskoop, for instance, is a research lab that was formed by a merger of the experimental station for crop research and other

regional research centres in the Netherlands, in the year 2000. The PPO researchers actively collaborate with the Wageningen University, and the research centre Wageningen-UR, and this enables the industry to update knowledge and to meet changing research requirements of firms.

New technologies in plant cell and tissue culture are applied both to cell culture for propagation (through non-sexual reproduction methods), and to plant transformation with recombinant DNA (Cocking, 1989). Sometimes, genetically engineered plants do not transfer the new embedded characteristics to subsequent generations. Thus, they have to be reproduced only through cell propagation.

PPO is active both on plant propagation and on recombinant DNA engineering. It aims also to create sustainable management systems, supporting quality management in the chain, cultivation management, plant health, and efficient utilization of resources and structuring of rural areas. It configures itself as a link between practice and science, conducting research not only on modern greenhouse practices - conditioned storage and treatment rooms, experimental fields, laboratories and climate chambers - but also on commercial issues.

Similar to PPO, in Pistoia there is Ce.Spe.Vi. a s.r.l. (limited liability) company, founded in the year 1981, between the Chamber of Commerce and the Cassa di Risparmio of Pistoia and Pescia (a local bank), for the creation of a centre of experimentation and propagation of nursery plants and, for promoting the participation of the company's capital to other nursery agencies or associations. In Pistoia there is little DNA plant recombination research activity. The centre accommodates warehouses, offices, a meeting room, two fixed experimental greenhouses in iron and glass, and an area equipped for the plant breeding in containers. The Ce.Spe.Vi. has also developed a system of mother-plants, organised in collaboration with the C.N.R. (National Research Centre) Institute of Florence for the propagation of the wooden species (mainly conifers), flowers, and hedge shrubs. This initiative has recently merged with the National Germplasm[7] Bank, a joint project of the Ce.Spe.Vi. together with the Department of Florence University "Ortoflorifrutticoltura" (horticulture plus floriculture plus fruit-growing).

Process technologies are also significant for the industry. In regard to automation technologies, it is evident that they can streamline the process, sustain cost cutting, and allow the possibility of reaching scale economies. Process technologies are applied to irrigation systems and fertirrigation, farm tractors, trailers, power cultivators, ploughs, clod busters, extraction machineries, motor mowers, and elevating trucks. Dutch firms are at the front line in these technologies, followed by mechanical firms specialised in agriculture machinery, which are mainly based in Emilia Romagna (within the district of Reggio Emilia) and in the Veneto region.

The evolution of the Dutch global value chain is illustrated in Tab. 1 and in Fig. 2, where the power of the Netherlands is evidenced. The Netherlands plays the role of a monopolist supplier of cut flowers distributed throughout Europe. In particular, Italy has consistently incremented the imports of horticultural products. This process was accelerated by the constitution of the "Mercato Unico Europeo" (Economic European Area - EEA), which occurred the 1st of January, 1993.

In the year 2004, exports towards Italy contributed to a sales turnover of 333 million Euro for the Netherlands, an amount that increased 5.1% between 2003 and 2004.

4. Three case studies[8]

Few studies have been conducted on the international ornamental horticulture industry, which is often neither well known, nor examined in its economic, social and territorial aspects. Also the Italian productive industry has been understudied. In Italy there is a vast assortment, which goes from cut flowers to potted plants for apartments, plants for gardens, and large parks. Some typical national products are the ornamental citruses in vases of terracotta, the olive trees of all the varieties and shapes, and the most singular Mediterranean plants. This makes Italy one of the most heterogeneous and commercially interesting countries.

Some ornamental horticulture production takes place in territorially circumscribed areas, and its organization assumes the appearance and the characteristics of the classical industrial districts, such as in the case of Pistoia, in Tuscany, and Saonara (in the province of Padua), which will be further analysed.

However, the Italian production is strictly dependent on several Dutch activities, as the Netherlands is the leading country in this industry. In this article we have chosen to focus on three ornamental horticulture districts, two located in Italy, and one in the Netherlands: in Boskoop. In Tab. 2 structural features and performance indicators are schematically represented.

4.1 The Boskoop ornamental horticulture district

The most important production centre in the Netherlands is Boskoop. Boskoop can be considered a horticulture district belonging to a very specialised and dense area (called here cluster) of activities related to the same sector (the region/country of the Netherlands). The horticultural sector is indeed responsible for 41% of the entire agricultural production in the Netherlands, and the ornamental plants sector accounts for two thirds of the latter. The ornamental plants sector also accounts for about 25% of the Dutch trade surplus (Maijers, Vokurka, van Uffelen, and Ravensbergen, 2005). In Boskoop (Tab.3), hundreds of firms are producing ornamental plants and conifers (in greenhouse pots and in open air).

The origin of the district dates back to the Renaissance time, when local farmers learned from the Rijnsburg Coventry the art of fructiferous grafting[9]. For a long time they applied the new techniques only to fructiferous plants, but during the XVII Century they started the production of ornamental plants, with same methodologies. Interestingly, as in the Italian case, in the XIX Century, the local production was mainly concentrated in few large firms. Subsequently, the process of spin off of qualified manual workers, thoroughly studied in the district theory, gave rise to a multitude of small-specialised firms. However, the district firms[10], until World War II, were still quite undeveloped, and commercial circuits were mainly local, with few exports. The real business started during 1970s, as a result of the growth of the international demand, and the development of the economic welfare (horticultural plants are a luxury good sold in affluent societies).

Why is horticultural production so specialised in Boskoop? Boskoop bears some unique characteristics, for the type of soil that exists in the land, and that combines a

high density of water (high humidity) with an always-moist quality of compote, ideal to the plant cultivation. So, the district is specialised in the production of young plants, which they cultivated only up to low-medium height. Boskoop producers are able to develop all types of plants (such as red Fagus, Magnolia, Buxus, Acer, etc.), of course excluding tropical plants. Production is mainly in open air.

The "savoir fair" is given from father to son, and by the sharing of knowledge with on-the-job training for the newly employed people. In the past, there was a local vocational training school based on horticulture, but now it is closed, because firms deal directly with more advanced centres and universities. During the analysis we found that these firms share the sense of identity from being a district, but younger entrepreneurs are more directly involved in cooperation with public institutions, and rival firms within the collective associations.

Firms are mainly family firms, often made of 2-3 employees plus the owner. Greenhouse producers and open air growers no longer sow by themselves. Sowing and cultivation of young plants has become the work of highly specialised nurseries, using advanced computer techniques, and robots. The whole production process is a prime example of applied advanced technology to horticulture. Family firms do not deal with market directly, and work on the behalf of the wholesalers. It is a type of subcontracting arrangement existing among manufacturing sectors, like footwear or clothing. Wholesalers annually stipulate contracts for buying a clearly defined set of products, which they will sell on the international level.

These contracts are regulated by external institutions, and are limited by strict obligations, on both sides. So, foreign clients cannot simply override the wholesale structure, buying directly from the producers. They can have access only to redundant production, and in any case, they must pay by cash in advance.

The largest firms in the district are wholesalers; typically they are private, limited companies with 5-20 employees, and with a range of sales varying between 2.5 million and 5 million Euro. These firms, and generally local entrepreneurs, belong to the third or fourth generation. Local wholesalers sell mainly in UE, and in Canada, US, Japan. They import adult plants from Italy, France, and Germany. The characteristic of

Boskoop is that, using advanced logistic techniques, in 24 hours, clients receive their orders in all parts of Europe, and also in other parts of the globe. In Boskoop there is an incredible variety of plants that can be bought. Variation is the typical resource of industrial districts, where production is decentralised, and many specialist firms co-exist.

Wholesalers sell primarily to Garden Centres (60%), or to other wholesalers (30%), or to public institutions (10%).

Plants are small, so they save money in packaging and transportation costs. There are mainly 6 international exhibitions on horticulture, and two are organised in the district areas studied here: Plantarium in Boskoop, IPM in Essen, Glee in UK, Four Oaks in UK, Iberflora in Spain, and Flormart/Miflor in Padua. Local district firms are connected to entrepreneurial associations of Boskoop (see Fig.3) as well as to national associations[11].

Many public/private bodies (see Fig. 3) assist firms (both producers and commercial firms) in their daily activities, and are responsible for the provision of "real services", like marketing the district on international level (PPH Plant Publicity Holland), and R&D activity (PT-Product Board for Ornamental Horticulture).

This latter organisation invests about 4,5 million Euro each year in research.

NBvB (National Horticulture Firms Association) has signed a general agreement with LTO-Nederland, the association that groups all the Dutch agriculture sectors. In addition, it takes part in other numerous committees and executives councils, such as PT, for instance, and others.

On one hand, firms directly support their specialised associations, for advertising and marketing, and for due R&D, but on the other hand, many governmental agencies are involved in related R&D activities.

Many projects on logistics have been launched by the associations, together with the use of public funds. For example, recently they have supported the introduction of a single, uniform type of trolley throughout the Netherlands, and the standardisation of packaging, such as the chrysanthemum box. These projects show that the higher the level of standardisation in logistics, the more efficiently the logistic processes can

proceed. The general association of entrepreneur, VBN, plays a central part in creating and maintaining that standardisation. All the VBN-approved forms of packaging, for example, have a unique VBN code. Suppliers, auctions and the buyers, all use those codes. Indeed, they would be unable to communicate with one another without them. The VBN is responsible for distributing and issuing the codes. The management of the standardised VBN packaging units is the responsibility of the ornamental plant sector's packaging pool SiVePo.

Local associations are active in setting rules and fair business practices, which are now standardised and codified (see: *Trade Rules for Flower Bulb Trading* and *The Dutch Terms and Conditions of Trade for Nursery Stock)*. One of the essential associations is the Horticulture board of Councils, where KBGBB and NBvB are represented. The Horticulture board of Council sets the policy lines for environmental issues, trade rules, and participates to EU consultation in ENA (European Nursery stock Association).

The local association of Boskoop (KVBC) has collections of Dutch old plants in reserved areas of Boskoop private producer's farms, and this is a kind of genetic living museum of vegetarian species. The members of KVBC can ask for small quantities of these old plants from the firm that mange the reservoir, so they can reproduce on a large scale old forgotten species. The association publishes specialist's manuals and a yearly book called *Dendroflora*.

PT is financed through the small revenues obtained from each sale. The money collected is used to finance innovation projects, and all activity that sustains the sector.

PPH was created in 1952 for the collective marketing of horticulture of the Dutch cluster, and it is financed by PT.

PPO is the research centre, which represents a point of intersection between horticultural practical and science, and runs experimental stations.

NVZP, the Dutch Seed Trade Association, represents firms working in breeding, production and trade of plant propagating material. It offers its members a platform for exchange of knowledge and information, provides information and advice, co-ordinates

joint research projects, and acts as an employers' organisation for collective labour agreements.

There is then the General Dutch Service for the Quality Control that certifies all agriculture and horticulture products, and monitors that the level of pesticides is sufficiently low, as prescribed by UE norms.

Considering the public institutions, the renown University of Wageningen (Wageningen UR) must be mentioned as it produces researchers and has contributed to the success of the district and of the horticulture sector.

Additionally, we must acknowledge the software producers that worked with Beurshal organisation in the first years of 1980s to build an automated system for the selling and buying of horticultural products (VARB), which is now one of the most advanced systems of electronic commerce.

VARB works together with the site www.plantscope.nl which provides the users the following information: scientific data, correct nomenclature with all synonyms, commercial information, product codes, data on patents and copyrights, and regulations on their potential use[12].

Governmental agencies are very much involved in the sector[13].

There is then a special Tribunal for the horticulture commerce, which deals immediately with all litigations (*Boskoops Scheidsgerecht voor de Boomkwekerij*). The members of Dutch associations are advantaged by lower costs for the use of this service. Finally, all payments not executed are registered at the *Particle Aligns Aagency*, and local firms are assisted by legal specialist advice. A legal procedure of international requirement (hearing) is initiated, if things are not soon resolved. There is also an archive on delinquent clients, based on the historical file of un-received payments, to which local firms can have access, and they can order special inquires, in order to understand the future clients credit guaranty[14].

Thus, the Boskoop district, which contains breeding firms, firms raising plants, growers, and trade distributors, has developed some specific institutions (associations, research, and training institutions), but is also immersed in a larger national agriculture

horticulture cluster[15], which has developed supplying sectors, process and packaging industries, and transportation and logistics sectors (see Fig. 4).

Recently a Dutch Innovation platform was set up by the government to stimulate innovation in Dutch knowledge-intensive industry - concerning the Flower and Food-business. The idea is to reinforce the connections between knowledge institutions, innovative suppliers, leader entrepreneurs, and buyers.

The Boskoop district is a clear-cut open innovation system. Innovation did not take place within a vertically-integrated company, with everything in-house, but was instead the result of an open cooperation between firms, research centres, and universities.

The concept of "open innovation system" means that networks of organisations (private and public) are involved in the innovation (Chesbrough 2003).

Dutch horticulture is an advanced cluster, which produces sophisticated items (Fig. 4). The long standing division of labour among firms, and the use of science applied to the reproduction of plants (and to manufacturing and transportation techniques), has created a large and professional supply industry: a) propagating material, b) plant breeding suppliers of vegetable seed and young plants, c) greenhouse construction and installation companies[16], d) suppliers of harvesting and sorting machines, e) innovative machines for logistic improvement of the production process, and f) suppliers of other horticultural goods (equipment, accessories) such as: pots, trays, covers and sheeting. There are also of course, many specialised consultants that work in the horticultural sector[17].

Horticultural suppliers are not only active in the Netherlands. They operate increasingly on the world market. Almost a quarter of the production value of this sector is obtained nowadays abroad (den Hertog, 2003).

The breeding of horticultural crops has a long history in the Netherlands. Traditionally, seed companies were located in the northwest, around Enkhuizen. But subsequently, many plant breeders moved, or were created also in (or near) the Westland. Because of the importance of the Dutch market, many plant breeders come from the United States, Japan, France, and other countries. Due to the highly specialised

nature of plant breeding, and the high costs involved, firms tend to collaborate also with foreign firms located in the area.

In spite of the internationalisation of plant breeding sector, much of the scientific research into new varieties has remained in the Netherlands. This gives a high competitive advantage to seed firms, which export a significant proportion of their products (seeds). Netherlands is now the home of plant breeding, and the innovator for new plant and flower varieties (Maijers, Vokurka, van Uffelen, and Ravensbergen, 2005). A close look at the national innovation system is reported in Tab. 4.

4.2 Pistoia ornamental horticulture district

Pistoia is the "greenest province" of Italy, being beyond 50% of its territory covered by forests of conifers, hardwood forests and typical shrubs of the maquis. The hills are carpeted with rows of vines and olive trees that produce high quality wines, and extra virgin olive oils. The plains are adorned with splendid cultivations of ornamental plants and flowers, which characterize deeply the economy of Pistoia and render it famous all over Europe. The ornamental horticulture industry is the most important agricultural activity; it contributes for the 25% to the formation of the gross product of the Tuscany agriculture, and represents the 5% of the overall European ornamental horticulture industry, being Pistoia one of the most important productive districts of the continent.[18]

Three categories of firms can be identified in the Pistoia district, according to their size: a) small size firms: small producers, specialized in the production of one only variety of plant, upon request of one great company, with which they subscribe yearly contracts that guarantees them the job, but with small margins of gain; b) medium size firms: producers that both produce and commercialise their products. They tend not to establish any dependence from larger companies, and they aim to grow at the national and international level. Therefore they are part of international networks with which they interact occasionally; b) big size firms (about 20 firms): they concentrate their activity on the wholesale trade of their productions, destined mostly to foreign markets (in the EU), besides, they invest much of the revenues in R&D activities, often carried out in house in advanced laboratories. As a result, they were able during time to deposit

5 new types of plants: (one Magnolia grandiflora, two Quercus robur, two Robinia). The assortment of plants cultivated in the district is very large in species, but the specialisation is in evergreen, deciduous plants, and conifers. In the Pistoia industrial district the enterprises and the public system have been able during time to conjugate entrepreneurial culture and scientific knowledge, creating, as a result, modern ornamental horticulture enterprises, and advanced structures of training and technical-scientific support, like the bachelor course in Nursery Technique and Landscape Architecture.

In the district, we find a strong firm specialisation, and the division of labour between companies has been pushed so much further that it can be easily stated that a plant born in Pistoia can be object of the cures of 2-3 (or even 4) various enterprises before being ready to reach the market. The experience that some of the firms have been accumulated during time is so precious that they became a point of reference at the national level – it is the case of companies that develop gardens and parks, means of production (vases, fertile soil, greenhouses and plant engineering, etc.), or that supply services (and connected materials goods).

Moreover, the district is characterized for the typical productions that draw their origin in the tradition of the Tuscany renaissance small farms, namely the cultivation in vase of citruses and other exotic species, or the topiary art in order to obtain plants of several shapes for the furnishings of classic garden.

But today many firms in the district buy young plants from the Netherlands, which then they cultivate in their nurseries. However, the largest firms are able to sell their cultivated plants back to the Dutch garden centres. Netherlands lacks of the right soil and sun for the “maturation” of the plant development, and production costs are much higher than in Italy. So, we can observe an interesting division of labour that take place between the two districts: science activities and propagation tasks (which are also related to the application of biotech techniques to the propagation phase), are more developed in Netherlands, where local firms benefit from the existing well developed “national innovation system”, while the “manufacturing” process of plants development, starting from the small plant to the adult plant is organised by the Italian district.

Strictly speaking, we see that horticultural districts are no more low-tech activities, but science is applied differently in the two districts, and districts work now in an integrated flows of knowledge exchanged in goods and services. Some districts specialised themselves in knowledge-intensive activities, other are less knowledge-intensive specialised.

1. In the former, biotech activities are behind the development of knowledge in plant reproduction and in product innovation (the generation of new varieties), and in ICT applied to logistics, selling and marketing techniques.

2. In the latter - which can not benefit from a national advanced system in plant reproduction and in biotech science - we see interesting new applications of mechanical labour saving techniques for irrigation, movements automation, and so on, which are more related to medium-low value added phases of the value chain, and some timid progresses in new techniques of propagation related to typical endogenous niche products, that the Dutch have not much developed (Mediterranean plants). It is a process very similar to the one that take place in clothing and footwear district, described in other chapters of the book, with the difference that here more advanced Italian districts specialised in design, production techniques and marketing activities govern the entire global supply chain (and often own the foreign firms that in the manufacturing districts operate along the "manufacturing" phase).

In this context, it is interesting to observe that Pistoia firms are also involved in commercial activities with Saonara firms, to which they sell plants and some mechanical tools for the nursery sector, because in the Pistoia district there are some specialist firms, which have developed new machinery (specialised suppliers, which have developed in collaboration with the advanced Italian mechanical sector/cluster in agricultural machinery of Reggio Emilia, in Emilia Romagna, and of Padua, in the Veneto region). They now are among the Italian largest suppliers of these products.

4.2.1 Historical development of the Pistoia district

The birth of the ornamental horticulture district in Pistoia dates back to 1849, with the work of a young gardener of Villa Bozzi: Antonio Bartolini. The garden of Villa

Bozzi, and those of the surroundings, very soon became too small to contain all the plants produced, therefore Bartolini convinced his father to rent a narrow piece of land on the “Lucchese” Provincial road. Here he built up his first small nursery, and it was also the first one in Pistoia; soon his brothers started to work with him, constituting a small family firm.

In 1851 the rooms of the former “Convento del Carmine”, a monastery, accommodated the first edition of the Pistoia horticulture exhibition. Between 1870 and 1900 several important fairs dedicated to horticulture took place, since the Bartolini Brothers company was no longer the only one in the Pistoia horticulture industry. Among the 15 firms operating at the end of the 1800, we can mention the Bianco Bianchi, the Raffaello Fedi and the Massimiliano Capecchi companies (all founded during the 1880s), the Martino Bianchi Company (1888), the Chiari Company. In 1895, Ernesto Tonelli built an important nursery in the garden of the “Madonna del Soccorso”, and he was the first one to “export” his own productions to the Livorno market.

The propulsive phase of the Pistoia horticulture industry began during the first two decades of the 1900s. The agricultural companies grew in dimension and number, and the activities that previously were carried out within the walls of the city began to cover also external pieces of land (along the eastern and southern direction).

In the course of only two decades the field expanded quickly, to cover a cultivated surface of two hundred hectares, and assumed an advanced shape if compared to the average of that time. Furthermore, between 1909 and 1923 a significant number of agricultural institutions, researching, experimenting, and diffusing knowledge, began to support the horticulture industry production in Pistoia.

In 1911 the AOPI (Italian Professional Horticultural Association) was created, involving horticulturists, floriculturists, nursery professionals, garden constructors, seed traders, and florists. It was the first association dedicated to scientific, technical or practical knowledge transfer among the professionals created in Italy in the industry.

In 1923 the "Regal Practical and Theoretical Observatory of Fruit-growing” was founded in Italy, for research and experimentation in the field of the fruit-bearing plants.

The Observatory had two main objectives: a) maintaining the plant varieties and curing the diseases of the various cultivations, and b) organizing fruit growing courses, conferences, and working as a consultant to enhance the development of the industry.

As a result of such initiatives, a formal education system, focused on the arts of agriculture, was initiated in the city, through the institution of regular courses of pruning, grafting and diverse agrarian techniques. These initiatives were at the foundation of the future Agricultural College "De Franceschi".

In the 1920s, after having overcome the crises due to the fillossera[19] and to World War I, the Pistoia horticulture enterprises were ready to affirm themselves in Italy and in the foreign countries.

Between the 1920s and the 1940s new firms were born, as a result of spin-off from the larger nurseries, giving rise to a quick development of the district in the Pistoia territory. Unfortunately the district entered a crisis due to World War II. Several firms closed down and left a large vacuum in the district.

As in the Netherlands, the 1950s were characterised by a phase of strong expansion; the number of firms and employees increased dramatically, the cultivated surface increased from the 500 ha in the 1956 to more than 3000 at the end of the 1960s. New institutions and specialist schools were created to serve the Pistoia firms. Since 1965 entrepreneurs began to participate in international fairs such as the Flormart (in Padua) and the Miflor (in Milan).

During the 1970s the Pistoia companies introduced innovative improvements such as the activity of large scale cultivation of plants in vases.

In the 1980s the topiary plants assumed great importance in the market. Following the demand, Pistoia firms introduced the cultivation of the shrubby creepers not only in vase, but also with particular shapes, using trellises to obtain a completely original product. The innovative activity of the firms of the district found a new supporter in the Ce.Spe.Vi, the experimental nursery centre founded in 1981, whose purpose and work has been already discussed in Section 3.

The experience of the terrible frost of 1985, incited the need to establish a new University course of Nursery, which started only in the 1992 to be active.

During the 1990s a product innovation characterised the district: the cultivation of great trees in affixed containers. Olive trees, strawberry-trees, palms, carob trees, oaks and other species, "captured" from various environments, began to be transported to Pistoia, unloaded, placed in large vases with the appropriate soil, correctly pruned, and placed in fields to be cultivated and grow, and to be reproduced. In this way, they could be sold to enrich "instant" gardens, a new trend in the sector, as confirmed by Hodgson (2004).

As a result of the advances in the horticulture production, and the continuous growing of new species, during the 20th century the cultivated hectares increased to 5000 ha. The district now is composed of roughly 2000 firms with 5000 employees, and the value of its production has reached in the last years about 300 million in sales.

4.3 The Saonara ornamental horticulture district

The industrial district of Saonara, is located in the Padua province. As Pistoia, it is one of the most ancient horticulture districts in Italy. In the district more than 40% of the 2,000 hectares are used as cultivated nursery. About 1,000 firms form the district[20].

The majority of firms in the district are family companies (30%), with a very small land (1 ha): mostly one-man companies (the entrepreneur himself). Some of them employ extra-family members employees (3-8), and only two or three firms have more than 20 employees. Besides, the employees are often linked to the firm by a seasonal contract.

The district is specialised in rosebushes and fruit-bearing trees. The production includes also ornamental plants for gardens, trees, plants for the landscaping and forestry. Firms are also limited exporters. Recently some firms have begun to specialise in gardening, and private and public green maintenance. The revenues of the producers depending on wholesalers' purchases tend to be low. Being active in the service of gardening is a good opportunity to escape the price mechanism provided by the marketplace technologies, which put producers in a global competition following a pure neoclassical mechanism. Prices are no longer dependent on "local" costs but are fixed in a global context.

All the firms operating in the district have some relationships with Pistoia, for buying plants, materials, and equipment at lower prices than sold by Padua local suppliers. For this purpose firms have developed an effective logistic system, which is organised in two ways (with plants and materials bought in Pistoia) and sold to Pistoia (mainly rose bushes). Some of the firms are connected to the Netherlands, from which they buy rootstocks and young plants. Thus, Pistoia is more specialised in cut foliage and "instant gardens" plants, and Saonara in roses. Saonara is also involved in the service sector of garden and public flowerbed maintenance, for which they are able to compose "bunches" of different plants: some bought and some cultivated by them.

Despite their relationships with Pistoia and Boskoop, the Saonara firms are backward: they are not adopting advance techniques in product development, and they are neither innovators nor followers. This is probably due to a lack of intrinsic motivations and cultural embeddedness, which make the entrepreneurs very resistant to novelties and self-upgrading.

Saonara is a typical case of a district suffering from look-in.

The district lacks experimentation centres, which, on the contrary, are judged as indispensable by the entrepreneurs. In Legnaro there is Agripolis, a university pole of the Faculty of Agrarian and veterinarian medicine, incorporating also the Veneto Centre for Agricultural Studies, and in Padua there is a secondary school specialised in agriculture studies, the Istituto Tecnico Agrario "Duca degli Abruzzi". However there are not many close and productive connections. The Faculty of Agriculture has recently proposed two courses specific for the sector that are the bachelor course in Nursery Techniques and the bachelor course in Landscaping, Parks and Gardens. But the local entrepreneurs are reluctant to employ graduated students in their small firms, and to provide "stages" (internships) for the university students.

Despite the existence of specific education programmes, a poor network of internal relationships, which involve institutions, universities, and firms, contribute to create a relational vacuum, where knowledge circulation and collaborative projects are not easily pursued.

The absence of effective meta-organizers, which operate as district boundary spanners (i.e. a training institution or a district museum) constitutes a strong limit to the evolution of the Saonara district, and keep it qualitatively and technologically distant from both the Boskoop and the Pistoia districts.

Similarly, there is a "paradox", that is the presence in Padua of an important international fair, Flormart/Miflor, which hosts, twice yearly, the leading operators in the ornamental horticulture industry[21]. Surprisingly this fair does not contribute considerably to the Saonara district firms' performance.

Again, the Saonara case shows that the development of a single firm depends strongly on its geographical localisation.

The conditions related to the presence of communities of practice and advanced firms networks with science institutions is not only an individual characteristic, but it depends on the "atmosphere" in which relations with the local environment are settled.

This appears to be a fundamental prerequisite to the diffusion and adoption of novelties. Distant relationships with extra-district operators are not a sufficient condition for the innovative development of internal products and processes. The district assists firms with knowledge "interpretation", and district institutions provide the necessary knowledge circulation on the basis of which external relations can be fruitful. As a result, Saonara district configures itself as a weak component of a global value chain, where the Netherlands are the innovators that sell their new products (in the shape of young plants) to Saonara, which does not hold the capabilities to develop technological improvements, and to experiment *in loco* the creation of new flower and plant varieties.

4.3.1 Historical development of the Saonara district

The historical origins of the ornamental horticulture industry go back to the city of Venice, which, between the XV and the XVIII century, assumes the role of propulsive centre for the local development of botanic science. The Venetian aristocracy has consistently maintained a passion for the cultivation of rare plants, creating beautiful gardens in the lagoon city, and in the "terra firma". A particular recognition dates back

to the abate and “nobiluomo” Gabriele Farsetti, who, already in the XVIII Century, built, around his historical house in Santa Maria di Sala, near Padua, a big company dedicated to the cultivation of ancient plants (botanic gardens, meditation gardens, fruit-bearing fields, and so on), and published twice in the 1793 and the 1796 some rich catalogues, collecting all his varieties of plants.

Following this first attempt to codified ornamental horticulture knowledge, some more popular oriented publications have been diffused also for a larger audience than the scientific and academic ones. Since 1763 a public institution for the cultivation of fruit and garden plants was active in Padua, founded by decree of the “Veneto Dominio” (the Venice Republic).

This phenomenon of popularisation of sector-specific knowledge shows other evidence in the fact that in the first half of the XIX Century the participation in flower exhibitions was not only a privilege of the aristocracy, and the wealthy classes, but simply a passion for average people (Bussadori, 1990).

The association “Società Promotrice del Giardinaggio”, active in Padua between 1846 and 1868, was at the basis of an ample local diffusion of the horticulture practices. This association started to sponsor in Padua numerous flower exhibitions, and to promote flower expositions in private villas. So, in the area, we find a slow growth of these activities, whose expansion was intensified in the first decades of the XX Century. Already during the 1930s the district firms were specialised in the cultivation of the roses, lilies, dahlias, carnations and gladioli.

During the 1940s, the local horticulture business began to employ the new technologies developed in Europe: greenhouses, heating systems, pumps, washing boxes, bathtubs etc.

Pioneer firms were the following companies: Fassina, Croff, Gribaldo, Rizzi, Sgaravatti, Zorzi, and Van Den Borre. At that time these were substantial firms, but for one reason or another they closed down or decreased in size.

Particularly important, in this historical context, is the story of the Sgaravatti family firm, which made known the name of Saonara in all Europe.

Angelo Sgaravatti, born in 1798, became in 1815 an expert gardener for Count Morosini. In 1820 he bought a small piece of land from the Count (one ha.) - whose economic fortunes went in bankrupt as occurred to many Venetian nobles - on which he built a small ornamental horticulture production.

In 1936 the "Fratelli Sgaravatti Piante" firm bought a firm in Pistoia: the "Stabilimento d'orticoltura Bianco Bianchi", where more favourable climate conditions allowed the cultivation of conifers. In 1946, the firm acquired some land in Rome. The family firm was very dynamic during the King of Italy's reign. In the Villa Leone Sgaravatti ex-Morosini also Vittorio Emanuele III was once a famous guest. The firm closed down during 1960s and went in the hands of its workers, with the name of Cooperativa Co.Vi.Sa, which no longer exists.

Actually, in Padua there are many activities related to the horticulture production organised by the provincial agriculture association (Unione Provinciale Agricoltori, and Coltivatori Diretti, and C.I.A.- Confederazione Nazionale dell'Industria e dell'Agricoltura).

A specific association for horticulture was set up only in 1985 (Associazione Vivaisti Padovani), but it is not very active in organising conferences, R&D agreements with the university, firms' cooperation, and training activities. Thus, another institution was founded in 2000 (Consorzio Florovivaisti Padovani). It specialises in quality certification (ISO 9001), organisation of participation of members to exhibitions, and publication of a technical manual for the production of ornamental horticultural plants for the members.

4.4 A brief comparison among the three cases

In Tab. 5 we can find some illuminating comparisons based on our firms qualitative interviews. The three districts are very old, and are now formed mainly by small firms. In all three cases during the 1930s and the 1940s, large firms were dominant in the districts, but a strong process of decentralisation occurred in the post-war period.

However, the exploitation of science has greatly contributed to globalise the Dutch district, and to render this district a very particular combination of science activity and

practical knowledge embedded in manufacturing tasks. It is clear, from our interpretation, that local and national institutions played a very different role.

A global division of labour is now linking the three districts along the value chain: Pistoia and Saonara must buy nearly all the small plants they need in the Netherlands, where the propagation activities are more developed, and grow, then, the small plants in Italy. In some cases, adult plants are re-exported in Netherlands, and sold in the global markets, through the advanced commercial structures of the Dutch distributive sector.

5. Concluding remarks

This article started with a question about the difference among the notion of industrial district and cluster. We argued that the main differences between these two concepts are related: a) to the definition of the geographical border (which in the case of an industrial district is strictly linked to the possibility of the emergence of a historical-dependent system, where social relations influence the economic dynamics), and b) to the presence of a social embeddedness provided by the sense of identity of the local community, the building of local institutions, and the presence of some forms of cooperation. The heterogeneity of industrial districts is appreciated only through a type of analysis which uses qualitative sources, and ad hoc investigations. In fact, as we have deeply discussed, even in a circumscribed industry such as the ornamental horticulture, the three districts are remarkably different, in research capabilities, types of products, adoption of technology, market shares, business models, and relations with local institutions. The influence of globalisation has not reduced the diversity but it has contributed to increase the specialisation and to enforce the symbiotic division of labour among them. In this article we have presented the evolution of three horticultural districts, two of them, the less advanced, are placed in Italy, the other (Boskoop) is part of the larger horticultural Dutch cluster.

The development of the ornamental horticulture industry exhibits clearly how the globalisation of the markets can affect the localisation of the industry. A product – the flower or a plant –is easily transportable. Thus, we will expect that the production will be moved to lower energy costs countries, or to countries with better climates, or with

lower labour costs. On the contrary, the Netherlands is presently at the forefront of this industry, and contains a whole cluster of related activities and a specialised district (Boskoop), because, even with the highest labour costs and the most unfavourable climate, it has been able, over time, to develop a strong expertise in the horticulture production, and in related R&D activities.

A large number of specific institutions have sustained this trend, developing several collaborations with universities and research centres, with the purpose of keeping “in house” the most profitable activities (in science application: plant propagation, new plants engineering, seeds production, and in distribution: logistics, auction, marketing, and retailing), and to outsource the lowest value added ones, such as the plants growing.

This attitude towards product and process innovation places the Netherlands in a leading position, allowing it to exert its power as a strong supplier of cut flowers and young potted plants to be sold throughout Europe.

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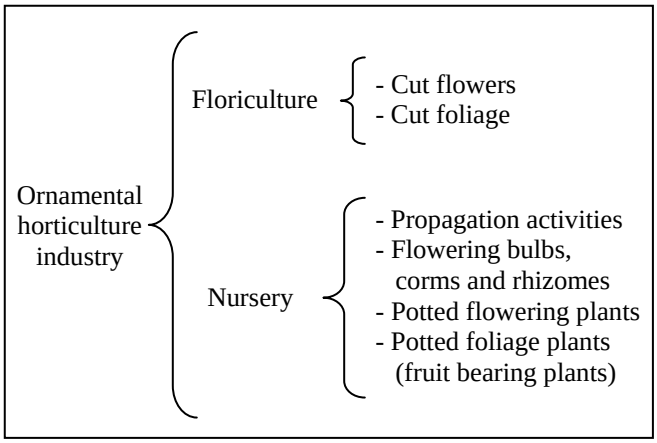
Fig. 1 An abridged classification of the ornamental horticulture industry

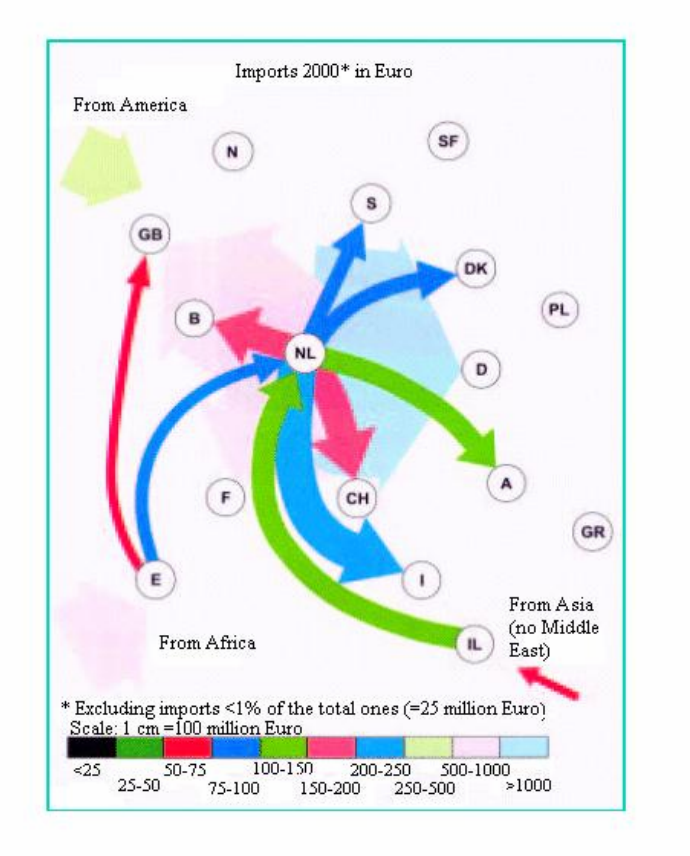


Tab. 1 Dutch export horticultural products
Sales turnover (x € 1,000,000)

	2002	2003	2004	%'04/'03
Germany	1,512	1,585	1,571	-0.9%
UK	729	741	797	7.5%
France	606	649	654	0.7%
Italy	281	317	333	5.1%
Belgium	164	184	190	3.0%
Denmark	107	123	138	12.4%
Austria	127	133	135	1.4%
Switzerland	141	134	126	-6.0%
USA	143	115	101	-12.4%
Spain	72	85	97	14.1%
Other countries	671	678	729	5.0%
Total	4,553	4,744	4,869	2.2%

Source: Dutch Floricultural Wholesale Board

Fig. 2 Intra EU exchange of cut flowers



Source: International Association of Horticultural Producers (AIPH)/Union Fleurs, International Statistics Flowers and Plants, 2001.

Tab. 2 Structure and performance indicators of the three districts (2003)

District	*Number of firms*	*Area covered (ha)*	*Number of employees*	*Sales (mil. €)*	*Export (%)*
Boskoop*	1000	2200	2500	350	90
Pistoia**	1790	4393	5000	300	45
Saonara*	151	1000	800	15.5	10

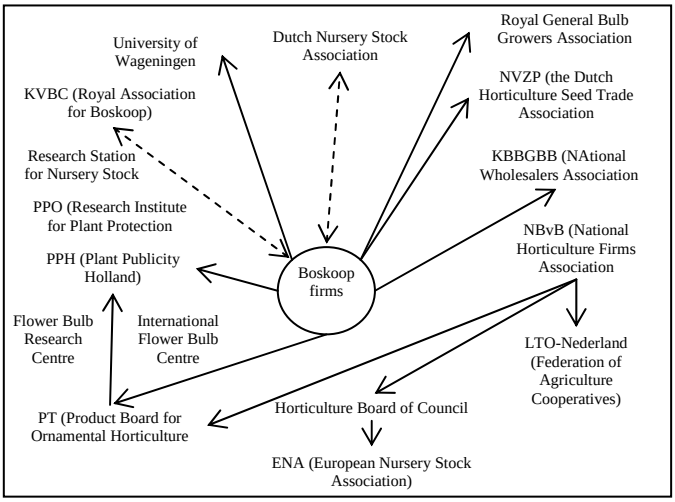
*Source: * Our survey ** Regione Toscana – Settore Statistica*

Tab. 3 Structure and performance indicators of Boskoop district (2003)

	Number of horticultural firms	*Area covered (ha)*	*Number of employees*	*Sales (mil. €)*
Boskoop	1000*	2200	2500	350
The Netherlands	4000	12,000	4170	445
% weight of the district	25.0	16.7	60.0	78.7

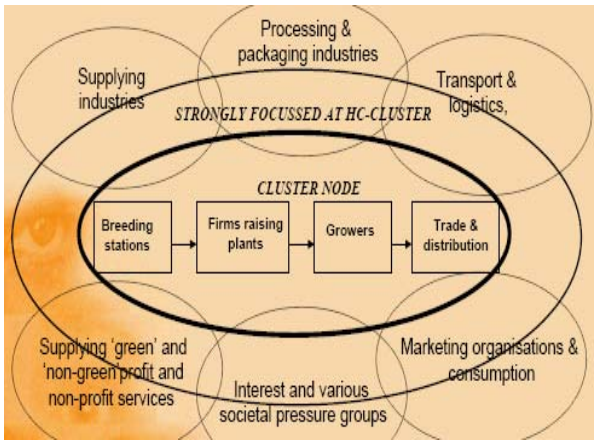
*Note: * of which 100 firms are wholesalers.*
Source: interviews conducted during the survey.

Fig. 3 Main Collective public and private associations related to the district of Boskoop



Note: Dotted lines are related to Boskoop district institutions

Fig. 4 The Netherlands cluster



Source: den Hertog (2003)

Tab. 4 The Netherlands innovation system

Period	*Characterisation*	*Productivity boosters*	*Knowledge architecture*
1945-1965	Reconstruction and food safety	Soil productivity Crop protection Variety improvement	Research and information as trouble-shooters Auctions increase sharply
1965-1980	Mechanisation	Heating Climate control Plant material Mechanisation of labour Large scale export through liberalisation EU market	Close cooperation between government and industry Development of the agricultural knowledge system (OVO/Research, Information, education triptych)
1980-1993	Computerisation	Introduction of computer boosts hydroponic cultivation, trickle irrigation, CO2 fertilisation, assimilation-clarification	The knowledge systems supports the introduction of new technology Study groups for growers Development of management information systems Auction develop data-processing, as well as guidelines for environmentally aware cultivation
1993-2000	Chain reversal	Great changes in sales structure and knowledge systems Market changes from supply-driven to demand-driven Privatisation of information and research	Emergence of chain-thinking, growers associations and brand strategy Social concerns play a greater role (e.g. environment) License to produce Knowledge system breaks up into individual parties

2000-	Mobilisation and integration	Multidisciplinary approach Combination of various types of knowledge From “formula to concept” Demand- and supply- articulation Chains and chain management	Knowledge circulation instead of knowledge development Networks, communication of practices, knowledge circles Socio-technical networks, knowledge groups Horticultural academy Globalisation of market and production Certification and quality assurance systems Supply chain management License to deliver

Source: Our elaboration on Buurma (2001)

Tab. 5 A cross-comparison between the 3 districts (Saonara, Pistoia and Boskoop).

	Saonara district	*Pistoia district*	*Boskoop district*
Natural resources	Malleable soil	Malleable soil and Mediterranean climate	Soil rich of water, and tender compote
Climatic conditions	Medium	Very good	Unfavourable
History	Founder firm: Sgaravatti in 1820	Founder firm: Bartolini in 1849	Horticultural specialisation emerged during XVI Century Numerous firms emerged during XIX Century Take off after the WW II
District specialisation	Fructiferous plants, and rosebushes Maintenance of public gardens and green areas	Cultivation of ornamental plants ready to instant garden	Small plants, seeds, and propagation (R&D- intensive production)
Quality of the product	Very good	Very good	Very good and certified on the basis of numerous criteria Central Dutch Service for the quality (Naktuinbouw)
Labour market	Specialised	Specialised	Specialised
Co-operation	Very low	Medium level	Very high (both among firms and institutions)

Infrastructures	Medium	Medium	Advanced through the Rotterdam port (diversity and volume of cargos)
Entrepreneurial organisational capabilities	Very low for SMEs medium for lager firms	Very low for SMEs medium for lager firms	Very high for all firm size
Diffusion of new technology	Limited	Higher	Very high Logistics and e-commerce retail; presence of VBA, the most prominent floricultural products auction in the world
R&D	None	Few links with Italian Universities	High R&D flows provided by public expenditures and by firms associations
Promotion	None	None	PPH - Plant Publicity Holland

Source: Our elaboration through firms' interviews.

Notes

[1] It is also true that the term of industrial district and cluster is used as a synonymous. In some cases this depends from the national origin of the researchers: Italian researchers (Garofoli, 1989; Belussi, 1996) often use the terms industrial districts or local production systems, the term cluster or industrial cluster reflects the Anglo-Saxon research, and the strong influenced of Porter's works.

[2] The Italian Institute of Statistics ISTAT, with the contribution of Fabio Sforzi, basing on the analysis of the daily commuting of the local working population, divided Italy into different geographical areas of local labour systems (LLS). In 199 cases, these areas were considered, with a good approximation, as areas characterised by the presence of industrial districts (Sforzi, 1989; Brusco and Paba, 1997). However, this is a classical case of realised semantic ambiguity. The 199 Italian systems selected are in fact geographical aggregation and not districts. In a complex cartographic elaboration recently the IPI Institute (2002) has published a series of maps confronting the various qualitative and quantitative methodologies used in various researches and in official regional documents for the industrial district identification in Italy. In each map a different geography of the industrial districts is displayed. The confusion is big under the roof of cartography.

[3] The international trade has been strongly influenced by intra-industry trade and PPT (Passive Perfectioning Traffic), giving rise to enormous flows of outsourcing. Within IDs, the first wave of outsourcing began in traditional sectors during 1970s, in clothing, textile, footwear, and cheap electronics, and in 1990s it developed greatly due to the fall of Berlin wall, and the integration of eastern countries into the European Community, and of large economies of developing countries like China, India, and the Far East in the global market created by WTO.

[4] ISTAT (2000).

[5] A reverse auction is an on-line procurement method used to obtain quotations for commodities and services. In a reverse auction, something is purchased from the lowest quote (which is the "reverse" of a normal auction, typically organised for unique artistic pieces sold to the highest quote to discerning bidders). A reverse auction is typically organised via the Internet, where in the same market there are hundreds (and not just one) of suppliers and hundreds of wholesalers, whereby bidders anonymously bid against each other for a specific quantity of given items. Bidding takes place at a specified date and time, and continues for a specified amount of time or until no more bids are received. Producers list first their products, and then wholesalers will begin to express interest. The Netherlands invention has transformed an artistic version of market mechanism into a typical district "market" model for phase firms (subcontracting), where producers are strongly induced to cut their prices, and the market is very transparent, described by the Italian researchers (Becattini, 2003).

[6] This auction method uses a clock: the clock hand starts at a high price and drops until a buyer, by pressing a button, stops the clock to bid and accept (part of) the lot. A Dutch cauliflower grower invented the clock in the 1870s to reduce the time spent by growers at markets.

[7] The germplasm is the genetic material, especially its specific molecular and chemical constitution that compromises the inherited qualities of an organism. Germplasm banks are collections of genetic material, principally in the form of seeds, conserved in temperature and humidity conditions that enable the material to be used over long periods of time. The bank serves to keep species in a dormant state, always ready for germination whenever fresh material is needed, whether for new research studies or to obtain plants for their reintroduction into their natural habitat.

[8] This work is based on secondary data collections and face-to-face interviews to 30 local entrepreneurs (in small and large firms) in the 3 districts analysed (10 firms for district), on the basis of a qualitative questionnaire developed conjointly by the authors of this chapter and by Zoccarato. Our assistant Zoccarato conducted the interviews. In addition we have explored a long list of web pages of horticultural institutions, as explained in Belussi and Sedita (2005). Considering the theoretical framework proposed in Section 2 we have fulfilled step 1,3, and 4.

[9] Sources: information provided during interviews to Dutch horticultural firms.

[10] The term "district" is not clearly spread in The Netherlands, where they, on the contrary, frequently use the Porterian term "Dutch Horticulture cluster". Often these studies refer to a national dimension, and the term "cluster" is used to underline the synergic relations among firms and the public actors.

[11] Within national associations "plant groups" are created, which deal with specific species. They organise training activity, business trips, etc.

[12] In order to finance the high cost of plant breeding it is important that the breeders are paid for their efforts through plant breeders' rights and licences. It is now possible for breeders to claim the rights for new varieties in about thirty countries.

[13] A good example of partnership between Government and the horticulture industry is the tendency to pursue common policy goals; the Ministry of Agriculture and the associations have agreed jointly to fund research aimed at enabling growers to reduce CO2 emissions by 15% over 10 years, in line with the Dutch Government's commitments under the Kyoto Agreement. The Government has adopted a similar partnership approach to a four-year plant-breeding programme for the ornamental sector (1.5 million of investment each year). The aims are to address problems in the supply chain, shelf life resistance to pests and disease, quality improvements, and product innovation.

[14] The organisation of information on client reputation is not unique in Boskoop. To our knowledge there is something similar also in another Italian district: the footwear district of the Riviera del Brenta (Belussi, 2000).

[15] Zundert, west to Brabant, is the centre of parks and garden plants producers. Also in the North there is significant trees production. Many producers now are shifting towards the ornamental plants production. Lottum, situated in the Limburg province, is renewed for roses and grafting boxes. The latter are produces on large scale also in Gronighen, in the east part. There are then three big centres for high trees: Haaren and Oudenbosch, in North Brabant, and Opheusden, in Gheldria province. Fructiferous plants are produced in Flevoland, Limburgo, North Brabante and Zelanda. North provinces, on the cost, are famous for tulips and perennial plants. Water plant producers are more spread in the country.

[16] There are about 40 firms in the greenhouse construction business, including system suppliers and fitters of glasshouse technology. AVAG is the Dutch Association of Contractors and Fitters in Glasshouse Horticulture.

[17] The total production value of this sector amounted in 1996 to EUR 1.7 thousand million (den Hertog, 2003).

[18] The district covers five municipalities in the Pistoia province: Pistoia, Serravalle Pistoiese, Agliana, Quarrata and Montale.

[19] The fillossera (Phylloxera vastatrix, or Viteus vitifoliae) is an aphid parasite of the vines, pertaining to the family of the Phylloxeridae. Originally from North America, it reached Europe during the end of the XIX century.

[20] The district covers ten municipalities of the Padua province: Saonara, Campagna Lupia, Campolongo Maggiore, Vigonovo, Piove di Sacco, Ponte San Nicolò, Polverara, Legnaro, S.Angelo di Piove, and Strà.

[21] The fair covers about 30,000 m^2, hosting yearly more than 1,000 exhibiting firms and 35,000 visitors. Source of data is the Flormart/Miflor web-site, years 2000-2003.